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Preservice Teachers' Perceptions about the Arming of Teachers in K-12 Schools based on Their Experience in the University Campus Carry Environment

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Abstract

In the United States, many preservice teachers attend universities where the concealed carrying of handguns is permitted. Like many other university students throughout the nation, they have grown up in the era of school gun violence and are no stranger to the possibility of an active shooter event occurring at school. This study used a quantitative analysis based on Douglas and Wildavsky's (1983) Cultural Theory of Risk to examine whether preservice teachers' experience with campus carry affects their views on being armed in K-12 classrooms. A sample of preservice teachers (N = 170) were selected from a public university in Arkansas. Results suggest that regional culture has a significant impact on preservice teachers' attitudes toward the concealed carrying of handguns in universities and their support for arming teachers in K-12 schools.

Key Words: preservice teachers, arming teachers, campus carry, gun control, perceptions, concealed carry, handguns, cultural theory of risk, risk perception

Introduction

Mass school shootings have become far too common in the United States. In fact, according to the Center for Homeland Defense and Security Naval Post Graduate School, the highest incidents of an active shooter event in the K-12 environment since the 1970s was in 2018, where 116 active shooter incidents were recorded with 63 fatalities. In 2019, there were 112 active shooter incidents recorded with 28 fatalities, and, as of this writing (March 2020), there have been 30 active shooter incidents in the K-12 environment and 7 fatalities (Riedman, & O'Neill, 2019). By some estimations, as many as 187,000 American school-aged children have experienced a school shooting in 2018 alone (Cox & Rich, 2018). The numbers are sobering, and it is no wonder then why parents, students, and teachers feel unsafe at school (Cox & Rich, 2018; Ingraham, 2018; Jones & Horan, 2019; PDK International, 2018).

Yet, as staggering as these statistics are, most scholars agree that intense media coverage falsely leads the public to believe that there is an epidemic of school shootings in the United States (University of Virginia, 2015). Researchers have repeatedly concluded that school shootings are actually statistically rare events. Although not crime free, our schools and universities are indeed safe places (Birnbaum, 2013; Cornell, 2015; Harding et al., 2002; Knox, 2018; Schultz, et al., 2013; University of Virginia, 2015).

Although Arkansas law prohibits concealed handguns on the K-12 school campus, law enforcement and registered commissioned security guards are exempt from the law; thus, some K-12 schools in Arkansas have allowed school personnel to serve as commissioned security guards and carry firearms on the K-12 campus (Arkansas Act 393 of 2015). In 2018, Governor Asa Hutchinson assembled a commission to study school safety. It was the recommendation of the Commission in their final report that "no campus should ever be without an armed presence" (p. i). To clarify, the report underscores the requirements that personnel who have been appointed

to carry a concealed gun on the K-12 campus must undergo rigorous training beyond minimum requirements by completing 60 hours of instruction, plus undergo a criminal history investigation and psychological testing (Arkansas School Safety Commission, 2018).

Preservice teachers, most of whom have had little to no experience in the classroom, have not yet had to face the harsh reality of being responsible for their students' safety in the event of an active shooter; although, having grown up in the era of school gun violence, they are no stranger to the possibility of an active shooter event occurring at school (APA, 2018; Mascia, 2019). As well, many preservice teachers across the country attend universities where the concealed carrying of handguns on campus is permitted, as is the case in the present study. Thus, given the foregoing, and in light of the lack of literature addressing preservice teachers' perceptions of university and K-12 campus carry policy, the present study attempts to inquire whether preservice teachers' experience in the university campus carry setting influences how they might feel about the possibility of being armed themselves in the K-12 classroom. Therefore, the aim of this study is to investigate the relationship between preservice teachers' experience in the university campus carry setting and their perceptions of the possibility of being armed themselves in the K-12 classroom. A conceptual framework is proposed based on the Cultural Theory of Risk (Douglas & Wildavsky, 1983), which postulates that culture plays a significant role in sociopolitical attitudes and risk perceptions.

Literature Review

Although the literature covers a wide variety of issues related to this topic, this review will focus on several major themes which emerge repeatedly throughout the literature reviewed. These themes are: 1. divergent views about the proposal to arm teachers in K-12 schools; 2. pros and cons of arming teachers; 3. opinions of teachers and national educational associations; and 4. discourse about the causes of school gun violence.

1. National Discourse and Partisan Divide

Few issues have elicited such strong emotional response as the gun debate in the United States. National grief and outrage for the lack of legislative action for common sense gun reform after mass school shootings has resulted in an ever-widening cultural divide. The proposal to arm teachers in K-12 schools has both garnered support and provoked condemnation, with public opinion sharply divided along partisan lines. Almost immediately after the Marjory Stoneman Douglas High School mass shooting and President Donald Trump's subsequent call to arm teachers in 2018, many polls surfaced on social media. Two such polls were the CBS News Poll and the NBC News Poll.

To illustrate, of a random sample of 1,012 adults, the CBS News poll found that nearly 70% of Republicans and 20% of Democrats supported the arming of teachers (CBS News, 2018). Likewise, of a random sample of 2,857 adults, the NBC Poll rendered similar results with 80% of Republicans and 11% of Democrats favoring armed teachers (NBC News, 2018). Not only do these two polls demonstrate how Americans are sharply divided but are reflective of current and past research, where Republicans, especially Republican white male gun owners, are more likely to agree with policies like the proposal to allow guns in schools than their Democrat counterparts (Luca et al., 2020; Montanaro, 2018; Oliphant, 2017). Although, it is notable that a considerable number of Republicans and Democrats do agree on some gun-related policies, like background checks and preventing people with mental illnesses from purchasing firearms (Oliphant, 2017).

So, what do Arkansans think? Divergent views about allowing teachers to carry guns in Arkansas schools was likewise well defined in a 2019 poll administered by the University of Arkansas. Out of the 811 participants surveyed--35% identifying as Republicans, 23% as Democrats, and 31% as Independents--a little over half (52%) of the participants agreed with arming of teachers, while 44% disagreed. Interestingly, 40% agreed with *university* campus carry, while over half (54%) *disapproved*. A comparison of national samples reflected that 37% of Americans agreed with arming teachers, while over half (57%) disagreed (University of Arkansas, 2019).

2. Pros and Cons of Arming Teachers

While both sides of the debate about arming teachers agree that children are first priority, coming to a consensus on how to solve the problem of mass school shootings has been problematic. Wayne Lapiere, President of the National Rifle Association, responded to calls for stricter limitations on guns in the wake of the 2012 Newton, Connecticut tragedy. He, along with Asa Hutchinson, now governor of Arkansas, appealed for trained and armed security personnel to be placed in every school. Mr. Lapiere said, "They're our kids. They're our responsibility. And it's not just our duty to protect them--it's our right to protect them" (The New York Times, n.d., citing NRA, 2012, p. 6). Elements of the NRA's recommendation that armed security personnel be placed in every school were incorporated in the 2018 Federal Commission on School Safety Final Report (DeVos et al., 2018) and the 2018 Arkansas School Safety Commission's Final Report (Arkansas School Safety Commission, 2018).

Three of the strongest arguments made by proponents of armed teachers are that teachers are the first line of defense, gun-free zones are open invitations for an active shooter, and that overstating risks of mass school shootings is causing unnecessary fear (Fox & Fridel, 2018; Kopel, 2009; Webb & Levels, 2014).

Armed Teachers are the First Line of Defense: According to the FBI (2018), of the 277 active shooter events that occurred from 2000 until 2018, roughly 21% occurred in the educational environment, with 57 active shooter events occurring in K12 schools and 15 occurring at institutions of higher education. Further, the FBI (2013) has determined that of all the places where active shooter events occur, the educational environment most often results in higher injuries and deaths, for example: 32 people were killed and 17 were injured at Virginia Tech, 26 people were killed and 2 people were injured at Sandy Hook, at Northern Illinois University, 5 people were killed and 16 wounded, at Santana High School, 2 people were killed and 13 wounded, and more recently, 17 people were killed and 17 others injured in the Marjory Stoneman Douglas High School mass shooting in 2018.

From start to finish, an active shooter event is over within 5 to 10 minutes (DHS, 2008). Time truly is of the essence for help to arrive. This is especially true for rural schools, where it could take as long as 30 to 45 minutes for law enforcement to arrive on the scene in some areas of the country (Brundin, 2017). In the crucial minutes it takes for law enforcement to arrive, many lives would have been lost (FBI, 2013). Proponents for armed teachers argue that because every second counts, teachers who have been properly trained in firearms are the best line of defense (Webb & Levels, 2014). Some schools in Arkansas, for instance, have trained and armed their teachers as security officers. Some of the requirements are that they must have completed 60 hours of rigorous firearm and defense training, plus undergo a criminal history investigation and psychological testing (Arkansas School Safety Commission, 2018). It is worth mentioning, however, that according to the FBI (2013), more often school shooters are stopped by an unarmed intervention by school staff.

Gun-free Zones, an Open Invitation for a Shooter: Many proponents of armed teachers feel that gun-free zones at schools and universities leave people defenseless and are an open invitation to a would-be shooter (Debrabander, 2016; Kopel, 2009). Hsaio (2018) makes the moral argument for university campus carry and for the arming of teachers in K12 schools. Referring to gun-free zones and special places in university and K-12 campuses (as described in *District of Columbia v. Heller*; *McDonald v. City of Chicago*; and Miller, 2011), Hsaio reasons that when the government denies citizens their human right to self-defense against unjust hostility, then it has failed in its moral responsibility to protect its citizens and is therefore obligated to provide a way for citizens to protect themselves. Hsaio argues that campus carry policy is a citizen's "natural right to self-defense" and therefore, all stakeholders in the campus community who have undergone the required training should be permitted to carry a gun on campus (p. 466). Further, speaking to those who claim that guns in the classroom have a chilling effect upon their free speech (thereby impeding First Amendment rights and the Principles of Academic Freedom) (Miller, 2011), Hsaio contends that the campus community not only has the right to protect themselves from unjust harm but the right to protect themselves from being persecuted for their ideas. He says that guns in the classroom is the "guardian of free expression" (p. 470). In other words, it is Hsaio's contention that laws that deny citizens the ability to defend themselves from unjust hostility and from persecution of ideas and speech are morally unjust.

Kopel (2009) offers evidence of how arming the campus community has deterred mass school shootings in Utah. Since 1995, Utah has permitted citizens who possess the proper training and licensing to conceal carry on all school premises, including in gun-free zones in kindergarten through the university settings. He says that there has since been no incidents of mass shootings and no incidents of misuse of a firearm by a permit holder. Thus, Kopel argues that campus carry policy is an effective means of deterring mass shootings in schools.

DeMitchell (2014) refutes Kopel's assertions that concealed carry in Utah has deterred mass shootings in schools. DeMitchell says that the association Kopel makes between concealed carry and no incidents of mass shootings in schools does not infer causation, that there could be other factors that account for student's safety on campus. Further, DeMitchell argues that research does not support the notion that shooters are attracted to gun-free zones at school at all. For example, DeMitchell cites Overbert et al.,'s (2013) study that found that most mass shootings take place away from school premises. Other researchers have reached similar conclusions that most gun-related crimes usually take place in a location that has meaning to the shooter, which are usually not a school gun-free zone (DeMitchell, 2014; Everytown for Gun Safety, 2015, Fox & Fridel, 2018).

Undue Stress: Fox and Fridel (2018) assert that schools are safer than they have been since the 1990s, with the risk of death as a result of gun violence being far greater outside of school premises. Their research found that mass school shootings are statistically rare events, comprising less than 1% of deaths of children and adolescents. Fox and Fridel further assert that the heightened sense of alarm in schools, especially after active-shooter drills and lockdowns, has caused undue stress and anxiety to students and parents, as well as create a school climate not advantageous to learning. They and other researchers, like Cox and Rich (2018), further assert that the contagion effect perpetuated by extensive media coverage has not only caused copy-cat occurrences but has caused schools to take unnecessary and costly security-related measures. Lastly, Fox and Fridel caution that when society regards school shootings as the "new normal," that mass school shootings then become a self-fulfilling prophecy.

Many teachers hold negative views about being armed in the classroom (Brenan, 2018, NEA, 2018). One of the main objections to arming teachers is that the mere presence or knowledge of a firearm in classroom or on the school campus is not conducive to the school's mission of fostering a safe learning environment (Minchew, 2018). Minchew cites the lack of empirical research on whether arming teachers is an effective means to deterring school mass shootings. She and other scholars, like Cabrera and Kown (2018), Kramer (2000), and Kown and Cabrera (2019), believe that framing the arming of teachers in schools as the solution does not truly address the underlying real problem of mass school shootings in the United States. She further proposes that many questions should be examined about how arming teachers impacts the school climate, how arming teachers impacts people of color, how security measures make students feel, whether or not teachers really want to be armed, and lastly, Minchew asks whether there is any evidence that students actually feel safer knowing that their teacher is armed.

School Climate and the Weapons Effect: Minchew (2018), Yacek (2018), and Buck et al. (2013) relate the impact of the arming of teachers to a well-known concept in social psychology known as the “weapons effect” (Anderson et al., 1998; Berkowitz & LaPage, 1967). The weapons effect, in essence, means that the mere knowledge of a gun (in the classroom) causes feelings of uneasiness and aggression. Negative outcomes experienced by students are manifested by a palpable sense of imminent fear and the feeling that they are viewed as criminals by their teachers. These were the feelings of student activist Edna Chavez after a shooting at her school. She said, “Arming teachers will not work. More security in our schools does not work. Zero tolerance police do not work. They make us feel like criminals. We should feel supported and empowered in our schools” (Minchew, 2018, p. 132).

Implicit Bias: Delgado (2020) addresses how the presence of armed personnel and teachers in schools has compounded the school-to-prison pipeline for students of color. He says that the very idea of teachers “packing” sends “chills” into communities of color (p. 107). Minchew (2018) and Marchbanks et al. (2018) concur with Delgado’s assessment, pointing out that implicit bias negatively impacts African American students, as they disproportionately experience harsher disciplinary action than white students (U.S. Department of Education Office of Civil Rights, 2014).

Implicit bias can also be directed toward teachers of color. Payne (2006) explains how the concept of weapons bias unjustly profiles people of color. He explains that when snap-judgment circumstances arise involving firearms, people (law enforcement, for instance) automatically assume a person of color is the perpetrator. Payne cites several studies, including Greenwald et al. (2002) and Correll et al. (2002), where biased assumptions were made by *both* African American and European American participants, when under snap-judgment (computer simulation) circumstances, all the participants shot a person of color, rather than a white person, even when the participants did not hold racist perspectives. It is no wonder then why educators of color have serious concerns about being armed in the classroom.

Do teachers really want to be armed? Tish Jennings, professor of education at the University of Virginia, has researched extensively about social and emotional dynamics in classroom and the effects of stress on teachers. She says that K-12 teacher stress levels are already at an “all-time high” due to a number of factors, like student behavioral problems, demands of parents, unsupportive administrators, long hours, and being underpaid. She explains that stress is contagious and can negatively impact teacher-student communication, as well as interfere with brain function that facilitates learning. Additionally, Dr. Jennings says that stress can harm the relationship between the student and the teacher, resulting in misinterpreted behaviors, overreacting, and unfair disciplinary measures. She says that not only is the presence of guns in schools dangerous, but the added responsibility of being armed in the classroom negatively impacts the profession. Consequently, experienced teachers are reaching the burnout point and leaving the teaching profession, while fewer young people are entering the teaching profession (Kelly, 2018).

3. Opinions of Teachers and National Teacher Organizations

Among teachers throughout the nation, the partisan divide surrounding controversial topics that effect education is as profound (Education Week Research Center, 2017). Many of the national educational polls in 2018 reflect that most teachers throughout the nation oppose the arming of teachers in the K-12 environment (Brenan, 2018; NEA, 2018; PDK International, 2018).

Teachers in the United States are now asked to prepare for the possibility of an armed intruder and respond with deadly force (Rappaport & Barnett, 2009). While some teachers feel that having a concealed weapon would be effective in catching an active shooter off guard, other teachers have expressed fears of children being caught in the crossfire or having to shoot one of their own students (Wu & Desroches, 2018). No doubt, the new reality of mass school shootings has changed what it means to be a teacher (Wender & DeMille, 2019).

Wender and DeMille's (2019) case study of one preservice teacher's journal reflection shortly after the Marjory Stoneman Douglas High School shooting highlighted how the new reality of school mass shootings shaped her perception of what it means to be a teacher. Wender and DeMille bring to light the role of experienced teachers and teacher educators in helping preservice teachers harness and redirect negative emotions associated with participating in active shooter drills and lockdowns into positive emotional practices.

Hara (2020) recognized that while teachers and administrators are actively engaged in the process of policy making relative to safety measures related to school shootings, the opinions and concerns of preservice teachers were not included. Hara's qualitative analysis described how preservice teachers perceived school gun violence safety policies in elementary and secondary schools in Massachusetts. She found that preservice teachers in her study were very concerned about the threat of an active shooter on their school campus, yet strongly opposed the proposal to arm teachers as being contrary to their values as educators. Further, the preservice teachers in Hara's study felt that existing security measures were ineffective and negatively impacted their teaching practices and relationships with students. They felt their status as student teachers precluded them from being active participants in discussions and planning meetings about school shootings. Overall, the pre-service teachers in Hara's study, and in Wender and DeMille's study cited above, perceived school shooting policies as "unsettling but ultimately an unchangeable reality of teaching" (Hara, 2020, p. 14).

While the vast majority of teachers in the United States are unsupportive of legislation that would allow teachers to carry firearms on the school campus (Brenan, 2018; NEA, 2018), teacher opinions vary from region to region. For example, Olive's (2019) investigation of 212 teachers in Central Florida found that most teachers opposed armed teachers in the classroom but were more supportive of the presence of school resource officers (attached to sheriff's departments or local law enforcement), safer school structures, and preventative safety measures, like anti-bullying programs, emergency preparedness drills, relationship building between students, administrators, teachers, and the greater community, as well as mental and behavioral health services. Teachers surveyed in Olive's study generally felt safe on the school campus and were more concerned about student behavior, rather than the possibility of an active shooter event occurring.

In contrast to Olive's (2019) study above, Winston's (2011) qualitative study explored the perceptions of 51 high school teachers from two public school districts, one in Texas and the other in Alabama. Winston found that while most of the teachers in his study felt safe on their school campus, they were not opposed to the arming of teachers, provided they received the proper training and background checks.

4. Causation

Much of the debate about school gun violence centers around causal factors. While most scholars agree that access to guns is the primary cause of mass school shootings (Ahonen et al., 2019; Lu & Temple, 2019; McGinty et al., 2014), current and past administrations have

distanced themselves from pointing to access to firearms as a primary cause of school gun violence and instead have focused on other issues, like mental health, the role of the media, and video games (Gruskin, 2014). Other researchers suggest that environmental and socioeconomic factors are the main drivers of school gun violence (Cabrera & Kwon, 2018; Kramer, 2000; Kwon & Cabrera, 2019).

The Media's Role in Generalized Imitation Behavior (Contagion Effect): No doubt, how public and school mass shootings are framed by the media influences public opinion and policy responses, with gun control, mental health, cyber bullying, and violent media emerging as important issues. Moreover, the manner in which public mass shootings have been reported in the media, according to Schildkraut et al. (2019) and Burns and Crawford (1999), can result in issue salience, moral panic, fear, the dissemination of myths, and unfeasible calls for action.

Imitation Behavior: Meindl and Ivy (2017) discuss how intense media coverage of public mass shootings contributes to generalized imitation behavior in some individuals, particularly for individuals who may be experiencing a mental health crisis. Further, Towers et al. (2015) also found evidence of a contagion effect perpetuated by increased media coverage after a public mass shooting. Their study concluded that after a public mass shooting, there is an increased likelihood that a similar event will happen within a two-week timeframe, and after a school mass shooting, the increased likelihood of a repeated event will happen within a month. Other findings of their study suggest that the prevalence of firearm ownership and the strength of gun control legislation were significantly correlated to public and school mass shootings. Finally, Towers et al. also found that there was not a significant relationship between mental illness and public or school mass shootings.

Researchers Lin et al. (2018) examined 30 years of mass shootings data and found that not only were incidents of mass shootings in the United States increasing, but there was also a strong correlation between successive shootings and online search interest. Raintanen's (2018) ethnographic fieldwork investigated the global online subculture rooted in their fascination with mass school shootings. Participants in this global online subculture, comprised of researchers, fan girls, Columbiners, and copycats, were deeply influenced by media coverage of mass school shootings.

Accessibility to Firearms, Not Mental Illness: Media sources and policymakers often highlight mental health as the cause of school mass shootings, but most experts agree that accessibility to firearms and dangerous behaviors are the key contributing factors and not people with mental health diagnoses (Ahonen et al., 2019; Lu & Temple, 2019; McGinty et al., 2014). In fact, current research affirms that people with serious mental illness are more likely to be victims of violent acts and not the perpetrators (McGinty, et al., 2014; Stuart, 2003). Further, researchers point out that the narrative linking mental health to mass shootings is not supported by empirical evidence and wrongly stigmatizes people with mental illness (Lu & Temple, 2019; McGinty et al., 2014).

Video Games: Media sources and politicians often place the blame of mass school shootings on mental illness and violent video games (Villanova University, 2019). Since the 1990s, professional medical associations have issued a number of policy statements about the

negative impacts of prolonged violent media exposure on the psychological wellbeing of children and young adults (Elson, et al., 2019). It is their position that the normalization and glamorization of violence in media has led to an increase of violent behaviors, like aggression, anti-social behaviors, nightmares, depression, and the use of violence as a means of problem solving and the realization of goals (American Academy of Pediatrics, 2001, 2009). Yet recently many scholars have voiced their concerns that the American Academy of Pediatrics' policy statements contained a number of methodological errors, like exaggerated findings, unreported conflicting evidence, inconsistencies in methodologies, and unreported limitations of their findings (Elson, et al., 2019; Ferguson et al., 2011). Moreover, more recently, a growing number of researchers, including the American Psychological Association (2019), suggest there is insufficient evidence to support claims that violent video games predispose violent behaviors (APA, 2019; Ferguson et al., 2011; Markey, et al., 2019; The Amplifier Magazine, 2016).

Another aspect to blaming violent video games as a cause of school gun violence was observed in a recent study by Markey et al. (2019). They found that people were more likely to blame violent video games as a causal factor in mass school shootings when the perpetrator did not fit the preconceived image of a person who commits violent acts; in other words, supporting the stereotype that persons of color are associated with crime. Markey et al.'s findings mirror Payne's (2006) weapons bias study, described above.

Environmental Factors: While most researchers who study mental health issues in relation to school mass shootings focus on the individual characteristics of the shooter, other researchers have examined how environmental factors might affect a student's mental wellbeing and vulnerability to committing acts of gun violence at school. Researchers Fridel (2019) and Baird et al. (2017) found that smaller schools are less likely to experience school gun violence than schools with higher enrollments due to a variety of reasons, like inadequate student-to-teacher ratios, student transitions, and lack of student support. Further, Baird et al. pointed out that students with preexisting mental health conditions who move from a small school to a larger school may be more vulnerable to committing acts of gun violence at school.

Socioeconomic Factors: Relatively few studies have considered the socio-economic factors in the context of mass shootings. Researchers Cabrera and Kwon (2018) compared high income counties to low income counties to examine the interaction of inequality and income on mass shootings in the United States. They concluded that populations with high income levels and wide disparities of equality (New York and San Francisco, for instance) are most vulnerable to incidents of mass school shootings.

Finally, drawing on the works of scholars, like Merton (1968), Agnew (1992), and Elgar et al. (2013), Cabrera and Kwon (2018) explain how feelings of frustration and aggression in youth living in communities with high levels of inequality and deprivation are often manifested as school bullying and other acts of violence (like mass shootings). In a follow-up study, Kwon and Cabrera (2019) reaffirmed a strong relationship between income inequality and mass shootings, which led them to conclude that socio-economic factors are the main drivers of mass shootings in the United States. These findings are further supported by other researchers, like Newman et al. (2008) and Kramer (2000), who argue that socio-economic forces (e.g., poverty, inequality, social marginalization, and the inability of families, community, and schools to identify problematic behaviors and provide support) are key contributing factors in youth violence and rampage school shootings.

Purpose of the Study

Given the foregoing, and in light of the lack of literature addressing preservice teachers' perceptions of university and K-12 campus carry policy, the purpose of this study was to investigate whether preservice teachers' experience in the university campus carry environment influences their perception about the arming of teachers in K-12 schools in Arkansas.

Research Questions

Based on prior research and grounded in the Cultural theory of Risk (Douglas & Wildavsky, 1983), the current study is driven by the following questions:

1. Is there an association between preservice teachers' support for university campus carry policy and their support for the arming of teachers in the K-12 environment?
2. What factors predict preservice teachers' support for the arming of teachers in the K-12 environment?
3. What factors predict preservice teachers' feelings that they would just feel safer if they were allowed to carry a gun on the K-12 campus?

Research Framework

The present study proposes a conceptual framework based on Mary Douglas's Cultural Theory of Risk (Douglas & Wildavsky, 1983). The model includes the dependent variable, support for campus carry policy, and the following independent variables: (1) demographic factors (*i.e.*, age, gender, ethnicity/race, experience in the classroom, undergraduate or graduate student); (2) perception of risk (*i.e.*, feelings of safety); and (3) sociopolitical attitudes or worldview (*i.e.*, cultural perspectives, political affiliation, support of gun control).

Mary Douglas's Cultural Theory of Risk postulates that culture--meaning values, beliefs, and worldviews--influences perceptions of risk. The Cultural Theory of Risk further suggests that a person's worldview is influenced by peer groups, institutions, or other authorities to which that person feels bonded (Douglas & Wildavsky, 1983). Many scholars have used this theory to explain why different groups perceive risks about controversial topics so differently, for instance, climate change or gun control (Douglas & Wildavsky, 1983; Finucane, et al., 2000; Kahan, 2003; Kahan & Braman, 2003; Tansey & O'Riordan, 1999).

Methodology

Research Design

This study employed a within-subject design with one dependent variable: preservice teachers' support for the arming of teachers in the K-12 environment. The independent variables were: (1) demographic factors (*e.g.*, age, gender, ethnicity/race, experience in the classroom, undergraduate or graduate student); (2) perceptions of risk (*e.g.*, feelings of safety); (3) support campus carry policy; (4) sociopolitical attitudes or worldview (*e.g.*, cultural perspectives, political affiliation, support of gun control); (5) desire to obtain a license permitting the concealed carry of handguns on campus; and (6) perceptions of impact of campus carry policy in the classroom.

Data were collected by using a web-link survey (see Appendix A). The research employed quantitative analysis methods using correlation, Analysis of Variance (ANOVA), and multiple regression analysis using Statistical Package for the Social Sciences (SPSS).

Participants

The research employed a convenience sampling to select participants. This study included 170 preservice teachers enrolled in the 2020 spring semester. All participants were fluent in English, with 128 females and 37 males. The average age of the participants was 21-29, with 85.9% identifying as White. A summary of the demographic descriptive statistics is summarized in Table 1.

Table 1

Demographic descriptive statistics summarizing teacher experience, age, gender, and ethnicity/race

Experience	Age			Gender			Ethnicity/Race				
Preservice	69.6	18-	4	25.3			21.		14	85.9	
e	120	0%	20	3	%	Male	37	8%	White	6	%
			21-	7	44.7		12	75.			
Inservice	50	0%	29	6	%	Female	8	3%	Latinx	6	3.5%
			31-	3	18.8				Black/African		
			40	2	%	LBGTQ	1	.6%	American	5	2.9%
									Native		
			>	1	11.2	No		2.4	American/Alaska		
			41	9	0%	Answer	4	%	Native	2	4.5%
									Asian	1	1.2%
									Multiracial	4	2.4%
									Multiracial	6	3.5%

Note: Total participants were 170.

Instruments

The instrumentation included a survey that asked questions about demographics, support for university and K-12 campus carry policy, perceptions of risk, sociopolitical attitudes, desire to obtain a license permitting the concealed carry of handguns on campus, and the impact of campus carry policy in the classroom.

The demographic portion of the survey consisted of nine categorical-type items to collect information about the participants' background, such as the number of years of experience in the classroom, grade level taught or would like to teach in the future, as well as other demographic factors, such as age, gender, and ethnicity.

The portion of the survey relating to participants' support for university and K-12 campus carry policy consisted of 8 items. The portion of the survey relating to perceptions of risk consisted of 11 items. The portion of the survey relating to sociopolitical attitudes consisted of 4 items. The portion of the survey relating to participants' desire to obtain a concealed carry license consisted of 3 items, and the portion of the survey relating to the impact of concealed carry policy in the classroom consisted of 3 items. A 5-point Likert scale was applied for all questions, except for questions relating to demographics. The survey is attached as Appendix A.

An example of the survey item relating to support for university and K-12 campus carry policy, participants were asked, “What do you think about concealed carry of handguns on university campuses?” and “What do you think about the proposal to arm teachers in K-12 schools?” Participants had the choice to choose from a 5-point Likert scale (1 strongly disagree to 5 strongly agree).

An example of the survey item relating to perceptions of risk, participants were asked, “In your opinion (whether or not you are physically on the university campus or in the school where you teach or will be teaching): Do you generally feel safe?” Participants had the choice to choose from a 5-point Likert scale (1 strongly disagree to 5 strongly agree).

Procedure

After recruiting participants, preservice teachers were given a web-link to the survey and consent form. The recruitment script and consent form were included in the preface of the survey. The data was then collected and analyzed using SPSS software.

Results

Prior to the main analyses, data were screened for systematic patterns of missing data (*e.g.*, when no value was stored for the variable within variable sets) and found that the missing values were found to be scattered evenly across variables and groups with a small number of cases and no apparent patterns or clusters emerging.

Factor Analysis

Initially, the factorability of the 29-item was examined. Several well-recognized criteria for the factorability of a correlation were used. First, it was observed that all items correlated at least .3, with at least one other item, suggesting reasonable factorability. Second, the Kaiser-Meyer-Olkin measure of sampling adequacy was .883, above the commonly recommended value of .6, and Bartlett’s test of sphericity was significant (Approx. Chi-Square = 2320.752, $p < .001$) (see Table 2). The diagonals of the anti-image correlation matrix were also all over .5. Finally, the communalities were all above .3, further confirming that each item shared some common variance with other items. Given these overall indicators, factor analysis was deemed to be suitable with all 29 items.

Table 2

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.883
Bartlett's Test of Sphericity	Approx. Chi-Square	2320.752
	df	406
	Sig.	.000

Note: Significant at the $p < .001$ level

Principal components analysis was used because the primary purpose was to identify and compute composite scores for the factors underlying the 29-item survey. Initial eigen values indicated that the first three factors explained 47% of the variance collectively. For the final stage, a principal component factor analysis of the 29-item using varimax and oblimin rotations was conducted, with three factors explaining 47% of the variance. A varimax rotation provided the best-defined factor structure. All items in this analysis had primary loadings over .5. Internal

consistency for each of the scales was examined using Cronbach’s alpha. The alphas were large: .963 for worldview (15 items), .869 for risk perception (5 items) and .863 for policy issues (5 items) (see Table 3).

Table 3
Reliability Statistics Table

Factor	Cronbach’s Alpha	No. of Items
Worldview	.963	15
Risk Perception	.869	5
Policy Issues	.863	5

Note: *Correlation Cronbach’s Alpha is large.*

Examining the varimax rotation revealed that there were large and positive correlations between each of the composite scores: .43 between worldview and policy issues; .25 risk perception and policy issues; and .43 risk perception and worldview, at $p < .001$. Overall, these analyses indicated that three distinct factors were underlying the survey items and that these factors were strongly internally consistent. Four of the 29 items were eliminated. An approximately normal distribution was evident for the composite score data in the current study; thus, the data were well suited for non-parametric statistical analyses.

Research Question 1: Is there an association between preservice teachers’ support for university campus carry policy and their support for the arming of teachers in the K-12 environment?

To answer this question, the investigator conducted a Goodman and Kruskal's gamma analysis to determine the association between preservice teachers’ support for university campus carry policy and their support for campus carry in the K-12 environment. There was a strong, positive correlation between support for university campus carry policy and support for the arming of teachers in K-12 schools, which was statistically significant ($G = .584, p < .001$). The effect size of this association was strong (Cohen, 1988). The Goodman and Kruskal’s gamma association is summarized in Tables 4 and 5.

Table 4
Crosstabulation

		What do you think about the proposal to arm teachers in K-12 schools?					Total
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
What do you think about the concealed carry of handguns on university campuses?	Strongly Disagree	17	0	2	4	3	26
	Disagree	6	4	6	1	2	19
	Neutral	5	7	19	12	9	52
	Agree	4	3	10	16	11	44
	Strongly Agree	0	1	1	5	22	29
Total		32	15	38	38	47	170

Table 5*Symmetric Measures*

The Goodman and Kruskal's gamma correlation summary of the association between university campus carry and support for arming teachers in K-12 schools.

		Value	Asymptotic Standardized Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal	Gamma	.584	.066	8.110	.000
N of Valid Cases		170			

Research Question 2: What factors predict preservice teachers' support for the arming of teachers in the K-12 environment?

Multiple Regression Assumptions: The regression descriptive statistics output was checked for multicollinearity assumption between predictor variables and found that correlations between variables were less than 0.7, and therefore none of the included predictors has multicollinearity. Further, all predictor variables correlate with the outcome variable (support for the arming of teachers in K-12 schools) at a value greater than 0.3. The linear relationship between the independent variables and the dependent variable was checked through the probability plot, and it was found that all points followed a straight line. Then the scatter plot was checked, and it was found that the regression standardized residual on the y-axis and the regression standardized predicted value on the x-axis was within negative 3 to 3.

Next, the residuals statistics were checked through standard residual, and it was found that the minimum of standard residual was -2.88, and the maximum was 5.45. Finally, the Cooks Distance was checked, and it was found that the minimum was .000, the maximum .19 and less than 1. ANOVA table showed that there was a statistical significance, and therefore we reject the null hypothesis that the regression slope is 0. The researchers used the R-square (this research has adequate sample size) and the dependent variable (support for arming teachers) = .000 (Kolmogorov-Smirnova).

The researcher conducted multiple regression analysis to identify the unique variance predicted by the independent variables.

Multiple Regression analysis: Multiple linear regression analysis was conducted to develop a model predicting preservice teachers' support for the arming of teachers in K-12 schools. The predictor model was able to account for 76% of the variance in the dependent variable and was statistically significant at $p < .001$. Individual predictors were examined further, and the result indicated that the independent variable (Just Feel Safer if Could Carry Gun in School) was found to be a significant predictor of preservice teachers' support for the arming of teachers in K-12 schools ($t = 16.394$, $p = .000$). Basic descriptive statistics and regression coefficients are summarized in Table 6 and 7.

Table 6

Model Summary: Multiple Regression analysis. a. Predictors: (Constant), Attitude UCC, Plan ECCL, Just Feel Safer if Could Carry Gun in School, Possibility ASE, Feel Safe on Campus

Mode	R	Adjusted R Square	Std. Error	Change Statistics					
				R Square	F	df1	df2	Sig. F	
1	R	Square	Square						

				of the Estimate	Change	Change			Change
1	.874 ^a	.763	.756	.713	.763	105.794	5	164	.000

Note: $p < .001$

Table 7

Unstandardized coefficients, standardized coefficients and significance of all independent variables included in the model.

Model (Constant)	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Zero-order	Partial	Part Tolerance	VIF	
	.385	.310		1.241	.216					
Attitude UCC	-.114	.062	-.101	1.850	.066	.551	-.143	.07	.484	2.066
Plan ECCL	.080	.047	.084	1.718	.088	.529	.133	.065	.609	1.641
Just Feel Safer if Could Carry Gun in School	.955	.058	.884	16.394	.000	.867	.78	.623	.496	2.015
Possibility ASE Feel Safe on Campus	.056	.058	.037	.975	.331	.020	.076	.037	.985	1.015
	-.076	.046	-.063	-1.634	.104	-.129	-.127	-.062	.981	1.019

Note: $p < .001$

Research Question 3: What factors predict preservice teachers' feelings that they would feel safer if they were allowed to carry a gun on the K-12 campus?

The researcher conducted multiple regression analysis to identify the unique variance predicted by the independent variables. The preliminary analysis to check for the multiple regression analysis assumptions was conducted and found that all the assumptions were met.

Multiple Regression analysis: Multiple linear regression analysis was conducted to develop a model predicting preservice teachers' feelings that they would feel safer if they were allowed to carry a gun at school. The predictor model was able to account for 38% of the variance in the dependent variable and was statistically significant at $p < .001$. Individual predictors were examined further, and the result indicated that the independent variables (Political Affiliation, Gun Ownership, Stricter Gun Laws) were found to be significant predictors of preservice teachers' feelings that they would feel safer if they were allowed to carry a gun at school ($t = 5.755$, $p = .000$; $t = 2.870$, $p = .005$; $t = 4.114$, $p = .000$, respectively). Basic descriptive statistics and regression coefficients are summarized in Tables 8 and 9.

Table 8

Model Summary: Multiple Regression analysis. a. Predictors: (Constant), Political Affiliation, Gun Owner, Stricter Gun Laws

Mode	R	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
				R Square Change	F Change	df1	df2	Sig. F Change	
1	.614 ^a	.377	1.068	.377	33.397	3	165	.000	

Note: $p < .001$

Table 9

Unstandardized coefficients, standardized coefficients and significance of all independent variables included in the model.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Zero-order	Partial	Part Tolerance	VIF	
(Constant)	.273	.342		.796	.427					
Political Affiliation	.415	.072	.379	5.755	.000	.498	.409	.354	.870	1.149
Gun Owner	.493	.172	.184	2.870	.005	.302	.218	.176	.916	1.091
Stricter Gun Laws	.294	.071	.284	4.114	.000	.471	.305	.253	.805	1.242

Note: $p < .001$

Discussion, Scientific Importance, and Conclusion

Like many other university students throughout the nation, the preservice teachers in the present study have grown up in the era of school gun violence and are no stranger to the possibility of an active shooter event occurring at school (APA, 2018; Mascia, 2019). As well, many preservice teachers across the country attend universities where the concealed carrying of handguns on campus is permitted, as is the case in the present study. So how then do preservice teachers perceive the possibility that they themselves may be asked to respond with deadly force to an armed intruder? Teacher educators are consequently faced with the task of preparing preservice teachers for the harsh reality of being responsible for their students’ safety in the school gun violence era. Thus, given the foregoing, and in light of the lack of literature addressing preservice teachers’ feelings about the possibility of being armed in the classroom, the present study attempted to inquire whether preservice teachers’ experience in the university campus carry environment influences how they might feel about the possibility of being armed themselves in the K-12 classroom.

The first finding indicated that there was a strong positive association between support for university campus carry policy and support for the arming of teachers in K-12 schools, which was statistically significant ($G = .584, p < .001$); although there was no significant difference in attitudes about the arming of teachers based on demographic factors like gender, age, or level of experience in the classroom. To put it in context, roughly 68% of the preservice teachers in this study had no experience in the classroom, and roughly 30% had from 2 to over 10 years’ experience; yet, despite these differences, most of the preservice teachers favored arming teachers (50% agreed, 22% felt neutral, and 28% disagreed). This finding is notable because

most researchers have found that students are usually more favorable of campus carry policy than faculty (teachers). Such is the case in McMahon-Howard et al.'s (2018) study at a university in Georgia, where 57% of students indicated their approval of campus carry policy, in contrast to only 19% of faculty and administrators. Likewise, at East Tennessee State University, Bishop's (2019) findings were very similar, where 60% of students favored campus carry, as opposed to 39% of faculty and staff.

While most polls reveal that teachers throughout the nation are not comfortable being armed in the classroom (Brenan, 2018; NEA, 2018), attitudes vary throughout different regions in the country. Another reason why this finding is notable is because both universities are located in the South, where guns are generally positively viewed. To compare the preservice teachers in the present study with the rest of the population in Arkansas, a 2019 poll administered by the University of Arkansas revealed that, out of the 811 participants surveyed, a little over half (52%) of the participants agreed with arming of teachers, while 44% disagreed (University of Arkansas 2019). In the present study, 51% of preservice teachers agreed with arming teachers, 22% felt neutral, and 28% disagreed. To compare the preservice teachers' perception of arming teachers with the rest of the nation, a March 2018 Gallup poll surveyed 497 teachers throughout the country and found that the vast majority of teachers, nearly 75%, opposed guns in schools. This finding, along with the above statistics, demonstrate how regional culture plays a significant role in perceptions of risk (Douglas & Wildavsky, 1983).

The second finding of this study revealed that the independent variable, preservice teachers' *desire to have a gun at school*, was a significant predictor, accounting for 79% of the variation in the dependent variable, *support for arming teachers in K-12*. The model was statistically significant at $p < .001$. The investigator considered whether safety concerns might be the reason why preservice teachers felt safer if they were allowed to carry a gun to school, or whether there might be another reason. Safety factors, however, like the possibility of an active shooter event occurring on campus, general feelings of safety on the school campus, and other crime-related variables, did not produce a significant model.

One possible explanation for preservice teachers' feelings that they would feel safer if they were allowed to carry a gun at school is that most of the preservice teachers in this study are female (75%), and prior research affirms that females perceive risk more than males (Douglas & Wildavsky, 1983; Finucane, et al., 2000; Kahan, 2003; Kahan & Braman, 2003; Kahan et al., 2007). Although most of the preservice teachers indicated that they felt safe on the school or university campus (55% felt safe, 22% felt neutral, and 23% did not feel safe), it is possible that even though they felt safe, being women, they might just feel vulnerable generally (Archer, 2019; Biastro et al., 2017; White, 2019). It is also possible that since most of the preservice teachers in the current study are female, that there may be gender-specific explanations regarding their attitudes about guns generally (Lizotte, 2019).

In the case of more experienced teachers who are juggling a myriad of responsibilities in the classroom, it is possible that their perceptions of safety might be influenced or even distorted by work-related stress factors, like disciplinary problems with students, demanding parents, unsupportive administrators, *etc.* (Kelly, 2018). In other words, teachers might be experiencing fearfulness without any observable signs of threat (Brosschot, et al., 2018; Brosschot, 2017; Carleton, 2016).

The third result revealed that preservice teachers' feelings that they would feel safer if they were allowed to have a gun on the K-12 campus was strongly influenced by their worldview. Another multiple linear regression analysis was conducted to develop a model that

would predict preservice teachers' *feelings that they would feel safer if they were allowed to have a gun on the K-12 campus*. The resultant predictor model was statistically significant at $p < .001$. The independent variables, *political affiliation*, *gun ownership*, and *attitudes about gun laws*, were significant predictors, accounting for 38% of the variation in the dependent variable. To assess the strength of association between the variables, the researcher conducted a Cramer's V measure of association between the dependent variable *preservice teachers' feelings that they would feel safer if allowed to have gun at school* and the independent variables, *political affiliation*, *gun ownership*, and *attitudes about gun laws*. The result of the analysis shows that there was a strong association between all the variables. Collectively, these findings are consistent with prior research that suggests that worldviews define perceptions of risk, in this case, preservice teachers' feelings that they would feel safer if they were allowed to carry a gun at school (Douglas & Wildavsky, 1983).

So, there was no association between safety concerns and support of armed teachers, but there was, however, a strong association between preservice teachers' worldviews and their perceived need to have a gun at school. One explanation of can be attributed to the Identity-Protective Cognition Thesis, which explains that individuals (even scholars), may be motivated to actively seek out empirical evidence and draw conclusions that *conform to their particular cultural group's position*. The consequence of this kind of motivated reasoning is that scientific facts, which citizens and policymakers rely upon to make informed decisions about their safety and wellbeing, then become "symbols of membership in and loyalty to affinity groups" (Kahan, 2013, p. 14).

In summary, the present study found that there was a strong positive association between preservice teachers' experience in the university campus carry environment and their attitudes about the arming of teachers in K-12 schools. Fifty percent of the preservice teachers in this study did not object to the policy of arming teachers. Demographic factors, like age, gender, level of experience in the classroom, did not appear to influence their attitudes about arming teachers. Safety factors, like the possibility of an active shooter event occurring on campus, general feelings of safety on the school campus, and perceptions of crime generally, also did not appear to contribute to their support for the arming of teachers. The main factor that contributed to preservice teachers' support for arming teachers was their feeling that they would feel safer if they were allowed to have a gun at school. Lastly, preservice teachers' worldview was a strong predictor of their feelings that they would feel safer if they could carry a gun on the K12 campus. Collectively, these findings are consistent with Mary Douglas's Cultural Theory of Risk, which suggests that culture defines perceptions of risk. In this study, preservice teachers' perceptions of risk were reflective of regional culture, in particular the gun culture in the South, where guns are positively viewed. Additionally, some of the findings were contrary to national norms, like gendered perceptions of safety and overall national opinions of teachers opposing the arming of teachers in K-12 schools.

The findings of this study cannot be generalized due to the small sample, which is not representative of the university's population. A larger university-wide study, perhaps in collaboration with other universities, is recommended.

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Building Student Engagement and Sense of Belonging: Small-Group Discussions in the Online Learning Environment

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Abstract

This study explores the use of learner-to-learner interactions in the online learning environment. The study utilizes small group discussions and activities during synchronous seminars in the online course environment. Through a survey design, participants' perceptions are measured to determine their experiences and the impact of the small group experience on the participants' engagement and sense of belonging. The study determined that the use of small-group discussions indicates a positive experience related to student engagement and a sense of belonging for students. Further, the majority of participants found the collaborative opportunity to be a quality experience for engaging with peers in the discussions and activities while developing a sense of belonging in the online learning environment. As such, the results of this study find that learner-to-learner interactions in the online learning environment through small group activities in synchronous seminars have a positive impact on student engagement and sense of belonging.

Keywords: Student Engagement, Sense of Belonging, Online Learning Environment, Distant Learning, Collaborative Learning

Introduction

Social interaction in the learning environment is a key component necessary to constructing knowledge. Further, students are more engaged in the learning experience when participating in social interaction. Students also express more satisfaction and sense of belonging with the learning experience includes social interaction (Harley et al., 2018; Thomas, Herbert, & Teras, 2014). This study aims to incorporate social interaction through the use of open-ended questions and conversations in small-group discussions in the online classroom. This study seeks to explore the use of small-group discussions during synchronous seminars to improve student engagement and sense of belonging in the online learning environment.

Review of Literature

Higher education has experienced major changes and shifts over the last few decades as a result of the pandemic, enrollment declines, and overall changes in learner demographics (Conceição et al., 2020). Online learning, which is commonly referred to as distance learning, e-learning, or remote learning has continued to evolve as internet access has continued to increase. In order to address these changing educational demands and the need for flexibility in education, the prevalence and popularity of online instruction has increased (Conceição et al., 2020). Online instruction has increased as traditional enrollment on college campuses has experienced a decline primarily based on the flexibility online courses offer to working students. Online instruction continues to increase because it allows for flexibility in location in which students are not required to relocate in order to enroll in the university or college (Seaman et al., 2018). At the current rate, almost one-third of college students take at least one course online and at least half of the students in higher education are enrolled in an exclusive online program

(Baum, 2019). Many online programs allow students from across the world and from different backgrounds to enroll, therefore, lack of proximity can be an ongoing issue. Due to the demand and increase in online instruction, adjustments have been made in order to engage and retain the online learner. Roles of both instructors and students have been redefined over the past decades as it relates to the online classroom (Martin et al., 2020).

Online Learning Challenges

Although many higher education students were born into a generation that is immersed in technology and many are considered highly mobile digital learners by nature, this does not necessarily mean that technology creates the best learning environment for all students (Gutiérrez-Portlán et al., 2018). Learners continue to differ in personality, learning style, background, and ability to communicate regardless of the modality and delivery of the course. As online instruction takes place, a consistent focus on equity and inclusion must be taken into consideration. Online courses must continue to meet the needs of diverse learners. Creating and facilitating instruction continues to include taking into account diverse learning styles such as kinesthetic, auditory, and visual learners (Newton & Miah, 2017). Students can particularly struggle to be engaged in the online learning environment and struggle with the lack of accountability some platforms offer. As the need for online instruction can potentially create difficulties for engaging students in intentional conversations around content, it is especially important to consider both the design and delivery methods in order to engage the learner in meaningful collaboration (Baum, 2019). Lack of direct access to the instructor or various on campus resources can also pose a problem. The overall experience of learners, student learning styles, and quality of instruction are also considered in both the development of online courses and facilitating online instruction (Conceição et al., 2020). According to Chen (2017), learning engagement in the classroom through various modalities has a direct impact on learning performance when evaluating students. Engaging the learner through online course instruction must consider engagement in various forms through the lens of interaction, collaboration, community, involvement, attendance, and participation (Martin et al., 2020).

Types of Interaction

Three common types of interaction in the classroom regardless of the modality include interaction between learner-content, learner-instructor, and learner-learner. Each interaction is uniquely important and can complement one another when intentionally assimilated into the classroom environment (Conveicao et al., 2020). Learner-instructor interaction can be described as engaging the student in order to motivate or engage the learner through guided questions or prompts by means of an instructor or facilitator (Hartnett, 2016). The purpose in creating collaborative learning in the online learning environment should be focused on increasing learner to learner engagement while creating a positive environment, promoting deeper learning, and building learner involvement (Conveicao et al., 2020). In turn, increased comprehension and retention of information should be the result. Learner-learner interactions in an online environment can include sharing information, understanding, and sharing personal insights or opinions which can in turn deepen understanding, comprehension, and retention of information (Hartnett, 2016). The interactions regardless of whether it is between learner-learner or learner-instructor must be grounded in content which can include textbook access, articles, or instructor presentations. The type of interaction with content should result in learner understanding and retention of information (Martin et al., 2020). All interactions ultimately

should have the goal of creating an environment in which higher level thinking skills such as analysis, synthesis, critical thinking, and transfer take place (Conveicao et al., 2020).

Strategy Approaches

Facilitation strategies led by online course instructors include both communication and modeling practices. Communication involves the process of exchanging or sharing information whether it is learner to learner or learner-instructor (Martin et al., 2020). Conversations and interactions must be grounded in the content, therefore, facilitation by the instructor can be a critical component. Interactions include the process of interacting with the instructor, content, or peers within the online learning environment which results in an increase in learners understanding (Martin et al., 2020). Within the online learning community, a content focused only approach is increasingly replaced by a more learner centered approach in online instruction.

As a result, students and instructors have an increased awareness of the lack of personal connectedness within technology-based courses compared to traditional face to face courses (Seaman et al., 2018). There is often a sense of disconnectedness among students engaging in fully remote courses. The disconnectedness felt by many students can be considered emotional in nature but can directly impact learner outcome in cognition and understanding. Due to this factor, there is a greater need for increased intentionality in creating online collaborative learning environments. In the term of collaborative learning, it includes the idea that students or peers are working together in order to create something (Martin et al., 2020). Quality social interaction between the learner, instructor, and other learners through meaningful, intentional conversations about the content increase learner outcomes and greater overall satisfaction (Isasis, 2020). “Both staff and students expressed greater satisfaction with online courses that successfully fostered a sense of belonging among students” (Thomas, Herbert, & Teras 2014, p. 76). However, a sense of hesitancy is common among instructors when creating collaborative learning experiences due to the lack of accountable talk and potential lack of understanding about the purpose of collaborative learning. Therefore, creating and maintaining a purpose in online interactions is important to engage students in content specific conversations with the goal of application and retention (Spector et al., 2019). Reflection is also a necessary skill many instructors or facilitators must use in order exhibit responsiveness and flexibility within the context of online learning similar to other modalities. Changes are made to increase rigor and accountability within the instruction (Spector et al., 2019).

Social Interaction

One goal of instruction is to provide scaffolding for students and a level of support needed to guide students to a higher level of understanding. The use of learner-learner instruction within the course provides the opportunity for social interaction, often lacking within the online context. According to Vygotsky (1978), learning must first take place within the social context before learning can become individualized. Based upon this construct, learner-learner interactions are a vital part of the course design and instruction in order for the individual to gain knowledge and understanding. Vygotsky (1978) states that “the zone of proximal development furnishes...educators with a tool through which the internal course of development can be understood” (p. 87). In order to teach an individual in the zone of proximal development, social interaction must occur within the learning space. Opportunities for learner-learner interactions must be made available for the individual to engage in social interaction so that learning can occur within the zone of proximal development. The zone of proximal development is what the

learner is able to do with assistance from the instructor or another learner. As Vygotsky (1978) describes, “the zone of proximal development today will be the actual development level tomorrow” (p. 87). Intentional collaboration and engagement can provide scaffolding for students in online instruction (Beland, 2017). Scaffolding according to Vygotsky’s zone of proximal development can be defined as the “distance between actual developmental level of a student and the level of potential development as determined through problem-solving under adult guidance and in collaboration with more capable peers” (Vygotsky, 1978, p. 86).

As instructors and course designers either create or make adjustments to online courses and content, a focus on the learner, the environment, and the learning interactions is important as increased challenges have appeared as online learning can constrain interactions between instructors and peers (Harley et al., 2018). Tools, guidelines, and the type of support must also be considered in collaboration (Martin et al., 2020). Gender, age, prior knowledge, aptitude, culture, ethnicity, self-regulation, and self-efficacy are all individual differences that are brought into a collaborative learning environment and can be described as demographic characteristics (Martin et al., 2020). Cognitive characteristics that can differ in distant or online learning include attention, memory, and intellect. These factors directly influence and impact how learners within the context of the classroom engage (Conceição et al., 2020). Various studies on self-regulation and motivation show that involving the learner through collaboration and conversation can lead to an overall increase in motivation. An increase in motivation can result in deeper learning, understanding, and retention (Harley et al., 2018). Motivation can be considered the engine of learning and can directly influence when students choose to learn and how students learn. With higher dropout rates in many online courses compared to traditional settings it is important to consider that motivation is a complex factor (Hartnett, 2016).

Student Engagement

Intentionality in every aspect of course design, interaction, and delivery should include cognitive, emotional, social, and behavioral needs of diverse learners (Conceição et al. 2020). Learning engagement is multidimensional and can be defined in broader terms as an individual’s ability to engage in an on-going learning process both cognitively, behaviorally, emotionally, and motivationally (Beland, 2017). Social presence through engagement with classmates or colleagues can promote cognitive presence as students collaborate with one another especially with clear objectives in mind (Conceição et al., 2020). Rigor which includes critical thinking, active learning, and high expectations can increase as students engage in guided interactions around meaningful content (Martin et al., 2020).

Including opportunities for collaboration with peers and instructors has shown to promote student engagement and a sense of belonging (Thomas, Herbert, & Teras, 2014). This is particularly evident when students are provided with the opportunity for real-time interactions with peers (Thomas, Herbert, & Teras, 2014). One method utilized during these opportunities is open-ended questions and conversations to help encourage student engagement. Open ended questions and conversations are often used to elicit elaboration and justification among peers in small groups (Qureshi et al., 2021). Collaborative sessions and opportunities allow for students to communicate, share experiences, and learn from one another with a goal to enhance academic performance (Isasis, 2020). Promoting student engagement in online courses is important in the learning process to both motivate and challenge students to practice higher level critical thinking skills, promoting meaningful learning experiences, transfer knowledge, and elicit application (Heflin et al., 2017).

Study Design

The purpose of this study is to determine if learner-to-learner interactions have an impact on students in the online learning environment. Based on the theoretical and methodological framework of Vygotsky (1978), the study design seeks to determine the experience of the participants. Vygotsky's (1978) approach to research design was not a "purely methodological critique", but rather a "flow from his theory of the nature of higher psychological processes" (p. 12). Through observation of behavior, Vygotsky (1978) sought to make "visible processes that are ordinarily hidden beneath the surface of habitual behavior" (p. 12). In this way, the methodological approach of this study is based upon Vygotsky's (1978) methodological and theoretical framework in that the researchers are seeking to determine the participant experience. Further, the perceived experiences of the individual based on the participation in this study are sought to be determined.

In this study, the researchers included small group learning opportunities in online courses in order to impact student engagement and sense of belonging. The small group learning opportunities are offered through synchronous seminars in the online learning environment. This is a descriptive research design study using a survey to determine the participants perceived impact of small group learning opportunities on their own engagement and sense of belonging in the online course.

Participants

The participants in the study are online graduate students with the option to attend synchronous live seminars as part of the online course. The study was conducted throughout the academic year across ten different graduate courses. Live synchronous seminars are optional for students completing the Graduate Education courses. During the optional synchronous seminars, small group learning opportunities were offered to students for participation. Therefore, the participants are those that attended the optional synchronous live seminars, voluntarily participated in the small group activities offered during the seminars and chose to complete the survey for participation in the research. The online survey was completed anonymously at the end of each course during the academic year. A total of fifty-eight students participated in the study.

Data Collection

The research occurred in optional synchronous seminars provided in online Graduate Education courses during one academic year. During each synchronous seminar, students were placed into small groups. The small group included three to five students attending the same online course. The purpose of the small groups was to allow participants to engage in discussions and activities with peers to increase student engagement and sense of belonging in the online course environment. During the small groups, students were provided with open-ended questions and activities to engage with peers. The instructor monitored the small group discussions during the synchronous seminars. In general, the instructor did not participate in discussions with the small groups unless it became necessary for the instructor to do so. This allowed the small group discussions to be student-centered and student led. As such, the focus was on learner-to-learner engagement to allow participants to focus on social interactions to build knowledge within each individual's zone of proximal development (Vygotsky, 1978).

A survey instrument was used to collect data on the participant's experiences during small groups. The survey was composed of questions adapted from the National Survey of

Student Engagement (NSSE) Survey. The questions were quantitative based on a Likert Scale design. Only questions from the NSSE survey relevant to the purpose of this research study were included. Students provided consent for participation in the study prior to completing the survey. The survey can be found in Appendix A.

The survey was provided to participants in a Google Form at the end of each term. The survey was optional, and responses were anonymous. The survey was distributed to participants in the final online seminar of the course and via course announcement by the researcher in the courses.

Students were allowed to provide additional qualitative comments at the conclusion of the research study regarding their experience. To further determine participants' perceived impact of the small groups on engagement and sense of belonging, student comments related to seminar shared from the course with the instructor were included to support or refute the findings from the NSSE survey responses. The students' comments were recorded by the researcher to capture the participant's experience related to participation in the research study. All comments were shared anonymously to protect participant confidentiality.

Data Analysis

When responding to the survey questions, participants were asked to think about their experiences during the small group discussion and activities in the online seminars. The survey provided students with a Likert scale from 1 to 4 with 1 indicating Never and 4 indicating Very Often. The method of graphing data utilized is a frequency polygon, indicating how many participants responded to each item on the Likert Scale survey. The frequency of participants responding to each question related to each Likert scale response option is provided in Table 1.

Table 1
Experiences during Small Group Discussions and Activities

<i>Questions N=58</i>	<i>1 (Never)</i>	<i>2</i>	<i>3</i>	<i>4 (Very Often)</i>
Asked questions or contributed to discussions	1	8	15	34
Asked another student to help you understand course material	14	18	17	9
Prepared for assignments by discussing course material with other students	11	13	16	18
Connected your learning to societal problems or issues	5	5	23	25
Included diverse perspectives in discussions	2	10	19	27
Examined the strengths and weaknesses of your own views on a topic or issue	3	4	25	26
Tried to better understand someone else's views by imagining how an issue looks from their perspective	1	3	24	30

Learned something that changed the way you understand an issue or concept	3	8	18	29
Connected ideas from the course to your prior experiences and knowledge	1	2	16	39

In further analyzing the scores, the mode is used as a measure of central tendency indicating the score that was chosen most frequently by the participants. This was chosen as the method for analysis as this will provide the most accurate information regarding the measure related to the students' perceptions. For the item, *asked questions or contributed to discussions*, the mode is 4 or very often indicating that the majority of participants indicated that they very often asked questions or contributed to discussions. The mode for *asked another student to help you understand course material* is 2 indicating that almost never did a participant choose to ask another student to help them understand course material. The mode is 4, or very often, indicating that participants very often *prepared for assignments by discussing course material with other students*. The mode is 4, or very often, indicating that participants very often *connected your learning to societal problems or issues*. When asked, *included diverse perspectives in discussions*, the mode is 4, or very often, indicating that participants very often included diverse perspectives in discussions. The mode is 4 indicating that participants very often *examined the strengths and weaknesses of your own views on a topic or issue*. The mode is 4 indicating that participants very often *tried to better understand someone else's views by imagining how an issue looks from their perspective*. When asked if the participant, *learned something that changed the way you understand an issue or concept*, the mode is 4, indicating that the participants very often indicated that they learned something that changed the way you understand an issue or concept. Finally, when asked if the participant *connected ideas from the course to your prior experiences and knowledge*, the mode is 4 indicating that the participant very often connected ideas from the course to your prior experiences and knowledge.

Participants were also asked to measure the quality of their interactions with their classmates during the small group discussion and activities from the seminar. A frequency polygon is used to graph the data, indicating how many participants responded to this item on the Likert Scale survey. For this response item on the survey, participants could rate the quality of their interactions from 1 to 7 with 1 being poor and 7 being excellent. The frequency of participants responding to this item is provided in Table 2.

Table 2
Quality of interactions with peers during the small group discussions and activities. N = 58

1 (Poor)	2	3	4	5	6	7 (Excellent)
0	1	1	10	13	13	20

In further analyzing the results from this item of the survey, the mode is used again as a measure of central tendency to determine the frequency by which the participants responded to measure the students' perceptions. When asked about the *quality of interactions with peers*

during the small group discussions and activities, the mode is 7 indicating that the participants found the quality of interactions to be excellent during the small group discussions and activities.

Conclusion

The majority of participants indicated a positive response (rating 3 or 4) for items related to student engagement. From the survey responses, 85% of participants asked questions or contributed to discussions. One participant stated that the seminars were “in depth with strong discussion activities.” While another participant stated that “I found the breakout groups very beneficial and motivating.” “Seminar helped to create an engaging learning environment” was stated by another participant.

According to the survey, 84% of participants connected their learning to societal problems or issues. “There was a lot of opportunities to talk with fellow students and discuss our thoughts, projects and concerns together in small groups” was stated by one participant. From the survey, 95% of participants connected ideas from the course to their prior experiences and knowledge. Another participant indicated that “there was a lot of collaboration and engaging thoughts” in the small-group activities during seminar.

The majority of participants also indicated a positive response (3 or 4) to the items related to developing a sense of belonging. “The small group breakout sessions...helped me feel more connected to my classmates and [the university] on the whole” was stated by one participant. According to the survey, 80% of participants included diverse perspectives in discussions. One participant stated, “The instructor used group discussions during the seminar to grasp different perspectives.” From the survey, 93% of participants tried to better understand someone else’s views by imagining how an issue looks from their perspective. One participant indicated that “having small group discussions during seminar was helpful to get some extra insight and different views on topics.” While another participant stated, “It was good to see everyone’s perspectives on things.” According to the survey, 81% of participants learned something that changed the way you understand an issue or concept.

However, many participants indicated a 1 or 2 for items related to learning course material. According to the survey, 55% of participants did not ask another student to help them understand course material and 44% of participants did not prepare for assignments by discussing course material with other students. While participants scored lower on these areas, one participant stated, “during the seminar, the instructor tied in the readings and assignments together to better understand them.” However, one participant confirmed these results by stating that “the small group work in the seminar was often stalled by students who were participating only via chat” while suggesting that “the organization of small group work needs to change.”

Overall, based on a scale of 1 to 7, the majority of participants (79%) indicated that their quality of interactions with peers during the small group discussions and activities were at least a 5 or better. One participant stated, “The way the instructor had small groups meet together and then return to whole group was very productive.” While one of the other participants stated, “I appreciate that that the instructor includes small group discussions into the seminars, it gives myself a chance to learn more about my peers and collaborate with them.”

Discussion

Based upon the majority of the responses by the participants, students indicated an overall positive response to questions related to student engagement during the small group discussions and activities. Further, students indicated a positive response to questions related to

developing a sense of belonging within the online learning environment. This supports the literature that students indicate more satisfaction in courses that support student engagement and a sense of belonging in online learning (Harley et al., 2018; Thomas, Herbert, & Teras, 2014). According to research (Isasis, 2020; Qureshi et al., 2021), open-ended questions and conversations are vital to encouraging student engagement and a sense of belonging during collaboration. This study supports this as open-ended questions and conversations were utilized in the small-group discussions and activities to promote engagement and sense of belonging. The survey results further support the findings that students indicated a positive experience related to engagement and a sense of community based on their experiences with the discussions and activities which utilized open-ended questions and conversations.

This study also supports the literature (Vygotsky, 1978) related to the importance of social interactions for building knowledge. This study utilized learner to learner interactions as the basis of instruction through the use of small-group discussions and activities that were student-led. Through this, students engaged in social interactions. Through the responses of participants, evidence indicates that students developed diverse perspectives and were able to develop new insight on an issue from a group member's viewpoint. This indicates that social engagement enabled group members to develop knowledge at each individual's zone of proximal development through learner-to-learner interactions as supported by the literature (Vygotsky, 1978).

Participants indicated low participation on the Likert scale for two survey items which were specifically related to course content and assignments. According to research (Sampson et al., 2019), providing content specific conversations as part of the collaborative engagement in online learning is important. The survey items may have been scored low by students due to the types of questions or activities provided by the instructor in the asynchronous seminars which did not lead the students into content specific conversations. Perhaps the items shared do not engage the participants in the level of reflection as required to expand content knowledge as indicated in research (Spector et al., 2019). In addition, one participant specifically indicated that this may be due to technology restraints with participants. More research is needed to determine if the type of open-ended questions utilized in the research study were appropriate to providing content specific conversations and reflection for the students. In addition, additional research is needed to determine if the specific technology requirements as indicated by the participants comment suggesting the need for everyone to use video are necessary to encourage content specific conversations. Further, more research is needed to explore if small group discussions and activities in asynchronous seminars for online courses are conducive to assisting students in better understanding the course content to prepare for course assignments.

The data for the final item on the survey further supports that the majority of students found the collaborative opportunity to be a quality experience for engaging with peers in the discussions and activities while developing a sense of belonging in the online learning environment. As Isis (2020) indicated, quality social interactions in the online learning environment led to greater overall satisfaction for learners. As such, the results of this study support that small group learning opportunities in synchronous seminars have a positive impact on student engagement and sense of belonging in the online course environment.

Based upon the results of the survey accompanied with the comments by the participants, this study indicates that small-group discussions during synchronous seminars in online courses have a positive impact on the participants. The majority of the participants found the collaborative opportunity to be a quality experience for engaging with peers while developing a

sense of belonging in the online learning environment. Further, the majority of participants found that the experience improved student engagement in the online course.

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Appendix A

Survey Instrument:

For the following questions think about your experience during the small group activities or discussions in seminars and consider about how often have you done the following:

Asked questions or contributed to discussions

Never 1 2 3 4 Very Often

Asked another student to help you understand course material

Never 1 2 3 4 Very Often

Prepared for assignments by discussing course material with other students

Never 1 2 3 4 Very Often

Connected your learning to societal problems or issues

Never 1 2 3 4 Very Often

Included diverse perspectives in discussions

Never 1 2 3 4 Very Often

Examined the strengths and weaknesses of your own views on a topic or issue

Never 1 2 3 4 Very Often

Tried to better understand someone else's views by imagining how an issue looks from their perspective

Never 1 2 3 4 Very Often

Tried to better understand someone else's views by imagining how an issue looks from their perspective

Never 1 2 3 4 Very Often

Learned something that changed the way you understand an issue or concept

Never 1 2 3 4 Very Often

Connected ideas from the course to your prior experiences and knowledge

Never 1 2 3 4 Very Often

Indicate the quality of your interactions with your peers during the small group activities and discussions during seminar:

Poor 1 2 3 4 5 6 7 Excellent

Funds of Knowledge Impact on Career Preparation

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Abstract

This study examines students' perceptions of Funds of Knowledge (FOK) and their influence on career preparation within the teacher education context. Employing mixed methods design, qualitative data collection and analysis were combined with a quantitative research design. Exploring data from a career and technical education (CTE) classroom, direct FOK instruction did not significantly differ between control and treatment groups. However, the treatment group showed elevated post-assessment scores in all subcategories. Variances emerged in students' viewpoints of family impact, interests, skills, and available resources. These findings hold crucial implications for teacher education programs. Understanding students' FOK and their role in career preparation can steer the formation and execution of impactful teacher education initiatives.

Keywords: career and technical education; Funds of Knowledge; career preparation; mixed methods

Introduction

This paper aims to explore the integration of Funds of Knowledge (FOK) within Career and Technical Education (CTE) classrooms. Employing a mixed methods design rooted in a pragmatic epistemological philosophy, the collected data underscores the potential advantages of incorporating FOK as a pedagogical tool to enrich student learning and achievement. By acknowledging students' inherent strengths and resources, educators can formulate more inclusive and efficient educational approaches, better preparing students for the modern workforce's demands. Building upon Moll et al.'s (1992) seminal work on working-class Latino families, this research accentuates the universal benefits of embracing FOK exploration as a strategy applicable to all educators. This approach facilitates genuine understanding of students, fostering their growth while nurturing their comprehension and capabilities.

The Role of Career and Technical Education

In the last century, formal CTE courses in US public schools have been established, supported by significant legislative measures. Acts like the Morrill Land-Grant Colleges Act of 1862 (Stringfield & Stringfield, 2017) and the Smith-Hughes National Vocational Education Act of 1917 (2020) served as cornerstones, offering funding and state backing for various vocational subjects. In 2006, a pivotal change occurred as CTE shifted from "vocational education" to "career and technical education," reflecting altered philosophical and developmental underpinnings (Conneely & Hyslop, 2018). The CTE classroom has since transformed, presenting varied career pathways and opportunities for students to explore personal interests. These structured courses intend to provide demanding and pertinent training aligned with postsecondary education and future careers. However, in this endeavor, there's been a tendency

to neglect the existing knowledge and skills within students and their families, leading to difficulties in effectively merging academic and CTE subjects within the curriculum. In September 2016, the Strengthening Career and Technical Education for the 21st Century Act undertook the reauthorization and reform of the Carl D. Perkins Career and Technical Education Act (Kiyama & Rios-Aguilar, 2018). Positioned as a significant stride, this bill aimed to address the nation's skills gap by ensuring the preparation of students, particularly those historically disadvantaged and underserved, for success in high-demand occupations with competitive wages, employment benefits, and avenues for meaningful career growth (162 Cong. Rec. H4185, 2017). Bolstering this legislation, the Strengthening Career and Technical Education for the 21st Century Act (Perkins V) was enacted on July 31, 2018 (2020).

The reauthorization of the Carl D. Perkins Career and Technical Education Act of 2006 reaffirmed the United States' commitment to high-quality CTE programs (2020). Additionally, the reauthorization required CTE students to follow a career pathway to prepare them for postsecondary education or employment (Bragg, 2017). Following this change, Bragg (2017) reported that students who "completed more high school academic course work in conjunction with CTE classes tended to perform better than those taking fewer academic classes and CTE" (p. 56). Additionally, CTE students are reported to be more motivated and interested in their coursework based on real-world connections. As a result, these students are less likely to drop out of school (Conneely & Hyslop, 2018).

Currently, CTE courses present an extensive array of career possibilities spanning the 16 Career Clusters and over 79 pathways ("The National Career Clusters Framework," n.d.). These programs facilitate career exploration by means of hands-on experiences including on-the-job training, internships, apprenticeships, and industry certifications (2020). The systematically structured courses within these career pathways are thoughtfully crafted to equip students for both postsecondary education and successful careers (Stringfield & Stringfield, 2017). This shift in CTE programs intends to offer thorough and pertinent training, aligning with the demands of established and emerging industries, with a primary focus on preparing students for well-paying, skill-intensive vocations (Conneely & Hyslop, 2018).

The Need for Funds of Knowledge

Instead of centering on students' existing skills and aspirations, CTE programs frequently emphasize shortcomings in skills and characteristics of both students and their families (English & Mayo, 2012). This perpetuates a deficit-oriented mindset towards marginalized student groups. FOK arose in the late 1990s as a remedy to the deficit perspective regarding working-class Latin American families (Subero & Esteban-Guitart, 2015). Educators adopting the FOK approach were tasked with a more comprehensive outlook, investing time in understanding the diverse and rich cultural experiences their students brought, and reframing these experiences and social interactions as valuable resources and strengths, rather than cultural or cognitive deficiencies (Howard & Lipinoga, 2008). Integrating students' FOK into the classroom empowers learners to recognize themselves as knowledge bearers, potentially boosting student self-efficacy and self-confidence (Subero & Esteban-Guitart, 2015).

Intersection of FOK and CTE

CTE has undergone considerable transformation to address the changing requirements of the modern workforce (Bailey, Jaggars, & Jenkins, 2015), which might have overshadowed the acknowledgment and utilization of students' FOK. In higher education discourse, there has been

a growing emphasis on aligning CTE with the labor market's needs and ensuring access for all students to lucrative, skill-intensive occupations (Duncan, 2011). The drive to promote industry certification on a national level could be enhanced by educators' commitment to actively delve into and harness students' FOK.

Research Questions

This mixed methods study aimed to investigate students' perceptions of their own FOK and the influence these funds have on their career preparation. The following research questions guided the study:

Quantitative Research Questions:

1. According to the FOK assessment as it pertains to career preparation:
 - a. How did the perceptions of students in the control group differ from those in the treatment group according to the FOK pre-assessment?
 - b. How did the responses of students receiving direct instruction differ from the perceptions of students who did not receive FOK direct instruction?
2. Regarding the subcategory of family impact, interests and skills, and resources on the FOK assessment:
 - a. What is the difference in participants between groups?
 - b. What subcategory do participants perceive to be most important for career planning?
 - c. To what extent do perceptions of males and females differ on the FOK assessment when looking at family impact, interests and skills, and resources?

Qualitative Research Question:

1. Why do students perceive specific subcategories of FOK (family impact, interests, skills, or resources) to be more important or less important as they plan for future careers?

Integrated Mixed Methods Question:

1. If differences are identified, how do these differences in students' perceptions of their FOK and role in career preparation provide a deeper understanding of career preparation coursework?

Methodology

The researchers employed a quantitative research approach, utilizing a convenience sample of eighth-grade students enrolled in six career development course sections at a junior high school in a southern state in the United States. The study aimed to gather empirical data to examine the effects of the career development instruction provided by a primary cooperating teacher. Researchers collaborated with the cooperating teacher who met with three sections of students each week, while another teacher met with three other sections. While both instructors co-planned the curriculum during their common course content, the primary cooperating teacher was responsible for creating the curriculum, producing instructional videos, developing assessments, and facilitating instruction for all six course sections of the career development classes. In addition, the cooperating teacher created presentation materials and instructional videos for students to view and follow for their daily lessons. Each lesson was disseminated to all students enrolled in career development courses each Monday using the Google Classroom[®]

learning management system. Because of the primary cooperating teacher's position and responsibility, all participants in this study received direct instruction from this teacher.

All students enrolled in the career development sections were invited to participate in this study and given the same career development instruction. A total of 58 students completed the informed consent and participated. Of this total, 31 (53%) identified as male, and 27 (47%) identified as female. Table 1 includes the participants' demographic information based on the class period.

Table 1

Participant Demographics

Class Period	Course Timing	Male Participants	Female Participants	Total Participants
1	8:45-9:28	2	8	10
2	9:33-10:16	3	4	7
4	11:09-11:52	2	7	9
5	1:41-2:24	4	2	6
6	2:29-3:12	12	2	14
7	3:17-4:00	8	4	12

Based on data from 2018-19 (ADE My School Info, 2020), the research-conducted school district had the state's largest student enrollment, with 21,962 students across 29 schools. Furthermore, 70.5% of these students qualified for free and reduced meals, compared to the state average of 59.6%. The school involved in the study, referred to as DJHS, consisted of 8th and 9th-grade students, totaling 669 enrollments. Notably, 87% of DJHS students came from low-income households, and 48% were English Language Learners (ELLs). The school's demographics comprised 62% Hispanic/Latino, 18.2% Hawaiian/Pacific Islander, and 14.3% white students (ADE My School Info, 2020). According to 2018-19 English Language Arts (ELA) national assessment data, 49.40% of 8th graders required support, 43.41% needed assistance in mathematics assessments, and 48.35% in the 8th-grade science assessment. Moreover, during the same year, 325 ELLs took the English Language Proficiency Exam (ELPA21), with 33 (10.15%) achieving proficiency.

Survey Instrument and Procedure

A pilot study of the instrument was conducted to identify potential issues. Adjustments to the instrument were made after the completion of the pilot study and follow-up analysis, and three questions were removed to increase the reliability quotient of the instrument. The convenience audience represented all classifications of university students ranging from freshman to graduate level. Survey questions related to the family impact on career planning included students' perceptions regarding the role of family background, experiences, values, languages, and native language. See Figure 1 for questions related to family impact.

All students enrolled in the career development course were invited to complete a 21-question pre-assessment survey via Google Forms[®]. A link to the Google Form[®] was published in the weekly class slide deck utilizing Google Slides[®] and disseminated to all students on the same day. Slide decks were used for all classes each week and contained daily objectives, assignment details, and links to resources and videos. This survey included questions pertaining to the influences that family, interests and skills, social interactions, and resources have on students' career planning. The survey took approximately two minutes for participants to complete and was completed at the beginning of the class period for all class periods on the same day to limit the amount of crossover between participants talking about their experiences with other students in the school.

Figure 1

Questions on FOK Assessment Related to Family Impact

Family Impact

Please rate how strongly you agree or disagree with each of the following statements.

<i>Strongly Disagree (1)</i>	<i>Strongly Agree (5)</i>
<input type="checkbox"/> My background experiences will help me as I plan my future career.	
<input type="checkbox"/> My family values will help me as I plan my future career.	
<input type="checkbox"/> My native language will influence my planning when determining a future career.	
<input type="checkbox"/> My family members' occupation(s) will influence my decision when planning my future career.	
<input type="checkbox"/> My experiences with my family will help me in career planning.	

Questions in the following two sections of the assessment measured participants' perceptions of the role that interests, skills, and resources had on participant career planning. Perceptions of participants' FOK originating from social interactions gained outside of school, along with communication skills, household chores, caregiving techniques, hobbies, entertainment, and use of free time were measured in the instrument section related to interests and skills. The final section of the instrument measured participants' perceptions of the impact their resources have on their career planning. Resources such as knowledge gained outside of school, personal connections to individuals, connections to resources, family members' connections to resources and individuals, friends, connections friends have to resources, along with access to technology were all evaluated as participants indicated how strongly they agreed or disagreed that each of these would help them in career planning. See Figures 2 and 3 for specific questions about interests, skills, and resources.

Figure 2*Questions on FOK Assessment Related to Interests and Skills*

Interests and Skills

Please rate how strongly you agree or disagree with each of the following statements.

Strongly Disagree (1) Strongly Agree (5)

<input type="checkbox"/> The skills I have gained outside of school will help me in career planning. <input type="checkbox"/> The communication skills I have gained in school will help me in career planning. <input type="checkbox"/> The household chores I know how to do will help me in career planning. <input type="checkbox"/> The skills I gained working with others will help me in career planning. <input type="checkbox"/> The care giving techniques I know will help me in career planning. <input type="checkbox"/> The hobbies I am interested in will help me in career planning. <input type="checkbox"/> The entertainment I enjoy will help me in career planning. <input type="checkbox"/> How I spend my free time will help me in career planning. <input type="checkbox"/> The experiences I gained in my free time will help me in career planning.
--

Figure 3*Questions on FOK Assessment Related to Resources*

Resources

Please rate how strongly you agree or disagree with each of the following statements.

Strongly Disagree (1) Strongly Agree (5)

<input type="checkbox"/> The knowledge I have gained outside of school will help me in career planning. <input type="checkbox"/> The personal connections I have to individuals will help me in career planning. <input type="checkbox"/> The connections I have to resources will help me in career planning. <input type="checkbox"/> My family members' connections to resources will help me in career planning. <input type="checkbox"/> My family members' connections to individuals will help me in career planning. <input type="checkbox"/> My friends have connections to resources that will help me in career planning. <input type="checkbox"/> The technology I have access to will be used to help with career planning.
--

Individual responses were on a five-point Likert scale in which 1 = strongly disagree, and 5 = strongly agree. A Cronbach's coefficient alpha test was conducted on the completed assessments to establish reliability. The coefficient alpha (Cronbach, 1951) provided a generalizable measure of the internal consistency and reliability of each question on the instrument, expressed by a number between 0-1. The reliability of the Career Development instrument was high (Cronbach's alpha = .91). Internal consistency is vital when using an instrument for research. It should be determined before instruments are used for analysis to ensure the validity of the findings (Tavakol & Dennick, 2011).

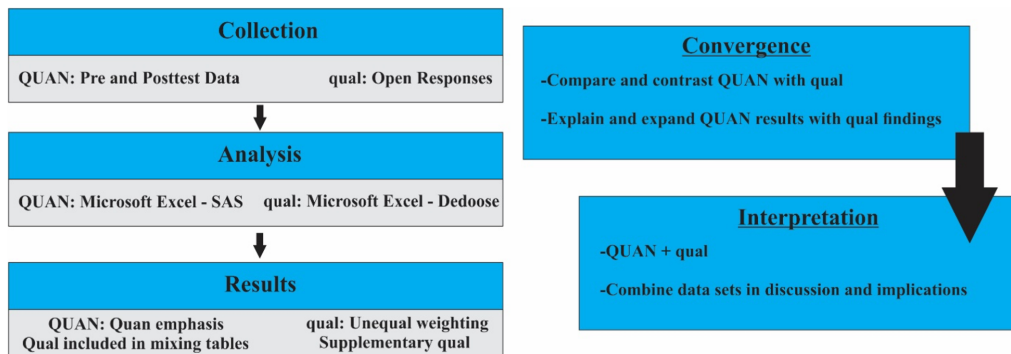
Research Design Overview

This research employs a pragmatic epistemological perspective, recognizing diverse viewpoints on reality and the acquisition of knowledge through independent observations (Biesta, 2010). Utilizing this framework, a mix of quantitative and qualitative data is drawn upon to derive inferences and consolidate findings (Plano Clark & Ivankova, 2016), depicted in Figure 4. Simultaneous data collection and analysis were conducted through a post-assessment instrument, employing concurrent timing (Plano Clark & Ivankova, 2016). Statistical insights from the pre-posttest design were combined with qualitative responses from participants'

open-response questions. While the study prioritized quantitative aspects, its inferences aligned with research questions and participant data. Throughout the research, the integration of quantitative and qualitative strands, predominantly quantitative, persisted (Creswell & Plano Clark, 2011), denoted as QUAN + qual.

Figure 4

QUAN + qual Integrated Mixed Methods Design of Study



Utilizing the pretest-posttest control group design, three class periods were selected to serve as the treatment groups. Class periods were 43 minutes in length following the bell schedule. See Table 1. Neither the cooperating teacher nor researchers had control over which students were enrolled in these classes. Class periods 2, 4, and 6 were randomly selected to serve as the treatment groups for this study due to their timing in the day and class demographics, ensuring that at least one class period occurred before lunch and at least one occurred after lunch. Using FOK as a complementary framework (Yosso, 2005; Moll, Amanti, Nerff, & Gonzalez, 1992) student diversity was approached from the lens of recognizing the social interactions, knowledge, and experiences that students already have and considering how they can use these resources and experiences to help them in their career preparation. Participants in the treatment groups received explicit instruction at two touchpoints during the semester. Touchpoints were designed to explain FOK, allow students to uncover their unique FOK, and encourage reflection about how individual FOK can serve as a resource for future goals.

The cooperating teacher also facilitated three additional class periods of a course related to career development. Participants in these sections served as controls for this study and did not receive direct instruction about FOK throughout the semester. Class periods 1, 5, and 7 were selected as the control groups, ensuring that at least one section occurred in the morning and at least one occurred in the afternoon to control for variation in score based on the time of the day. All participants completed a post assessment following a "washout" period of eight weeks. This survey was administered in the same format as the previous survey with all students participating in this study taking the survey on the same day via a link to the Google Form[®]. All participants completed this survey on the same day, and the post assessment used the same questions and format as the pre assessment, with additional opportunities for students to complete open-response prompts.

Data Collection

Prior to commencing the study, informed consent forms were provided to all students enrolled in the career development courses at DJHS. These forms, accessible digitally and in paper format,

were available in multiple languages, including English, Spanish, and Marshallese. Students returning their consent forms received university promotional items like notebooks, pens, folders, and bookmarks, courtesy of the researchers. Google Forms® were employed to collect data from consenting participants. At the semester's start, before discussing FOK, the cooperating teacher shared the pre-assessment Google Form® link in students' weekly lessons. Students were instructed to complete and submit this assessment as part of their daily participation.

Using Microsoft Excel®, the researchers collated and assessed the pre-assessment results. Data underwent cleaning, organization, sorting, uploading, and analysis through Microsoft Excel®. While three students completed the survey twice, only their initial responses were utilized. The data was structured based on participant emails, gender, class periods, and control/treatment groups.

At the end of the semester, all students enrolled in the career development courses were invited to complete the post assessment using a link system similar to the pre assessment. Participants who completed the pre- and post-assessment received a certificate of appreciation for participating in this study. The researchers collected participant responses and organized the data using the same protocol mentioned previously. Additionally, participant pre- and post-assessment responses were matched for further analysis. After cleaning the data, Microsoft Excel® was utilized to analyze the quantitative results of the study. Open responses collected in the post-assessment survey were downloaded, sorted, and imported into Dedoose® for analysis.

Data Analysis

The instrument used in this study to measure students' perceptions consisted of 21 questions within three categories concerning student perceptions of how their family, interests and skills, and resources impacted their career preparation. To better understand the first quantitative research question concerning how students in the control and treatment groups differ on the pre assessment, an independent *t* test was used. To analyze the extent that direct instruction impacted students' perceptions of their FOK, an independent samples *t*-test was used to analyze how students receiving direct FOK instruction differed from students who did not receive direct FOK instruction on the post assessment. To further investigate differences in control and treatment perspectives on the post assessment, scores were transposed to reflect a new scale of 1-3 to allow each survey question to be analyzed. Data collected from the post assessments were organized into three categories: strongly agree/agree (scores 5-4), neutral (score 3), and disagree/strongly disagree (scores 1-2). After data was transposed into these three categories, a Chi-square test of independence was performed to examine the relationship between the control and treatment groups to determine how strongly participants agreed or disagreed with each question.

When analyzing the second research question regarding the differences in participants' perceptions of the specific subcategories of FOK (family impact, interests and skills, or resources) an analysis of variance (ANOVA) was used. Follow-up tests were conducted to evaluate which subcategory the participants perceived to have the most difference on both the pre- and post-assessment. Additionally, an ANOVA was used to analyze the differences in participant perspectives for the control and treatment groups and how they varied according to each subcategory on the post assessment. An independent samples *t* test was conducted to evaluate the extent that males and females differ on the FOK assessment when looking at each of these subcategories. To further analyze differences in male and female perspectives on individual

survey questions on the post assessment, scores were transposed to reflect a new scale of 1-3.

Data collected from the post assessments were organized into three categories: strongly agree/agree (scores 5-4), neutral (score 3), and disagree/strongly disagree (scores 1-2). After data was transposed into these three categories, a Chi-square test of independence was performed to examine the relationship between gender and how strongly participants agreed or disagreed with each question.

Qualitative Questions

The qualitative research question associated with this study was: Why do students perceive specific subcategories of FOK (family impact, interests and skills, or resources) to be more important or less important as they plan for future careers? Considering that the Google Classroom[®] platform is one that the participants were well acquainted with due to school and district usage and that the cooperating teacher was their primary source of information and curriculum creation, sending the post-assessment survey to participants through the slide deck at the beginning of the week was the preferred mode of data collection for this study. After the post-assessment questions were collected and sorted, their responses were organized and loaded into a digital qualitative data analysis software program, Dedoose[®].

The researchers read the student responses to identify emerging codes designed to capture the essence and essential elements of the participants' perspectives (Saldaña, 2016). Responses for each section of the post assessment (family impact, interests and skills, and resources) were coded using open coding to allow categories and patterns to emerge from the data (Saldaña, 2016), then these were used as preliminary findings. This served as a method for continual analysis and consideration as the qualitative data explained the quantitative findings. Analysis of the codes that emerged from the open-response questions for each section was examined until all responses from each section of the post assessment were analyzed.

Integrated Mixed Methods Question

The integrated mixed methods question for this study was: If differences are identified, how do these differences in students' perceptions of their FOK and their role in career preparation provide a deeper understanding of career preparation coursework? The results of the ANOVA, Chi-square tests, *t* tests, and Dedoose[®] code occurrences were used to integrate the findings and answer this mixed research question. A cross analysis of the quantitative and qualitative data resulting from this study was completed to summarize the findings of this case of students, identify key themes and issues, and identify additional areas for future study. As the quantitative and qualitative data converged, the analysis of responses helped the researchers understand the differences in participants' perceptions of their FOK and the impact these have on students' career preparation.

Findings

Research Question 1 asked the question, according to the FOK assessment as it pertains to career preparation:

- a. How did the perceptions of students in the control group differ from the perceptions of students in the treatment group according to the FOK pre assessment?
- b. How did the responses of students receiving direct FOK instruction differ from students who did not receive FOK direct instruction?

An independent-samples t test was conducted to evaluate the first quantitative research question concerning how participants in the control and treatment groups differ on the pre assessment. Among the 8th graders who participated in this study ($N = 58$), there was no statistically significant difference between the control and treatment groups on the pre assessment, $t(56) = 2.00, p = .56$. Further, Cohen's effect size value ($d = .162$) suggested low practical significance. Participants in the treatment group ($M = 3.69, SD = .62$) scored slightly lower on the FOK pre assessment than participants in the control group ($M = 3.78, SD = .49$).

An independent-samples t test was also conducted to evaluate the second part of research Question 1 regarding how the responses of students who received direct FOK instruction differed from those who did not. With an alpha set at .05, the difference on the post assessment between the control and treatment groups was not significantly different, $t(56) = 2.00, p = .55$. While participants in the treatment group ($M = 3.73, SD = .73$) scored slightly higher on the post assessment than participants in the control group ($M = 3.63, SD = .63$), Cohen's effect size value ($d = .147$) suggested low practical significance.

To further analyze differences in control and treatment perspectives on the post assessment, scores were transposed to reflect a new scale of 1-3 to allow each of the 20 survey questions to be analyzed. Data collected from the post assessments were organized into three categories: strongly agree/agree (scores 5-4), neutral (score 3), and disagree/strongly disagree (scores 1-2). After data was transposed into these three categories, a Chi-square test of independence was performed to examine the relationship between the control and treatment groups to determine how strongly participants agreed or disagreed with each question. Group differences were not significant for 19 of the questions analyzed on the post assessment.

The results of the Chi-square tests were significant for one question related to family impact. The results of question Q #4, "My family members' occupation(s) will influence my decision when planning my future career" were significant $X^2(2, N=58) = 10.92, p = .004$. A greater percentage of participants in the control group 46% ($N=13$) strongly agreed/agreed with the statement "My family members' occupation(s) will influence my decision when planning my future career," while 40% ($N=12$) of participants in the treatment group strongly agreed/agreed to this statement. Additionally, results suggest that participants in the control group were more likely to strongly disagree/disagree that their family members' occupation(s) will influence their decision when planning for future careers (39%, $N = 11$), while only 10% ($N = 3$) of the participants in the treatment group strongly disagree/disagree with this statement. Finally, half of the participants in the treatment group (50%, $N = 15$) were neutral on the statement that their family members' occupation(s) would influence their decisions when planning their future career.

Table 2
Control and Treatment Analysis on Q #4

Q #4	Control (N=28)		Treatment (N=30)	
	N	%	N	%
Strongly Agree/Agree	13	46	12	40
Neutral	4	14	15	50
Strongly Disagree/Disagree	11	39	3	10

Research Question 2 asked the question regarding the subcategory of family impact, interests and skills, and resources on the FOK assessment:

- a. What is the difference in participants' perceptions between groups?
- b. What subcategory do participants perceive as most important for career planning?

A one-way analysis of variance (ANOVA) was conducted to determine the difference in participants' perceptions for the specific subcategories of FOK (family impact, interests and skills, or resources) on the assessment. The independent variable included three specific categories: family impact, interests and skills, and resources. The dependent variable was the participants' perception scores. The study's data satisfies the three assumptions of independent observations, normal population distribution, and the same variances. An ANOVA was run on all participants to determine if there was a significant difference in how participants perceived the three subcategories: family impact, interests and skills, and resources. On the pre assessment, participants' perceptions of the importance of the three subcategories were significant, $F(2, 171) = 34.32, p = \sim 0$.

Post Hoc t-tests were used to evaluate which subcategory the participants perceived as most important. While an ANOVA test indicates if the group means are equal or significantly different, follow-up *post hoc* tests control the experiment-wise error rate while exploring the differences between group means (Frost, 2021). Follow-up tests were conducted to evaluate pairwise differences among the means. With an alpha set at .05, the difference between the subcategories family impact ($M = 2.93$) and interests and skills ($M = 3.83$) was significantly different, $t(56) = 2.00, p = \sim 0$. The difference between the subcategories family impact ($M = 2.93$) and resources ($M = 3.63$) was statistically significant $t(56) = 2.00, p = \sim 0$, and the difference between interests and skills ($M = 3.83$) and resources ($M = 3.63$) was also statistically significant $t(56) = 2.00, p = 0.005$. The 95% confidence intervals for the pairwise differences and the means and standard deviations for the three subcategories are reported in Table 3.

Table 3
Pretest ANOVA Analysis by Subcategory

Subcategory	<i>M</i>	<i>SD</i>	Confidence Intervals
Family Impact	2.93	.49	2.80 - 3.06
Interests and Skills	3.83	.62	3.67 - 3.99
Resources	3.63	.70	2.45 - 3.81

An ANOVA was also completed for the post assessment and the perceptions of participants on the three categories were significant, $F(2, 171) = 21.49, p = \sim 0$. *Post hoc* t-tests were used to evaluate which subcategory the participants perceived as most important. Follow-up tests were conducted to evaluate pairwise differences among the means. With an alpha set at .05, the difference between the subcategories family impact ($M = 2.96$) and interests and skills ($M = 3.68$) was significantly different, $t(56) = 2.00, p = \sim 0$. The difference between the subcategories family impact ($M = 2.96$) and resources ($M = 3.74$) was also statistically significant $t(56) = 2.00, p = \sim 0$. However, unlike the pre assessment, the difference between interests and skills ($M = 3.63$) and resources ($M = 3.74$) was not statistically significant $t(56) =$

2.00, $p = 0.67$. The 95% confidence intervals for the pairwise differences and the means and standard deviations for the three subcategories are reported in Table 4.

Table 4
Post-test ANOVA Analysis by Subcategory

Subcategory	<i>M</i>	<i>SD</i>	Confidence Intervals
Family Impact	2.96	.66	2.79 - 3.13
Interests and Skills	3.68	.74	3.49 - 3.87
Resources	3.74	.75	3.55 - 3.93

Additional analysis of the differences in participant perspectives was calculated by analyzing the differences between how the control and treatment groups varied according to each subcategory on the post assessment. An ANOVA was completed for the post assessment in regard to the control and treatment group perceptions on the three categories was significant, $F(2, 81) = 12.80$, $p = \sim 0$. *Post hoc* t-tests were used to evaluate the subcategory the treatment group perceived as most important. With an alpha set at .05, there was a statistically significant difference in the treatment group between the subcategories family impact ($M = 3.03$) and interests and skills ($M = 3.73$), $t(29) = 2.00$, $p = \sim 0$. The treatment group differences between the subcategories family impact ($M = 3.03$) and resources ($M = 3.76$) were also statistically significant $t(29) = 2.00$, $p = \sim 0$. However, the treatment group differences between interests and skills ($M = 3.73$) and resources ($M = 3.76$) were not statistically significant $t(29) = 2.00$, $p = 0.68$.

Similarly, an ANOVA was completed to determine which subcategories were statistically significant for the control group of participants. With an alpha set at .05, the control group reported statistically significant differences between the subcategories family impact ($M = 2.88$) and interests and skills ($M = 3.63$), $t(27) = 2.00$, $p = \sim 0$. The control group differences between the subcategories family impact ($M = 2.88$) and resources ($M = 3.71$) were also statistically significant $t(27) = 2.00$, $p = \sim 0$. However, the control group differences between interests and skills ($M = 3.63$) and resources ($M = 3.71$) were not statistically significant $t(27) = 2.00$, $p = 0.37$. When comparing the control and treatment groups, the treatment means increased after receiving direct instruction in all three subcategories. The control group means showed a decrease in family impact and interests and skills and a slight increase in their perceptions regarding resources. See Table 5.

Table 5
ANOVA Analysis by Group on Pre Assessment and Post Assessment

	Pre Assessment		Post Assessment	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Control Group (<i>N</i> = 28)				
Family Impact	2.90	.51	2.88	.71
Interests and Skills	3.96	.50	3.63	.67
Resources	3.96	.50	3.71	.67
Treatment Group (<i>N</i> = 30)				
Family Impact	2.95	.49	3.03	.62
Interests and Skills	3.70	.71	3.73	.81
Resources	3.70	.71	3.76	.82

Research Question 3 asked, to what extent do perceptions of males and females differ on the FOK assessment when looking at family impact, interests and skills, and resources? An independent-samples *t* test was conducted to evaluate how males and females differ on the FOK assessment when looking at these three subcategories. On the pre assessment, female perceptions ($M = 3.47$) were slightly higher than male perceptions ($M = 3.45$), yet their differences were not statistically significant $t(56), = 2.00 p = 0.90$. In comparison to the pre assessment, female perceptions slightly decreased ($M = 3.43$) on the post assessment while male perceptions slightly increased ($M = 3.48$), yet the differences were not statistically significant $t(56), = 2.00 p = 0.75$.

While the differences were not statistically significant on the overall assessment, additional analysis of the perceptions on each subcategory revealed differences in how participants viewed the importance of family, interests and skills, and resources in their career planning. On the pre assessment, male perceptions of family impact ($M=2.98$) were slightly higher than females' perceptions ($M=2.89$) and males' perceptions of resources ($M=3.64$) were slightly higher than females' perceptions ($M=3.61$). On the pre assessment, both genders perceived interests and skills to be most valuable when planning for careers with male perceptions ($M=3.75$) slightly lower than female perceptions ($M=3.92$). With an alpha set at .05, the difference in perceptions for the three subcategories was not significantly different. On the post assessment, male perceptions of family impact ($M=3.03$) were slightly higher than female perceptions ($M=2.87$), and male perceptions of interests and skills ($M=3.71$) were also slightly higher than females' perceptions ($M=3.65$). On the post assessment, both genders perceived resources to be most valuable when planning for careers, with male perceptions ($M=3.71$) slightly lower than female perceptions ($M=3.77$). See Table 6.

Table 6
Male and Female Perceptions on Subcategories

	Males (<i>N</i> = 31)		Females (<i>N</i> = 27)	
	M	SD	M	SD
Pre Assessment				
Family	2.98	.59	2.89	.36
Impact				
Interests and	3.75	.73	3.92	.47
Skills				
Resources	3.64	.78	3.61	.61
Post Assessment				
Family	3.03	.72	2.87	.59
Impact				
Interests and	3.71	.87	3.65	.57
Skills				
Resources	3.71	.88	3.77	.57

To further analyze differences in male and female perspectives on individual survey questions on the post assessment, scores were transposed to reflect a new scale of 1-3. Data collected from the post assessments were organized into three categories: strongly agree/agree (scores 5-4), neutral (score 3), and disagree/strongly disagree (scores 1-2). After data was transposed into these three categories, a Chi-square test of independence was performed to examine the relationship between gender and how strongly participants agreed or disagreed with each question. Gender differences were not significant for 18 of the 20 questions analyzed on the post assessment. The two questions that showed significant differences were Q #6 "The skills I have gained outside of school will help me in career planning," and Q #16 "The personal connections I have to individuals will help me in career planning."

The results of the Chi-square tests were significant for two questions, one related to students' interests and skills and the other related to resources. The results of the question "The skills I have gained outside of school will help me in career planning" were significant $X^2(2, N=58) = 10.69 p = .005$. Male responses to this question revealed 83% ($N=25$) strongly agreed/agreed with the statement "The skills I have gained outside of school will help me in career planning," while 48% ($N=13$) of females were neutral on this statement. Overall, these results suggest that males strongly agree/agree that the skills they have gained outside of school through social interactions will help them in career planning in comparison to the 44% ($N=12$) of female participants in this study. The results of the question "The personal connections I have to individuals will help me in career planning" were significant $X^2(2, N=58) = 6.33 p = .004$. Male responses to this question revealed that 60% ($N=18$) strongly agreed/agreed with the statement "The personal connections I have to individuals will help me in career planning," while 44% ($N=12$) of females were neutral on this statement. See Table 7.

Table 7
Male and Female Perceptions on Specific Questions

Perception	Males (N=31)		Females (N=27)	
	N	%	N	%
Q #6				
Strongly Agree/Agree	25	83%	12	44%
Neutral	3	10%	13	48%
Strongly Disagree/Disagree	2	7%	2	7%
Q #16				
Strongly Agree/Agree	18	60%	13	48%
Neutral	5	17%	13	44%
Strongly Disagree/Disagree	7	23%	2	7%

Analysis Qualitative Data

The qualitative research question associated with this study was: Why do students perceive specific subcategories of FOK (family impact, interests and skills, or resources) to be more important or less important as they plan for future careers? A survey instrument was used in this study to measure participants' perceptions of FOK. The post-assessment instrument contained the same questions included in the pre-assessment instrument broken down into three categories: family impact, interests and skills, and resources. In addition, six open-response questions were included in the post assessment to better understand the qualitative research question. Open-response questions were optional for participants to complete; therefore, findings from this sample audience reflect the thoughts of participants who were willing to elaborate on their perceptions of their FOK. All participants provided answers to all response questions, with 93% (N = 54) of participants answering all six open-response prompts. See Table 8.

Table 8
Open Response Questions on Post Assessment

Subcategory	Open Response Question
Family Impact	How does your family impact your career planning?
Interests and Skills	What specific skills do you have that will help you in career planning? What specific interests do you have that will help you in career planning?
Resources	What specific knowledge have you gained outside of school that will help you in career planning? What specific connections do you have that will help you in career planning? How are your career goals impacted by your "Funds of Knowledge"?

The qualitative results from the survey were loaded into a Microsoft Excel[®] document and organized for analysis. Participant responses for each question were organized to reflect participant grouping (control and treatment) and gender. Responses were loaded into Dedoose[®] for each of the six open-response questions, and pseudonyms were created for each participant.

The question "How does your family impact your career planning?" was designed to understand why students perceive family impact as important. Questions related to interests and skills included, "What specific skills do you have that will help you in career planning?" and "What specific interests do you have that will help you in career planning?" Questions related to the specific subcategory of resources involved prompts such as, "What specific knowledge have you gained outside of school that will help you in career planning?", "What specific connections do you have that will help you in career planning?" and "How are your career goals impacted by your Funds of Knowledge?" Participants' responses to these questions helped the researchers better understand the qualitative research question: Why do students perceive specific subcategories of FOK to be most important as they plan for future careers?

The researchers read the student responses to identify emerging codes designed to capture the essence and essential elements of the participants' perspectives (Saldaña, 2016). Responses for each section of the post assessment (family impact, interests and skills, and resources) were coded using open coding to allow categories and patterns to emerge from the data (Saldaña, 2016). The researchers used these as preliminary findings rather than line-by-line coding as a way for continual analysis and consideration. Categories were single words or phrases, such as career goal impact, communication skills, autonomy/self-reliance, and neutral/negative. Analysis of the codes that emerged from the open response questions for each section was examined until all responses from each section of the post assessment were analyzed, and the author arrived at major thematic understandings. Throughout this process, the qualitative data helped explain the quantitative findings.

Multiple readings and analyses of the data yielded the following themes to understand better why participants perceive specific subcategories of FOK to be most important as they plan for future careers. Participant responses to open response questions on the post assessment reflect the importance of family guidance and support, a recognition of skills perceived to be important for career success, a reflection of autonomy or self-reliance that leads to a goal-oriented mindset, and a negative or neutral mindset related to the impact FOK have on participants' career aspirations. The excerpts presented are representative samples of the larger data set. See Table 9.

Table 9
Code Presence Analysis

	Control (N=28)	Treatment (N=30)	Males (N=31)	Females (N=27)
Code	N	N	N	N
Autonomy/Self-Reliance	7	22	13	16
Career Goal Impact	40	61	31	24
Communication Skills	11	7	9	5
Family & Family Experiences	12	18	15	12
Family Guidance & Support	14	15	16	13
Future Goals	26	29	30	25
Interpersonal/Social Skills	26	29	31	24
Neutral/Negative	35	57	31	25
Physical Skills	24	28	29	23

*N = number of times a code was identified in post-assessment open-response questions

Theme One Support and Guidance from Family

One finding of this study suggested that participants perceive the support and guidance they receive from their families to be important as they plan for their future careers. When asked, "How does your family impact your career planning?" participant responses indicated that they found the support and guidance they received from family members to be beneficial to them as they prepared for their future careers. The code *family guidance & support* was present in both groups of participants (control $N = 14$; treatment $N = 15$) and in both genders (male $N = 16$; female $N = 13$). This code co-occurred ten times with the code *career goal impact*, indicating a correlation of these two concepts. The code *career goal impact* was identified more in the treatment group ($N = 61$) than in the control group responses ($N = 40$) and was present more in male responses ($N = 31$) than in females' ($N = 24$).

Tatiana (female, treatment group) wrote, "My family impacts my career planning because they want me to be a big person in life and get a good job, so I could ask them for options on some good jobs." This response is similar to many participant responses, indicating the importance of family members' guidance on students in their career planning. Juanita, another female in the treatment group, reported, "They impact my career planning because they are my family, they are supposed to support me in anything I need and want and help with during my life." Family support and guidance were noted as methods of family impact on career planning, and these excerpts reflect the responses of many participants of this study.

Participant responses also indicated the importance of support and guidance from family when answering the question, "What specific knowledge have you gained outside of school that will help you in career planning?" Jasper (male, control group) reported, "My family have [sic] told me how the selling and buying cars and houses is like and I feel that's what's going to help me." He added, "What I want to do when I grow up is real estate and selling/buying cars. Lots of my family are already into these types of things so they will try and help me out." Jasper's response indicates his connection between his family's experiences, guidance and support, and his future career aspirations.

In addition to family guidance and support being linked with career goal impacts, participant responses reflect a correlation between family and *physical skills*. The code *physical skills* was present in both groups of participants (control $N = 24$; treatment $N = 28$) and in both genders (male $N = 29$; female $N = 23$). This code co-occurred 12 times with the code *family guidance & support*, indicating a correlation of these two concepts. The code *family & family experiences* was identified more in the treatment group ($N = 18$) than in the control group responses ($N = 12$), and was also present slightly more in male responses ($N = 15$) than in females ($N = 12$). Participant responses reflect perceptions of the connection between their family members' physical skills and how this can impact their career opportunities. Alberto (male, treatment group) reflected on his great grandfather. "His name was Joe, but I call him Papa Joe. He is a retired veteran from the navy." Alberto further discusses how he learned how guns function, how to defend himself, and how to be a good leader and team player. He saw these *physical skills* he learned from his family as "valuable skills when preparing for future careers."

Numerous participants shared their family occupations, noting the specific jobs or occupations their family members had and how their family members could guide and support them with their future careers. LaTisha (female, treatment group) discussed her family friend, who is a veterinarian, reporting, "they would help me become a veterinarian." Jose (male, control group) wrote, "Since my dad works at Tyson [Tyson Foods, Inc. is an American multinational food corporation] he knows a lot of people through there so that can help me" and Raquel

(female, treatment group) shared, "When I grow up I want to be an architect, and my dad is a framer in construction."

Theme Two Skills for Career Success

Questions related to interests and skills included, "What specific skills do you have that will help you in career planning?" and "What specific interests do you have that will help you in career planning?" yielded a variety of responses indicating participants' awareness of the roles that interests and skills have in assisting with career preparation. Participant responses indicated a recognition of communication skills, interpersonal and social skills, and *physical skills* which would all help them in career planning. The code *communication skills* was present in both groups of participants (control $N = 11$; treatment $N = 7$) and in both genders (male $N = 9$; female $N = 5$). Numerous participant responses included social interaction skills such as "eye contact," "listening," "speaking," "good body posture," "how to start a conversation," and "how to give presentations."

Heather (female, control group) reported that the two specific skills they had included "being respectful and being able to speak Spanish." Of note, Heather was the only participant who included her bilingual abilities as an important skill for career planning. In multiple responses, participants linked communication skills and interpersonal/social interaction skills together when discussing skills essential for career preparation. The code *interpersonal/social skills* was present in both groups of participants (control $N = 24$; treatment $N = 28$) and in both genders (male $N = 29$; female $N = 23$). Many participants wrote that their abilities to "get along with others," "exhibit teamwork," "leadership," and "how to act good" were social interaction skills they possess, which will help them in career planning. Juanita (female, treatment group) indicated a specific skill they have is the ability "to listen to other's ideas because their ideas might help too." Listening to others is essential to communication while learning from others reflects interpersonal/social interaction skills. Maria (female, treatment group) reflected, "I have learned friends is just a word so I can't trust anyone." They also reported, "I am sociable and can talk to people mostly very easy. Maybe in my job, they need someone who can talk to customers good." Participant responses to the open response prompts suggest that communication skills and interpersonal/social interaction skills are two of the most valuable skills they have to help them in their career preparation.

Theme Three Self-Reliance and Goal-Oriented Mindsets

In answering the qualitative question, "Why do students perceive specific subcategories of FOK (family impact, interests and skills, or resources) to be most important as they plan for future careers?" two interconnected codes emerged from the participant responses: *autonomy/self-reliance* and *future goals*. Responses from participants in the treatment group were coded with *autonomy/self-reliance* more frequently than responses from participants in the control group (control $N = 7$; treatment $N = 22$), while male and female responses were coded more equally (male $N = 13$; female $N = 16$). The code *future goals* were present in both participant groups (control $N = 26$; treatment $N = 29$) and in both genders (male $N = 30$; female $N = 25$). Participants in this study demonstrate they perceive their abilities and self-reliance, along with a goal-oriented mindset, to be important as they plan for their future.

Autonomy/self-reliance codes were present in a variety of responses as participants reported knowing "how to do a variety of tasks," "taking care of animals," "providing childcare," "doing things on my own," and "using technology" to achieve their goals. Participant responses

also included many positive statements such as, "I can do a lot of things," "I have a lot of skills," and "independence." LaTisha, (female, treatment group) reported, "I already know what I'm going to do when I group up and have my whole life planned out for college." They also said, "I want to become successful and make my whole family proud." This response reflects the self-reliance and autonomy in numerous participant responses on the post assessment. The last question of the post assessment asked "How are your career goals impacted by your FOK"? Jillian (female, treatment group) reported that knowing more about their FOK "boosts my confidence and it reminds me how much education I need to get the job I want." Vanessa (female, treatment group) wrote that FOK knowledge encourages them to work hard and study more in life so that they can go to college and "become who I want to be." Participant responses reflect a recognition that their autonomy and self-reliance are two FOK that may impact their career planning.

Theme Four Neutral or Negative Perspectives

Another finding of this study was a neutral or negative response to questions asked on the post assessment. Open-response questions were optional for participants to complete and 93% ($N = 54$) of participants answered all six open-response prompts. While open-response questions were optional, many participants chose to respond with "idk," "I'm not sure," or "I don't know" for multiple prompts. The code *neutral/negative* was present in all groups, with more participants in the treatment group responding in neutral or negative ways ($N = 57$) than participants in the control group ($N = 35$). Male responses ($N = 31$) were coded more frequently with the neutral/negative code than females ($N = 25$). When asked, "How are your career goals impacted by your "Funds of Knowledge"? Geraldo (male, treatment group) responded, "They are not, because no matter what my FOK is I can pick my own career and work towards it."

Integrated Mixed Data Analysis

The integrated mixed methods question for this study was: If differences are identified, how do these differences in students' perceptions of their FOK and their role in career preparation provide a deeper understanding of career preparation coursework? The results of ANOVA, t-tests, and Dedoose® code occurrences were used to integrate the findings and answer this mixed research question. A cross analysis of the quantitative and qualitative data resulting from this study was completed to summarize the findings of this case of participants, identify key themes and issues, and identify additional areas for future research. As the quantitative and qualitative data converged, the analysis of responses assisted the researchers in understanding the differences in participants' perceptions of their FOK and the impact these have on career preparation.

The quantitative and qualitative data integration results reveal that participants' perceptions of their FOK differ in the areas they perceive most important. This difference can be noted in participants' responses on the post assessment. Participants' perceptions of the impact their interests and skills would have on their career planning were not statistically significant from their perception that their resources would have on their future careers. Participant responses to the open-response questions showcased an understanding of how communication and interpersonal skills impact their career planning. Participant recognition of their family members as a resource for guidance and support was another theme that emerged from the qualitative data. The quantitative and qualitative data results give insights into what participants in this study perceive to be important for career planning.

Further integration of data revealed that male and female participants in this study evaluate subcategories of FOK differently. Male and female perceptions of the skills they gained outside of school and personal connections to individuals to help with career planning. The results of the question "The skills I have gained outside of school will help me in career planning" were significant $\chi^2(2, N=58) = 10.69, p = .005$. Male responses to this question revealed 83% ($N=25$) strongly agreed/agreed with the statement "The skills I have gained outside of school will help me in career planning," while 48% ($N=13$) of females were neutral on this statement. More male participants strongly agree/agree that the skills they have gained outside of school will help them in career planning in comparison to the 44% ($N=12$) of female participants in this study. The results of the question "The personal connections I have to individuals will help me in career planning" were also significant $\chi^2(2, N=58) = 6.33, p = .004$. Male responses to this question revealed that 60% ($N=18$) strongly agreed/agreed with the statement "The personal connections I have to individuals will help me in career planning," while 44% ($N=12$) of females were neutral on this statement. These results suggest that males more strongly agree/agree that the personal connections they have to individuals will help them in career planning in comparison to the 48% ($N=13$) of females who also strongly agreed/agreed with this statement. The differences in what males and females perceive to be most important for career planning provide a deeper understanding of students' perceptions of their FOK and their effect on their career preparation.

Conclusion

The conclusions of this study make a substantial contribution to the current knowledge by building upon the outcomes of Moll et al.'s (1992) initial research on working-class Latino families. This study specifically explores how junior high students perceive their Funds of Knowledge (FOK). While the direct instruction on FOK didn't result in statistically significant differences between the control and treatment groups, the post-assessment scores of the treatment group notably improved across all three subcategories compared to their pre-assessment scores. Based on these findings, it is crucial for CTE teachers instructing career-related subjects to actively engage students in deliberate conversations, activities, and assignments that reveal their unique FOK. The touchpoints used in this study provide exemplary models for fostering discussions on FOK and its role in individual career prospects. Results demonstrate that direct FOK instruction significantly impacts students' understanding. This highlights the importance of teachers discussing FOK, its relevance, and how students can leverage it while preparing for and pursuing specific careers. By shifting from a deficit mindset to an FOK mindset, educators begin to recognize students' skills, knowledge, and social interactions, thereby benefiting their career prospects (Poole, 2017).

Further findings underscore variations in students' perceptions of family impact, interests and skills, and resources. Quantitative data analysis reveals that participants assigned higher value to the subcategory of resources compared to interests and skills or family impact in relation to the FOK assessment instrument. Thus, CTE teachers should guide students on how their FOK—encompassing family experiences, interests, social interaction skills, and resources—can influence career opportunities. As students set goals in career development coursework, they should receive specific instruction on using their FOK to achieve these goals. When discussing essential workplace skills, teachers should create opportunities for students to share their outside-classroom experiences and skills. Showing understanding and respect for students' FOK enhances self-confidence and deepens their understanding of its impact on career choices.

Notably, male participants were more likely to agree that personal connections aid career planning and provide examples of social interaction skills learned outside school. Considering this, CTE teachers should address the differing perceptions of males and females about FOK's value in career preparation discussions. This might involve discussing skills acquired outside school and showcasing diverse gender roles in the workplace through male and female examples. Qualitative data analysis reveals participants value family guidance, communication skills, and autonomy as crucial FOK for career preparation. CTE teachers should recognize the array of social interaction skills family members possess. Participants in this study demonstrated the presence of community cultural wealth by emphasizing the importance they place on their family members' guidance and support. Consequently, CTE teachers should create opportunities for families to actively contribute to their students' educational experiences. Creating opportunities for families to contribute to students' education through interviews, guest speaking, or personal stories fosters trust and transnational social connections.

Participants in this study also saw communication skills as vital FOK for their future careers. Teachers should create chances for students to develop communication skills through activities like resume building and job application practice. Discussing career-specific social interaction skills, including digital and verbal communication, is important. As students enhance their communication skills, CTE teachers should discuss the specific social interaction skills required for success in various careers, including the ability to communicate effectively both digitally and verbally. Teachers should also recognize bilingual skills as valuable FOK and emphasize the impact that multilingual communication abilities can have on students' career trajectories. Teachers should emphasize bilingualism's impact on career paths and provide chances for critical thinking, problem-solving, reasoning, and perseverance—skills crucial for the modern workplace ("21st Century Skills Definition," 2014).

Another key finding is participants highly valuing autonomy and self-reliance. This aligns with Subero and Esteban-Guitart's (2015) conclusions that the FOK approach boosts self-efficacy and self-confidence. Students' autonomy and self-reliance were evident in their post-assessment responses. Acknowledging students' independent capabilities and giving opportunities to demonstrate their acquired skills empowers them to utilize their abilities effectively.

Limitations of the Study

The study employed a convenience sample taken from a school and a teacher with whom the researchers already had an established working relationship. It's important to note that the demographics of the school district and the specific school where the research took place may not accurately represent the population demographics across the state or country. Instead, they might reflect the researchers' interests and resemble features of school districts in particular urban settings. Additionally, data was collected during the global pandemic, thus limiting the researchers' abilities to interact with participants.

Recommendations

To further advance innovative teaching methods, ongoing research into the role FOK in students' career preparation should incorporate additional qualitative data collection techniques. Conducting focus groups with selected students could yield valuable, detailed insights into how FOK impacts their career readiness. For instance, the treatment group in this study primarily focused on family impact and resources, with limited attention to students' interests and skills. It

is crucial to introduce further discussions and activities that highlight the significance of students' social interaction skills and interests in their future careers. Teacher educators should introduce teacher candidates to FOK principles and how they can be utilized in the classrooms. It may also be helpful for both teacher educators and teacher candidates to understand their FOK. This understanding may provide a synergistic opportunity for creating meaningful connections and enriching discussions related to building relationships with students, classroom management, and implementing high quality teaching practices.

When discussing concepts related to career development, all teachers should explore direct instruction on FOK and how individual funds can influence potential careers. As evidenced by study participants, increasing students' appreciation and acknowledgment of their FOK may boost self-confidence. Neglecting FOK might perpetuate a deficit-based view of diversity, limiting students' perceptions of their career possibilities. Both classroom teachers and teacher educators are challenged to become familiar with their students, utilizing their understanding of students' skills, backgrounds, values, and knowledge to connect content with real-world applications. Integrating the FOK framework to support students' career and educational goals holds significant potential in the classroom.

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Improving Pre-Service Training Related to Teaching English Language Learners

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Abstract

Novice teachers believe that their pre-service training for working with English Language Learners is not satisfactory. The purpose of this paper is to provide possible solutions to the problem of unsatisfactory pre-service training for educators who will educate English Language Learners. It is necessary to prepare educators to teach in an inclusive environment, including English Language Learners. Improving the pre-service training for future educators benefits the institution, stakeholders, and the students.

Key Terms: English Language Learners, Pre-service training, Future educators

Introduction

A large majority of educators do not believe in their ability to accommodate ELL students (Wright et al., 2020). School districts, educators, pre-service training programs, families, and students are affected by the large numbers of ELLs, and unsure how to adequately provide the necessary services to them. Unfortunately, the research on ELLs and providing adequate training for teachers is minimal. Teachers from all grades are seeing an influx of ELL students in their classrooms. (Samson et al., 2012). The faculty members who participated in this study aided in determining the effectiveness of current instructional strategies being used. Solving this problem will lead to a stronger program offered to teachers who are better prepared to work in a diverse classroom environment. (Samson et al., 2012).

Narrative Review

An educator who is prepared to effectively work with English Language Learner (ELL) students can significantly impact education in a positive way (Samson & Collins, 2012). ELL students are often mislabeled and placed in a classroom environment that is not inclusive (Zacarian, 2011).

Teacher preparation programs should prepare teachers to actively engage in inclusive practices for ELL students, and ensure that ELL students' learning needs are being met throughout the program (Coady et al., 2015). All school-levels populations will consist of 25% of ELL students by 2025 (NYU, 2018). This prediction reinforces the need for highly qualified teachers who have extensive training and experience to effectively teach ELL students. Pre-service teachers lack an understanding of inclusion, and believe that professional development is necessary to successfully teach in an inclusive classroom (Stites, et al., 2018).

ELL Statistics

For many years, the ELL student population has drastically increased and this trend will continue in the future (National Clearinghouse on English Language Acquisition [NCELA], 2011). Approximately 40% of this student population will be in elementary classrooms (Russakoff, 2011). As this population is rapidly increasing, the necessary teacher training and experience with ELL students is quite narrow (Cheung & Slavin, 2012; NCELA, 2010; Pereira & de Oliveira, 2015).

It is important for teachers to be trained in evidence-based strategies that will help in developing academically successful ELL students. By researching and deciding what resources are needed for teachers to be successful in teaching ELL students, it is crucial that teacher preparation programs can modify their courses to include strategies with proven results. One way to improve is committing teacher preparation programs a curriculum that offers multiple field experiences throughout the entirety of the program. Pre-service teachers have a stronger sense of self-efficacy with hands-on field experiences which include working directly with a diverse classroom that includes ELL students (Peebles & Mendaglio, 2014).

Due to the substantial increase in the number of ELL students, teachers need sufficient training to modify and accommodate the different types of learners in today's classroom. It is critically important that teachers gain the necessary knowledge, specifically when teaching ELL students in an inclusive environment (Samson & Collins, 2012). ELL students are often placed in a special education environment, which lacks differentiation and accommodations specific to their needs. As previously discussed, many educators are often unprepared to accommodate or modify instruction for ELL students. Some teachers may assume inappropriately by labeling a student as "at-risk" due to poor academic performance. A large percentage of the ELL student population is labeled "at-risk" due to their limited English proficiency. As a result, ELL students are at risk for being inaccurately labeled as having a learning disability (Klingner, Artiles, & Méndez Barletta, 2006). ELL students benefit from exposure to their peers, regardless of their native spoken language (Robertson, 2020). With these challenges in education for teachers, a focus on quality teacher preparation programs and what they should include is highly important to ensure all student's needs are being met. The continued influx of ELL students has resulted in a need for an authentic and inclusive classroom. More importantly, it is a reminder that there is a major need for teachers who are adequately prepared and trained to work with ELL students.

General education teachers are expected to modify and adapt their curriculum in support of ELL students. This is a huge concern as ELL students are the fastest-growing student subgroup in U.S. schools (Cheung & Slavin, 2012). Some ELL students need support with the basic English rules, whereas some ELL students may speak English fluently. English language fluency does not ensure ELL students are strongly skilled in reading and writing, which can affect their overall proficiency. It is necessary that appropriate assessments are used to determine what unique support should be provided, specifically to each ELL student. ELL students are a diverse group of students. Factors such as English proficiency, native languages, and prior educational experiences make this group diverse (Helman, 2009). ELL students are a growing student population, which signals a significant problem in determining how to properly prepare pre-service teachers to support ELL students (Wolf, Herman, & Dietel, 2010).

There is a historical gap in the quality of education ELL students and non-ELL students receive in school (NCES, 2013). The high school dropout rate for ELL students is high and college enrollment is low. Therefore, high school graduation rates for ELL students was significantly lower as compared to non-ELL students. Based on the current research, the teaching strategies when working with ELL students are ineffective (Rodriguez, et al. 2020).

Disadvantages for ELLs

The number of ELL students in the United States is increasing along with a gap in published research on the ELL population. The expectation is for student achievement to be supported by teacher improvement (Calderón, Slavin, & Sanchez, 2011; Cheung & Slavin, 2012). Research has shown that current pre-service teacher training is insufficient in helping

solve problems with ELL students in real-life settings. Teachers lack the proper groundwork to effectively communicate with second language learners (Bell, 2010; Futrell et al., 2003). Young ELL students are already restricted in their development and learning. ELL students face typical barriers that most children deal with in school, but they also face learning a new language and overcoming developmental restrictions (Bell, 2010; Piaget, 1962). These restrictions lead to teacher difficulties in assessing ELL students.

Teacher Preparation Programs

Quality teacher preparation programs that prepare educators to teach ELL students will significantly improve ELL students' statistics. Additionally, teacher preparation will aid in developing self-efficacy for ELL students resulting in more academic success. Research showed that teacher effectiveness and student achievement parallel one another (Ding & Sherman, 2006). Teacher effectiveness and student achievement are "the common denominator in school improvement, and student success is the teacher" (Stronge, Ward, & Grant, 2011, p. 351). Effective teachers are ever-changing through a constant learning process and will continue seeking professional development opportunities.

Educators who commit to being a life-long learner are committed to more success. Researchers discovered there were three main dimensions of teacher effectiveness including managing a learner-focused classroom, being a professional learner, and being strict and examination-oriented (Tajeddin & Alemi, 2019). Pre-service teachers show kindness, patience, and knowledge no matter what subject they are teaching. In contrast, more in-service teachers followed an authoritative strategy by focusing on classroom management, sternness, and being well-behaved. For this to be effective, appropriate modifications and adaptations for ELL students must be in place. Without using differentiated instruction methods for ELL students, they may face unnecessary difficulties or be labeled inappropriately as a student with disabilities (Sullivan, 2011).

To effectively use assessment results, educators must be aware of how to utilize assessment results in delivering content and the strategies that are recommended. Language assessment literacy is defined as "...the acquisition of knowledge, skills, and principles of test construction, test interpretation and use, test evaluation, and classroom-based assessments alongside the development of a critical stance about the functions of assessment within a larger educational context" (Lam, 2015, p. 170). Research provided evidence that even though attempts were made; teacher candidates were not effectively prepared to these teach ELL students (De Jong, Harper, & Coady, 2013; Yucesan & Hughes, 2010). Based on the current research, there is a significant gap in knowing what strategies work best in preparing teacher candidates for ELL student instruction.

To aid in this research, it is vital to determine a teacher's perceptions of their effectiveness when working with ELL students. Teacher's self-efficacy when working with ELL students can impact the strategies they use, the instruction they give, and how they communicate in-and-out of the classroom (De Jong & Harper, 2005; Zheng, 2009). Teacher preparation should include how to communicate with student's families, particularly with ELL families. By developing rapport with a student's family, it can aid in the academic success of the student. Good, Masewicz, and Vogel (2010) explained,

Communication barriers for parents were more deeply rooted in relationships than in language differences. Teachers experienced communication gaps that impeded their relationships with Hispanic parents and students. For both parents and teachers, it was a lack of relationships

that inhibited communication, mutual understanding, trust, and, subsequently, parental involvement (p. 336). Teacher preparation programs should include training on how to develop relationship with families. The rapport between educators and parents plays an important role in the success of the student, especially an ELL student (Bailey, 2017).

Lucas and Villegas (2011) suggested that ELL student's needs have not been addressed adequately in teacher education programs. De Oliveira and Shoffner (2009) suggested that ELL teaching has generally fallen under a "teaching diverse students" category and suggested placing ELL students in this broad category was harmful (De Oliverira & Shoffner, 2009). Responsive teaching consists of collaboration, observing practice, and delivering linguistically appropriate instruction (Nagle, 2013). There is a significant need for the U.S. to improve instruction for ELL students (Giambo, Szecsi, & Manning, 2005; Hooks, 2008). Pre-service and current teachers are largely unprepared to teach ELL students, and the growing number of ELL students enrolling in school magnifies this need.

Zhao (2002) stated, "General education teachers, especially those in states with recent increases in ELLs, are often underprepared to educate ELLs without additional support or professional development" (Giambo et al., 2005, p. 106). The lack of preparedness affects all stakeholders. Capps et al. (2005) found that stakeholders were affected by the unpreparedness in teaching ELL students, which can negatively impact these student's academically. One of the most significant challenges for schools is the quality of general education teachers working with ELL students (Batt, 2008). Educators face many challenges in their profession and found they were not sufficiently trained in their teacher preparation programs to effectively teach ELL students (Hutchinson, 2013). This proves there are many gaps in pre-service education.

Teachers Self-Efficacy

Teachers who lack self-efficacy or feel that everyone should speak English tend to isolate ELL students, while making them feel invisible or even powerless (Yoon, 2008). A teacher's self-efficacy can positively contribute to their teaching and learning (Tschannen-Moran & Hoy, 2001). On the other hand, if teachers doubt their abilities, they will not be able to introduce new learning strategies and question their role in student effectiveness (Yucesan & Hughes 2010). When teachers doubt their teaching abilities, their self-efficacy will suffer in the process. Yucesan and Hughes (2010) found that in-service teachers did not set good examples for the pre-service teachers, and little support was found for ELL students. Pre-service teachers felt their teacher preparation experience left them feeling inadequately prepared to handle these types of situations (Yucesan & Hughes, 2010).

Teachers with a strong sense of self-efficacy can play a large role in achieving academic success in the classroom. A teacher's beliefs are a strong predictor of behavior, which can lead to successful students. With more ELL students in the U.S. than ever before, pre-service teacher's beliefs about students must be understood to ensure positive and productive educational experiences (Clark-Goff & Eslami, 2016). In general education classrooms, teacher's beliefs about ELL students and linguistic diversity were mainly ignored by the administration (Peter, Markham, & Fray, 2013; Polat & Mahalingappa, 2013). The challenge is for teacher preparation program leaders to influence these types of perceptions (Pajares, 1992).

When bringing about positive change in pre-service teacher's beliefs about ELL students, several studies have shown evidence of the teacher education program as responsible for the change in these beliefs (Cabaroglu & Roberts, 2000, Tillema, 1998). Due to the impact of teacher behavior and expectations of ELL students, this positive feedback about teacher education

programs is critical (Clark-Goff & Eslami 2016). Clark-Goff and Eslami (2016) used four methods to design a questionnaire to research this topic. The researchers interviewed course instructors in a teacher preparation program and concluded that the first step in improving ELL student's instruction and achievement was to change the teacher's self-efficacy, decision-making, and instructional practices. ELL teacher education courses can impact pre-service teachers and work towards a more positive future for ELL students by influencing the pre-service teachers' basic notions about language learning, ELL students, and appropriate instructional strategies (Clark-Goff & Eslami, 2016).

What Needs to be Done

Teacher preparation programs should evaluate the current program and integrate curriculum that will prepare pre-service teachers to teach ELLs. Evaluating the program and determining what areas are strong and which areas need modifications is the first step in improving the overall quality of the program. A quality teacher preparation program will experience a higher rate of producing quality educators.

Educators need effective strategies to use with ELL students. Teacher preparation programs should consist of teaching and modeling multiple strategies to pre-service teachers that can be used specifically when working with ELL students. By utilizing multiple strategies, it enables a learner to feel confident (Zimmerman et al., 2006). A student-led environment requires educators who can choose appropriate strategies and model these strategies in the classroom (Murray, 2004; Reder & Strawn, 2001). When students are encouraged by their teacher, they are motivated to succeed. Motivation can lead to higher levels of student success.

Fernandes (2012) found that a pre-service teacher who adopted instruction strategies after observing an ELL experienced classroom success. Using task-based interviews was also an effective strategy when working with ELL students, which resulted in pre-service teachers utilizing this method. This method enables pre-service teachers to adopt effective ELL student strategies and become aware of challenges ELL students face in their academic success. Researchers found that pre-service teacher's field experiences with ELL students were valuable in teaching them effective instructional strategies and improving the ELL student's academic language (McLeman, Fernandes, & McNulty, 2012). It is crucial to find effective strategies for ELL students and increase their educational success.

Wissink and Starks (2019) discovered multiple themes from a case study that focused on educators and their perceptions and preparedness when working with ELL students. The themes found included teacher preparation programs should be more specific in their curriculum in how to effectively teach ELL students; teacher preparation programs should have a stronger focus on how to teach emergent readers, teacher preparation programs should provide field experiences that include experiences focused specifically on ELL students, and developing empathy for ELL students by learning another language (Wissink & Starks, 2019).

The qualitative research design determined if faculty members believed the instructional strategies used are effective with ELL students. Fifteen participants were asked the following interview questions:

Interview Questions

1. How do you integrate strategies into your curriculum that is specific to training pre-service teachers on working with ELLs?
2. How do these strategies prepare pre-service teachers on how to educate ELLs?

3. How have you modified how you instruct pre-service teachers on how to accommodate ELLs?
4. How do the instructional resources available, including textbooks and other in-class materials, as well as electronic tools, support instructional practice to prepare pre-service teachers to work with ELL students?
5. Please describe any training you have received that is specific to training pre-service teachers on how to work with ELLs?
6. What strategies have been explored to increase your students' self-efficacy specific to working with ELLs?
7. How were these strategies decided upon?
8. How were they implemented?
9. How do you think pre-service teachers feel about the skills they have to work with ELLs in the near future?
10. In what ways do you feel that the curriculum you are using prepares pre-service teachers on how to educate ELLs?
11. What other thoughts or feedback about pre-service teachers training specific to ELLs can you add?

Interview Results

Codes were taken from each transcript and combined. They were then categorized into themes based on similarities. Various themes that emerged from this qualitative data is reported in Table 1.

Table 1

Codes and Themes from the Interview Data

Themes	Codes	Examples of Participants' Words
Strategies	Awareness	Other than bringing an awareness to the situation, we didn't work on strategies at all.
	Feedback	I think talking about it, giving them feedback and suggesting ways they can make it better talking about it in class, talking about a case study and saying "Hey, how do you solve this problem?"
Diversity	Challenges	We talk a lot about diversity and some of the challenges with it, though, because some of my students are exposed prior to being in the education program.
	Discussion	I don't know that it's extensive enough. We hit on it in diversity. We hit on it in classes, we talk about it, and we have them incorporate it. I don't know that I ever see them put it into place unless it's an observation of their internship.
Differentiation	Modifying Lessons	They have to incorporate ways that they're going to work, they're going to differentiate, or they're going to modify their lessons for the students and most people have English learners in their class.
	Change	I realize that we've got to talk about differentiation, we've got to talk about how you have to know your students in order to teach and change assessments and change how you teach them.

	Different Backgrounds	You might have gifted students that you differentiated, you might have ELL students that you differentiate for, but how are you differentiating your instruction?
Technology	Online Tools	They have to have different kinds of online tools and resources that they actually provide to students that students just don't go out and pick their own resources.
	Supplement	I think we shouldn't be using textbooks as much as we are. I generally supplement quite a bit. Just because there's technology doesn't mean it's good.
	Multiple Methods	We should be incorporating technology in to show real world teaching experiences with our students, and how to better address that, then through the use of technology during that pre-service training phase.
Training	Strategies	Five years ago, this wasn't even a consideration. Other than bringing an awareness to the situation, we didn't work on strategies at all.
	Professional Development	We actually will complete three hours of a professional development course, specifically geared to ELLs in the course.
	ELL Training	I have not received any specific training, pretty much self-taught.
	Resources	I think there needs to be more trainings. If there was more information or professional development, materials, resources out there, I think more people could get trained on their own time.
Resources	Textbook	It's just one chapter, I don't think that there is enough out there. That is why I supplement with podcasts and with blogs. It's definitely not enough.
	Materials	With the advent of technology, with the advantage of Google, and all the media platforms that are there, it's much easier now to have access to teaching materials that you can use.
Preparation	Problem	I feel comfortable saying we're not doing what we need to do, I'm glad I'm not the only one feeling like this is a problem.
	Information	There is some preparation, some information out there. I think that we should include probably more training.
	Depth	I believe it is minimal. I think it's just barely scratching the surface of what they need to truly be able to work with ELL students. It's an overview. It does not go into depth on actually working with ELL students.
	Curriculum	I don't think we truly prepare them to teach ELL students, especially in the populations that they're in.

Themes were identified by using a word search. The results of the word search can be found in the Frequency Codes Across Interview Data as reported in Table 2.

Table 2
Themes and Frequency Codes Across Interview Data

Themes	Code Word	Occurrences Across Data
Strategies	Awareness	21
	Feedback	18
Diversity	Challenges	27
	Discussion	8
Differentiation	Modifying Lessons	31
	Change	14
	Different Backgrounds	20
Technology	Online Tools	24
	Supplement	6
	Multiple Methods	6
Training	Strategies	130
	Professional Development	19
	ELL Training	119
	Resources	46
Resources	Textbook	32
	Materials	21
Preparation	Problem	29
	Information	21
	ELL Students	40

Interview Discussion of the Findings

Eight different themes emerged from the interviews. They are as follows: strategies, diversity, differentiation, technology, training, resources, and preparation.

Strategies

The first theme to emerge was strategies. A participant stated, “Other than bringing an awareness to the situation, we didn’t work on strategies at all.” Several participants reported that they bring awareness of ELLs in the classroom but did not teach or discuss specific strategies to pre-service teachers. Awareness was mentioned 21 times (see Table 2 above) in the interviews as most participants seemed to struggle with implementing strategies specific to preparing pre-service teachers in working with ELLs.

Diversity

The second theme to emerge was diversity. A participant said “I don’t know that it’s extensive enough. We hit on it in diversity. We hit on it in classes, we talk about it, and we have them incorporate it. I don’t know that I ever see them put it into place unless it’s an observation of their internship.” Many of the participants discussed the challenges of implementing enough content about diversity in the classroom and having discussions in class about diversity but stated that it was limited. “Challenges” were mentioned 27 times while “discussion” was mentioned eight times (see table 2 above). This reiterated that participants are finding that implementing a larger focus on pre-service training specific to ELLs is a challenge.

Differentiation

The third theme to emerge was differentiation. Participants discussed “modifying lessons” 31 times. Additionally, “change” was mentioned 14 times with “different backgrounds” discussed 20 times (see table 2 above). One participant stated “I realize that we’ve got to talk about differentiation, we’ve got to talk about how you have to know your students in order to teach and change assessments and change how you teach them.” Several other participants discussed similar feelings of the need to discuss differentiation to students.

Technology

The fourth theme to emerge was technology. Participants discussed “online tools” 24 times (see table 2 above). According to one participant, “we should be incorporating technology in to show real world teaching experiences with our students, and how to better address that, then through the use of technology during that pre-service training phase.” Several participants mentioned that they encourage using technology as a resource for working with ELL students. Some participants expressed that all technology is not good and caution should be used when selecting online tools to use for pre-service training.

Training

The fifth theme to emerge was training. Multiple code-words were extracted from this theme. They include the following: strategies, professional development, ELL training, and resources. “Strategies” was mentioned 130 times, “professional development” was mentioned 19 times, “ELL training” was mentioned 119 times, and “resources” was mentioned 46 times (see table 2 above) in the interviews. Most participants expressed a weakness in using strategies specific to ELLs with pre-service teachers. One participant said “I think there needs to be more trainings. If there was more information or professional development, materials, resources out there, I think more people could get trained on their own time.” Several participants mentioned they would like more training on strategies to use with pre-service teachers specific to working with ELLs.

Resources

The sixth theme to emerge was resources. “Textbook” was used by participants 32 times while “materials” were mentioned 21 times (see table 2 above). While discussing a textbook being used, a participant stated “it’s just one chapter, I don’t think that there is enough out there. That is why I supplement with podcasts and with blogs. It’s definitely not enough.” This was a common feeling amongst most of the participants.

Preparation

The final theme to emerge was preparation. Multiple code words developed from this theme and include the following: problem, information, and ELL students. “Problem” was mentioned 29 times, “information” was mentioned 21 times, and “ELL students” was mentioned 40 times (see table 2 above). A participant stated “I don’t think we truly prepare them to teach ELL students, especially in the populations that they’re in.” Another participant said “I feel comfortable saying we’re not doing what we need to do, I’m glad I’m not the only one feeling like this is a problem.” Several participants mirrored these statements in their feelings on preparing pre-service teachers to work with ELL students.

Survey Procedures

A five-point Likert scale survey was administered electronically through Google Forms. The survey explored how faculty members feel about ELL instruction in the teacher education program.

The sample is a purposeful sample because of the faculty members will be familiar with the curriculum used in the teacher education program (Creswell & Poth, 2019). Fifteen faculty members completed the survey. The prompts on the survey included the following questions:

Survey Questions

1. Instruction specific to working with ELL's is delivered with the same rigor as other areas of diversity.

5	4	3	2	1
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

2. Training for ELL instruction is provided for faculty to collaborate and discuss strategies to utilize for pre-service teachers.

5	4	3	2	1
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

3. Data is collected to determine future instruction for pre-service educators who will work with ELL's.

5	4	3	2	1
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

4. Content taught in your course is clearly communicated and includes strategies to work with ELLs.

5	4	3	2	1
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

5. On-going support and resources specific to preparing pre-service teachers to work with ELLs are available to you.

5	4	3	2	1
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

6. Professional development serves the instructional needs of preparing pre-service teachers to work with ELLs.

5	4	3	2	1
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

7. As a faculty member, you are confident in your ability to teach pre-service teachers' curriculum that prepares them to work with ELLs.

5 **4** **3** **2** **1**
Strongly Agree Neutral Disagree Strongly
Agree

8. Faculty should receive yearly professional development to use with in preparing pre-service teachers to work with ELL students.

5 **4** **3** **2** **1**
Strongly Agree Neutral Disagree Strongly
Agree

9. Strategies for communicating with families in and out of the classroom are used in the curriculum you teach.

5 **4** **3** **2** **1**
Strongly Agree Neutral Disagree Strongly
Agree

Table 3

Frequency and Average of Survey Responses

Note: *Averages for each question was calculated by multiplying each response value by the corresponding Likert scale value and summing the results and then dividing the results by the total number of participant responses to the question*

Question	Frequency					Avg.
	5	4	3	2	1	
1. Instruction specific to working with ELL's is delivered with the same rigor as other areas of diversity.	0	5	2	2	1	3.1
2. Training for ELL instruction is provided for faculty to collaborate and discuss strategies to utilize for pre-service teachers.	0	2	0	4	4	2.0
3. Data is collected to determine future instruction for pre-service educators who will work with ELL's	0	3	0	4	3	2.3
4. Content taught in your course is clearly communicated and includes strategies to work with ELLs.	0	5	4	0	1	3.3
5. On-going support and resources specific to preparing pre-service teachers to work with ELLs are available to you.	0	3	3	4	0	2.9
6. Professional development serves the instructional needs of preparing pre-service teachers to work with ELLs.	0	2	6	1	1	2.9
7. As a faculty member, you are confident in your ability to teach pre-service teachers' curriculum that prepares them to work with ELLs.	1	3	2	3	1	3.0

8. Faculty should receive yearly professional development to use with in preparing pre-service teachers to work with ELL students.	4	5	1	0	0	4.3
9. Strategies for communicating with families in and out of the classroom are used in the curriculum you teach.	4	4	1	0	1	4.0

Survey Discussion of the Findings

Based on the survey data, questions 2, 3, 5, and 6 received the lowest ratings. All other questions received an average of 3.0 or greater. Questions 2 and 7 were of similar interest, which addressed training and professional development available for faculty. In the survey, participants indicated that professional development specifically related to ELL instruction is not provided. Question 2 scored an average of 2.0 out of 5—the lowest score of any question on the survey. The lack of training for ELL instruction provided to faculty members is reason for consideration of a focus on offering professional development to strengthen ELL instruction which would better prepare pre-service teachers for their career in education. Question 7 received an average score of 3.0. This question addressed the confidence of the participant in their ability to teach pre-service teachers' curriculum that includes instruction on working with ELL's. This score equates to that the faculty do not agree or disagree with this statement. Questions 1, 4, 8, and 9 all received an average greater than 3.0. Question 1 addressed the rigor of instruction specific to working with ELL's and it received an average score of 3.1. This average is evidence that the curriculum in use should be examined. Question 4 addressed if the content taught in courses was clearly communicated and included strategies to work with ELLs. The average score is 3.3 out of 5. This average revealed that there is a need to incorporate strategies to work with ELLs in multiple courses. Question 8 is related to question 2 and 6 as these questions share the topic of professional development. Question 8 received an average score of 4.3 out of 5. It is reasonable to consider that a majority of the participants feel that professional development with preparing pre-service teachers on how to work with ELL's should be offered annually. Question 9 is related to curriculum that includes strategies on communicating with families and received a score of 4 out of 5.

Final Thoughts

Experiences can shape a person's attitudes and beliefs (Markos, 2012). Professional development can provide opportunities for people to share different perspectives while continuing to shape their attitudes and beliefs. With effective pre-service teacher preparedness to work with ELL students, the chance of a connection between ELL students and the educator can increase. Self-efficacy and the need to adapt materials are required for academic success. Teachers of all subject areas should exhibit the ability to work with ELL students in an effective manner.

To achieve academic success for all students, teacher preparation programs should consist of a curriculum that models and teaches multiple effective strategies on how to teach in an inclusive classroom environment, which is needed for pre-service teachers including ELL students. Not only should pre-service teachers learn how to teach ELL students, but they should also model these strategies during field experiences. Field experiences for pre-service teachers have shown to be effective in changing attitudes, self-efficacy, and working effectively with ELL students (Jimenez-Silvia, Olson, & Jimenez, 2012; Yucesan & Hughes, 2010). Teacher preparation programs should also provide specific opportunities for pre-service teachers to work

with ELL students and develop a communication strategy when working with ELL student's parents. By understanding the importance of this collaboration and developing a strong rapport with ELL parents, it plays a significant role in the success of ELL students.

Across the United States, teacher preparation programs must evaluate their current curriculum and determine if it is effective in a changing educational environment. A teacher preparation program should support pre-service teachers and prepare them to effectively teach ELL students. By evaluating their current program and making the necessary changes, the likelihood of producing quality teachers will increase. Teacher preparation programs should also incorporate the social cognitive theory into their curriculum. By doing so, they will provide multiple opportunities for pre-service teachers to self-observe, self-evaluate, self-react, and discover their self-efficacy. In return, this will better prepare pre-service teachers to work with ELL students in a classroom environment.

Due to a national teacher shortage, it is difficult to ensure quality teachers are leading U.S. classrooms. The national teacher shortage has been in effect for several years. In several states, there is such a huge demand for teachers that they do not require teachers to be certified in their subject area. Additionally, teachers who do not have the required training are twice as likely to leave the field of education (Sutcher, Darling-Hammond, & Carver-Thomas, 2016). With an extreme urgency to fill teaching positions, the quality of an educator is a low priority. This is a massive disservice to all students, particularly ELL students. Quality teacher preparation programs should remain a top priority as well as having quality educators inside of all classrooms.

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Association between School District Educational Resources, Socioeconomic Status, and STEM Educational Outcomes

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Abstract

School district resources and county-level characteristics may be associated with student outcomes. This study used data for 211 out of 265 school districts in Arkansas to examine the relationship between multiple demographics, education, behavior, and area-level characteristics with Advanced Placement (AP) science, technology, engineering, and mathematics (STEM) enrollment and performance. Findings showed strong associations between school district and county-level variables with STEM performance but not AP STEM enrollment. Efforts to improve resource allocation to low-resource districts may be an important step for ensuring a strong STEM education across all populations.

Key Words: Educational Resources, Socioeconomic Status, STEM Education

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Introduction

According to the 2022 Health Workforce Report, healthcare workers are predominately White in the state of Arkansas. Specifically, around 62% of Arkansans are White (United States Census Bureau, 2021); however, 90% of dentists, 78% of specialty surgeons, 87% of registered nurses, 87% of pharmacists, and 79% of psychologists are White (Arkansas Minority Health Commission, 2022). Having a diverse healthcare workforce is critical for ensuring that all populations have access to high-quality healthcare.

The course of action to increase the number of minority healthcare workers should be approached from all angles, starting with increasing the number of students entering careers in science, technology, engineering, or mathematics (STEM). While there are many individual-level characteristics and experiences that may influence STEM education, many school district-level factors may also influence STEM education. Therefore, the purpose of this analysis was to measure the relationships between factors at the school district level including educational resources, student outcomes, and socioeconomic status.

Methods

For this project, we obtained information for 211 of the 265 Arkansas school districts, including demographics, education, area-level demographics, and employment information. We defined advanced placement (AP) STEM enrollment based on the total student counts in AP biology, calculus AB or BC, chemistry, environmental science, statistics, or physics 1, 2, B, or C

per 1,000 students in grades 9 through 12 using 2020-2021 school year data from the University of Arkansas (UofA) Office of Education Policy (OEP) data (University of Arkansas Office for Education Policy, 2022). Percent meeting STEM benchmark came from 2020-2021 school year data from the UofA OEP data and indicates the percent that met the readiness benchmark for ACT Aspire testing. The going to college rate came from the latest year available, 2018-2019, from the UofA OEP data. The percent free/reduced lunch, percent non-White students, and percent Black students came from the Arkansas Department of Education (ADE) Data Center (Arkansas Department of Education, 2023) for the 2020-2021 school year. The percent rural and the number of primary care providers, dentists, and mental health providers per 100,000 came from the 2021 County Robert Wood Johnson Foundation County Health Rankings data (University of Wisconsin Population Health Institute and Robert Wood Johnson Foundation, 2023).

The collected data were analyzed using Pearson correlations, averages, minimums, and maximums. We identified correlations ≤ 0.3 as weak/neutral, $0.3-0.5$ as moderate, and ≥ 0.5 as strong. The analyses were conducted in Stata, and visualizations were made in Tableau. The project was deemed non-human subjects research by the [blinded] Institutional Review Board.

Results

Table 1 provides maximums and minimums for each school district-level and county-level variable. We found large variations in several variables, including the percent free/reduced lunch (range: 8.6% - 100.0%), percent Black students (range: 0.0%- 95.8%), percent of students meeting STEM benchmark (range: 0.0% - 28.0%), and STEM AP per 1,000 students (range: 0.0 – 383.2).

Table 1
Summary Statistics for Study Variables

Variable	Mean	Minimum	Maximum
<i>School district-level variables</i>			
Percent Free/Reduced Lunch	71.0	8.6	100.0
Percent Black Students	16.6	0.0	95.8
Percent Non-White	29.8	3.0	98.6
Percent Going to College	50.0	20.7	85.7
Percent Met STEM benchmark	10.3	0.0	28.0
AP STEM Enrollment per 1,000	61.8	0.0	383.2
<i>County-level variables</i>			
Percent rural	54.9	12.3	100.0
Primary Care Providers per 100,000	54.3	6.7	126.8
Dentists per 100,000	42.0	9.7	77.6
Mental Health Providers per 100,000	183.8	5.6	625.7

Figure 1 shows the correlations between each of the school district and county-level variables with AP STEM enrollment. There were neutral correlations between the AP STEM enrollment variable versus each of the school district and county-level variables, with the strongest correlation found between AP STEM enrollment and the percent of individuals living in a rural area (corr. -0.220).

Figure 1

Correlations with STEM Enrollment

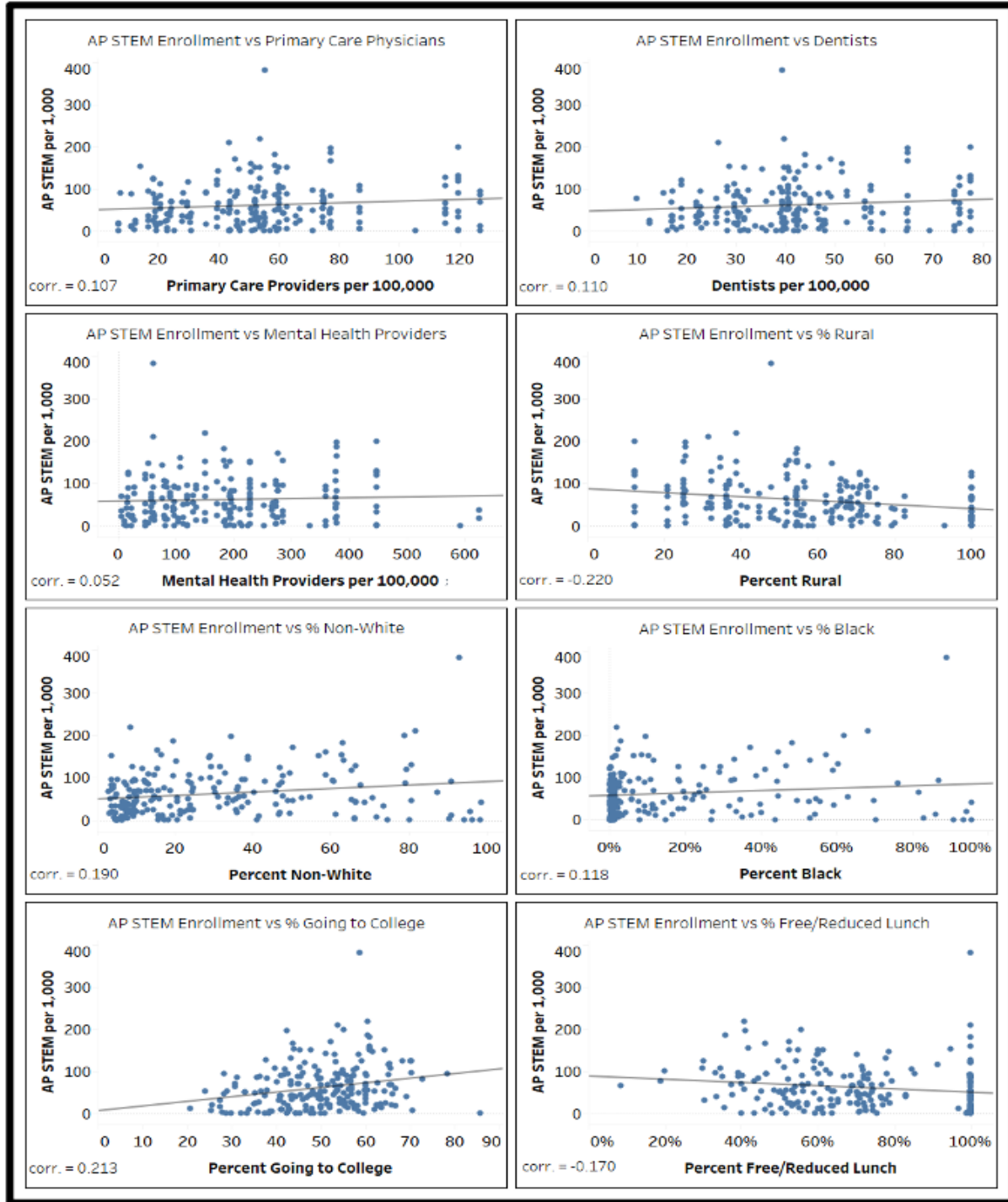


Figure 2 provides the correlations between the percent that met the STEM benchmark and the school district and county-level variables. The percentage met the STEM benchmark versus the percent Non-White students (corr. -0.500), the percentage met the STEM benchmark versus the percent Black students (corr. -0.571), and the percentage met the STEM benchmark versus the percent free/reduced lunch (corr. -0.660) all showed strong negative associations. In addition, the percentage that met the STEM benchmark versus the percentage going to college (corr. 0.292)

showed a positive association. There were no strong relationships between the percent meeting the STEM benchmarks and the county-level healthcare provider variables.

Figure 2
Correlations with Meeting STEM Benchmark

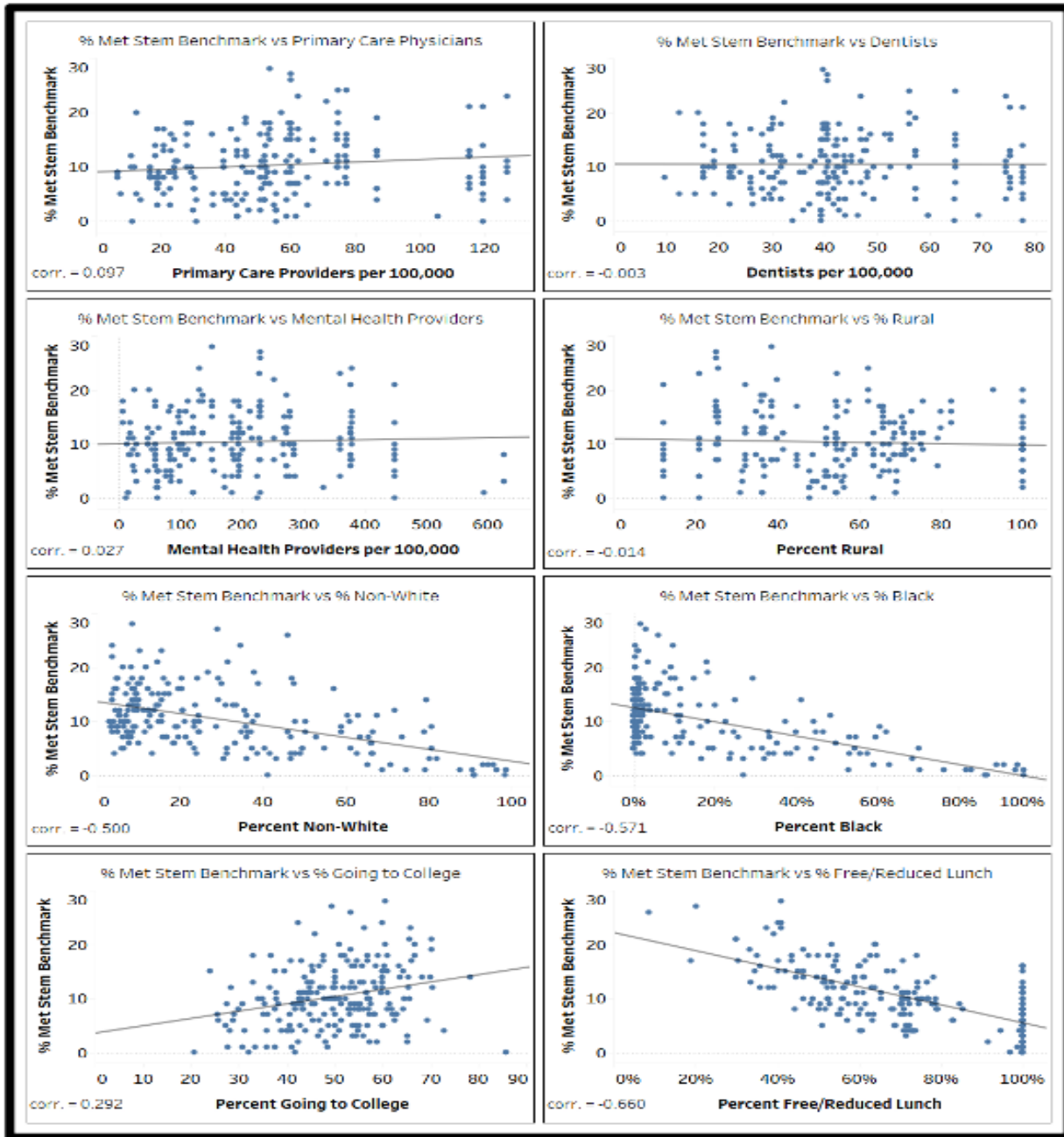
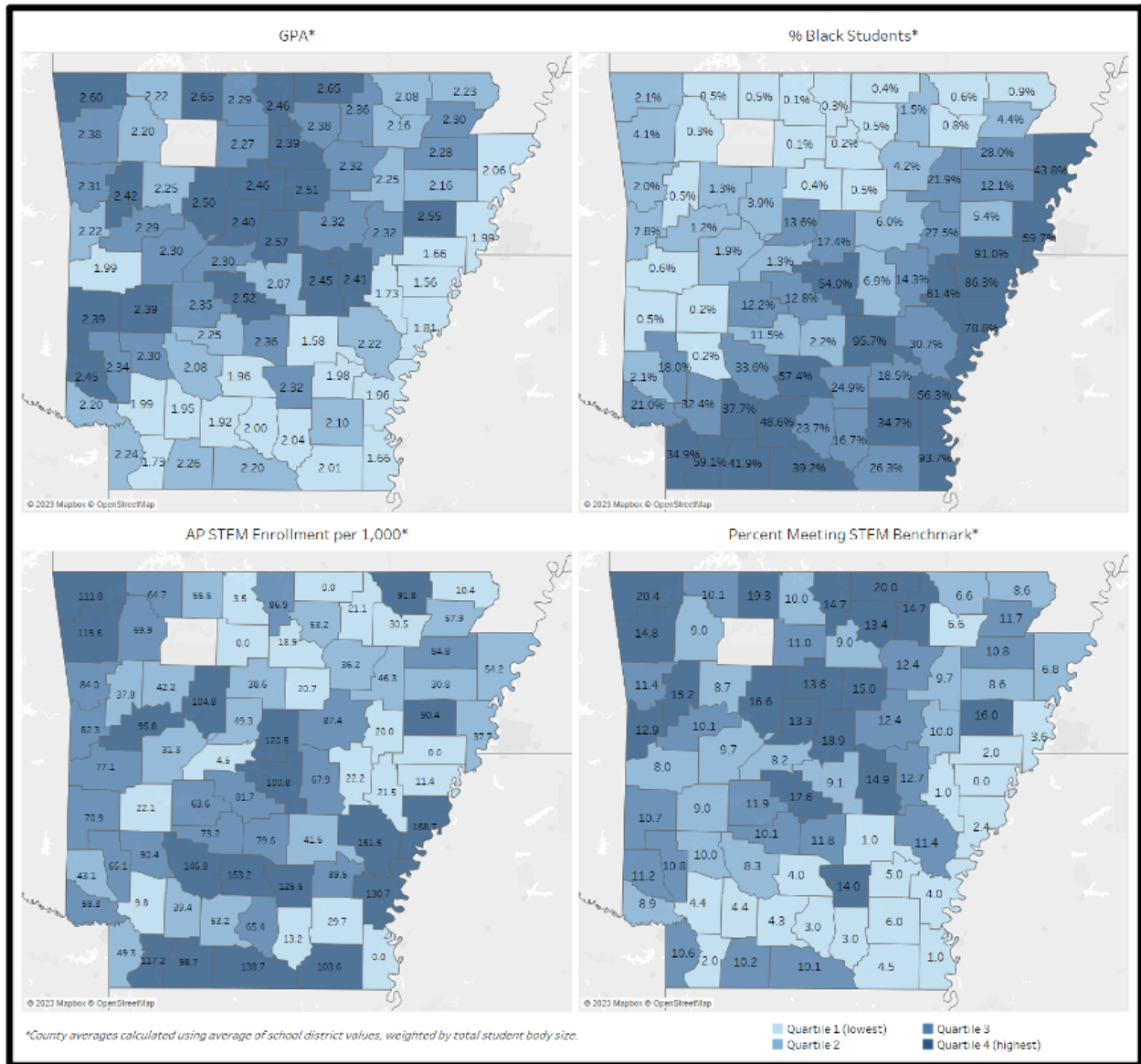


Figure 3 provides the geographic distribution of outcomes across counties. Northwestern counties in Arkansas have higher grade point averages and percent meeting STEM benchmarks than the rest of the state, and southeastern and eastern counties had the lowest grade point averages and percent meeting STEM benchmarks.

Figure 3

Maps of Selected Study Outcomes



Discussion

This study evaluated school district variables to better understand access to STEM education in Arkansas. The results emphasized that there are critical relationships between multiple factors that affect STEM education at the high school level. One of the main takeaways from these results is that the AP STEM enrollment among students is similar across all factors; however, when the results of the STEM benchmark are analyzed, there are large disparities across schools. For example, the percentage of Black students versus AP STEM enrollment has a flat or no trend, meaning that as the percentage of Black students increases or decreases the AP STEM enrollment is about the same. However, when observing the percentage of Black students versus the percent that met the STEM benchmark, there is a strong negative association. This means that as the percentage of Black students increases in a given school district in Arkansas, then fewer students are meeting the STEM benchmark.

There were limitations and strengths to this study. One limitation was that the information included was data at the school district level. This was a limitation because data was not able to be captured on individual students and each student's experiences are not considered when drawing conclusions and trying to address those specific issues. Another limitation was that important information was not able to be analyzed, such as meeting the STEM benchmark among each race/ethnicity. Being able to study and analyze on an individual basis would allow for a narrower approach to identifying factors associated with meeting STEM benchmarks. In this study, we found strong relationships between school district variables and STEM benchmark performance; however, there was no relationship with healthcare providers at the county level. Future studies should better understand factors associated with geographic and racial disparities in the distribution of healthcare providers in Arkansas.

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Arkansas Novice Teachers: Teacher Education Program Preparedness, Prior Experience, and Self-Efficacy

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Abstract

This phenomenological study was conducted to examine the perceptions regarding overall preparedness of novice teachers in Arkansas. Participants for this study were Arkansas novice teachers who completed Arkansas teacher education programs. Virtual interviews were used to further understand the lived experience of being an Arkansas novice teacher. The data revealed that preparation programs can have a direct influence to how well novice teachers apply classroom management skills, develop curriculum and instruction, and communicate with families. The data also revealed that prior experience in educational settings can impact novice teachers' self-efficacy. The results of this study offer perspectives that have promise to decrease teacher attrition and increase teacher retention.

Keywords: Alternative teacher pathway, novice teachers, teacher attrition, teacher self-efficacy, traditional teacher program

Introduction

Teacher education programs in the United States are as diverse as the student population in the nation's schools. Each program has specific course requirements, and individual states have certain conditions for completion. There are also alternative programs that offer alternative routes to teacher licensure, which have been created over the years due to the student decline in teacher education programs (Park et al., 2018) and teacher shortages. Due to this decline and other circumstances, such as the recent pandemic, opportunities continue to arise for states to adopt additional pathways (Slay et al., 2020). Therefore, novice teachers' exposure to different teacher education program experiences can impact levels of preparedness in regards to classroom management, curriculum and instruction, and communication with families, which are primary elements for any educator.

Arkansas continues to face a shortage in educators, specifically certified educators (TNTP, 2021; Wong, 2023). Newly created pathways have been introduced and developed for pre-service teachers which consist of alternative, short-term, and special certificates to combat the teacher shortage and diversity of teachers within the nation (Park et al., 2018). However, even with the implementation of alternative programs to teacher education preparation, teacher shortages continue (Park et al., 2018). Teacher shortages are also problematic nationwide and can be partially attributed to novice teachers who are not adequately prepared in their teacher education program (Guha et al., 2017). Novice teachers who complete a teacher education program with a traditional internship tend to remain in their positions compared to those who do not have traditional internship experiences (Guha et al., 2017). Further data, in the form of first-hand experience from novice teachers who have completed a teacher education program or an alternative pathway to licensure is important for the field of education.

Review of Literature

There is a decline in the number of teachers in education due to teacher attrition within the first three to five years of teaching (Guthery & Bailes, 2019). Teacher attrition occurs for many reasons and within the first few years, higher attrition rates can occur. Teacher self-efficacy

levels can lead to teachers leaving or remaining in the field of education. If a teacher has higher levels of self-efficacy, and more confidence in their abilities, they may be more likely to remain in education. However, if a teacher has lower self-efficacy, they may leave the field altogether in search of another career. This study explored perceptions of Arkansas novice teachers based on their experiences in the classroom as they construct knowledge overtime through those experiences and how those experiences may or may not influence teacher retention, through the lens of social cognitive theory, specifically teacher self-efficacy.

Self-efficacy is defined by Bandura (1977, 1986, 1989, 1994, 1997) as a person's belief in one's ability to be successful in completing a task. Bandura (1997) further described self-efficacy as a belief in what someone can endure during certain circumstances with the knowledge and skills they have to date. Therefore, when a person does feel confident in their ability or have a higher level of perceived efficacy, then they are more likely to succeed in their current role (Bandura, 1982, 1997). If a person has strong beliefs in themselves, then they are more likely to pursue goals and withstand hardships until they succeed (Bandura, 1982, 1997). Thus, novice teachers who have a higher perceived self-efficacy will be more likely to remain in the field of education, whereas, the teachers who have lower self-efficacy might leave their position in search of another career outside of education.

Bandura's research further led to the identification of concepts within teacher self-efficacy. Teacher self-efficacy is one's belief in his or her ability to impact student learning which can include outcomes, achievement, behavior, and engagement (Bandura, 1993; Bandura 1997). Therefore, when teachers believe that they can influence a student, they can be more effective with their instruction. Teacher self-efficacy can be critical as it relates to their level of quality and effectiveness within management, curriculum and instruction, and communication with families (Bandura, 1993). Consequently, teachers who do have a higher level of self-efficacy are more likely to show professional growth, have a more positive attitude toward teaching, and are more open to feedback and ideas from others (Tschannen-Moran et al., 1998). Teachers who have low self-efficacy may leave the field of education instead of continuing to work in a position where they feel unsuccessful (Blackburn et al., 2017; Tschannen-Moran & McMaster, 2009).

Traditional vs. Alternative Pathways

Previous research has compared traditional vs. alternative pathways to becoming an educator. Most research pointed to the advantages of traditional pathways over alternative pathways; however, it could be due to the level of training provided (Koedel et al, 2015; Raymond-West & Rangel, 2019). The traditional route in Arkansas consists of pre-service teachers attaining a degree, completing an educator preparation program (EPP) with field experiences, and receiving a passing score on specific Praxis exams.

There are several Arkansas colleges and universities that offer traditional pathways to teacher licensure. As of 2020, there are twenty-one programs amongst Arkansas colleges that offer K-6, elementary education, thirteen programs that offer middle childhood or middle level, grades 4-8, and a number of programs ranging from two to eighteen for secondary and multi-level core content programs ("Approved Educator", n.d.). Other offerings include foreign language, visual and performing arts, career and technical education, special education, and several add-on endorsements that require a standard teaching license ("Approved Educator", n.d.).

As of 2021, Teachers in Arkansas have eight (8) alternative pathways available to them

(“Alternative Routes”, n.d.). Therefore, people without an education degree who want to be a teacher can select from a few different available options. If a person currently holds a bachelor's degree in another field of study, they can complete a master's degree, referred to as MAT., MTL, or MEd, which will lead to first-time licensure (“Alternative Routes”, n.d.). Another option available is the ArPEP which is the Arkansas Professional Educator Pathway that is more work-based (“Alternative Routes”, n.d.). American Board also has a pathway called ABCTE, where people with a bachelor's degree can apply to the program leading to Arkansas licensure in all middle level, grades 4-8, areas, such as biology, chemistry, physics, English, social studies, and math (“Alternative Routes”, n.d.). Another option for licensure for middle level or secondary in Arkansas is the Provisional Professional Teaching License, which also requires a person to hold a bachelor's degree and complete other application requirements to be approved into the program (“Alternative Routes”, n.d.). Arkansas Teacher Corps, Teach for America, eStem Residency Program, and Prism Teacher Institute are other options available to those who want to become a teacher in Arkansas as an alternative to traditional teacher education programs (“Alternative Routes”, n.d.). However, some alternative programs, like Teach for America, are being criticized for lack of specified training and high attrition rates (Sexton, 2017). The unified goal is to retain teachers, especially in the higher shortage areas. Research needs to look at overall preparedness through a self-efficacy lens to find areas to support novice teachers and retain them once they are in the classroom.

Methodology

The purpose of this qualitative phenomenological research study was to examine the perceptions of novice teachers regarding their overall preparedness which may have impacted their self-efficacy in classroom management, curriculum and instructional planning, and communication with families after their completion of a teacher education program. The study utilized individual virtual interviews via Google Meet software and lasted approximately 25-45 minutes. The interview questions were initially tested for dependability in a study pilot. The pilot test included two participants who are currently Arkansas teachers and have been teaching for at least 1-3 years. The interview questions were revised based on feedback from the two participants in the pilot study. The interview questions (Appendix A) included demographic questions and eight specific questions stemmed from subtopic components driven from the literature review. Additional probing questions were asked if more information was needed. The results of this study may inform current practices and future research for teacher education programs.

The following research questions were explored for this study:

Research Question 1: What are the perceptions of novice teachers regarding their self-efficacy in relation to classroom management after the completion of a teacher education program?

Research Question 2: What are the perceptions of novice teachers regarding their self-efficacy in relation to curriculum and instruction after the completion of a teacher education program?

Research Question 3: What are the perceptions of novice teachers regarding their self-efficacy in relation to communication with families after the completion of a teacher education program?

Results

Ten participants were recruited across the state of Arkansas. All participants had to be

currently employed in an Arkansas School District and had completed an Arkansas Teacher Education program. The participants had to be considered a novice and, for the purposes of this study, defined as an educator who was in the first contracted year, second year, or third year in the classroom. Out of the sample population, nine identified as female, and one identified as male. The age of participants varied from the early twenties to the early forties. Three of the ten participants have completed a master's degree.

All participants completed an Arkansas teacher education program. Two completed an online teacher education program at the University of Arkansas at Monticello (UAM), three completed at Arkansas State University (Astate), one completed the Arkansas Professional Educator Pathway (ArPEP) administered by the Division of Elementary and Secondary Education (DESE), one at the University of Arkansas at Little Rock (UALR), one at Harding University (HU), and two at University of Central Arkansas (UCA). Five participants are hired in Northcentral Arkansas, two in Central Arkansas, two in Northwest Arkansas, and one in Southeast Arkansas. Seven of the participants identified their ethnicity as Caucasian, one as Asian, one as Native American, and one as Pacific Islander/Caucasian. Seven of the participants are in their first year of teaching; and when interviewed most participants had only been teaching for about four or five weeks in total. One participant was in their second contracted year, and two other participants were in their third contracted year of teaching.

The participants were assigned a pseudonym as an identifier and the results are reported with the participants' pseudonyms. Participants are chronologically listed in the tables per interview date from first to last. Demographic information and teacher education preparation programs are listed in Table 1. Table 2 included the current position of each participant, contracted year, teaching location, and highest level of education to date. All information listed in Table 1 and Table 2 are included below.

Table 1

Teacher Education Preparation Programs and Demographic Data of Participants

Name (pseudonym)	Gender	Age	Ethnicity	Teacher Education Preparation Program
June	Female	26	Caucasian	UAM
Sophia	Female	35	Caucasian	Astate
Delilah	Female	31	Caucasian	ArPEP
Rachel	Female	33	Caucasian	UALR
Ashton	Female	35	Caucasian	Astate
Jim	Male	33	Caucasian	Astate
Kyra	Female	42	Native American	HU
Gillian	Female	22	Pacific Islander/Caucasian	UCA
Lilith	Female	23	Asian	UCA
Katrina	Female	25	Caucasian	UAM

Note. UAM=University of Arkansas at Monticello; Astate=Arkansas State University; ArPEP=The Arkansas Professional Educator Pathway; UALR=University of Arkansas at Little Rock; UCA=University of Central Arkansas; HU=Harding University.

Table 2*Participants' Education, Location, Current Position, and Total Years*

Name (pseudonym)	Current Position	Contracted Year	AR Location	Education Completed
June	1 st	2	Northcentral	BSES, MAT
Sophia	2 nd	1	Northcentral	BSE (K-6)
Delilah	7 th , 9 th -12 th S	1	Central	MS Biology
Rachel	7 th -8 th S and M	3	Northcentral	BSE (4-8)
Ashton	5 th	1	Northcentral	BSE (K-6)
Jim	5 th grade S and M	1	Northcentral	BSE (K-6)
Kyra	5 th M	1	Northwest	BSE (K-6)
Gillian	5 th SS	1	Central	BSE (4-8)
Lilith	4 th S	1	Northwest	BSE (4-8)
Katrina	8 th S	3	Southeast	BSBA, MAT

Note. S=Science; M=Math; SS=Social Studies; ELA=English Language Arts; BSES=Bachelor of Science in Educational Studies; BSE=Bachelor of Science in Education; MS=Master of Science; GT=Gifted and Talented; MIR=Master in International Relations; MAT=Master of Arts in Teaching; BSBA= Bachelor of Science in Business Administration

Research Question 1: What are the perceptions of novice teachers regarding their self-efficacy in relation to classroom management after the completion of a teacher education program?

Based on the findings, eight of the ten total participants' self-efficacy was high in regards to classroom management. Participants in the study had prior knowledge from previous work experiences or observations and internships, as well as knowledge from program coursework. The two participants who reported a lower self-efficacy, all explained that they struggled with managing the classroom. Interview participants discussed learning from clinical supervisors or asking for help and suggestions from veteran teachers in the building they worked in. Based on the participants' responses, implications include prior experience in an educational setting can impact self-efficacy in regards to classroom management, and support received from clinical teachers during education program internship and support received from veteran teachers after completion of the program impact perceived self-efficacy regarding classroom management.

Participants described the structure of their education preparation program. All ten participants discussed a classroom management course or session which was a program requirement. Since completion of the teacher education preparation program, none of the participants had attended a professional development session which was specific to classroom management as a standalone. Some participants did mention there were aspects of novice teacher training or another professional development that mentioned classroom management practices, but it was not the sole focus of the session. Based on participants' responses, program requirements for traditional, nontraditional, and alternative pathways in Arkansas were similar in structure, specifically with coursework or training requirements, and can impact perceived self-efficacy in classroom management. Professional development opportunities in Arkansas

described by participants are either in-person at a local educational cooperative, in-person at their school district, or online through Arkansas Ideas. The professional development sessions discussed did include classroom management components, but did not focus solely on classroom management, which may impact perceived self-efficacy as a novice teacher in Arkansas. Some participants discussed professional development sessions titled novice teacher training, which provided support to the participants as a novice teacher. The support from clinical supervisors, administrators, and other teachers impacted interview participants' overall perceived self-efficacy for classroom management.

Research Question 2: What are the perceptions of novice teachers regarding their self-efficacy in relation to curriculum and instruction after the completion of a teacher education program?

Out of the ten total participants, five participants reported a lower self-efficacy in regards to curriculum and instruction. Four of those five participants said their self-efficacy in classroom management was higher than their self-efficacy in curriculum and instruction. Out of those five participants who reported lower self-efficacy, two of them completed an online teacher education preparation program, one completed an alternative pathway to licensure, and the other two completed a traditional teacher education program. One of the two who completed an online teacher education program, one participant did have traditional internship experiences, while the other did not have any internship experiences. Three of the five participants who had a perceived lower self-efficacy for curriculum and instruction are in their first-year.

Participants who completed a traditional program and internship said they were provided standards and curricular components, if available, and resources from their clinical supervisor. This connected to Grady et al. (2019) and Henning et al. (2016) in that, traditionally, the intern will be provided standards and curricular components or a pacing guide, as well as resources from the mentor, and then the mentor observes and assesses the pre-service teacher's lesson(s). Participants described the internship and said they observed the clinical supervisor at first and moved to other responsibilities in the classroom, such as part-time instruction to full-time instruction as the internship progressed.

Seven participants shared they learned about curriculum, instruction, or standards during their teacher education program coursework. However, the participants completed different types of programs that ranged from an alternative pathway to licensure to traditional or nontraditional. One participant completed an alternative pathway to licensure. Six participants completed a traditional education preparation program with face-to-face classes and traditional internship experiences. Two participants completed an online teacher education preparation program, which means all of their coursework was online and they did not have a traditional internship. One participant completed a teacher education preparation program where coursework was all online, but the participant did have traditional internship experiences. Even though programs differ in structure, learning for some participants was similar.

Three participants all made note that their teacher education programs did not prepare them fully for curriculum and instruction. One of those participants completed online coursework with a traditional internship. Another participant completed an online teacher education program without a traditional internship. The other participant completed an alternative route to licensure. Some participants did not believe the teacher education program prepared them for real-world experiences in the classroom. Based on participants' responses, some teacher education programs provided information in theory but not practice or

application, which means there may seem to be a disconnect between theory and practice, specifically in regards to curriculum and instruction.

Research Question 3: What are the perceptions of novice teachers regarding their self-efficacy in relation to communication with families after the completion of a teacher education program?

Out of the ten total participants, six participants reported lower self-efficacy in relation to communicating with families. Of those six, three are in their first-year teaching, one is in their second year, and the other two are in their third contracted year. Out of the six, three were substitute teachers, and the other three completed internship placements. Two of the six participants were substitute teachers and both completed an online teacher education program. The other four participants reported higher self-efficacy in communicating with families. Out of the four, all participants had prior experience in an educational setting either as a substitute teacher or another position in an educational setting. Some interview participants discussed attending novice teacher training which provided professional development sessions and, in some cases, supplied a mentor to the novice teacher.

Some participants noted that they learned about how to communicate with families during teacher education program coursework, specifically in a Classroom Management course. This converged with Zeichner et al. (2016) who shared that there have been efforts made to include family involvement in coursework (i.e. classroom management course), but this continues to be a minor focus. Some participants mentioned certain assignments in the program coursework, such as a newsletter, or one discussed using Remind101 during a traditional internship. This conjoined with Zeichner et al. (2016) research that some of the efforts from teacher education preparation programs include a number of ways to communicate with families, which are limited in scope to one-way communication completed by the pre-service teachers only and focuses more on academic progress or classroom updates. The newsletter and Remind 101 are both types of communication discussed by interview participants.

Novice teachers' lack of experience in the classroom can lead to a lower self-efficacy in this area of communicating with families, which is highlighted in the results of the participants' interview data. A little less than half of the participants reported a higher self-efficacy due to prior experience either in a position in the education field or traditional internship experiences. A little more than half of the participants reported lower self-efficacy in relation to communication with families, and still had some prior experience as a substitute teacher or during a traditional internship. Therefore, prior experience in the form of previous positions in an educational setting or professional development trainings may or may not impact overall self-efficacy in relation to communication with families.

Recommendations for Practice

Based on participants' responses, it is recommended that teacher educators review and revise coursework to include more opportunities for pre-service educators to practice classroom management. When participants had prior experiences in educational settings, reported self-efficacy was higher than those who did not have prior experiences. Administrators in K-12 may also need to reevaluate the support provided to novice teachers for classroom management practices. Administrators can identify what supports are in place and what supports should be possibly added to further improve and impact novice teachers' self-efficacy in novice teachers.

Since completion of the teacher education preparation program, none of the participants

had attended a professional development session which was specific to classroom management as a standalone. Some participants did mention there were aspects of professional development trainings that mentioned classroom management practices. Some participants discussed attending professional development sessions, specifically Arkansas Novice Teacher Training, which provided support to novice or beginning teachers. Professional development trainings should be further evaluated to identify current classroom management opportunities, and consider revising and restructuring trainings to focus more on classroom management in an effort to impact self-efficacy in novice teachers (Warsame & Valles, 2018). Thus, individuals can further develop competency through guided mastery modeling, encouragement by strengthening their perceived beliefs in their own capability to use their possessed talents, and enhancement of internal motivation to reach overall success (Bandura, 1988). Novice teachers must rely on mentor teachers and administrators to supply modeling, feedback, and support to increase and develop self-efficacy in regards to classroom management overtime.

Based on the findings, participants reported curriculum variations from their current districts. Due to the variations of curriculum in the state of Arkansas, creating meaningful partnerships with area school districts can provide a starting point on what types of curriculum to include in teacher education preparation coursework (Grossman & Hirsh, 2021). Therefore, curriculum should be more of a focus for coursework, field experiences, and internship experiences in teacher education preparation programs to support novice teachers by providing opportunities for growth in pedagogical content knowledge (Steiner et al., 2018).

Some teacher education preparation programs prepare pre-service teachers with a narrow understanding of the role families can have in their child's education and overall success (Amatea, 2009). Therefore, pre-service educators must be provided with prior experiences in educational settings. This can be in the form of more interactions and engagement with families or guardians during internship or field experiences. If this is not an option due to program structure, novice teachers should receive further support from administration in the form of professional development trainings in order to learn how to more effectively communicate with families.

Conclusions

To conclude, self-efficacy in regards to classroom management increased due to prior experience in the field of education. However, if interview participants did not have prior experience in an educational setting, self-efficacy in relation to classroom management was reportedly lower. Participants who were not in year one of teaching, also reported a higher self-efficacy than participants who did not have any prior experience and were in year one; which means participants who were in year two or three had completed prior experience as a teacher which increased their self-efficacy in classroom management. The second research question focused on participants' self-efficacy in regards to curriculum and instruction. Half of the participants who reported a lower self-efficacy in relation to curriculum and instruction were in their first year of teaching. Half of the participants who reported higher self-efficacy in regards to curriculum and instruction completed a traditional teacher education program and shared that their coursework and traditional internship experiences in the program prepared them for the classroom. The third research question focused on participants' self-efficacy in regards to communicating with families or caregivers. A little less than half of the participants who reported higher self-efficacy in regards to communicating with families had prior experiences in an educational setting. Prior experience in an educational setting seemed to increase overall

self-efficacy in the interview participants. These findings are comprised of perceptions of preparedness in relation to self-efficacy from ten Arkansas novice teachers. The responses included in the study showcase the phenomena of being a novice teacher in Arkansas, which makes this study important for teacher educators, K-12 administrators, and policymakers as they attempt to retain teachers in the field of education within Arkansas, and the United States.

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Appendix A

Demographic Questions

1. Position of Interviewee:
2. What gender do you identify?
3. What is your age?
4. What is your ethnicity?
5. What type of teacher education program did you complete in Arkansas?
6. How many years have you been employed in an Arkansas school district as a teacher?
7. What area of Arkansas do you teach in?
8. What is your highest level of education?

Interview Questions

1. What is your current position and how long have you been in your current position?
Optional Probe: What positions have you held prior to this position?
2. What teacher program did you complete in Arkansas and can you describe how it was structured (i.e., classes, field experiences, internships, etc.)?
Optional Probe: If you did have an internship or field experience(s), can you discuss the internship and/or field experience(s)?
3. How did you learn about classroom management?
Optional Probe: What specific components of the program, if any, prepared you to apply classroom management strategies?
Optional Probe: What professional development(s) have you attended regarding classroom management?
4. Teacher self-efficacy is one's belief in his or her ability to impact student learning which can include outcomes, achievement, behavior, and engagement (Bandura, 1993; Bandura 1997). How did your teacher preparation education shape your current self-efficacy in classroom management?
5. How did you learn about Arkansas curriculum and instructional strategies?
Optional Probe: What specific components of the program, if any, prepared you to develop curriculum and apply instructional strategies?
Optional Probe: What professional development(s) have you attended regarding curriculum and instructional strategies?
6. How did your teacher preparation education shape your current self-efficacy in development of curriculum and application of instructional strategies?
7. How did you learn about how to communicate with families?
Optional Probe: What specific components of the program, if any, prepared you to effectively communicate with families?
Optional Probe: What professional development(s) have you attended regarding how to communicate with families?
8. How did your teacher preparation education shape your current self-efficacy in how to communicate effectively with families?

Exploring the Relationship between Dyslexia and Dyscalculia

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Abstract

Dyslexia and Dyscalculia are common learning disabilities identified in school aged children as well as in adults. This quantitative research study explores the question: Do learners diagnosed with dyslexia, or who demonstrate characteristics of dyslexia, display attributes of dyscalculia? A random sample of the parents of 22 school-aged children who had been diagnosed with or displayed characteristics of dyslexia completed a survey in which they indicated if their child also displayed certain characteristics of Dyscalculia. Results showed that there is a possible correlation between those diagnosed with, or who demonstrate characteristics, of dyslexia and those with characteristics of Dyscalculia, but the topic requires further research.

Keywords: dyslexia, dyscalculia, learning disabilities, diagnosis, characteristics

Introduction

Dyslexia and Dyscalculia are learning disabilities identified in both school-aged children and adults. It is estimated that 20 percent of the population has Dyslexia which makes it the most commonly identified learning disability (US News and World Report, 2021). In comparison 5 to 10 percent of the population is estimated to have Dyscalculia (Understood.org, n.d.). However, more research is needed to determine the relationship between learners who are diagnosed with dyslexia and the likelihood that they also display characteristics of dyscalculia.

The purpose of this quantitative research study is to determine if learners either diagnosed with dyslexia or demonstrate the characteristics of dyslexia also exhibit characteristics of dyscalculia.

Research Question

Do learners diagnosed with dyslexia, or who demonstrate characteristics of dyslexia, display attributes of dyscalculia?

Definitions

Those identified as having dyslexia have difficulties with accurate or fluent word recognition and spelling. These difficulties persist despite continued instruction. Dyslexia is defined by difficulties in decoding words while comprehension still remains in place. (Peterson & Pennington, 2012).

Learners with dyscalculia display persistent problems with simple number operations, such as counting, recognizing patterns within numbers, identifying relationships between numbers, and displaying knowledge of the place value system (Emerson & Babbie, 2013).

Literature Review

Dyslexia

Dyslexia is a learning disorder that affects individuals' ability to read, write, and spell (Peterson & Pennington, 2012). It is characterized by difficulties in reading fluency, decoding, and spelling skills, which are believed to stem from a deficit in the phonological component of language. Despite having received appropriate instruction and possessing a normal intellectual level, individuals with dyslexia struggle to acquire and apply basic literacy skills effectively (Elliott, 2020).

According to various sources, dyslexia is a specific neurologic or neurobiological disorder that impacts individuals' reading and writing abilities (Gul et al., 2022). It is important to note that dyslexia is not related to low intelligence or a lack of learning opportunities (Gul et al., 2022). The International Dyslexia Association defines dyslexia as a language-based disorder that affects skills such as spelling, writing, pronouncing words, and particularly reading. Individuals with dyslexia often experience persistent difficulties in spelling and writing, which can significantly impact their educational advancement and long-term academic achievement (Catts & Petscher, 2022). In addition to difficulties with language skills, dyslexia may also affect other areas such as executive functions and sustained visual attention (Taran et al., 2022).

Dyslexia is not solely limited to academic difficulties. Individuals with dyslexia may also face challenges in their daily lives, including difficulties in organizing and expressing thoughts, following oral instructions, and remembering sequences of information (Taran et al., 2022). Dyslexia is a complex disorder with multifaceted impacts on individuals' lives. Moreover, dyslexia is a lifelong condition that can persist into adulthood. This disorder affects individuals across different age groups and can have a profound impact on their academic, social, and emotional well-being.

Causations

The primary causation of dyslexia is deficits in underlying cognitive skills (Catts & Petscher, 2022). According to the International Dyslexia Association, dyslexia is a neurological condition caused by a different wiring of the brain. This different wiring of the brain leads to difficulties in processing language and decoding words, which are essential for proficient reading. Although the exact causes of dyslexia are still unclear, research has shown that there are differences in brain physiology and development among individuals with dyslexia (Rahul, 2021). These differences manifest in the wide network of brain areas responsible for phonological skills, leading to reading difficulties (Rahul, 2021). Furthermore, the European Dyslexia Association defines dyslexia as a difference in the adoption and use of reading, spelling, and writing skills caused by a combination of difficulties in phonological processing, working memory, rapid naming, sequencing, and automation of basic skills (Passadelli et al., 2020). Moreover, studies have shown that dyslexia is associated with deficiencies in phonological coding. This suggests that individuals with dyslexia have visual and auditory difficulties that impair their ability to read

and write effectively (Keelor et al., 2023). Additionally, neuroimaging research indicates that dyslexia is neurologically based and involves differences in the network of regions implicated in typical reading development (Chyl et al., 2021). These differences in brain functioning result in a lack of development in the reading network, which is typically seen in successful readers. While the exact causes of dyslexia are still being researched and are not completely understood, it is clear that dyslexia involves a combination of genetic and environmental factors. These factors interact and contribute to the differences in brain wiring and cognitive skills seen in individuals with dyslexia.

Indicators

Individuals with dyslexia often exhibit indicators that can help identify the presence of this learning disability. These indicators include (Mundorf et al., 2021):

1. **Difficulty with phonological processing:** This refers to difficulties in accurately identifying and manipulating the sounds of spoken language. Individuals with dyslexia may struggle to associate letters with their corresponding sounds, which can make it challenging for them to sound out words while reading or spelling.
2. **Poor reading and spelling skills:** Dyslexia is characterized by significant difficulties in acquiring reading and spelling skills, despite adequate exposure to classroom instruction.
3. **Slow and labored reading:** Individuals with dyslexia may read slowly and struggle to decode words.
4. **Low levels of reading fluency:** Dyslexic individuals often have difficulties in reading smoothly and with accuracy, resulting in a lack of reading fluency.
5. **Problems with word decoding:** Dyslexia is primarily characterized by difficulties in developing effective word-decoding strategies. This means that individuals with dyslexia may have difficulty breaking down and recognizing individual sounds within words, which can make it challenging for them to accurately decode words while reading.
6. **Difficulties with rapid automatized naming:** Individuals with dyslexia may have difficulties quickly and accurately naming familiar objects, colors, or letters which is often indicative of underlying phonological processing difficulties.
7. **Weak spelling skills:** Dyslexic individuals may struggle with spelling words accurately, often making frequent errors and inconsistencies in their written work.
8. **Difficulties with oral language production and comprehension:** In addition to reading and spelling difficulties, individuals with dyslexia may also exhibit challenges in understanding and producing oral language.

These indicators provide valuable insight into the presence of dyslexia, but it's important to note that not all individuals with dyslexia will exhibit every indicator. Some may exhibit only a few of these indicators, while others may display additional challenges that are not listed here (Mundorf et al., 2021).

Screenings

Dyslexia is a neurodevelopmental disorder that affects approximately 20% of the population, making it one of the most common learning disabilities. Despite its prevalence, dyslexia often goes undiagnosed or misdiagnosed, resulting in students not receiving the appropriate support and accommodations they need to succeed academically (Darweesh et al., 2020). To address this issue, it is crucial to implement screenings for students who are expected to have dyslexia (Patali, 2018). These screenings should be based on a comprehensive assessment that takes into account various factors, including biographical information, educational history, behavioral aspects and academic indicators.

The purpose of dyslexia screenings for students is to accurately identify those who may have dyslexia and provide them with the necessary support and accommodations to ensure their academic success (Blinkoff, 2016). Early identification is essential as it allows for interventions to be implemented at a young age, when they are most effective. Furthermore, screenings for dyslexia can also help reduce the stigma and misconceptions associated with this learning disability. Among states with dyslexia laws, policies still vary with respect to early identification, interventions, and accommodations for students with the disorder (Blinkoff, 2016). Despite evidence for early identification, only a few states have mandated universal dyslexia screening for students in grades K-2, with several more having released voluntary guidelines for student dyslexia screenings (Blinkoff, 2016).

Interventions

The difficulties in reading, writing, and spelling associated with dyslexia can significantly impact the academic performance and overall well-being of students diagnosed with dyslexia. To address the unique needs of students with dyslexia, various interventions have been developed and implemented in educational settings. These interventions aim to provide targeted support and strategies to help students overcome their challenges and achieve academic success.

One of the most widely recognized interventions for students with dyslexia is structured literacy instruction (Spear-Swerling, 2019). Structured literacy instruction is an evidence-based approach that focuses on teaching the foundational skills of reading and writing in a systematic and explicit manner. This approach includes instruction in phonics, phonological awareness, and decoding skills. Phonics-based instruction, which involves teaching sound awareness and decoding skills, is considered the gold standard in reading rehabilitation for students with dyslexia. Research has shown that structured literacy instruction can significantly improve reading skills and spelling abilities in students with dyslexia (Spear-Swerling, 2019).

Another intervention technique that has shown promise in improving word reading skills for children with dyslexia is letter-sound training (Elbro & Peterson, 2004). Letter-sound training involves teaching students the correspondence between letters and their corresponding sounds. This intervention is particularly effective for students in alphabetic scripts, as it helps them develop phonological processing skills necessary for reading (Mather et al., 2020).

In addition to structured literacy instruction and letter-sound training, other interventions for students with dyslexia include systematic phonics instruction, morpheme-based approaches, teaching of orthographic rules, and interventions targeting reading comprehension skills (Johnston, 2019). These interventions are based on the principles of evidence-based practices and have been found to be effective in improving reading skills for individuals with dyslexia across different orthographies. Phonics instruction, in particular, has been extensively studied and has consistently shown positive results for students with dyslexia (Mather et al., 2020).

Dyscalculia

Kunwar (2022) articulated that mathematics has widely become known as a problematic academic content area. Mathematics encompasses many aspects of everyday life; however, many students display anxiety when presented with mathematical learning (Lin, et al. 2017). Emerson and Babtie (2013) indicated that dyscalculia originates from the wiring of one's brain structure; however, they also found that dyscalculia has been challenging to identify due to a lack of research and not having a joint indicator assessment, which also causes learners to continue to be frustrated in mathematical learning. The United Brain Association (2022) supported the claim that dyscalculia originates in the brain, where they divided dyscalculia into two subcategories: Developmental or Acquired. Developmental dyscalculia was the inability of learners to develop number concepts. Acquired dyscalculia was identified as an acquisition of mathematical difficulty resulting from an event in life, such as a brain injury. Kunwar (2022) divided dyscalculia into the following categories with descriptions:

1. Verbal Dyscalculia: Learners can read and write numbers but do not recognize numbers when presented orally.
2. Prognostic Dyscalculia: Learners understand mathematical concepts but struggle to analyze mathematical equations.
3. Lexical Dyscalculia: Learners cannot read numbers, use symbols, and analyze equations.
4. Graphical Dyscalculia: Learners are unable to use mathematical symbols correctly.
5. Ideognostical Dyscalculia: Learners display difficulty with memorization and mental operations.
6. Operational Dyscalculia: Learners cannot carry out basic operations, or they confuse the processes.

Haberstroh and Schulte-Körne (2019) identified the severity of dyscalculia as underappreciated since adverse mathematical skills negatively impact society and the struggling individual. For example, individuals with dyscalculia typically suffer from depressive events, academic failure, high absenteeism, and even low-paying jobs or high unemployment. Despite these staggering statistics, research on dyscalculia is far behind the efforts to research reading-related struggles, including dyslexia. Students continue to struggle with mathematics; therefore, more attention should be given to the concerns surrounding mathematical learning and struggles with mathematical processes (Kunwar, 2022).

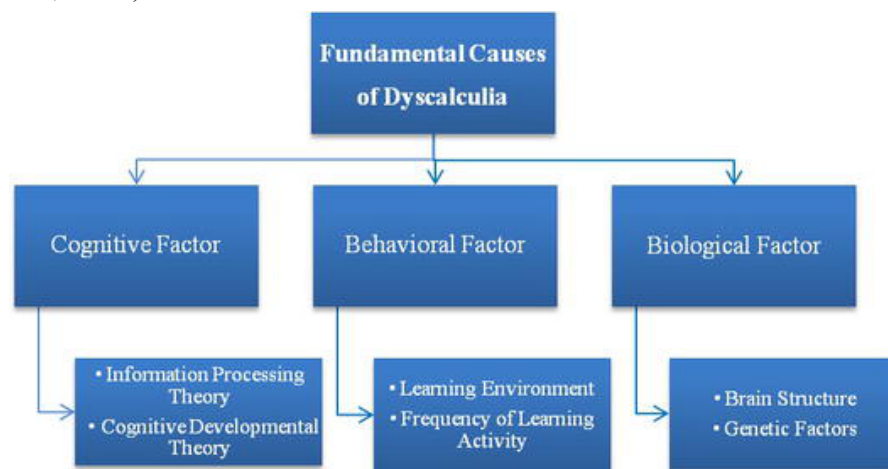
Miller & Koepke (2023) acknowledged the lack of multiple research projects centered around dyscalculia; they indicated that 7 percent or less of the population had been appropriately evaluated and diagnosed with dyscalculia tendencies. For this reason, most identified with dyscalculia struggle with mathematical concepts into adulthood. Dycalculia.org (2023) outlined test scores in mathematics for 4th grade, 8th grade, and 12th grade. The results are shocking. On the national average, 64% of 4th graders fall below proficiency in mathematics, 73% of 8th graders fall below proficiency in mathematics, and 75% of 12th graders fall below proficiency in mathematics. These factors indicate that more research should center on dyscalculia in school-aged learners.

Causations

Even though the exact causes of dyscalculia are unknown, Frye (2020) points to brain function as a significant contributor. Dr. Anneke Schreuder (n.d.) identified significant causes of dyscalculia: genetics, heredity, and brain development. Kunwar (2022) described dyscalculia as a neurological disorder, and research has provided genetic, neurobiological, and epidemiological evidence to support this claim. In addition, students who consistently struggle with mathematics lose confidence in their abilities and suffer detrimental impacts on their mathematical skills (Haberstroh & Schulte-Körne, 2019). Kunwar (2022) illustrated in Table 1 the multiple causes of dyscalculia:

1. He described cognitive factors that outline inconsistencies in Piaget's development stages. For example, the learner will struggle with simple mathematical or number concepts.
2. He focused on behavioral factors, such as the impacts of the learning environment or teaching methods used in the classroom.
3. He outlined the biological factors, including brain structure and development.

Table 1 (Kunwar, 2022)



Dyscalculia sometimes presents in adulthood, when adults face severe anxiety when presented with mathematical tasks (The Cleveland Clinic, 2022). Furthermore, this anxiety can turn into frustration, anger, fear, and physical ailments. The Cleveland Clinic (2022) also suggested that dyscalculia often occurs alongside other learning disabilities, such as autism, attention deficit hyperactivity disorder, and oppositional defiant disorder. Kunwar (2022) described a sense of low self-efficacy as a cause of dyscalculia, where the person has grown accustomed to failing mathematical tasks. Many learners with persistent challenges in mathematics are performing well below the expectation for the learners age and grade-level (Frye, 2020).

Indicators

Kunwar (2022) explained that dyscalculia is an umbrella term used to cover many mathematical concerns, but dyscalculia has more specific, targeted areas of concern. Individuals who show below-average achievement in mathematical skills should be considered for dyscalculia tendencies (Haberstroh & Schulte-Körne, 2019). They listed the following indicators as causes for concern:

- Early learners, as early as preschool, display difficulty processing numbers and quantities, such as the inability to subitize quantities.
- Learners demonstrate problems in basic operations, including math facts and simple mathematical assignments.

Dr. Anneke Schreuder (n.d.) provided a more specific list of indicators that represent the need for testing to determine if a learner is exhibiting characteristics of dyscalculia.

- Learning to count late based on the expected timeline
- Lack of associated numbers to quantities
- Inability to skip count or count backward
- Inability to count on from a set of objects without recounting all objects
- Lack of carry-over of previously learned skills
- Low self-confidence dealing with mathematical tasks
- Inability to read clocks, move from left to right, sequence events, recognize patterns, sort items, recognize the value of numbers in comparison to another number, compose or decompose numbers, grasp place value, and evaluate word problems

The Cleveland Clinic (2022) further explained that dyscalculia characteristics present differently at different stages of learning. Young learners (PreK and Kindergarten) tend to show features that center around counting. For example, the learners may present difficulties in counting from a number or set objects or present challenges in recognizing numbers. Primary-aged learners may struggle with mathematical concepts by relying on their fingers for small numbers, doing simple calculations of basic math facts from memory, or recognizing that problems within the commutative property yield the same result. Secondary learners may present difficulties following measurements in baking, working with fractions, and counting money correctly and efficiently. Dycalculia.org (2023) pointed out these tendencies can present in

different aspects. For example, some trends can be present in the reading, writing, reasoning, recalling, or speaking of mathematical concepts.

Screenings

Frye (2020) labeled dyscalculia as a “specific learning disorder” but also pointed out there is not one specific evaluation to diagnose dyscalculia. Therefore, he outlined criteria warranting evaluation:

- Learners have at least one indicator.
- Their academic work falls far below expectations.
- Problems were presented in school even if evaluated as an adult.
- Testing for other disabilities has or will occur to eliminate other contributors.

Emerson and Babbie (2013) indicated the importance of approaching dyscalculia screeners as a screener, not a test. In addition, they also emphasized the importance of explicit and direct instructions that are easy to understand. Haberstroh & Schulte-Körne (2019) indicated a direct correlation between intelligence and mathematical ability. They further detailed that most students diagnosed with dyscalculia fall at or below the 25th percentile in working mathematical knowledge.

Dr. Anneke Schreuder (n.d.) outlined the sequential steps needed in testing for dyscalculia. First, you begin with a dyscalculia screener. Since there is no standard screener for diagnosis, you must select the screener that best meets the learner's needs (The Cleveland Clinic, 2022). Some screeners are paper-pencil, while others are online. Then, you gather the results to advocate for the learner with parents, school officials, or health providers.; at this point, the school system should provide a plan of action to address the learner's needs (Schreuder, n.d.).

Interventions

Unfortunately, there is no specified cure for dyscalculia, so interventions must directly correlate with the targeted areas of concern in mathematical skills (The Cleveland Clinic, 2022). Accommodations, provided through either a 504 plan or Individualized Educational Plan (IEP), are provided based on what supports the individual learner needs to address their mathematical struggles, where students will still be learning the same instructional material. Still, the presentation will look different based on their needs (Schreuder, n.d.). Accommodations can include extended time, adjusting the complexity of tasks, using mathematical tools, providing explicit directions or sequential steps, foundational interventions, or supplemental activities (Frye, 2020). Kunwar (2022) further explained that the desired learning tailored to the learner’s interest, ability, and foundational skills shows the most impressive learner growth.

Educators should approach learners diagnosed with dyscalculia with positivity and patience (The Cleveland Clinic, 2022). Students begin to develop low self-esteem from their continuous failure when performing mathematical tasks, so they suffer from issues that have lasting impacts on their learning, such as anxiety. Therefore, interventionists must show unconditional support for their understanding and positive reinforcement of their successes (The

Cleveland Clinic, 2022). Miller and Koepke (2023) stressed the importance of remaining aware and optimistic about progressing with mathematical ability growth. Interventionists must be mindful of where the students are learning and the resources needed to move them forward. Also, the interventionist must be optimistic to demonstrate patience and persistence in the desired learning outcomes.

Kunwar (2022) outlined ten strategies to intervene in mathematical learning in learners diagnosed with dyscalculia effectively.

1. Use real and concrete materials when teaching number concepts, place value, and mathematical reasoning.
2. Time is essential. Give students adequate time to manipulate concrete materials to develop their understanding of mathematical concepts and form relationships between mathematical tasks, such as connecting number patterns to basic facts.
3. Develop a sense of fun in learning mathematics. Educators deliver the learning in engaging, hands-on activities to foster deeper connections between the learner and the desired outcomes.
4. Make visualization a priority. Students should either manipulate concrete materials or represent mathematical concepts through drawings.
5. Learners exposed to multisensory mathematics, where engagement happens by using all their senses to connect to the learning effectively, show more growth in their mathematical knowledge.
6. Use cooperative learning groups. Students should learn to work together to solve problems, which allows them to have meaningful discourse with their peers about mathematical tasks.
7. Provide opportunities to use technology. “The use of technology helps the dyscalculic learners to learn mathematics in a fun and interactive way and also motivates them for mathematics learning.” (Kunwar, 2022).
8. Build rapport with students to establish a safe and positive learning environment.
9. Use peer tutoring. Students sometimes learn more efficient strategies when they hear and see the methods of their peers.
10. Teach smaller chunks of content. Students receive the same instruction, but the content is divided into smaller pieces to enhance student learning.

Relationship of Dyslexia and Dyscalculia

The Cleveland Clinic (2022) compared dyslexia and dyscalculia by saying that dyslexia affects one’s ability to read, and dyscalculia affects one’s ability to do math. Dr. Anneke Schreuder (n.d.) has spent numerous years studying children’s brains, and she concluded that about forty percent of children who have dyslexia also struggle with mathematics. In comparison, students who display difficulty in reading without a dyslexia diagnosis also display mathematical struggles; in fact, 30 to 40 percent of learners who demonstrate extensive difficulty in reading and spelling also show many characteristics of dyscalculia (Haberstroh &

Schulte-Körne, 2019). Miller and Koepke (2023) identified dyslexia as a learned symbolic task with language, visualization, memory difficulties, and a well-defined deficit. In contrast, dyscalculia presents unknowns that make it challenging to characterize it as a deficit, and the lasting impacts are not fully understood. Therefore, this research study is essential.

Methodology

To determine if a connection between dyslexia and dyscalculia exists, we surveyed parents of children who either have been diagnosed with dyslexia or demonstrate characteristics of dyslexia. We partnered with local school districts to have the survey completed. Each district offered the parents of students who receive reading interventions in their communities the link to the study. Participation was voluntary and required to be completed by a specified date.

The survey was conducted using a Google Form, which provided definitions for dyslexia and dyscalculia. It consisted of 3 questions. The questions were outlined as follows:

1. Has your child been diagnosed with Dyslexia? If yes, please skip to question #3.
2. If your child has not been diagnosed with Dyslexia, does your child have any of the following characteristics of dyslexia?
 - Noticeable hesitations when speaking or trouble pronouncing words
 - Difficulty learning new vocabulary words
 - Difficulty rhyming words
 - Difficulty with spelling words
 - Difficulty learning numbers, alphabet, days of the week, colors, and shapes
3. Does your child display any of these characteristics for dyscalculia?
 - Learned to count later than expected timeline
 - Lack of associated numbers to quantities (For example, the learner can not look at a stack of 10 and immediately recognize the quantity 10.)
 - Inability to skip count or count backward
 - Struggles to count on from a set of objects without recounting all objects
 - Lack of carry-over of previously learned mathematical skills
 - Low self-confidence dealing with mathematical tasks
 - Difficulty reading clocks
 - Inability to move from left to right
 - Unable or shows difficulty in sequencing events
 - Inability to recognize patterns and sort items
 - Inability or shows difficulty recognizing the value of numbers in comparison to another number (7 is less than 10)
 - Difficulty in composing (put together) or decomposing (taking apart) numbers
 - Lack of place value (56 equals 5 tens and 6 ones)
 - Inability to evaluate word problems
 - None of the above

Parents completed the survey voluntarily and unanimously. The results were collected, analyzed, and stored in the Google Drive platform. Twenty-two parents participated in the survey. They provided information about their children based on their child’s academic performance.

Results

Table 1

In Table 1, the data shows that 12 out of 22 students were diagnosed with dyslexia. Therefore, they moved on to the third question to identify the characteristics demonstrated by Dyscalculia. The other ten students had not been diagnosed with dyslexia, so those parents first identified factors that led them to believe their child was displaying characteristics of dyslexia. Finally, the parents identified the features of dyscalculia demonstrated by their children.

Table 1: Diagnosis of Dyslexia

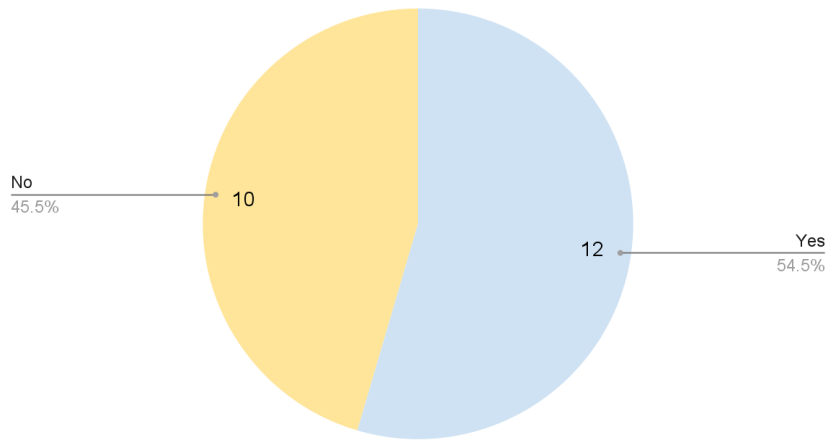
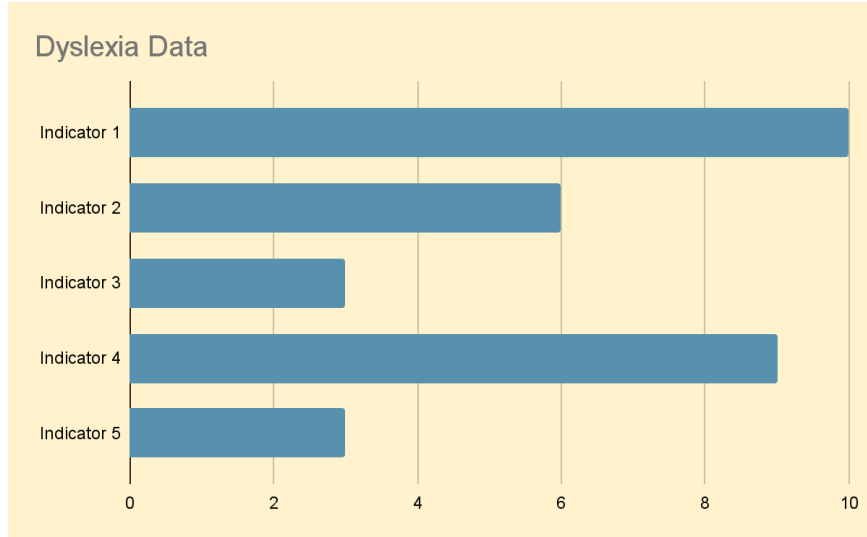


Table 2

Table 2 shows parents of children without a dyslexia diagnosis completed question two. Most children exhibited more than one characteristic of dyslexia. Ten children demonstrated noticeable hesitations when speaking or trouble pronouncing words. Parents of 6 children noticed difficulty learning new vocabulary words. Three students showed difficulty rhyming words and learning numbers, the alphabet, days of the week, colors, and shapes. Nine parents identified difficulty spelling words as a characteristic. This table shows how many students were identified for each indicator of dyslexia. .

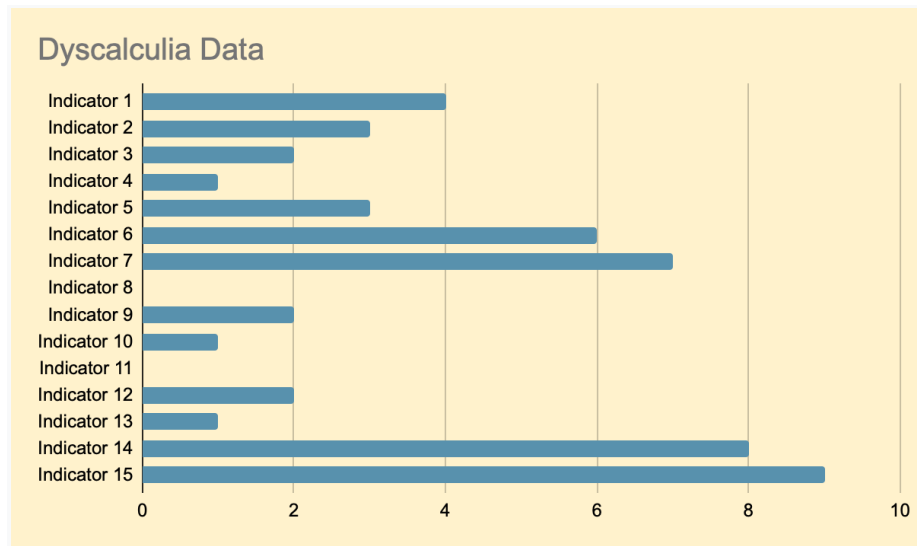


Indicators for Reference (Table 2):

1. Noticeable hesitations when speaking or trouble pronouncing words
2. Difficulty learning new vocabulary words
3. Difficulty rhyming words
4. Difficulty with spelling words
5. Difficulty learning numbers, alphabet, days of the week, colors, and shapes

Table 3

Table 3 revealed if students, diagnosed with or not diagnosed with dyslexia, demonstrated signs of dyscalculia. Almost half of the twenty-two students did not show any characteristics of dyscalculia. However, half the students showed at least one indication of dyscalculia. This table shows how many students demonstrated each indicator of dyscalculia.



Indicators for Reference (Table 3):

1. Learned to count later than expected timeline
2. Lack of associated numbers to quantities (For example, the learner can not look at a stack of 10 and immediately recognize the quantity 10.)
3. Inability to skip count or count backward
4. Struggles to count on from a set of objects without recounting all objects
5. Lack of carry-over of previously learned mathematical skills
6. Low self-confidence dealing with mathematical tasks
7. Difficulty reading clocks
8. Inability to move from left to right
9. Unable or shows difficulty in sequencing events
10. Inability to recognize patterns and sort items
11. Inability or shows difficulty recognizing the value of numbers in comparison to another number (7 is less than 10)
12. Difficulty in composing (put together) or decomposing (taking apart) numbers
13. Lack of place value (56 equals 5 tens and 6 ones)
14. Inability to evaluate word problems
15. None of the above

Table 4

Table four serves as a detailed outline for each student. This table maintains the confidentiality of each student by identifying each student with a number. Then, based on their parent’s response, this table indicates whether the student has received a dyslexia diagnosis. In the next column, the data represents indicators of dyslexia for undiagnosed students. Finally, all parents chose characteristics of dyscalculia based on their children’s actions in mathematics.

Participants	Dyslexia Diagnosis	Dyslexia Indicators	Dyscalculia Indicators
1	Yes		9
2	Yes		15
3	Yes		6,7
4	Yes		1,7,14
5	Yes		15
6	No	1,2,3,4,5	1,2,3,5,6,7,12,13,14
7	Yes		14
8	No	1,2,3,4,5	6,7
9	No	1,2,4	15
10	No	1,4	15
11	Yes		15

12	No	1	15
13	Yes		5
14	No	1,2,4,5	2,4,5,6,7,9,14
15	No	3,4	14
16	No	1,2,4	1,5,10,14
17	Yes		15
18	Yes		1,2,3,6,7,12,14
19	No	2,3,4,5	15
20	Yes		15
21	Yes		6,7,14
22	No	1,2,4	14

Dyslexia Indicators:

1. Noticeable hesitations when speaking or trouble pronouncing words
2. Difficulty learning new vocabulary words
3. Difficulty rhyming words
4. Difficulty with spelling words
5. Difficulty learning numbers, alphabet, days of the week, colors, and shapes

Dyscalculia Indicators:

1. Learned to count later than expected timeline
2. Lack of associated numbers to quantities (For example, the learner can not look at a stack of 10 and immediately recognize the quantity 10.)
3. Inability to skip count or count backward
4. Struggles to count on from a set of objects without recounting all objects
5. Lack of carry-over of previously learned mathematical skills
6. Low self-confidence dealing with mathematical tasks
7. Difficulty reading clocks
8. Inability to move from left to right
9. Unable or shows difficulty in sequencing events
10. Inability to recognize patterns and sort items
11. Inability or shows difficulty recognizing the value of numbers in comparison to another number (7 is less than 10)
12. Difficulty in composing (put together) or decomposing (taking apart) numbers
13. Lack of place value (56 equals 5 tens and 6 ones)
14. Inability to evaluate word problems
15. None of the above

Conclusion and Recommendations

Approximately half of the participants in the study indicated that they had characteristics of both Dyslexia and Dyscalculia. These results indicate that there is a possible correlation between those diagnosed with, or who demonstrate characteristics, of dyslexia and those with characteristics of Dyscalculia. The most commonly reported characteristics of Dyslexia were: noticeable hesitations when speaking or trouble pronouncing words and difficulty with spelling words. The most common reported characteristics of Dyscalculia were inability to evaluate a word problem and inability to read a clock.

The topic would benefit from further research using a larger number of participants. Further research should be conducted to determine if specific characteristics between Dyslexia and Dyscalculia are linked. Additionally, research should be done to determine if siblings are more likely to exhibit similar characteristics of both Dyslexia and Dyscalculia.

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