ABSTRACT

COATS, TEENA LEIGH. Should "I" Stay, or Should "I" Go? An Exploration and Examination of Technology and Engineering Education Teacher Identity and Retention. (Under the direction of Dr. Aaron Clark, and Dr. Cameron Denson).

This nationwide study explores the professional identity of technology and engineering education (TEE) teachers and the impacts of this identity on retention and attrition decisions. Using existing literature on retention and attrition research within general education and other STEM education areas as a guide, this study made use of a phenomenological case study approach. Participants were reached using respondent driven sampling in which an initial recruitment contact list containing current technology and engineering education teachers, industry professionals, and higher education professionals. This initial list was asked to forward the request for participation to others who fit the criteria needed for study participation. A total of 21 participants participated in a demographic survey, a semi-structured interview, and a card-sorting activity.

A theoretical framework based on the identity research of James Gee was used to structure the questions used in the semi-structured interview, as well as the data analysis (Gee, 2000). The four identity perspectives within this framework are discussed and findings showed that each of these perspectives has an impact on teacher development. Within the N-identity, the factors of gender and race were identified as influencers for the experiences and subsequent development of the participants in this study. Within the I-identity, influences that were introduced to the participants based on their places of work were identified and discussed. These influences included their preservice education programs, any state mandated teaching license and credential requirements, school settings and administration teams, and influences for entering the profession. Within the D-identity, descriptors of TEE professionals were identified through the perspective of the current and former teachers. Some of these characteristics include qualities of

leadership, problem solving, resourcefulness, and adaptability. Many of these qualities emerge to meet the needs of their students in their creation of a positive learning environment. Finally, within the A-identity, a list of affinitive practices for TEE were listed and discussed. These practices were found to be a part of the TEE experience shared by the current teachers and echoed in the past experiences of the former teachers. Many of these practices were developed as a response to problem solving to meet the needs of their students or the expectations placed on them professionally.

Factors for retention and attrition were identified, revealing that professionals both currently in and out of the classroom placed a high value on the relationships within their professional settings. These relationships can be heavily influenced by the culture within a school which are largely set and maintained by the leadership structures within the school and the community. While these factors held a different level of importance for members within both the current and former teacher cases, it was revealed that the majority of those in the former case entered the TEE profession with goals that would ultimately remove them from the classroom regardless of their environments. Others would leave with a need for more as a result of their experiences. Those current teachers who choose to remain in the classroom, despite negative experiences, do so out of loyalty to their students and coworkers. Many feel they can create change for their students and seek the chance to do that through their day-to-day interactions. However, if deemed necessary, these professionals will seek out better opportunities in different schools and communities under different leadership to have their personal and professional needs met.

Should “I” Stay, or Should “I” Go? An Exploration and Examination of Technology and Engineering Education Teacher Identity and Retention.

by
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DEDICATION

To everyone who believed in me, thank you.

BIOGRAPHY

Teena L. Coats earned a doctorate in Learning and Teaching in STEM from North Carolina State University in December 2021. During this time, she completed multi-level certifications in SOLIDWORKS as well as ITEEA's 21st Century Leadership Academy Fellowship. She received honors including the 2019-2020 & 2020-2021 Epsilon Pi Tau Robert & Marilyn Wenig Scholarship and the 2020 Epsilon Pi Tau Leadership Award from the NC State TDE faculty.

Teena was born in Greenville, North Carolina to Benny and Bonnie Coats in December 1992. After graduating from Greene Central High School in 2011, she attended North Carolina State University where she earned a Bachelor of Science degree in Technology, Engineering and Design Education. Despite personal claims that she would never be a teacher, she found her heart and passion for students through the coursework and the role models that turned into mentor relationships with her professors, especially the late Dr. Busby. After the completion of her undergraduate experience, she entered the Integrative STEM Education Curriculum and Instruction program at Virginia Polytechnical University. It was here she further developed a passion for students, specifically students with disabilities and the mentor relationships between teachers and students. She graduated from this program in May 2017.

During her time in higher education, Teena served in a graduate teaching assistant teaching for the Technology, Engineering and Design Education Department teaching an entry level course for graphic communications and 3D modeling. She also spent her summers working with various summer camps where she further witnessed the value of relationships in formal and informal education settings. These experiences have shaped her research interests in the role of relationships in education and how they shape the experiences and goals of educators.

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To my dissertation committee, Drs. Aaron Clark, Cameron Denson, Brian Matthews, KC Busch, thank you for your expertise and guidance through this process. Without your support none of this would have ever been possible.

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To Dominick Manusos, you've believed in me, you've loved me, you've been patient, and you've pushed me to be the best I can be. I'm excited to see where this life will take us. I love you bigger.

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CHAPTER 1: INTRODUCTION

Study Background

Teacher attrition within K-12 education in the United States is at a high, with 24% of teachers making plans to leave the classroom within their first five years in the profession (Warner-Griffin et al., 2018). Teacher turnover rates are greater in high poverty areas with rates reaching levels of 50% in some areas (Ronfeldt et al., 2013). Such a high turnover is disruptive for the school community and its ability to form a cohesive team and negatively impacts student achievement (Ronfeldt et al., 2013). Students benefit when they have an opportunity to create meaningful relationships and build trust with those within their school environments, and these benefits carry over into their performance in the classroom (Ronfeldt et al., 2013).

With the struggle to fill classrooms with qualified teachers, the push for schools to be more involved and to promote learning in science, technology, engineering, and mathematics (STEM) by hiring these individuals is a tough goal to meet (Sanders, 2009). Since the space race of the 1960s, there has been a national demand for professionals in STEM fields, with the U.S. government funding over 200 federal level projects with the goal of increasing the number of STEM professionals (Granovskiy, 2018). These projects exist to recruit students to pursue professions within STEM at all levels of education, as well as projects to support teachers who teach the content in education (Granovskiy, 2018). Schools need teachers qualified in each of these subject areas, as well as the pedagogical content knowledge (PCK) required to teach the specialized content. As science and mathematics are already considered core subjects (Sanders, 2009), many schools have teachers in place to teach these disciplines to students. With minimal training, these instructors could teach integrated STEM-focused content (Sanders, 2009). In contrast to science and mathematics, technology and engineering education (TEE) is not a

required subject for schools to provide in the United States. In North Carolina, where the researcher is located, these teachers may be tasked with teaching subjects that extend from introductory levels of engineering and technology courses to advanced animation and visualization courses (NCDPI, 2020). Due to the wide range of topics TEE covers, this content has a tendency to bring in teachers with different training backgrounds than those in core disciplines such as reading, science, and mathematics. According to data from the 2011-2012 data set of the Schools and Staffing Survey (SASS), approximately 21% of TEE teachers start their careers in industry or a different field, not in education. While this brings experts on these topics into schools, it also creates a problem, as these professionals are accustomed to higher wages, different stressors, and supportive management (Ruhland, 2001). Additionally, they can lack the pedagogical knowledge to support a formal classroom. If these professionals are unhappy, as many teachers are, they can leave education and return to a job within their industry (Song et al., 2013). The other 73% of these teachers follow a more traditional route, participating in an undergraduate teacher preparation program where they are trained to teach a variety of subjects within the realm of technology and engineering (Ernst & Williams, 2015). Alongside their courses focusing on methods of teaching, many of these "traditional" teachers also complete industry-based skill certifications that could allow them to transition into an industry-based position if they decided not to continue teaching. Therefore, to maintain these trained individuals in teaching positions, it is critical to understand their struggles and what is needed to help to overcome them (Grissom et al., 2016).

Teacher Retention and Attrition

Research on teacher retention and attrition is closely related. This research can be classified in three main foci: reasons teachers leave (Fimian & Blanton, 1987), possible ways to

prevent exiting the field (Inman & Marlow, 2004; Mills, 2001), and the unique exiting situations of teachers within different subjects and grade levels (Goldhaber et al., 2014; Williams et al., 2019; Volkmann & Anderson, 1998). The general consensus among these research studies conducted over the last 40 years is that most teachers leave the educational workplace because they are unhappy, under-appreciated, and/or underpaid. These external factors are often the focus when discussing teacher retention, but a body of research examines the importance of internal, personal factors in decision making (Canrinus et al., 2012; Flores & Day, 2006; Skaalvik & Skaalvik, 2015; Zembylas, 2003). Measuring internal factors with an exact degree of specificity is difficult and leaves researchers struggling to accurately identify and understand these internal factors and how they could influence a teacher's decision to remain in the profession when other teachers do not. Internal factors may include: thoughts and beliefs held by an individual about their role in the teaching profession, self-efficacy with sharing content knowledge, and sense of purpose or ease in the classroom (Skaalvik & Skaalvik, 2010).

For many teachers, professional experiences in the classroom have the power to be deeply meaningful, serving both as an external and internal factor, some even having a permanent influence, becoming a part of who they are at their core (Helms, 1998). Such experiences help to develop a teacher's identity, which is recognized as one of the most important internal factors in teacher development (Canrinus et al., 2012; Olsen, 2008). In the setting of this research, identity is operationally defined as the kind of person someone is within a given context (Gee, 2000). For the purposes of this study, teacher identity is defined as a dynamic concept influenced by a range of factors including internal emotions as well as external job and life experiences in particular contexts relevant to the personal and professional aspects of teaching (Beauchamp & Thomas, 2009).

When researching the development of teachers during their beginning years, studies try to illuminate the experiences of these in an attempt to better understand their reality and professional development (Beatty, 2016; Fantalli & McDougall, 2009; Friesen & Besley, 2013; LeMaistre & Pare, 2010). Studies focusing on these early career experiences tend to focus on three themes: learning alongside mentor teachers (Hobson et al., 2013; Lehman, 2017), preparation programs (Stein & Stein, 2016), and the development of a teacher identity (Friesen & Besley, 2013; Pillen et al., 2014; Sutherland et al., 2010). The use of mentor teachers has been proven as an effective method to help beginning teachers develop as individuals within the classroom (Andrews & Quinn, 2005; Flores & Day, 2006; Hiiffman & Leak, 1986). This opportunity provides new teachers with the chance to discover tools, resources, and skills that they can use in their own classrooms. Mentors help their partnered teachers navigate the unique climate within their schools (Andrews & Quinn, 2005). Partnership with a mentor has been found as one of the keys to the strengthening of a teacher's teacher identity within their first few years as a teacher (Flores & Day, 2006). There is even research that discusses the importance of the development of this identity within the teacher education degree programs (Hong, 2010). Stein & Stein (2016) illuminates the need for preservice teachers to gain more experience within the classroom before completing their education preparation programs. They suggest increasing the classroom experience of students in a public classroom to a minimum of 500 to 600 prior to a student teaching experience. This recommendation is made as a way to better prepare student teachers for the reality and hardships of classroom teaching, as many new teachers report feeling unprepared by their education programs to handle the first few years of teaching (Stein & Stein, 2016).

Teacher Identity

The concept of a "teacher identity" is one that researchers struggle to find a common definition. Based on their findings after reviewing extensive literature, Beauchamp and Thomas (2009) determined that teacher identity is a dynamic concept influenced by a range of factors including internal emotions as well as external job and life experiences in particular contexts relevant to the personal and professional aspects of teaching often based in the who and what a teacher is in the role of education or in the function of a classroom. Teacher identity research commonly focuses on three overarching groups: variables for teacher attrition (Hong, 2010), students choosing to become teachers (Fajardo Castañeda, 2014; Olsen, 2008), and identity development of beginning teachers (Chong, & Low, 2009; Walkington, 2005). This body of research has determined that the first years of teaching are critical for a teacher's identity development. For early career teachers, emotional burn out was the most saliant pattern when discussing teacher identity for attrition. This burnout is connected to their efficacy, commitment, knowledge, and micro politics within their environments (Hong, 2010). This first years are heavily influenced by their decisions and training to become teachers, which further impacts their abilities to navigate their identity development during those beginning years (Chong & Low, 2009; Fajardo Castañeda, 2014; Olsen, 2008; Walkington, 2005) It has also revealed that this time period is an indication of a person's likelihood of remaining in the classroom long term. The body of literature exploring teacher identity development for those in STEM fields is overall limited, with the few existing pieces focusing on science and mathematics fields (Avraamidou, 2016; Helms, 1998; Settlage et al., 2009; Volkmann & Anderson, 1998). However, research covering TEE teachers explicitly, currently is incredibly scarce and should be explored to

understand if their experiences or identities are similar or different from those in other STEM areas.

Gee's Identity Theory (2000) was created for exploring professional identity within an educational context. He defines the concept of identity as recognizing a certain "kind of person" within a given context (Gee, 2000). His theory proposes that there are four lenses within which to discuss an individual's identity: the nature perspective (N-identity), the institutional perspective (I-identity), the discursive perspective (D-identity), and the affinity perspective (A-identity) (Gee, 2000). Many studies using his theory as a basis for research focuses on the discourse analysis of an individual and about an individual within the educational setting (Akkerman & Meijer, 2011; Madden & Weibe, 2015). This body of research seeks to address how identity is dynamic and changing as well as the relationship between the teacher identity and the perceived teaching skills of the individual. Madden & Weibe's (2015) study focuses on the discourse analysis, but thematically organize the discourse into the four perspectives, while Akkerman & Meijer (2011) organizes the discourse by the impacts perceived by the participants.

Statement of Problem

Despite collegiate programs graduating more than the required number of teachers necessary to replace retiring teachers, schools struggle to fill positions in K-12 classrooms (Granovskiy, 2018). The national teacher attrition rate currently averages 24% across all education areas (Warner-Griffin et al., 2018). The attrition rate is higher amongst specialty fields, including STEM education (Goldhaber et al., 2014). TEE is one of these fields with teachers choosing to leave the classroom for another profession within the first five years of completing their teacher education degree program (Steinke & Putnam, 2011).

In the state where the researcher is based, North Carolina is no stranger to teacher shortages and the struggle of filling the spaces at the front of the classroom (Richardson, 2017; Schlechty & Vance, 1981). As one of the few remaining states home to a TEE teacher degree program, North Carolina continues to produce TEE teachers, but there is still a demand for these professionals at the classroom level (Goldhaber et al., 2014). The demand for TEE teachers, is not just a retention issue, but also a supply issue. In 2015-2016, 206 new TEE teachers completed degrees from institutions (Moye, 2017). This number is just over a quarter of the number produced in 1995-1995 (Moye, 2017). TEE teachers are especially at risk of leaving the classroom due to the additional stress of creating a classroom environment that integrates new technologies, hands-on projects, and managing labs, all while navigating the more common stressors teachers encounter in their beginning years (Steinke & Putnam, 2011). Internal factors such as teacher identity have been shown through other research studies to have a large impact on an individual's decision to stay in the classroom or leave (Skaalvik & Skaalvik, 2010). By better understanding the experience and development of a teacher identity within TEE, teacher preparation programs and beginning teacher mentor programs can attempt to better address the needs of the next generation of TEE teachers. This study sought to examine TEE teacher experiences to reveal which factors pertaining to identity may be influencing the decision to stay or go once they enter the educational profession.

Study Purpose

The research within the field of TEE is lacking regarding the experiences and development of its teachers when compared to the other STEM fields, such as science or mathematics (Avraamidou, 2016; Helms, 1998; Settlage et al., 2009; Volkmann & Anderson, 1998). More research was needed to better understand the reality of these individuals, and how

their experiences or development may impact retention and attrition decisions. As these studies from science and mathematics call for a greater understanding of these teachers' motivations, this study sought to contribute to the literature by exploring internal factors of teacher retention in TEE teachers. One such internal factor is the concept of teacher identity; it has been recognized as a critical part of teacher development and has been shown to have the potential to affect an individual's decision to stay or leave the teaching profession (Day et al., 2005; Gaziel, 1995). This study sought to explore the identity factors present in TEE teachers and attempted to make relationships between these factors and teachers' decisions to stay in the classroom. This study included current and former TEE teachers to provide a better understanding as to why these professionals stay, why they leave, and how long before they exit the classroom. By including those who have stayed and those who have left, the experiences and decisions of these individuals can be examined and compared to explore the implications of any direct causes within education or the TEE field.

Principal Research Questions

As the purpose of this study was to add to the content area specific literature on teacher identity and teacher retention while expanding its scope to include the unique field of TEE, the study sought to answer the following questions:

Research Question 1: What aspects of teacher identity are most prevalent in traditionally trained technology and engineering education teachers, current and former?

Research Question 2: What is the relationship between the identified aspects of teacher identity and technology and engineering education teachers' decisions to stay in the classroom?

These research questions guided the development of the interview questions used for participants as part of the data collection process. They also guided the data analysis by shaping the coding process and organization of themes.

Definition of Terms

The following terms are listed and defined for clarity and understanding:

Attrition: Describes the action of teachers leaving the teaching profession (Struyven & Vanthournout, 2014).

Career and Technical Education (CTE): The educational program area designed to specifically prepare students for work. Areas may include agriculture, business education, family and consumer sciences, health occupations, marketing education, technology education, and trade and industrial education (Gordon & Schultz, 2020).

Identity: This general term is heavily influenced due to the use of the framework outlined by Gee (2000). He writes that individual identity is linked to being recognized as a certain "kind of person" in a given context. Within this study, this term is often paired with teacher identity, which describes who or what "kind of person" an individual is when linked to the profession of being a teacher.

STEM: Acronym standing for science, technology, engineering, and mathematics. Used in reference to STEM education (Sanders, 2009).

Teacher Identity: A dynamic concept influenced by a range of factors including internal emotions as well as external job and life experiences in particular contexts relevant to the personal and professional aspects of teaching (Beauchamp, & Thomas, 2009).

Technology and Engineering Education (TEE): An area in education that seeks to provide students with the breadth of hands-on skills and conceptual knowledge needed for

careers in industry and engineering (International Technology and Engineering Educators Association, 2020).

Theoretical Framework

The use of a theoretical framework in qualitative research acts as a lens through which to view the research being conducted to better understand the phenomena being studied (Anfara & Mertz, 2015). Gee's Identity Theory (2000) defines the concept of identity as recognizing a certain "kind of person" within a given context. As this study sought to further understand the identity of individuals within the specific context of a TEE classroom in K-12 education, it was deemed a good fit to guide the analysis of the data collected. To view these contexts, there are four lenses within which to discuss an individual's identity: the nature perspective (N-identity), the institutional perspective (I-identity), the discursive perspective (D-identity), and the affinity perspective (A-identity) (Gee, 2000). The nature perspective (N-identity) of identity is defined by "nature, not society" (Gee, 2000). It is a way of looking at who a person is. It is outside of the individual's control or the control of society. The institutional perspective (I-identity) of identity stems from a place in which a higher authority has given the individual the identity, usually an institution (Gee, 2000). Gee (2000) states that this is not a factor of anything nature has given or something the individual has worked to accomplish. Characteristics recognized in an individual by those interacting with that individual make up the discourse perspective of identity (D-identity). Gee (2000) surmises that these interactions or discourses are abstract as they are the result of biases, environment, and in some cases, the individual's creation. The affinity perspective (A-identity) is based on a set of practices dictated by a group of individuals that share an "affinity group" (Gee, 2000). In order for a group of people to be an "affinity group,"

the members' practices must primarily focus on fulfilling a set of common endeavors or practices second to a shared culture or series of traits.

While Gee's theory may seem overly simplistic in nature, it allowed for a complex concept such as identity, which is difficult to view in a one-dimensional light, to be explored in-depth within a very specific context. By looking at each type of identity on its own and as part of a whole, the essence of the participants' experiences was explored through the data collection and analysis. As such, Gee's framework allowed for a more holistic response to questions about identity factors and the relation of those factors to decisions about teacher retention.

Study Significance

As the body of research linking beginning teacher experiences, teacher retention, and teacher identity continues to grow, the scarcity of content specific research on TEE teachers in also grows. This study serves to fill a void in current research by providing an insight into the decisions considered by TEE teachers to stay or leave the profession, and how the role a teacher identity impacts these decisions. These insights may serve to provide understanding to those who have the ability to impact and address the needs of teachers at all stages in their careers within the schooling systems, such as those in school administration ((Brown & Wynn, 2009; Grissom, 2011). Identifying and addressing what these teachers need at an internal level may also provide insight to future researchers and policymakers by providing a glimpse into the development of these teachers and how it affects their professional decisions (Aragon, 2016). With a greater understanding of the whole teacher, supporting teachers who choose to remain in the classroom may become a little more achievable. Additionally, changes within the K-12 school environment may be made to create a better workplace for those who are considering exiting the profession.

With a shortage in the STEM workforce and a shortage in the TEE workforce, qualified individuals are needed on all fronts (Goldhaber et al., 2014; Granovskiy, 2018).

Methodological Overview

This study used a case study approach to define the boundaries of the two cases being studied, with a phenomenological approach to data collection, data analysis, and data reporting. A qualitative methodology, the phenomenological approach in conjunction with the case study method, paves the way for the researcher to illuminate the intricacies of human-life experiences while retaining the richness that comes with anchoring the stories with a more holistic approach (Merriam, 2009; Moustakas, 1994).

The researcher developed two cases to be explored within a nation-wide study: in-service and former TEE teachers. The criteria for sample selection included:

- **Current TEE teachers,** or those who at the time of the study were actively teaching material that is considered TEE by their state, had taught for at least 1 year outside of a student teaching experience, and had completed at minimum an undergraduate degree in education.
- **Former TEE teachers,** or those who left K-12 education and had taught for at least one year outside of a student teaching experience and had completed at minimum an undergraduate degree in education.

Following approval from the institutional review board (IRB), snowball sampling was used to recruit potential participants (Parker et al., 2019). Professional contacts of the researcher were sent a recruitment email requesting participation as well as a request to forward the communication to anyone who fit into the intended cases. This email contained a link for a demographic survey asking for basic demographic information and if the individual wished to

continue participating through an interview. The survey asked for contact information, if the individual indicated they would like to participate in the interview portion of the study. Using this provided contact information, potential participants were contacted to set up an interview that was at a time convenient for both parties (Seidman, 2019).

The researcher developed two similar semi-structured interviews that included questions and a card-sorting activity to be used within the interviews (Friedrichsen & Dana, 2003). One interview protocol was developed for current TEE teachers and contained questions asking about past and present circumstances. The second interview protocol was developed for former teachers and also contained questions asked about current and past circumstances. The two interview structures provided case specific questions to reflect the current roles of the participants. The interviews took place using Zoom, a teleconferencing app, where security could be ensured and enforced. During the interview, the researcher participated from a private office (Seidman, 1998, 2019). At the start of the interviews, participants were asked to read and sign the informed consent form and provided with a verbal explanation of the risks and benefits of participation. All participants were given an explanation of the protections in place to protect their identities and any risks of reidentification. With written and oral consent, the interviews were audio-recorded, with the option to stop recording, as well as to withdraw consent for participation at any point.

The interview began with both groups of participants completing the designed card-sorting activity (Conrad et al., 2019; Spencer, 2009). When conducted within in-depth qualitative interviews, card sorting exercises have been shown to offer a unique perspective of participant experiences that enriches data for interpretation by the investigator (Conrad et al., 2019; Conrad & Tucker, 2019; Friedrichsen & Dana, 2003). Additionally, the card sorting activity can serve as

an ice breaker, easing the nerves of the participant and can help deepen participant reflection and recall for the topic being discussed (Conrad et al., 2019). An example of the card sorting activity is available in Appendix F. The participant was asked to complete two sorts of retention criteria. At the beginning of both sorts, the researcher asked the participant to sort the criteria into two predetermined stacks while voicing their thought process aloud. Once the items had been sorted, they were asked to briefly explain their reasoning (Friedrichsen & Dana, 2003). Following the card sort activity, the researcher continued with the aligned semi-structured interview. The full interview protocols can be viewed in Appendix E. Example interview questions from both protocols include:

- Who/what influenced your decision to become a teacher? A technology and engineering education teacher?
- Where do you see yourself (professionally) in five years?
- If you could give advice to yourself as a first-year teacher, what would you say?
- Tell me about an experience that taught you something about being a teacher that you didn't learn in your educational degree program.

Some examples of how questions were similar but different between the two interviews were:

- Current Teacher Interview Questions
    - Has there ever been a time where you thought you may leave the profession?
        - Can you describe that time in your life to me?
    - Describe your job responsibilities to me. How do these affect you as a teacher?
- Former Teacher Interview Questions
    - How long were you a teacher? What ultimately was the deciding factor to leave?

- Describe how your current job responsibilities differ from when you were a teacher. How has that affected you?

As outlined by the semi-structured interview design, additional probing questions were added to the established interview protocol as deemed necessary by the researcher to gain additional relevant information (Seidman, 2019). Probing questions included asking for further clarification or detail and rewording any questions at the request of the participant. Throughout the interview, the researcher took hand-written notes regarding what the participant said, their body language, and any relevant observations (Creswell & Poth, 2018; Seidman, 2019). At the conclusion of the interview, participants were thanked for their time. They were informed their name would be entered into a raffle for a $75 Amazon gift card and then requested to participate in a follow-up session for participant checking (Glesne, 2006). Participants were notified they may be contacted for a follow-up meeting for clarification of responses; however, this step was unnecessary. If it had been necessary, members would have been offered all the same protections and courtesies as before, with the exception of additional chances for monetary reimbursement.

The audio recordings were uploaded to a secure password-protected folder stored in the researcher's university Google Drive and deleted from the recording devices (Creswell & Poth, 2018). All recordings were renamed under a pseudonym to protect confidentiality. The assigned pseudonym was used in all locations to replace any identifying information disclosed within the original demographic questionnaire (Seidman, 1998). Unused demographic questionnaires were deleted to further ensure the confidentiality of those who did not participate. The audio recordings were then transcribed verbatim.

Following transcription, interviews were analyzed with deductive coding for references related to teacher identity as defined by Gee (2000), retention factors, career prospect decisions,

and measurement of standards. A full list of deductive codes is available in Chapter 3 under Table 3.1. Analysis was not limited to these references; the researcher remained open to additional themes that emerged based on the participants' experiences (inductive approach) related to their decision to persevere within the K-12 classroom environment (Demetriou et al., 2017). Examples of the codes and samples from the transcriptions can be viewed in Appendix H.

The data are presented as the culmination of the shared lived experiences of the participants using direct quotes and the perspectives of Gee's (2000) identity theory in Chapter 4. Any further similarities between the participants' experiences are discussed through themes of shared experiences or similar realities. Discussion of these results and connections to literature along with implications of findings, and suggestions for future research can be found in Chapter 5. The workflow of the researcher is presented in a timeline format in Figure 1.2.

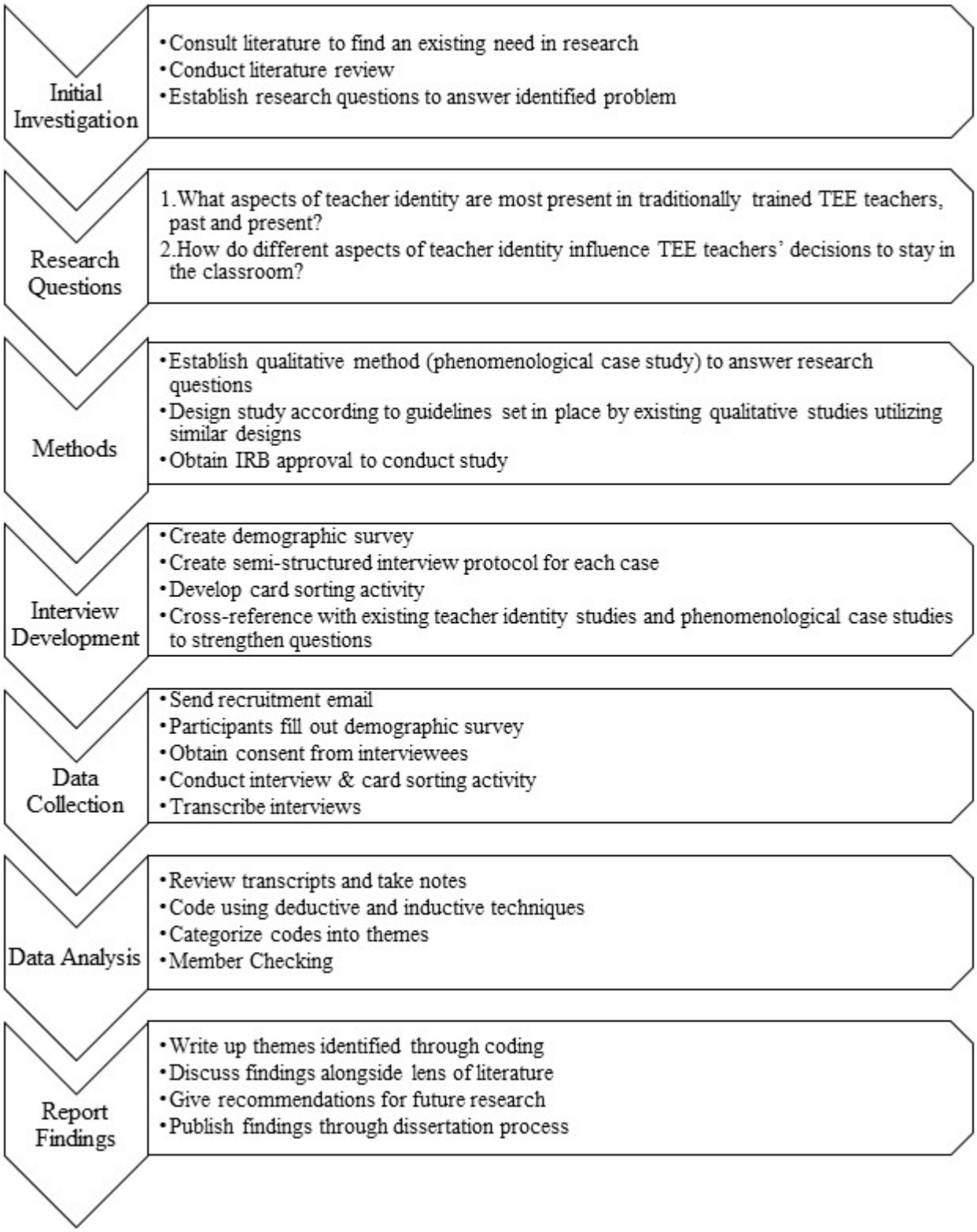

Figure 1.1 Graphic representation of researcher's workflow throughout conducted research study

Limitations

This study is not meant to represent a larger sample, and the results should not be generalized as such. The participants selected for this study met very specific criteria to serve as a foundation for the discussion; the design was intended to allow further exploration into a subject that has not been readily studied within the TEE field at present.

Time served as a limitation within this study. Under a different situation, a similar study could be developed to follow a group of teachers from teacher training through several years of teaching to gain a more personable outlook on how teachers develop a teacher identity in and outside of the classroom. Since this study was performed for a dissertation, this type of research was not feasible or affordable. For this reason, the participant selection included as many participants at different stages of a teacher's career path as possible in hopes that input from multiple sources would provide a similar spectrum of data. Time also dictated that only one interview would be conducted with each participant. Meeting with the participants multiple times over the course of several months or years might have allowed additional themes or a deeper understanding of their lived experiences, the development of their teacher identities, and classroom retention factors (Creswell & Poth, 2018).

Another limitation that became apparent during the study was access to qualified teachers for the study. At this time there is no state or national database of contact information for those who are teaching TEE courses accessible to the public. Unfortunately, this meant some current teachers who may have met the outlined criteria were not reached or polled for participation. It also meant that some former teachers who fit the outlined criteria were not polled for participation, as there is not database containing these contacts. With the use of snowball sampling, the researcher relied on personal and professional contacts to share the recruitment

information with other potential participants. This resulted in the researcher knowing many of the participants and a number of the participants knowing one another. This may lead to an increased risk of reidentification despite the researcher's best efforts to de-identify the data as much as possible (Seidman, 2019).

Another potential limitation was related to changes in the teaching field due to the Coronavirus Disease 2019 (COVID-19) pandemic (Centers for Disease Control and Prevention [CDC], 2021). Due to safety restrictions, the interviews took place through teleconferencing, which might have influenced the responses and the interviewees' sense of ease. At the time of the interviews, teachers were primarily teaching through online video methods. Adding the additional online time may have impacted the data gathered due to technical difficulties or contributed to virtual fatigue.

Chapter Summary

Technology and engineering education teachers are leaving the teaching profession at an alarming rate. However, given the current demand for more students to enter STEM fields both in education and in industry, there is a need to explore factors that are impacting teachers' departure. Existing research in teacher retention discusses the importance of addressing both external and internal factors. While the scope of research examining various external factors and ways to address teachers' concerns has been covered extensively, the research on internal factors is still developing. Internal factors, such as the development and solidifying of teacher identity, have been identified as critical to a teacher's decision to stay in the classroom. Literature addressing teacher identity exists for teachers within science and mathematics education, but there is currently a gap looking at the needs and experiences of TEE teachers. As a part of the

STEM education shortage, it is important to acknowledge and understand these teachers' unique perspectives.

This study sought to answer two research questions about the variables within teacher identity and the effects of these variables on teacher retention through a phenomenological case study approach, allowing for data collection through in-depth interviews with the participants to gain insight into their first-person lived experiences as TEE teachers. Current and former teachers were recruited to participate in the study that met the outlined criteria. Interviews with participants were kept confidential throughout the transcribing and analysis process, with anonymity preserved throughout the study. Analysis involved multiple rounds of coding. Summaries of themes and findings were sent to participants through a member checking step to ensure that the interpretation of the researcher is what the individuals intended. All findings were typed up into a final report and submitted for approval by the dissertation committee.

CHAPTER 2: LITERATURE REVIEW

Technology Education

History of Technology and Engineering Education (TEE)

The Smith Hughes Act of 1917 was the first national recognition of the importance of vocational education in public schools (Gordon & Schultz, 2020). It established vocational education as a separate entity from academic education and required that states have a state board for vocational education to receive federal funds for direct use to build these programs. Influenced by a series of social, economic, and political forces, the primary objective was to offer an alternative to the general curriculum than what was readily provided to youth at the time (Lynch, 2000). Vocational education continued to be an important part of the American education system.

During and directly following World War II (WWII), formidable advances in technology were made (Gordon & Schultz, 2020). To create advancements, such as the atomic bomb and synthetic rubber, many academics worked alongside the military and industry to create innovations that would help win the war (Gordon & Schultz, 2020). To preserve these efforts and encourage further developments, the National Science Foundation (NSF) was founded in 1950. As early as 1953, the NSF was involved in trying to improve education in the lower grades (Granovskiy, 2018). Not only was it important for youth to understand science and mathematical concepts, but also be proficient in the industrial art skills necessary to produce these innovations as well.

Introduced into Maryland schools in 1954, the Maryland Plan endeavored to rework the focus of vocational education from skill-based competencies to a more goal-oriented classroom (Smith, 1970). Within the Maryland Plan, Industrial Arts courses began to emphasize the

importance of integrating mathematics and science into designing a product. It also shifted the methods to employ the use of real-world applications of the skills through problem-solving scenarios within their community by encouraging "role-playing" interactions with suppliers and managers (Smith, 1970). The success of this process within Maryland schools had other Industrial Arts programs taking notice of the skills these students gained and they began to incorporate similar arrangements where students did not just focus on the "hard and fast skills" but the design aspect and problem-solving skills as well (Gordon & Schultz, 2020).

However, the United States became concerned with its global standing in the fields of science, mathematics, foreign language, and technical competencies when the Soviet Union launched Sputnik I (Gordon & Schultz, 2020). This led to the passing of the National Defense Education Act of 1958. The policies in this act focused on providing a quality education for youth and adults in the areas of mathematics, science, and vocational training (Granovskiy, 2018). Funds were dispersed to states to use to improve local school systems, higher education, and fellowships, to create and disseminate educational material, and boost vocational education related to occupations.

In 1963, congress passed the Perkins-Morse Bill, also known as the Vocational Education Act of 1963. This legislation served to maintain, extend, and improve existing vocational education programs, as well as extend the capabilities of these programs to provide part-time employment for students who may need it to pay for furthering their vocational education. It was also the first law that mandated vocational programs adapt to meet the needs of the students within the programs, not just the employers in industry (Mason et al., 1989). The Vocational Education Amendments of 1976 expanded the federal definition of vocational education to include the body of industrial arts programs in its funding efforts (Gordon & Schultz, 2020). This

set of amendments made it possible for states to include industrial arts programs in their plans, making it possible to increase staff, expand training programs, build and expand facilities, and provide essential resources for many learning experiences common to industrial arts (Moye, 2012). This expansion provided students with experiences geared towards making informed decisions following high school, whether that be entering the workforce, attending further vocational programs, or continuing their education at the collegiate level (Moye, 2012).

To meet the needs of these students and the growing industrial arts movement, the Standards Project (1978-1980) led by Dr. William Dugger, sought to develop basic standards for industrial arts programs (Moye & Dugger, 2016). The Jackson Mills Project was formed to develop a "comprehensive" set of expectations for industrial arts programs (Foster, 1994; Snyder & Hale, 1981). This initiative advocated for industrial arts classrooms to become more comprehensive by including science and humanities surrounding the technology content presented to students (Snyder & Hale, 1981). Using the framework built during the Jackson Mills Project, the American Association of Industrial Arts published the first definition of technology education, "...a comprehensive, action-based educational program concerned with technical means, their evolution, utilization, and significance; with industry, its organization, personnel systems, techniques, resources, and products; and their socio-cultural impacts" (American Industrial Arts Association, 1985, p. 25). The *Standards for Industrial Arts Programs* were published and later revised in 1985 by the American Industrial Arts Association (AIAA) to reflect a focus on technology rather than industry. The *Standards for Technology Education Programs* would be the first set of standards outlining a working framework of technology education to be disseminated by the International Technology Education Association (Moye, 2012). To present day, these standards have been revised a number of times. The most recent

publication in standards from this organization, now the International Technology and Engineering Education Association (ITEEA) is *The Standards for Technological and Engineering Literacy: Defining the Role of Technology and Engineering in STEM Education (STEL)*, published in 2020. These new standards provide an up-to-date vision of what students should strive to know and be able to do to earn the designation of technological and engineering literacy (ITEEA, 2020).

Some of the most recent legislation influencing TEE is the Carl D. Perkins Career and Technical Education Act which was passed in 2006. This is the main federal law aimed at supporting the development of career and technical skills in secondary and post-secondary education. The Perkins Act sought to improve the preparedness of students enrolled in CTE programs for entry into higher education or entry into the trade industry (Gordon & Schultz, 2020). The act expired in 2013 but was reauthorized in the form of the Strengthening Career and Technical Education for the 21st Century Act in 2018. Along with funding for these programs, the reauthorization provided more flexibility in its set annual performance targets and consequences for states that failed to meet these targets (Granovskiy, 2018). The Building Blocks for STEM Act was signed into law in 2019, which identifies a need for increased female recruitment for STEM subjects at the K-12 levels. The bill modified National Science Foundation (NSF) grant programs to be used to support the goal of supporting girls as young as kindergarten to take part in STEM subjects and areas through research and action (building Blocks of STEM Act, 2019; Gordon & Schutlz, 2020)

Funding of Secondary Career and Technical Education Programs

Career and technical education (CTE) programs in the United States receive nearly $1.3 billion of federal funding through the Carl D. Perkins Career and Technical Education Act of

2006. This act was originally put into place in 1984 to provide funding to the states to be used specifically for CTE courses and their betterment in secondary education (Gordon & Schultz, 2020; Carl D. Perkins Career and Technical Education Act, 2006). It has been renewed every three to five years. The most recent renewal was in 2018 as part of the Strengthening Career and Technical Education for the 21st Century Act which reauthorized the program through 2024 (Strengthening Career and Technical Education for the 21st Century Act, 2018). Each renewal brings about changes such as the quantity of funding, how these funds are allotted to states, ways to justify spending, and how the funding should be used to reach the goals set at the renewal (Gordon & Schultz, 2020). The act identifies CTE spending agencies at the national, state, and local levels from programs that have met the goals since the last renewal. These agencies must comply with the mandates put in place by the Perkins Act to continue receiving funding (Carl D. Perkins Career and Technical Education Act, 2006). Teachers are often presented with documents from their state on how the funding may or may not be used to remain in compliance with federal standards (Carl D. Perkins Career and Technical Education Act, 2006)

Earning an Educator License

Participants for this study have taught in the following states: New Jersey, North Carolina, Pennsylvania, Utah, or Virginia. As the majority of the participants completed their teaching experiences in NC, its licensure process has been explained in depth. The remaining states will be compared to these requirements with similarities and differences called to attention.

North Carolina

The North Carolina State Board of Education (NCSBE) defines a teacher as “an individual whose major responsibility is to either teach or directly supervise

teaching…" (2018a). The NCSBE maintains a policy manual that includes policies dictating the requirements for an individual to earn a license to teach within a public classroom in North Carolina, as well as the different levels of licenses available to prospective teachers. There are two levels of licenses: the Individual Professional License (IPL) and the Continuing Professional License (CPL) (NCSBE, 2020a). An IPL allows an educator to begin practicing teaching within NC and is valid for a maximum of three years. Once an educator has completed their three years of teaching, they can apply for a CPL, which is valid for five years and allows an educator to continue teaching. The CPL must be renewed every five years (NCSBE, 2020a). The policy "Routes to Licensure" (NCSBE, 2018a) dictates the requirements prospective teachers must meet to achieve these levels of licensure. The methods that will be focused on have been sorted into the "traditional" route and alternative routes, below.

Traditional Licensure. Traditional licensure for this study has been defined as completing an approved Educator Preparation Program. College-level education programs are approved by the State Board of Education as quality programs that produce quality teachers (NCSBE, 2018b). Students who complete these programs are eligible to apply for a license within the state of NC. Each program area may have its own set of requirements, such as tests like the PRAXIS. The traditional route is also set up for out-of-state teachers to apply for licensure within NC if relocating. However, NC does not have reciprocity with all states. Out-of-state teachers desiring to use their existing license to teach must meet the equivalency standards outlined in the NC SBE Policy Manual. These requirements include passing the relevant NCSBE licensure exams and providing proof of effective teaching. If an out-of-state educator holds a National Board Certification, they are eligible to apply for a CPL (NCSBE, 2020a).

Alternative Routes to Licensure. Individuals who have not completed an Educator Preparation Program in North Carolina or another state can still apply for licensure under an alternative pathway. One such pathway is through participation in programs such as Teach for America (NCSBE, 2018a). The SBE affirms that participants who successfully complete the program are entitled to a teaching license if they meet certain predetermined restrictions, such as completing the required licensure exams.

Another way to earn a teaching license within NC is through the lateral entry process. Lateral entry allows for individuals who have not completed an approved teacher education program to begin work as a teacher while completing required courses in pedagogy through an approved teacher education program. To be eligible for lateral entry an individual must have passed the required NCSBE licensing exams and have a bachelor's degree from an accredited college/university (NCSBE, 2020a). Individuals must also have a minimum of a 2.5 GPA with their degree or have completed five years of relevant experience to their desired subject area. Lateral entry teachers work under a one-year Residency License, which can only be renewed twice. At which point, the educator must meet the requirements to apply for an IPL or a CPL to continue teaching (NCSBE, 2020a).

Pennsylvania

As dictated by the Pennsylvania Department of Education (PDE) the teaching licensure process in PA is similar to NC. Pathways to a "Level I" or initial licensure for both traditional and alternative licenses are almost identical. The largest place PA differs is in its additional requirements for attaining a "Level II" or professional teaching license (PDE, 2021). The requirements necessary include remaining an active teacher while completing three years of creditable service, completing 24 hours towards a post baccalaureate degree, completing a new

teacher induction program, and having six satisfactory assessments conducted by an employer (PDE, 2021).

New Jersey

The New Jersey Department of Education (NJDOE) outlines the requirements for teaching licenses in the state of NJ (NJDOE, 2021). Initial licensure or a provisional license enforces the same standards as PA and NC. Applicants must complete a bachelor's degree, a NJ approved teacher preparation program, and pass any required examinations (NJDOE, 2021). The next level of licensure available for teachers is a Standard Certificate, which is NJ's permanent teaching credential. To earn this certificate, teachers must complete the Provisional Teacher Program (PTP) (NJDOE, 2021). The PTP is a school-based training program developed by the school district and requires mandatory participation from new hires (NJDOE, 2021).

Virginia

The Virginia Department of Education (VDOE) outlines the requirements for initial licensure and a professional license as well as the renewal of these licenses on its website (VDOE, 2021). Initial license requirements are the same as the aforementioned states in that individuals must have completed a state-approved preparation program along with mandatory training and examinations. Those who seek a professional teaching license must obtain passing scores on assessments prescribed by the Virginia Board of Education (VBOE) within three years of their initial provisional license (VDOE, 2021).

Utah

The Utah State Board of Education (USBOE) dictates the requirements for those in Utah to obtain and maintain an educator license (USBOE, 2021). Educators have the opportunity to seek an associate license, or a professional license. The professional license follows the same

criteria as other traditional licenses in other states, while the associate license is equivalent to an alternative license in other states (USBOE, 2021).

Technology and Engineering Education Licensure and Demand

Educators wanting to instruct within TEE subjects must, at minimum, meet the above requirements either through an educator preparation program or an alternative licensure route. All prospective educators must complete the required licensure exams for their subject areas before they can apply for licensure. Based on an analysis of the most recent available Schools and Staffing Survey Teacher Questionnaire (SASS TQ), 78.4% of TEE teachers entered the field through a traditional certification program, which is lower than teachers in other subjects (85.5%) (Ernst & Williams, 2015). This means that 21.4% of TEE teachers enter the teaching field through a form of alternative certification. These numbers are based on national reporting. Johnny Moye (2017) did an analysis on the supply of TEE teachers graduating from institutions annually. He found that over the course of a decade (from 1995-2016) the amount of TEE teacher produced had decreased by just over 60%. Another report from Rogers (2015), makes the claim that there is a plague in the discipline as the number of institutions with TEE programs is declining alongside the graduation rates. His report showed that year 36% of these graduates came from three institutions; 50% of the colleges graduated four or fewer graduates, and six institutions reported zero graduates that year. Both highlight the issue of supply to the TEE field, and voice concern for the longevity of TEE as a profession.

Teachers Attrition and Retention

The topics of attrition and retention have a lot of overlap when it comes to discussing the reasons teachers choose to stay or leave the profession. This section will attempt to present both sides when discussing factors that have been found in both research areas.

In research, there are two overarching ways to discuss the recognized value of teachers. The first is financial compensation through the form of wages and benefits (U.S. Department of Education, 2021). Teacher compensation and wages are not new issues or points of discussion. In fact, a quick search of the article database from the researcher's university shows debates on the topic dating back to the 1920s. A national longitudinal study of K-12 public school teachers found a 10% higher retention rate of first-year teachers if salary was $40,000 or more (NCES, 2015). When discussing teacher attrition, Imezki (2004) hones in on the inner-district attritions that happens when teachers seek positions in higher paying districts. She expands on this, discussing how some teachers cannot afford to live in or send their children to the school districts they teach in. Her study highlights the importance of not only raising teacher wages statewide but doing so with respect to the cost of living in the areas teachers teach in, so that they may be able to live and work within the same communities. The second way to discuss the recognized value of teachers is a quite literal interpretation of the term; how they are recognized and valued by their peers and supervisors (Deci & Ryan, 2000). This value can be centered on how well the goals and values of a school match the individual goals and values of the teacher, referred to in research as value consonance (Skaalvik & Skaalvik, 2011; Rosenberg, 1979). Skaalvik & Skaalvik (2011) found a positive relationship between this value consonance and teachers' feelings of belonging, which was found to be one of the key variables for job satisfaction or motivation to leave the profession.

This feeling of belonging extends to the relationship's teachers are able to establish and maintain within their schools and their content areas. Research on teacher-colleague relationships focuses on the impact positive coworker relationships can have on relieving work-related stress (Goodpaster et al., 2018, Wolfgast & Fisher, 2017). This is especially important for early career

teachers, as they are often trying to build curriculum resources and navigate the culture of their schools (Barrera et al., 2010). Research also states that positive teacher-colleague relationships improve teacher commitment, by providing a way to process emotions about the workplace (Jo, 2014; Saunders, 2013). Jo (2014) even suggests that these teacher-colleague relationships may have a greater impact on teacher commitment than teacher-principal relationships as they influence the sense of community in schools in different ways.

Education is no exception when discussing how supervisors have an effect on employee satisfaction. As such, principal support has been shown to have a direct effect on the job satisfaction of teachers (Olsen & Huang, 2019; Brown & Wynne, 2009; Petzko, 2004). These individuals have a unique position to impact the climate and culture within a school (Olsen & Huang, 2019). Research suggests that effective principals are those who seek to improve student achievement by creating school environments that are conducive to student learning instead of solely focusing on students directly (Grissom, 2011). One such way to do so, is through actively supporting teachers in a commitment to personal growth and fostering an environment of recognition and appreciation, there are higher retention rates versus those that do not (Brown & Wynn, 2009; Petzko, 2004). Higher teacher turnover rates have been shown to negatively impact students' achievement (Ronfeldt et al., 2013).

It's impossible to discuss teacher working conditions without discussing students. and workload. Relationships with students, both positive and negative, have an impact on teacher job satisfaction (Skaalvik & Skaalvik, 2011; Spilt et al., 2011). Stressors related to students include class sizes, diversity of students' knowledge and backgrounds, low motivation to learn, and discipline problems (Torres et al., 2018). Discipline problems can be a major stress leading to burnout at all levels of teaching (Torres et al., 2018; Skaalvik & Skaalvik, 2017). Skaalvik &

Skaalvik (2017) argue that discipline problems and low motivation to learn can cause teachers to feel that students are interfering with their goals for student achievement, which can add additional stress to meeting the pressures placed on them by their schools and society. Hughes (2012) found that when teachers were satisfied with the level of involvement from their students and cooperation of parents, they were more likely to continue teaching. When developing lessons to address the diverse student needs within their classrooms, teachers tend to put in longer hours (up to 18-hour days and weekends) which interferes with a work-life balance (Lemons et al., 2015). Lots of research discusses the connection between job satisfaction and perceived workload for teachers (Torres et al., 2018; Skaalvik & Skaalvik, 2017; Lemons et al., 2015; Hirsch & Emerick, 2007). Some parts of workload can be attributed to leadership in the school and how additional tasks are assigned and timed by the schools. Others are related to time spent preparing content, finding and creating resources, and providing student feedback (Lemons et al., 2015; Torres et al., 2018).

Teacher Attrition

Teachers' decisions to leave the classroom can vary greatly. To simplify the different forms, Struyven and Vanthournout (2014) have classified the different forms of attrition into two categories: transfer attrition and exit-attrition. Transfer attrition refers to teachers who may leave a teaching position within one school to pursue a teaching career at another (Struyven & Vanthournout, 2014). Exit-attrition refers to teachers who have left the teaching profession for a career change (Struyven & Vanthournout, 2014). Researchers have found that the reasons teachers choose to leave can be both personal and/or career driven (Skaalvik & Skaalvik, 2011). Some of these reasons include administrative support, relationships with colleagues, discipline problems (student relationships), relationships with parents, workload, other job prospects,

burnout, salary, and overall job satisfaction (Grissom et al., 2016; Skaalvik & Skaalvik, 2011, 2015; Struyven & Vanthournout, 2014). Figure 3 provides a visual of how these factors are connected to overall job satisfaction which in turn can affect a teacher's motivation to leave the profession.

Figure 2.1 Flowchart of relationship between teachers' job satisfaction factors and motivation to leave based on a model from Skaalvik & Skaalvik (2011, p. 1035).

Technology and engineering education teachers may be at risk of leaving the classroom due to the training within their degree programs which often teaches industry skills alongside pedagogy techniques. Based on location, these industry skills can be more profitable outside the classroom as a result of the shortage in the STEM workforce (Lemons et al., 2015; Ruhland, 2001). Additionally, CTE teachers and programs often have unique facility and equipment needs. When teachers do not have access to these resources, it can lead to feelings of exasperation and may leave teachers feeling unsupported. A lack of proper facilities, equipment, and monetary support have all been identified as frustrations for teachers (Mundt & Connors, 1999; Torres et al., 2008).

Teacher Retention

Studies in teacher retention have often focused on specific interventions to address the concerns of those identified in attrition studies. A national longitudinal study of K-12 public school teachers found a 10% higher retention rate of first-year teachers if salary was $40,000 or more (NCES, 2015). Other factors such as the presence of a strong and supportive administrative team, access to up-to-date professional developments, opportunities for further education, and promotion of healthy work-life balances have been shown to increase retention (Clark et al., 2014; Hasselquist & Graves, 2020; Inman & Marlow, 2004). By far, mentor programs have been found to be the most effective way to support beginning teachers and retain their presence in the classroom (Andrews & Quinn, 2005; Barrera et al., 2010; Bressman et al., 2018; Flores & Day, 2006; Gu & Day, 2007; Hiiffman & Leak, 1986; Inman & Marlow, 2004; Skaalvik & Skaalvik, 2010).

Early Career Teachers

Early career teachers are those within their first seven years in the classroom (Bresssman et al., 2018). When researching the development of teachers during their beginning years, studies try to illuminate the experiences in an attempt to better understand their realities (Beatty, 2016; Fantalli & McDougall, 2009; Friesen & Besley, 2013; Le Maistre & Pare, 2010). With regards to teacher retention, pairing beginning teachers with a mentor has shown to increase the return rate of these early-career teachers (National Center for Education Statistics, 2015). Mentoring is a practice in which a more experienced educator (often in the same field) is paired with a less experienced, often beginner teacher, with the purpose of offering guidance, advice, support, and encouragement (Barrera et al., 2010; Bressman et al., 2018). Mentor teachers have proven to be an effective method to helping teachers develop as individuals (Andrews & Quinn, 2005; Flores

& Day, 2006; Hiiffman & Leak, 1986). An effective mentor pairing provides new teachers with the chance to further their knowledge regarding teaching tools, resources, and skills from experienced teachers (Lehman, 2017). It also promotes positive work life relationships, which has been shown to improve retention (Gu & Day, 2007). Partnership with a mentor has also been found as one of the keys to strengthening a teacher's teacher identity within their first few years (Flores & Day, 2006). Internal factors such as teacher identity have been shown through other research studies to have a significant impact on an individual's decision to remain in the classroom (Skaalvik & Skaalvik, 2010).

Mid & Late-Career Teachers

Mid-career teachers (6 to 15 years) and late-career teachers (15+ years) in CTE are not exempt from unmet needs in the classroom (Hasselquist & Graves, 2020; Weinburgh, 2020). Gu and Day (2014) argue teachers face different challenges at each professional life phase. However, this time is not as heavily researched as early-career teacher experiences. Separately from their early-career counterparts, mid and late-career teachers focuses shift from building their own confidence and comfort in the classroom to exploration of new teaching techniques and attempts to improve students' learning experiences (Coutler & Lester, 2011; Eros, 2011). In addition to these areas, mid and late-career teachers must adapt to the ever-changing uses of technology, new assessment practices, and changing needs of diverse learners (Bressman et al., 2018). However, workload and extreme time demands often leave these teachers feeling emotionally and physically exhausted (Lemons et al., 2015; Struyven & Vanthournout, 2014; Weinburgh, 2020). As it is more common for work to interfere with teachers' personal lives, it is important for there to be a balance (Crutchfield et al., 2013; Hasselquist & Graves, 2020). Those that were able to find a balance between the personal and professional demands were more likely

to remain in the classroom, even past their initial eligibility for retirement (Clark et al., 2014). In many of these areas, mid and late-career teachers face unique challenges that may benefit from additional mentoring and support similarly to their early-career counterparts. Bressman, et al. (2018) have suggested a system in which mid and late-career teachers are paired with beginning teachers to form a give-and-take mentorship in which both sides aid and coach each other.

Identity

Several researchers and theorists have sought to answer the questions "what is identity?" and "how is it formed?" It is still a concept that has current researchers searching for answers. Generally, identity theorists have taken two disciplinary perspectives: psychoanalytic or sociological. Psychoanalytic perspectives structure the development of an individual at the psychological level and often credit personal growth to the struggle created through reflection of experiences and life events (Sokol, 2009). Sociological perspectives pose that the parts of a self are composed of unique meanings the individual assigns to the numerous roles they participate in within distinct societal environments (Stryker & Burker, 2000).

Modern research using a psychoanalytic framework are most often based on the writings of Erik Erikson. Erikson posed that the formation of identity, or ego, is separated into eight stages. Each stage is grounded in experiences of internal conflict that the individual must undergo and resolve to progress in their development (Erikson, 1968). The outcome of these crucial turning points could positively or negatively affect the development of the individual, as progression is not strictly linear, nor is a stage guaranteed to be maintained once reached (Erikson, 1959). Another well-known psychoanalytic theorist is Sigmund Freud, whose work focused on personality development rather than identity (Vanheule & Verhaeghe, 2009). His work also focused on the development of the Ego, the Id, and the Super-Ego as the elements that

make up the psyche and how it operates (Freud, 1923). The theories of both men evolved throughout their subsequent publications and have been heavily criticized, both positively and negatively by other researchers as they try to understand and apply the theories of these theorists (Vanheule & Verhaeghe, 2009).

Identity rooted in sociology can be traced back to the publications of George Herbert Mead (1934). His writings presented the identity as a stable continuous concept shaped by social interactions that was ultimately developed through reflexive language and social experiences (Mead, 1934). This stable self could take on different approaches to different experiences based on the role played by the individual (Day et al., 2006). His works have served as a framework in numerous analyses of sociological and social psychological issues (Stryker & Burke, 2000). Developing this idea further, since peoples' lives are multifaceted, Goffman (1959) presented the idea that each person is made up of a series of 'selves.' Each self is meant to focus on completing a specific role at any given time or situation (Goffman, 1959). His writings expressed that adaptability of the self was essential to communicate effectively within the required social processes unique to each situation (Day et al., 2006). Similar to this way of framing identity, Ball (1972) was the first to specifically refer to "professional identity," which is separate from substantive identity. The concept that the identity of a person is an adaptable presentation rooted to the specific needs of a situation in addition to a more stable core presentation fundamental to how an individual perceives themselves (Day et al., 2006). Research studies exploring professional identity often vary in their approaches to defining identity, the goals in their research, and methodology for exploring this area of identity.

Teacher Professional Identity

Across literature, there has been a lack of consensus of how to define identity as the definition has evolved over time. The definition of teacher identity is no different. Beijaard, et al. (2004) conducted a review of 19 studies on teacher professional identity in an attempt to provide a definition. They found that these studies either failed to define teacher identity or professional identity, or the definitions varied greatly across the studies (Beijaard et al., 2004). The consensus amongst these studies is that teacher identity is multifaceted and ever-changing due to both internal and external influences (Beauchamp & Thomas, 2009; Beijaard et al., 2004). Some examples of internal influences include self-efficacy, self-actualization, a sense of autonomy, and emotional burnout (Beijaard et al., 2004). Some examples of external influences include job satisfaction, working environments, curriculum expectations, and student needs (Beijaard et al., 2004). Therefore, for this current study, teacher identity is operationally defined as a dynamic concept influenced by a range of factors including internal emotions as well as external job and life experiences in particular contexts relevant to the personal and professional aspects of teaching often based on the who and what a teacher is in the role of education or the function of a classroom (Beauchamp & Thomas, 2009; Beijaard et al., 2004; Cooper & Olsen, 1996; Goodson & Cole, 1994; Volkmann & Anderson, 1998).

When focusing on the concept of teacher identity, research commonly focuses on three overarching themes: variables regarding teacher attrition or retention (Gaziel, 1995; Richardson, 2019), students' choices that led them to becoming teachers and their experiences during their beginning years (Chong & Low, 2009; Fajardo Castañeda, 2014; Hong, 2010; Olsen, 2008; Walkington, 2005), and teachers' understandings of their own professional identities (Beijaard et

al., 2000; Brooke, 1994; Mitchell, 1997). Each of these themes focuses on teachers in a variety of subject areas, such as science and general education.

When examining teacher attrition, the previously identified external factors for attrition were often identified as still affecting teachers' decisions to remain in the classroom, but teachers may remain in a less-satisfactory employment situation with a highly developed teacher identity (Richardson, 2019). Teachers developed an increased sense of professional identity when provided with opportunities to engage in activities that met their needs to further their knowledge base or skills as a teacher (Gaziel, 1995; Richardson, 2019).

When examining choices of young adults to pursue teaching as a career, studies often focus on career choice as a way to meet people's needs. The findings were similar, in that, for many students, their reasons for pursuing teaching often had to do with wanting to make the world a better place, or due to the influence of someone of significance in their lives (Fajardo Casteñada, 2014; Hong, 2010). However, as they progressed and experienced teaching through pre-teaching courses, their motivations, and intentions of entering the professions often changed for a portion of the participants (Chong & Low, 2009; Hong, 2010). Walkington (2005) found those paired with a mentor teacher showed a more developed professional identity than those who were not.

When exploring the experiences of teachers and their interpretations of their teacher identities, teachers indicated a shared perception that their professional identity changed over time and was shaped through experiences in the classroom (Beijaard et al., 2000; Brooke, 1994; Mitchell, 1997). However, their defining experiences were often unique to each individual and varied across subject areas (Beijaard et al., 2000; Mitchell, 1997). Many participants struggled when asked to directly define the concept of professional identity (Beijaard et al., 2000).

Methodologies across these studies varied based on the population size in the study. For studies with 50 or fewer participants, in-depth interviews and survey questionnaires were popular methods of gathering data (Chong & Low, 2009; Mitchell, 1997; Richardson, 2019). For those greater than 50 participants, researchers relied either entirely on survey questionnaires for a quantitative study or a series of mixed method approaches, often involving interviewing a small sample of the population alongside the survey responses (Beijaard et al., 2000; Gaziel, 1995). Interview questions focused on different aspects of identity including roles of factors such as gender, decision making processes, meaningful influences and experiences, and long-term goals.

Gee's Identity Theory

This study will utilize James Gee's identity theory (2000) because it is organized in a way to specifically be used as an analytic lens for identity research in education related to teachers and students. Gee proposes that the concept of identity can be organized into four categories of sub-identities, or identity perspectives. These perspectives are the nature perspective (N-identity), the institutional perspective (I-identity), the discursive perspective (D-identity), and the affinity perspective (A-identity) (Gee, 2000). By dividing identity into these subcategories, Gee frames how identity can be developed internally as well as through external factors such as interactions with others. These subcategories are not always independent of one another, nor are they present at all times. Instead, these identity perspectives can change within contexts and even be woven together to create a fuller understanding of an individual's identity.

The nature perspective (N-identity) of identity is defined by "nature, not society" (Gee, 2000). It is a way of looking at who a person is. It is outside of the individual's control or the control of society. An example of such a perspective are biological factors regarding an individual. In an educational setting, the N-identity perspective can be observed through an

educators' race, sex, or other biological factors that may have affected their perspective as an educator. Some may refer to this as a "core identity" as it is unchanging due to external factors (Gee, 2000).

The institutional perspective (I-identity) of identity stems from a place in which a higher authority has given the individual the identity, usually an institution (Gee, 2000). Gee (2000) states that this is not a factor of anything nature has given or something the individual has worked to accomplish. This identity exists due to someone in a higher position of power or authority within an institution who has authorized the individual as such. Institutions can be granted the authority to give such identities through laws, rules, tradition, or principles of society. Gee's example is his title as a professor, which is sourced by the university with which he is employed. To be recognized as a teacher through institutions, an individual may need to complete a collegiate program focusing on education. Additionally, the individual may need to complete an application for a teaching license from the state (an institution) and be hired by a school (also an institution), before being recognized as a teacher by these institutions. Gee (2000) further discusses the I-identity as something that can be a calling or something that can be an imposition. For instance, someone who sees teaching as a calling, will fulfill the duties of the position as part of their "who I am." Whereas someone who is teaching simply because it is just a job, may view it more as an imposition and not take on some duties willingly as it is something they may be forced to do (Gee, 2000).

Characteristics recognized in an individual by those interacting with that individual make up the discourse perspective of identity (D-identity). Gee (2000) surmises that these interactions or discourses are abstract as they are the result of biases, environment, and in some cases, the individual's creation. For instance, if a person were to surround themselves only by people who

viewed them as “outgoing” in a setting where this trait was utilized, then “outgoing”, by the definition of those people, is part of the individual’s identity. Whereas, if that same individual entered another group of people where the understood definition of “outgoing” was not the same, due to the experiences of the group and/or differences of the setting, then the trait of “outgoing” may not fit the individual and therefore not be part of their identity. It is not something that an institution upholds or creates, nor is it something an individual is born with, but something others recognize through discourse with other people (Gee, 2000). However, Gee (2000) expands that part of what grants institutions power and authority to grant identities is in part to the dialogue and discourse around these institutions. This dialogue results in the continuation of these institutions and their authority to create action to sustain further discourse about the institutions. If people were to stop discussing and therefore giving “power” to these institutions, then there would be no authority with which an institution could use to grant institutional identities (Gee, 2000).

The affinity perspective (A-identity) is based on a set of practices dictated by a group of individuals that share an “affinity group” (Gee, 2000). In order for a group of people to be an “affinity group,” the members' practices must primarily focus on fulfilling a set of common endeavors or practices second to a shared culture or series of traits. Gee (2000) uses the example of *Star Trek* fans, also known as *Trekkies*, as an affinity group. These individuals will commonly participate in practices such as attending shows, talking about the shows in person and online, collecting memorabilia, and even dressing up and attending conventions as characters from the show. An affinity group is something someone must choose to join and voluntarily take part in its practices (Gee, 2000). Additional practices that are completed as an enforcement of an institution do not qualify as affinity group practice as these are dictated by an institution.

Therefore, actions such as lesson planning, delivering content, and other assigned tasks may not qualify as affinity practices for teachers if they are regulated and dictated by the institution with which they are employed.

Each of these identity perspectives are combined to form a singular identity for an individual. Through the examples provided, it can be observed how these identities would intertwine to create a more complex description of an individual's identity. The identity characteristics may not exist statically within each of these categories, but not all are fluid either (Gee, 2000). Using this theory to examine the development of TEE teachers and their retention decisions provides the unique opportunity to explore of different impacts are introduced and the resulting effects of the impacts individually or as a whole on their career decisions.

Chapter Summary

Technology and engineering education has evolved from historical vocational education and industrial arts programs (Gordon & Schutlz, 2020). With the intention of training youth to be technologically and engineering literate, teachers are often faced with balancing hands-on trade skills with an ever-changing technology landscape (Ruhland, 2001). Programs often struggle financially with access to these technologies or access to adequate facilities to teach these skills to their students (Torres et al., 2009). These factors add a unique struggle to the attrition factors experienced by most teachers in the United States. Research surrounding retention of teachers often takes a critical look at interventions or possible interventions meant to address the identified needs of teachers in attrition research (Skaalvik & Skaalvik, 2015; Struyven & Vanthournout, 2014). However, much of this research is pointed at early-career teachers even though their needs are different from mid and late-career teachers (Bressman et al., 2018). The

needs of these more seasoned teaching professionals must also be addressed as well if researchers hope to get a well-rounded view of teacher attrition and teacher retention.

Identity theory is a multifaceted area of study which makes creating a singular definition difficult. Many works in identity theory focus either on the sociological aspects of identity or the psychoanalytical aspects. Ball (1972) was the first to suggest professional identity in addition to an individual's core identity. Since then, the researchers examining the professional identity of teachers have struggled to settle on a concrete and stable definition of teacher identity and its role in a teacher's career and personal life.

While some of these studies reviewed do make use of quantitative or mixed method approaches, most are qualitative studies with primary use of interviews, survey questionnaires, and small sample sizes, which influenced the design of this study. Teacher identity has been identified as a critical part of the "who" in teachers and a possible intrinsic motivator to remain in the profession despite less-than-satisfactory employment. Therefore, this study sought to identify what parts of the multifaceted "identity" are most prevalent in technology education teachers and if there are specific factors that may contribute to the decision to remain in the classroom. Gee (2000) was selected as an analytic framework for this study. His theory of identity was originally proposed to be used specifically as a way of analyzing identity in education settings. His theory defines identity as recognizing a certain "kind of person" within a given context. Within his theory, there are four lenses within which to view an individual's identity: the nature perspective (N-identity), the institutional perspective (I-identity), the discursive perspective (D-identity), and the affinity perspective (A-identity) (Gee, 2000). The use of this framework will allow exploration of the different levels of the "who" participants are as technology education teachers.

CHAPTER 3: METHODOLOGY

Research Questions

The purpose of this study was to add to the content area specific literature on teacher identity and teacher retention while expanding its scope to include the unique field of TEE. Using the analysis of in-depth interviews and data from the recruitment questionnaires, this study examined what factors of teacher identity are most prevalent in TEE teachers and how these factors affect decisions to remain in the classroom. Interviews were informed by these two questions:

Research Question 1: What aspects of teacher identity are most prevalent in traditionally trained technology and engineering education teachers, current and former?

Research Question 2: What is the relationship between the identified aspects of teacher identity and technology and engineering education teachers' decisions to stay in the classroom?

Qualitative Research Design

Qualitative research uses data in the form of observations, interviews, documents, artifacts, and in some cases, visual data that seeks to answer or study a research problem by examining the meaning individuals or a group attribute to a social or human problem (Miles et al., 2014; Saldaña**,** 2016). To achieve this, data are collected "in a natural setting sensitive to the people and places under study" (Creswell, 2013, p. 44). Once collected, data are analyzed through a process known as coding to seek out patterns or themes (Saldaña**,** 2016). There are several approaches to coding, but the two most commonly accepted are inductive and deductive coding. Deductive coding uses a set of pre-existing codes, while inductive coding allows codes to emerge from the data set. A researcher may make use of a combination of coding approaches to unearth the essence of the data they have gathered (Saldaña, 2016). Rich qualitative data

provides the platform for researchers to create an emphasis on people's lived experiences to discover the meanings placed on the events, processes, and structures of their lives while connecting these meanings to the world around them (Miles et al., 2014). There are five main categories within qualitative research: narrative research, phenomenology, grounded theory, ethnography, and case study (Creswell & Poth, 2018; Miles et al., 2014). Each of these approaches outlines ways in which qualitative research can be conducted and reported. Variables that influence which approach to choose include timelines, artifacts, audiences, approaches to analysis, and the final report format (Creswell & Poth, 2018). Figure 3.1 is a visual representation of the workflow for this study. It has been updated and modified throughout the development and conduction of the study to reflect the most current actions of the researcher.

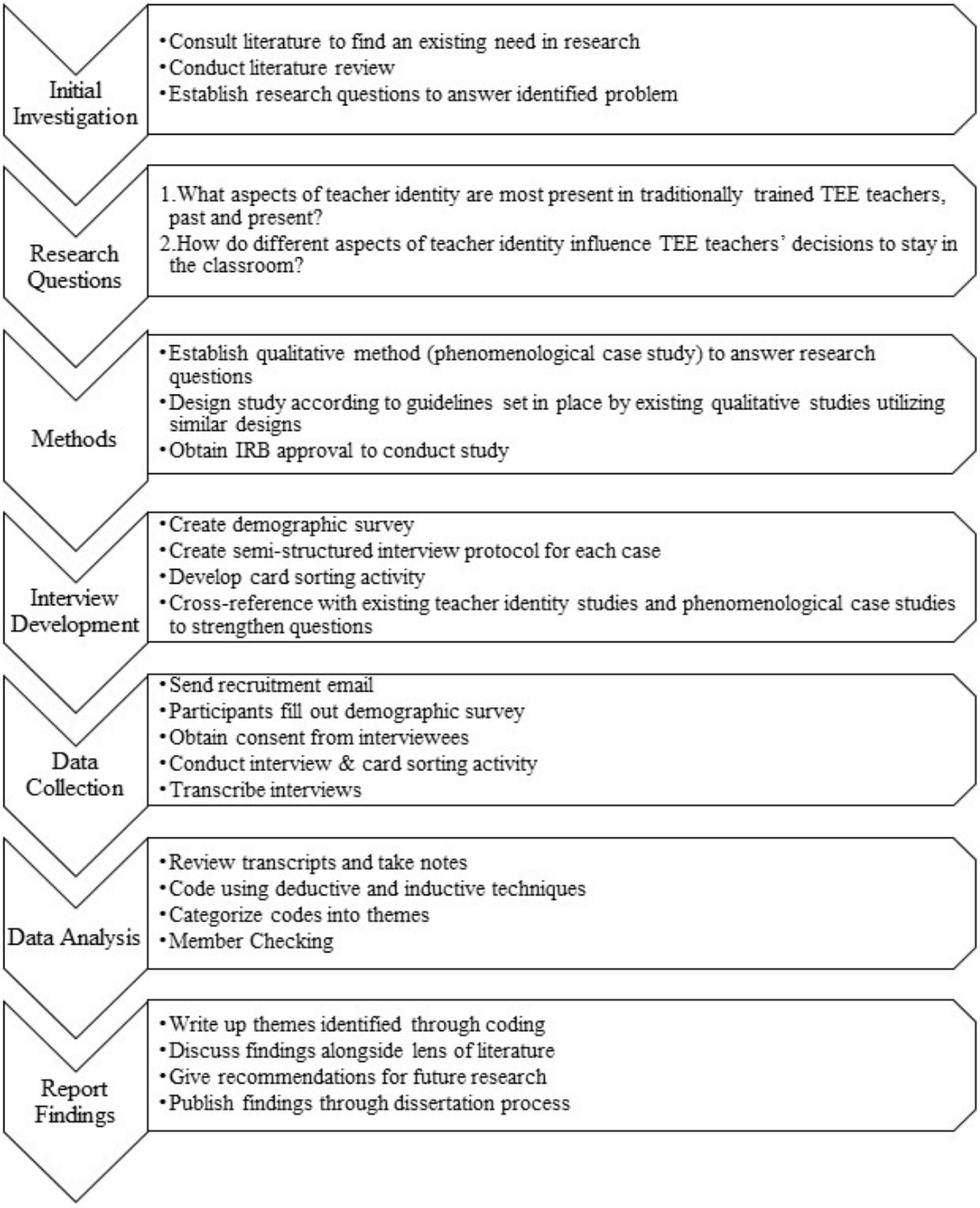

Figure 3.1 Graphic representation of researcher's workflow throughout conducted research study

Phenomenological Case Study Methodology

Phenomenology is a qualitative approach that studies a shared phenomenon among a research sample or group (Moustakas, 1994). Researchers utilizing this approach examine the lived experiences of a group of individuals to capture and describe their perceptions of reality within a specific context (Moustakas, 1994). The firsthand experiences of participants provide rich data, allowing the researcher to develop a clear-cut understanding of the experience for a particular phenomenon. In-depth phenomenological interviews are meant to "understand the experience of those who are interviewed" (Seidman, 2013, p. 56). This research approach will be used alongside the case study method which allows the researcher to make clear complex human experiences by capturing the overall essence of the real-life context.

A case study approach is defined as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used" (Yin & Campbell, 1984, p.23). Patterns within data collected can be examined on a deeper level, which allows researchers a richer understanding of the full experiences of participants by utilizing a cross-examination of multiple sources of data (Yin, 2018). It also provides the researcher with the ability to create defined boundaries where there is no direct control or role in the phenomenon being studied (Yin, 2018). To control the sample for this study in a way to allow for deeper examination of the collected data, the boundaries for the cases required the participants to be current or former TEE teachers who completed a minimum of an undergraduate degree in TEE, have experience teaching in a K-12 classroom for at least one full year outside of a student teaching experience, and either currently hold or have previously held a TEE teaching license within their state where teaching took place.

Merriam and Tisdell (2016) have stated that other methodologies can be combined with case study as a way to focus the intent of the study within a bounded system if the use of the combination exists within the literature (Crawford, 2016; Mourlam et al., 2019; Sumison, 2002). A combination of these two approaches were used in this study to allow the researcher to examine the cases within TEE teachers while using a phenomenological approach for data collection and analysis. Focus was given to the lived experiences of these teachers and the development of their teacher identity through those experiences in the classroom at a variety of experience levels without the need for an in-depth multiple-year study. As is common in a phenomenological case study approach, the reporting of results from this study contains first-person quotes from participants' experiences, while making comparisons across cases related to shared experiences to determine factors that could influence future research studies (Mourlam et al., 2019; Sumison, 2002).

The types of data that were collected within this study included individual interviews, a demographic information survey, and a card sorting activity. The data were analyzed using a coding protocol. Initial coding consisted of the researcher utilizing deductive coding using references regarding teacher identity, retention factors, career prospect decisions, and measurement of participants' standards. The framework for this study is Gee's identity theory for use in education (Gee, 2000). During the coding stage, the researcher also called out any emergent themes (inductive coding) related to the participants' experiences. Codes were then categorized and organized into themes. All codes were stored in a codebook for organization and consistency (Creswell & Poth, 2018). Once organized, findings were summarized into member profiles, and sent to participants for member checking (Glesne, 2006). With member approval, all findings were typed into a report, including first-person quotes from the participants. The

report includes summaries of the findings for clarity and understanding, suggestions for further research, and potential impacts of any revelations. Member summaries can be viewed in Appendix G.

Research Study Design

This study utilized a case study approach to define the boundaries of the two cases being studied, with a phenomenological approach to data collection, data analysis, and data reporting. The main premise of a case study approach is to describe the lived experiences of participants, while phenomenology is used by researchers to examine the lived experiences of a group of individuals to capture and describe their perceptions of reality within a specific context (Creswell & Poth 2018; Merriam, 2009; Moustakas, 1994). To effectively find meaning and to develop suggestions for further research in the areas of long-term retention of technology and engineering education (TEE) teachers by examining teacher identity as an intrinsic motivator to stay in the K-12 classroom, this approach was determined as the best fit. The use of case study allowed for two groups, current and former teachers, to be examined and any difference and similarities in their experiences explored. The use of phenomenological data collection via the use of interviews and a card sorting activity to gather a first-person perspective of the research participants (Crawford, 2016). The phenomenological approach for data analysis and data reporting also allowed for the participants' experiences to be the central focus and foundation for answering the research questions. The use of a theoretical framework further guided the data collection, data analysis and data reporting. In this study, Gee's (2000) identity theory was used to examine the sources of experiences and discuss the impacts of these experiences on the development of the TEE teachers and how these may impact retention and attrition decisions of the current and former TEE teachers. The use of a theoretical framework served as a lens with which to explore the

experiences of the TEE teachers and the realities they experienced during their time in the K-12 classroom.

Participants

The sample for this study includes two groups of TEE teachers; current and former teachers. These cases were created to provide strict boundaries when exploring the phenomenon of teaching TEE within a K-12 classroom space:

- **Current TEE teachers,** or those who at the time of the study were actively teaching material that is considered TEE by their state, had taught for at least 1 year outside of a student teaching experience, and had completed at minimum an undergraduate degree in education.
- **Former TEE teachers,** or those who left K-12 education and had taught for at least one year outside of a student teaching experience and had completed at minimum an undergraduate degree in education.

By structuring the data collection into these two cases, a deeper understanding of the decisions this sample made when choosing to stay or leave the K-12 classroom could be reached. It also prompted the development of appropriate set of questions to be asked during interviews based on when their TEE teaching took place.

Participant Recruitment

Respondent driven sampling, also referred to as snowball sampling methodology, was used to find and create a sample of participants (Gyarmathy et al., 2014). Snowball sampling is a technique in which the researcher begins with a small list of initial contacts who fit the research criteria and invites them to become participants in the research (Gymathy et al., 2014; Parker et al., 2019) Then participants are recruited to assist in identifying other potential participants who

may be willing participants, or willing to recommend other potential participants; repeating until a target sample size or saturation of data has been reached (Parker et al., 2019). This growth is likened to that of a rolling snowball, which is where the methodology gets its name (Gyarmathy et al., 2014; Parker, 2019). It is often used to reach hard-to-reach participants and can be used to reach a target population where no database of contacts exists (Gyarmathy et al., 2014; Parker, 2019).

Following IRB approval, the researcher sent out a recruitment email to a seed list of participants, in line with the snowballing sampling methodology (Parker et al., 2019). These initial contacts were individuals known professionally by the researcher due to her connection to the TEE profession. The list of contacts contained both current and former teachers that fit into the intended boundaries of the cases, as well as those that did not but had previously been connected to others who may. The current teachers in the contact list accounted for a range of experience levels of potential participants and included early, mid, and late-career individuals. Additionally, former teachers who worked in industry positions as well as higher education were contacted. The recruitment email contained an explanation of the intended study, a request for participation, and a link to a demographics survey that had been set up through Qualtrics. The Qualtrics survey asked questions based on the individual's status as a TEE teacher. If they indicated they were a current teacher, it asked questions about information related to the content the teacher teaches, the grade level they teach, the area they teach in, where they completed their TEE education degree, and demographic information such as race, gender identification, and age. For former teachers, similar lines of inquiry were used, but in past tense instead of present tense. Participants were then asked if they would like to participate in the next step of an interview. If they indicated yes, they were prompted to provide the email contact information they preferred

to use. The full survey can be viewed in Appendix D. The researcher contacted all willing participants to set up interviews. Due to the sampling methodology, maximum numbers were not calculated, but the researcher set a minimum goal of nine participants per case and a time limit of eight weeks was set to receive responses to the recruitment survey. As a measurement to ensure protection of privacy, the data of participants who indicated they were not interested in participating in the interview stage were not stored long-term and was destroyed at the end of the study (Seidman, 2019).

After initially sending the email out and the snowball failing to grow, the researcher sent the recruitment email a second time to all active participants and the initial contact list to try to reach more participants. This time the recruiter asked to be notified if the email had been forwarded past the initial seed list. Seven contacts responded in the affirmative and this led to five more responses over the next two weeks. Over six weeks, this form received 39 responses. From these initial responses, 28 agreed to be included in the interview process. Once contacted to set up times for interviews, 25 responded and 25 interviews were conducted. However, four interviewees were deemed ineligible for inclusion in this study due to a misunderstanding of qualifications required to participate. These participants either spent less than six months in a K-12 classroom setting (only completed student teaching or sub-positions) or did not have a degree in TEE. Therefore, the study includes 21 participants (n=21).

Participant Demographics

Of the 21 participants included in the study, eight previously spent time as K-12 technology and engineering educators and 13 were currently active K-12 TEE educators at the time of the data collection. Since data was collected, two of the active teacher participants have transitioned into positions outside of education. Table 4.1 features some of the key demographics

reported by the participants. Ethnically, 90.4% of the participants identified as Caucasian (19 of 21), 4.8% identified as African American (1 of 21), and 4.8% identified as multi-racial (1 of 21). This can be compared with data in the Schools and Staffing Survey (SASS) from 2011-2012 findings that found the reported ethnic makeup of TEE teachers in the US is 91.9% Caucasian, 4.8% African American, 7% Hispanic, 2.3% Asian, 0.5% Native Hawaiian, and 2.7 % Native American. The SASS data also identified that 24.6% of TEE teachers report as female. This study had seven female participants (33.3%).

Participants identified their age via a selection of provided ranges, including 20-25 years, 26-30 years, 31-35 years, 36-40 years, 41-45 years, 46-50 years, 51-55 years, 56-60 years, 61-65 years, and 66+ years. The time spent in the classroom varied from two years to more than 15 years. For current teachers, the most common age range was 31-35 years of age and participants averaged 6.75 years in the K-12 classroom. For former teachers, there were the same number of participants between 31-35 years and 36-40 years and the median amount of time spent in the K-12 classroom before leaving was 6.25 years. For the entire sample, 8 of 21 identified as between 31-35 years old, and had spent an average of 6.4 years in the classroom. Participant degree completion included 38.1% completed only a bachelor's degree program for TEE, 33.3% had completed a master's, and 28.5% had completed an advanced degree (Ed.D. or Ph.D.) in TEE or a related field (e.g., STEM education). According to the 2011-2012 SASS data, the highest degree obtained breakdown for TEE educators nationally is 54.1% bachelor's, 40.4% master's, and 5.5% combined for advanced degrees (education specialist and doctoral degrees). For this reason, this sample is not a complete match to the education demographic of TEE educators as the entire former teacher case is made up of individuals who are either working towards or have attained a doctoral degree.

It should be noted the researcher knew 16 of the participants through personal and professional connections, as she is a member of the TEE profession as a student and colleague. The remaining five participants she had not met before the interview.

Table 3.1
Demographic Information for Study Participants (*n*= 21)

Pseudonym	Age Range	Gender	Ethnicity	State of Licensure	Years -in K-12	Grade Levels Taught	Highest Degree Completed
Current TEE Teacher (*n*=13)							
Aiden	26-30	Male	Caucasian	NC	4	9-12	Master's
Caleb	20-25	Male	Caucasian	NC	3	9-12	Bachelor's
Charlotte	20-25	Female	Caucasian	NJ	3	9-12	Bachelor's
David	31-35	Male	Caucasian	NC	11	9-12	Bachelor's
Evan	26-30	Male	Caucasian	PA	5	9-12	Bachelor's
Holly	20-25	Female	Caucasian	PA	2	6-12	Bachelor's
Mark	51-55	Male	Caucasian	NC	15	6-12	Master's
Natalie	31-35	Female	Caucasian	PA	13	6-8	Master's
Reginald	31-35	Male	Caucasian	NC	4	9-12	Bachelor's
Roger	31-35	Male	Caucasian	NC	11	6-12	Master's
Sara	20-25	Female	African American	NC	3	9-12	Bachelor's
Terry	26-30	Male	Caucasian	NJ	7	6-12	Master's
Thomas	31-35	Male	Caucasian	NC	7	9-12	Bachelor's
Former TEE Teachers (*n*=8)							
Christopher	36-40	Male	Caucasian	NC	6.5	9-12	Doctoral
Duke	31-35	Male	Multiracial	UT	4	6-9	Master's
Greta	36-40	Female	Caucasian	VA	3	6-8	Doctoral
Henry	31-35	Male	Caucasian	NC	8	6-12	Master's
Janet	31-35	Female	Caucasian	NC	4	6-12	Doctoral
Leroy	56-60	Male	Caucasian	NC	6.5	6-12	Doctoral
Lucas	36-40	Male	Caucasian	NC	11	6-12	Doctoral
Morgan	46-50	Female	Caucasian	NC	6	6-12	Doctoral

Participant Profiles

Current TEE Teachers

Aiden. Aiden has been teaching for four years. He currently teaches topics such as software usage and design principles in a high school setting. He views himself as a laid-back teacher who prides himself on creating a relaxed and comfortable classroom setting for students to learn. He has completed both a bachelor's degree and a master's in technology and engineering education. Aiden knew in high school that he wanted a career doing something in technology after his experiences with the Project Lead the Way curriculum. He did not feel financially confident to enter a university program directly after high school and would work full time while completing his associate degree at a local college. He recalls his decision to attend university was heavily influenced by a love for the city where it was located, in-state tuition, and where he could continue working at his current job to cover associated costs. After doing some research on what programs he could enter that matched his interests and on paper would accept courses he had already taken, his top choice was the TEE program. He was able to see the fun side of teaching during his student teaching experience, and following graduation was able to have his pick of which school he wanted to work at. Aiden's decision to remain in the classroom thus far has been fueled by an enjoyment of his current job and tasks. Though, part of it also stems from not knowing what else to do with his degree training. He currently plans to remain teaching in the K-12 classroom for the foreseeable future but could see himself transitioning to a different school as the current commute is longer than he desires.

Caleb. Caleb has been teaching at the high school level for three years. His decision to enter teaching evolved from a desire to enter engineering at a university. He did not meet the qualifications to enter the engineering program directly, so he planned to complete courses

initially in the TEE program and transfer. However, he ended up enjoying the curriculum and direction of TEE. At the time of the interview, Caleb expressed that he would like to seek other employment outside of K-12 education within the next five years. He enjoys teaching and values his relationships with students and coworkers, but finds the resources offered to him as a teacher are inadequate. He has to share a classroom with other teachers in his school and there is no private area for his planning time, when it's not taken up with meetings or other assigned duties. In addition, he finds the relationships with the parents of his students to often be discouraging. While his administration does support its teachers and the decisions they make, it isn't enough for these interactions. He hopes to either find a position in higher education or within a company using the software he teaches and maintains certifications in.

Charlotte. Charlotte recalls always wanting to be a teacher. For a brief time, Charlotte considered going to school for architecture instead because of a positive experience in her high school drafting class. She did not know becoming a TEE teacher was an option until she began discussing her change in plans with her teacher. She began looking at universities that offered degrees in TEE, which led to her current career path.

Charlotte has been a teacher for three years in her school. She finds building relationships with her students to be incredibly important and has strong opinions about how administration should be involved to best support teachers in the classroom. She is working hard to build her current program for the benefit of her students but would like to advance in her career outside of the K-12 classroom. She is currently working on her master's degree, which puts her closer to her goal of working in higher education. She would love to be a professor at her alma mater even if it required her to relocate. She has also considered the idea of becoming a consultant where she could further utilize her skills for curriculum and program building to help other TEE teachers.

David. David has been teaching for 11 years. A self-described foodie, he enjoys using his interest in food to connect with the diverse student body he works with daily. David sees himself as a demanding teacher with high expectations of his students as his job is to prepare them for college. He wants to ensure they are ready for the challenges ahead of them. Even though he's spent over a decade in secondary education, when making an initial career choice he did not pursue a degree in education. It wasn't until a fraternity brother, who was an upperclassman in the TEE program, introduced him to the program that he considered teaching as a career path. He really enjoyed the courses and eventually made the transition from engineering to technology education. This was the start of many connections David would make to build a network of coworkers and colleagues that he values greatly. He uses these connections to better his courses, though some of them go beyond the classroom; one connection introduced him to his wife. When he looks to the future, David sees himself remaining where he is: "I enjoy where I teach. I enjoy the students I teach; I enjoy the people I work with." There he can continue to "break in the freshmen" and continue preparing future engineering students for the rigorous college experience ahead of them.

Evan. Evan has been teaching at a rural high school level for five years. He sees himself as an innovator with a positive mindset. He works hard to teach his courses with a scope of student future success and to build a rapport with his students and their parents. Just as he values connecting with students and their families, his own family has been influential in his decision to enter teaching as a profession. Family and past teachers are what drove him in the direction of education and the undergraduate TEE program he completed. He values that teaching has allowed him to make a difference. He holds an intrinsic value of seeing students succeed and enjoys the day-to-day changes and challenges it brings, "it's just not punching a clock." While

Evan can see himself fulfilling a career in TEE, he does express concern that he may have to leave education due to circumstances outside of his control. He has seen programs close due to changes in how CTE programs are funded near him and wonders how further changes due to COVID-19 will continue to have an impact.

Holly. Holly's journey as a teacher has been an adventure. Holly knew from a very young age that she wanted to be a teacher. However, after an initial student teaching experience, she almost didn't go into the K-12 classroom. This placement taught her a style of teaching that was "everything I didn't want to do." Thankfully, she was able to experience a second placement where her experience was completely different. It wasn't a smooth transition, but Holly was able to complete her student teaching. After taking a year to participate in an internship, Holly found her first position as a long-term substitute. This began a whirlwind over the next two years where she would get to experience a variety of different schools and positions. During these positions, she consistently volunteered her time with a theatre club at the local high school near where she lived. So when a position became available at that school, Holly applied and made the transition. Her time in these places allowed her to build and develop a network of coworkers and colleagues that have influenced her experience. This network has continued supporting her and has helped her be a better teacher to the students. Her desire to be a better educator and to learn all she can about bettering herself and the systems in place, she has recently begun a graduate program for educational leadership. In the future, she is looking forward to using all that she has learned, and will learn, in the classroom to make the best learning experience she possibly can for her students.

Mark. Mark has been a TEE teacher for over 16 years. During this time, he has worked in rural, urban, and suburban schools at both the middle school and high school levels. He is

looking forward to moving towards retirement and has begun exploring hobbies and activities he enjoys outside of teaching. He enjoys incorporating some of these passions into his courses including his love of art and design. He even teaches art classes at the local arts center. Throughout his time in education, Mark has built a network of colleagues and coworkers across the state to which he credits much of his success and longevity in the classroom. He did leave education for a short time at the beginning of his career due to personal reasons and considered not returning to the classroom. After two years, Mark eventually returned as "there seems to be some evidence I was pretty good at it. I liked it well enough. Let's give that another shot." Since then, he has served as a mentor teacher for the state's beginning teacher program, as an advisor to student organizations within his schools, and worked on curriculum teams. Mark has enjoyed the interactions with people, colleagues, and students, throughout his career and likes to joke with his students that he's the smartest teacher in the school. It's the relationships that have kept him going and the reason why he still does what he does.

Natalie. Natalie has taught middle school TEE for 13 years. As "a woman in a male dominated field" she has had to persevere and prove herself to individuals at all levels along the way. Taking on leadership roles and gaining confidence in herself has helped others see past the "pink safety glasses" to know that she is a passionate, caring, and fully capable teacher and leader. She is very involved in her school community and works hard to create and sustain relationships with her students and their parents. These relationships, along with support from her family and coworkers have helped her continue when the days in education get hard. This family connection is what began her path in TEE; her father was a TEE teacher. While she originally wanted to become a science teacher, she looked into the TEE program at her university at the encouragement of her father. There she found the TEE courses were "like science on

steroids" and she was hooked. Since then, Natalie has completed her master's degree and is working to complete her doctoral degree. For now, she plans to stay where she is in education, but is trying to determine what the future holds for her: "I have the best job in the world, but there's this other part of me that feels like I was meant to do something more." She wants to continue being connected to education but feels she may need to be connected with students at a higher level, whether that be in higher education or at the high school level.

Reginald. Reginald is unsure where he sees himself professionally in the next five years. For the past four years he has been teaching TEE at the high school level. As a "nerdy, funny" and "caring" person, he enjoys using common interests as a way to connect with his students through the game design curriculum and serving as the robotics coach; however, the cost of living in the area is higher than he can afford with teaching alone. In a school where CTE teachers share classroom spaces and work rooms are filled with distractions, he is unable to use his planning period effectively to prepare for each school day. These time demands make it difficult for him to consider balancing a second job. He has a desire to continue utilizing his technical skills in the software and design that he teaches and has considered changing schools or even seeking a position in industry if it means finding a better financial situation.

During his undergraduate education, Reginald originally began a degree in engineering. However, as he progressed, he found that his coursework was not what he wanted it to be, and academically his grades began to suffer as a result. He began to look within his university for a program that would accept as many of the credits he had already completed and would be a better match for him. Reginald found the TEE program, which allowed students to choose between industry certifications or a teaching license pathway. Initially, he chose to pursue just the industry certifications, but found himself enjoying the teaching assignments for the licensure

students in the shared courses. Between the relationships with his professors, and determining he "liked this stuff," he made the decision to switch focus to complete the licensure program.

Roger. Roger had no intentions of going to college; his plan was to enlist in the military. Until one day his best friend's mom took his keys and said he needed a different plan. She helped him find a program and a place to apply. He knew his favorite courses in high school were the graphic courses, so he decided to go to the same school and program as his teacher. As a "17th generation American", Roger became the first person in his family to graduate from college. Since then, he has spent 11 years teaching students skills that he "would want my family members to learn to make their lives better." He has taught in multiple schools during this timeframe and plans to continue to remain in education but is unsure if he will stay at his current school. He values being able to create relationships with those around him in his schools, and while he is able to do that to a degree in his current school, it is not at a satisfactory level. He also believes teachers should be "given and rewarded for new responsibilities," which can be difficult as education in his state is not known for compensating teachers and is considered for many in the state as a "dead end career." Nevertheless, "every other job is like work" and while he may look for a change in placement, he has no plans to leave education.

Sara. Sara has been teaching at the high school level for three years. She sees herself moving away from K-12 education in the next five years as she enjoys the content area, she teaches but is looking for a "higher caliber" experience. For her, this path may include looking into positions within higher education or community colleges, or even trainer positions in industry. For now, she strives to create a safe and welcoming learning environment for her students, which is a constant challenge as she is a mobile teacher within her school. She has also struggled to get access to technology and software required to teach her courses, even though

other schools in her district have access to similar resources. She works hard to be involved in the school's community and loves finding creative ways to connect with her students in the classroom.

Sara's original plan for her career path was to double major in computer and electrical engineering. However, after two years pursuing these programs, she realized she did not enjoy what she was doing. When completing an assignment for a course to attend an event on the university campus, she saw a notice on a bulletin board for an open house for the technology education program. It was similar to what she was already studying, so she went to the open house. There she met the professors within the TEE program and decided it was a switch she wanted to make. Even throughout this program, she recalls she was not a fan of the idea of being a teacher. It would be conversations with her professors that ultimately led her to earn her teaching license along with other industry certifications in software.

Terry. Terry is an Eagle Scout. He credits the teaching opportunities in the scouting program for guiding him towards the career choice of becoming a teacher. By high school, he knew that's what he wanted to become, but was unsure of the content area. After taking courses in woodworking, drafting, and architecture, he knew he wanted to teach these subjects as well. He found out where his teacher went to school and only applied to that program and that school. He has taught TEE for the past seven years in multiple school environments. His most recent transition took place due to a lack of support from administration and supervisors. At his current school, he enjoys teaching students structural design and fabrication. In these courses he works with members from the community to connect students to opportunities around them. Terry has had times where he questioned if what he was doing was worth the aggravation and has taken a glance at other opportunities around him, but he has never seriously gone on an interview for a

non-education job. While he does not see himself moving out of K-12 education in the future, he has considered seeking opportunities to advance within secondary education through positions such as school administration.

Thomas. Thomas is "a nerd in the classroom with other nerds." He has been an active member in the same high school for the past seven years. His courses cover graphic design and animation. He remains active in the school community by helping with the band and other afterschool activities. While he enjoys being a part of the community and making connections with students, he does find the additional responsibilities placed by the school can negatively impact time he is supposed to be guaranteed throughout the day. Most of these duties take place during the school day and can interfere or completely replace his designated planning time, which directly impacts his ability to be as prepared as possible for his students. Even with this frustration, Thomas sees himself remaining in a classroom for the foreseeable future. Where that classroom will be, is yet to be seen. He has considered staying at the high school level, but also remembers how influential his teachers were during his community college experience. It was a mix of high school teachers, and his community college experiences that eventually led to him pursuing a TEE program at a university. The community college provided him a place to pursue his passions in graphic design and creative writing. He doesn't remember what it was, but eventually it clicked that if he were to teach, he could combine his passions and create a space for students to grow in their own similar passions. So, he found the TEE program that gave him the tools to do just that. His time in the program would introduce him to more influential teaching role models that shaped how he conducts his own classrooms and engages with students.

Former TEE Teachers

Christopher. Christopher is a third-generation engineer turned educator, following in the footsteps of his father and grandfather. After completing two bachelor's degrees, one in engineering and the other in TEE, Christopher spent six and a half years as an educator in the K-12 classroom. During this time, he spent time in a variety of schools and completed his master's degree. His decision to leave each school would vary; some reasons he gave included a lack of trust of coworkers, problematic administration, and a lack of professionalism resulting in what he describes as a "toxic work environment". Ultimately, the repeated unfavorable environments of the K-12 classroom is what led him to seek other opportunities and he began to pursue a goal he had set for himself when he was a teenager: completing a doctoral degree.

He is now an associate faculty member at a university where he can influence students pursuing engineering degrees and cares deeply about ensuring the success of these students entering a challenging field. Every year, he considers leaving higher education to return to K-12 education or the engineering profession but states he will probably remain a faculty member for the time being. He does not feel stuck in the position and is comfortable with the idea that if he decided to leave his position, he could comfortably find an alternative.

Duke. Before leaving the classroom to pursue a doctoral degree, Duke taught materials processing for four years in a junior high environment. In addition to teaching, he also served as the basketball coach at his school. He is still working towards finishing his degree while working for a company where he works with students and develops content in a less restricted way than when he was in the K-12 classroom. He cites the restrictions and "red tape" as part of the reasons why he decided to find the joy in teaching outside of a K-12 classroom. Additionally, as a family man he has a high priority of being able to financially support his family, and teaching did not

meet those needs. He saw the decision to complete his doctoral degree as a step to a better financial place for his family, and a step towards more autonomy in doing the parts of teaching he loved. The current position he holds allows for more financial freedom where he can continue utilizing his creativity and love of learning and teaching without the inflexible system of state testing and rigid grading and standard systems.

Greta. Greta was a technology and engineering education teacher for three years. She began her career in TEE by filling in as a long-term substitute teacher for her mother. During this time, she got to experience teaching at two different schools, one public and one private. These were completely opposite worlds when it came to TEE. She describes her experience in the public school as "atrocious" due to the minimal value the school held for her subject area. Additionally, she was tasked by the administration with non-compensated duties before and after hours to sustain a student organization that did not fall into any of her covered content. A stark contrast to her private school environment in which the CTE programs were "revered" by students, parents, teachers, and administration. She had less students and a larger budget to meet the needs and wants of the school. Eventually though, she wanted to make a greater difference than she felt she could at the K-12 level. She completed her master's and her doctoral degree with the hopeful goal of bettering education through research and service. Currently, Greta is managing a couple of different jobs and is enjoying the variety and challenges that each of these brings. By exploring these different positions, she has been able to better define what it is she truly wants to do and pursue. Currently, her professional goals for the future are to be happy as she continues to find new ways to use her skill set to make a difference.

Henry. Henry sees his decision to enter TEE as a creative way of combining the worlds of his parents. His mother is an elementary school teacher, and his father is an electrical

engineer. They were his primary influence when choosing what he wanted to do with his life. Though he was originally pursuing a degree in textile engineering, it did not feel like it was a good fit. He began seeking another program that fit his needs at the university he was attending. This is how he learned of the TEE program, as he did not know anything about such a profession or program before entering college. This led to Henry's career in multiple roles in the K-12 classroom for eight years. During this time, he would serve in positions teaching, researching, coordinating, and other leadership roles. Ultimately, he chose to leave the classroom to better himself professionally by pursuing a doctoral degree program. He is now in the process of completing his coursework for the doctoral program, while completing research as a graduate research assistant. Upon completion of his degree, he would like to be hired on as a professor within the same program. If a position is not available, he plans to find a position at a community college or with a program doing community outreach.

Janet. Janet recalls always wanting to be a teacher. She started her collegiate journey in math education, partially from a love of math, and also in part to the influence of a calculus teacher in high school. However, after finding that math at the collegiate level did not contain as many numbers as it did letters, she decided to look for a different subject within education. She loved the hands-on experiences the technology and engineering education program offered and was happy to make the switch. She continued her schooling to obtain her master's and doctoral degrees in this area as well. She is currently an assistant teaching professor within this same TEE program. She always planned to teach in higher education but saw value in gaining teaching experience in secondary education before pursuing a career teaching future teachers. Therefore, she took the time to better prepare herself and taught for five years before applying for her current position. During this time, she taught at two different schools, a middle school and a high

school. Janet views her current position as being not so different from her job as a K-12 educator; “it's just teaching different topics” and “getting students prepared for different parts of their life.” She is looking forward to serving in this position and preparing future teachers in the years to come.

Leroy. Leroy was an active member in the K-12 public school system for many years, both as a teacher and in roles of administration. As the child of educators, he knew he wanted to complete the TEE program at a nearby university from “when I was eight years old.” After high school, Leroy served 2 years in the active-duty United States Army and then four additional years in the United States Army Reserves as he completed his undergraduate IA-TEE education program and degree. After nearly two years of employment in a CNC and tool and die shop, Leroy spent the next six and a half years in the classroom. He switched schools a number of times due to commute times and demands of the positions, but overall enjoyed his time in this area. He would eventually leave K-12 teaching to pursue a doctoral degree in school administration, which continued his career in K-12 education, this time as an administrator. Currently, he is now an assistant teaching professor at his alma mater focusing on teaching undergraduate courses in a TEE program. His role in this position is not drastically different from his role as a teacher as his primary focus is on student learning and developing a welcoming classroom for all students. His biggest challenge has been navigating the advancements in the technology these subjects now focus on. When he began teaching, most schools did not have computer labs, much less access to the internet. Now, all of his courses require an online component, and others focus on software and manufacturing technology that did not exist 20 years ago. As a lifelong learner, challenges have not discouraged Leroy. He

looks forward to spending the next several years preparing the next generation of TEE educators for their own journey's as lifelong learners and influencers of change.

Lucas. Lucas was a technology and engineering education teacher for 11 years before he left the K-12 classroom to pursue a TEE doctoral degree program. He was influenced to become a TEE teacher by his father and grandmother, who were both Career and Technical Education (CTE) teachers. During his time in education, he taught in multiple states and at multiple grade levels. Lucas now teaches in an undergraduate TEE program where he serves in roles as the program coordinator and an assistant teaching professor. The biggest difference he finds between his current and previous career paths are primarily the administrative tasks as the coordinator. He does not enjoy these administrative tasks as they are not the reason he got into teaching. His greatest priority is student learning and would like to be able to give more of his time and energy to his courses where he values building relationships with the students. When considering his future in this position, he was unsure what path he would take. At the time of the interview, he had other education-based prospects he was considering and was actively weighing the pros and cons compared to his current position. Some of these considerations included financial compensation, schedule flexibility, time demands, and job stability.

Morgan. When Morgan made the decision to seek an industrial education degree, she was discouraged by her mother who was a math teacher. Due to the influence of her drafting teacher in high school, she recalls wanting to attend the same program he did. She had plans to teach drafting during the school year and draw blueprints over the summer to become an architect. Her passion for the subject area eventually convinced her mother that the career choice wasn't so bad. Morgan taught TEE at the middle and high school levels for a combined six years. She enjoyed her time in the classroom and learned a lot about being a teacher that prepared her

for her current position as a professor in a TEE teacher preparation program. She had always planned to go into higher education but knew there was value in having teaching experience. These two schools offered differing experiences as the populations and community settings of these schools were quite different; one was in a very affluent neighborhood, while the other was not. These differences did present unique challenges at the classroom level but did not discourage her from working to create opportunities for her students. Ultimately, her decision to leave K-12 education came from a concern for her safety in the school she was in and the opportunity to pursue a doctoral degree under an NSF funded grant became available.

Data Collection

Demographic Questionnaire

The use of a demographic questionnaire allows researchers to gain background information on their participants (Allen, 2017). It is considered a crucial step in the research process to inform researchers about their participants and can include questions about any background characteristics the researcher deems essential to the research project (Allen, 2017). For this study, all participants were asked (but not required) to provide the researcher with commonly asked demographic information regarding such as age, race, and gender identification (Allen, 2017). Two questions at the beginning of the survey were added to prevent those who were not eligible to request to participate in the interviews. These questions clarified what area of education they were or had experience and how long was that experience, to ensure they were in TEE and had completed the required time outside of a student teaching experience. Additionally, the survey was designed to differentiate questions based on the selection of a question asking if the individual was a current or former TEE teacher. The indication of a current or former teacher would also be used to inform the researcher as to which interview protocol should be used at the

next step of data collection. All qualified participants were given the option to indicate if they were interested in participating further through the interview portion. This indication was used by the researcher to identify participants who met the initial criteria and would be willing to participate further. These individuals were asked to provide the best email contact information to use for scheduling of an interview. If a participant indicated they did not want to participate further, the researcher did not use their information for the study, and their responses were destroyed at the conclusion of data collection. This technique of data collection has been widely used throughout research and allowed the researcher to ask questions that provided categorical context for the participant's experiences (Yin, 2018). The full questionnaire can be reviewed in Appendix D.

As responses were received to the Qualtrics demographic survey, the researcher used the participant supplied email to contact participants that indicated they were interested in participating in the interview to set up a time. The participants were informed that the teleconference interview would last 45 to 60 minutes using a Zoom meeting with a unique link protected by a password and a waiting room. Using this teleconferencing method with the additional security measure in place, the protection of information could be ensured. Security of data was of the utmost importance, as modern-day technologies can leave individuals particularly vulnerable when given access to personal information (Creswell & Poth, 2018; Seidman, 2019). As a part of good research, it was important to the researcher to protect the privacy and integrity of the information given by participants to protect them should any sensitive information be given during the process of participating in the study (Seidman, 2019).

Interview Protocols

A popular research tool in qualitative research, interviews serve as an attempt to understand the world from another's point of view (Creswell & Poth, 2018). Interviews can be conducted in a variety of ways. This study made use of semi-structured interview protocols. The semi-structured interview technique allows for the researcher to develop questions prior to the interview session while also permitting the addition or removal of questions based on the content of the interview (Glesne, 2006). Semi-structured interviews are often used in qualitative research as a way to allow participants to fully describe a phenomenon to the researcher in as much detail as possible (Seidman, 1998). This approach is different to a structured interview, in which the interviewer does not stray from the questions previously prepared, or an open-ended interview in which the interviewer develops questions based on the flow of the interview (Seidman, 2019). Using this mid-line format provided a framework for the novice researcher but allowed for exploration questions to be added as a way to prompt the interviewee to go deeper into meanings that might have been vague or not understood completely by the researcher (Seidman, 2019). The use of a semi-structured interview was deemed appropriate as it falls into the recommended guidelines for the phenomenological in-depth interview process, which dictates list of questions should be made ahead of time (Moustakas, 1994). Questions for the interview were developed through the exploration of literature regarding teacher identity development and examples from similar studies (Glesne, 2006). These questions were developed to answer the research questions and provide insight into each of the different identities under Gee's identity framework (Gee, 2000). Two interview protocols were developed for the study: one for current TEE teachers and one for former TEE teachers. The researcher used the submitted demographic data to determine which interview protocol to use when interviewing participants.

The researcher participated in the interviews from a private office. Interviewees were asked to review and digitally sign the IRB approved informed consent form regarding participation in the study. With written and verbal permission from the participant the interviews were audio-recorded. Participants were reminded of their rights to request to stop recording, or to withdraw from the study at any point without fear of retribution. Due to current restrictions from the COVID-19 pandemic and location, interviews took place through teleconferencing using Zoom to communicate. Unique Zoom meetings were set up for each interview and were only shared with the researcher and intended participant. Additional security measures to prevent unauthorized users from entering during the sessions included requiring a passcode to enter the room and a waiting room controlled by the researcher. The meeting settings were also set to only record audio from the interactions, so no files were created containing video footage from the meetings. This audio was later used to transcribe the interviews for data analysis. The interviews began with both parties providing introductions and exchanging pleasantries, followed by the completion of the card sorting activity which served both as an ice breaker, as well as a method of data collection. Following the card sort activity, the researcher used the aligned semi-structured interview technique. Throughout the interview, additional probing questions were added to the established interview protocol when deemed necessary by the researcher to gain further understanding of relevant information. Throughout the interview, the researcher took hand-written notes regarding what the participant said, their body language, and any relevant observations (Creswell & Poth, 2018; Seidman, 2019). The full interview protocols can be reviewed in Appendix E.

At the conclusion of the interview, participants were thanked for their time. They were informed their name would be entered into a raffle for a $75 Amazon gift card and then

requested to participate in a follow-up session for participant checking (Glesne, 2006). Participants were notified they may be contacted for a follow-up meeting for clarification of responses; however, this step was unnecessary. If it had been necessary, members would have been offered all the same protections and courtesies as before, with the exception of additional chances for monetary reimbursement.

Directly following the interviews, the audio recordings were uploaded to a secure password-protected folder stored in the researcher's university assigned Google Drive and deleted from the recording devices. All recordings and card sort screenshots were saved under an assigned pseudonym to protect confidentiality. The chosen pseudonym was used in all locations to replace any identifying information disclosed within the questionnaire (Seidman, 1998). Pseudonyms were stored in an Excel document that served as a crosswalk containing the participants' names and supplied contact information. The researcher was the only person with access to this document, which was stored in a password-protected folder in Google Drive. The highest quality audio recordings were then used to transcribe the interviews verbatim for analysis. Following transcription, the researcher checked through each document while listening to the original recording to ensure they were identical (Seidman, 2019). This practice served to reacquaint the researcher with the data that was collected. Prior to analysis, the researcher uploaded the completed transcripts to NVivo, a computer-assisted qualitative analysis software, designed to aid in managing and organizing the data (Miles et al., 2014).

Card Sort

For this study, participants were asked to sort a set of virtual criteria. Card sorting is an interactive research method that is commonly used in information architecture and in beta-testing to enhance user experience designs (Conrad & Tucker, 2019; Osborn & Bethell, 2010). It has

also been used as a methodology for participants to sort ideas based on value, preference, or a set of similarities (Conrad et al., 2019). When conducted within in-depth qualitative interviews, card sorting exercises have been shown to offer a unique perspective of participant experiences that enriches data for interpretation by the investigator (Conrad et al., 2019; Conrad & Tucker, 2019; Friedrichsen & Dana, 2003). As the name implies, this activity is traditionally conducted using a stack of index cards with words or phrases that are sorted by an individual or group into categories. There are four main variations of conducting a card sort: open card labels with fixed categories, open card labels with open categories, fixed card labels with fixed categories, and fixed card labels with open categories (Conrad & Tucker, 2019). An open card or category is one that is determined by the participant in the activity (Spencer, 2009). Conversely, a fixed card or category is one that is predetermined by the investigator (Goodman, 2012). When used as part of an in-depth interview, the card sorting activity at the beginning of an interview can serve as an ice breaker, easing the nerves of the participant and can help deepen participant reflection and recall for the topic being discussed (Conrad et al., 2019).

For this study a fixed card sorting was used. The cards were labeled with 10 factors that have been identified through research to affect retention decisions amongst teachers (Darling-Hammond, 2003; Hughes et al., 2014; Smithers & Robinson, 2003; Struyven & Vanthournout, 2014). These factors included monetary compensation (salary), benefits (health coverage, retirement plan, etc.), the usefulness of earned degree(s), building relationships with students, support from administration, support from family/friends, opportunities for advancement, impacting student achievement, recognition in school/community, and building relationships with coworkers. Following the established card sort protocol, the participants were asked to sort

these factors twice. The first sort asked participants to sort the cards into two stacks, ones they personally identified as important and others they did not find important (see Figure 3.2).

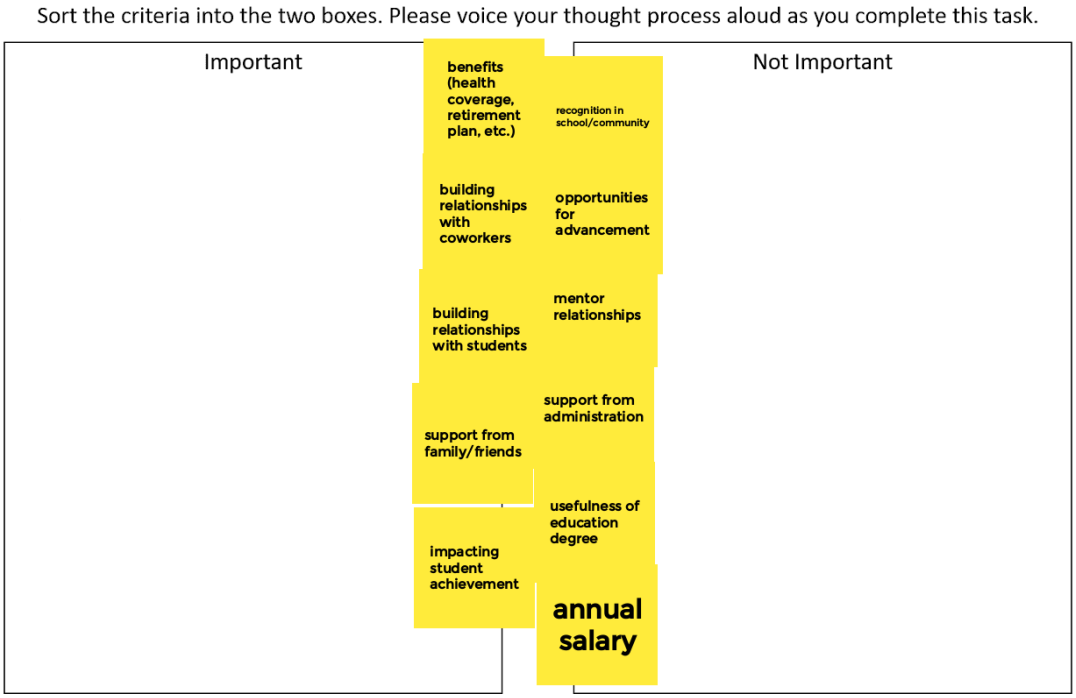

Figure 3.2 Initial set up of step one of the card sorting activity.

Participants were not provided with a definition of important or a context to consider the importance of these factors. They were also asked to think aloud during this process, however some forgot to do so. Once the criteria had been sorted, participants were asked to briefly discuss why they picked the placements for each, and their thought processes behind their decisions (Esquibel et al., 2015; Osborn & Bethell, 2010). Since importance can be defined in many ways, the participants were asked to define what important meant to them and provide an explanation of why and how these items are important.

The second sort asked participants to sort the cards into a stack of factors that were present in their current employment, and a stack of those that were not (See Figure 3.3). The goal of the activity was to discover if the needs identified in the literature were being met in the participants' professional lives, or at least those they deemed important. These results were used

to triangulate and form a deeper understanding of the participants' responses throughout the interview (Conrad & Tucker, 2019).

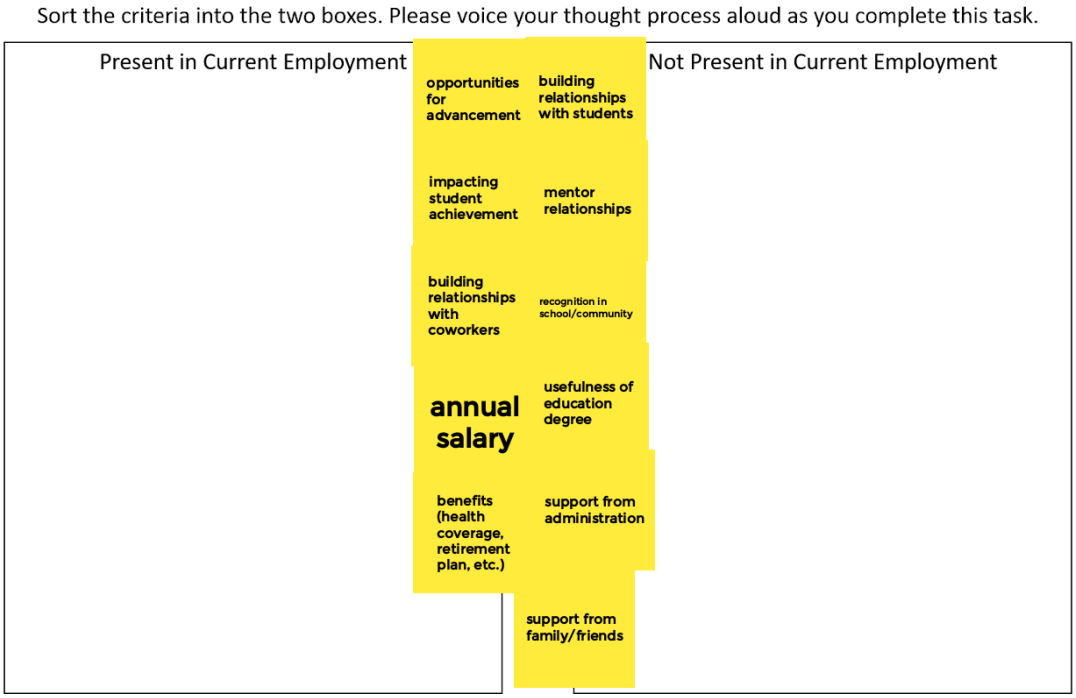

Figure 3.3 Initial set up of step two of the card sorting activity completed by participants

Data Analysis

Coding

Data was analyzed through a qualitative analysis method known as coding. Coding is the practice of identifying a word or phrase within a document that holds a meaning that is representative of a larger context or meaning (Saldaña, 2016). Coding can be approached from several different methods depending on the type of qualitative research method being utilized or the type of data being analyzed (Miles et al., 2014). For this study, multiple rounds of coding took place. The initial step involved reading through the transcripts to refamiliarize myself with the interviews in the NVivo workspace. Following this initial passthrough, I utilized a-priori coding, in which a list of preexisting codes was used to analyze the collected data, which can be viewed in Table 3.1 (Creswell & Poth, 2018; Saldaña, 2016). I applied broad codes related to

each of Gee's (2000) four identity perspectives, retention factors, career prospect decisions, and matching of expectations. These codes were used to analyze my research notes, the card activity, interview transcripts, and responses to the demographic survey. The unit of analysis was the individual participants and their experiences. As the purpose of the study was to gain a better understanding of the experiences and development of TEE teachers and their individual decisions to remain or leave the classroom, each participant's experience during their time in the K-12 classroom as a TEE teacher was the primary focus of analysis. The individual forms of data served to help provide a more complete picture of the participants' experiences by providing more than one way to discuss the experiences and any factors that held a role in developing the teachers' identities. Examples of codes created with samples from the transcripts can be viewed in Table 3.2.

Along with the deductive coding, inductive coding processes were used, in which I developed codes directly from the data. In this area, I primarily relied on In Vivo coding. Saldaña (2016) describes In Vivo coding as the process of using the participants' language as the data. Codes result in phrases or quotes that may be further analyzed through further coding and cross-analysis.

Following the coding process, I began to rearrange the data based on codes and categories into themes that were established or emerged (Creswell & Poth, 2018). I used a codebook to organize data so that it would remain organized and in an easy to manage format (Saldaña, 2016). This organization was crucial to the usage of the participants' original thoughts through quotes to illustrate the themes that emerged. The use of NVivo aided in this process. A sample of the resulting codebook can be viewed in Appendix H.

Table 3.1
List of deductive codes used in initial analysis of data collected

Deductive Code	Definition
Identity Factors	
Nature	Biological factors
Affinitive	Practices and descriptors unique to TEE
Discursive.profession	Dialogue about profession
Discursive.self	Dialogue about self
Institutional	Sources of authority influencing decisions
Retention factors	
Advancement	Opportunities for advancement
Monetary.Self	Salary/benefits
Monetary.profession	Resources for classrooms
Recognition	Recognition in school and community
Relationships.Admin	Relationship with administration
Relationships.Colleagues	Relationships with individuals in same profession
Relationship.Coworkers	Relationships with current employees in same school
Relationship.Parents	Relationship with students' parents
Relationship.Students	Relationships with students
Support	Support offered by family and friends of participant
Time Balance	Work/Life balance
Match of Expectations	Match between importance and presence in employment
Exemplary	Needs/expectations of participant met and more
Adequate	Needs/expectations of participant met
Shortcoming	Needs/expectations of participant not met
Decision	
Future	Participants plans for future in education
Exit	Reasons for leaving education (past or future)
Stay	Reasons for staying in education (past or future)

Table 3.2
Sample Codes from Codebook

Deductive Code	Key Terms	Example
Identity Factors		
Nature	Gender, Race, Biases	"I am constantly thinking about how I can be a role model, not just for the girls and the historically marginalized, but showing that those of us that fall in those categories, um, are perfectly capable being a role model, showing, you know, young, white men that a competent person in this field has nothing to do with how you look and talking through that with them, I think has been huge." "I like to think that maybe I have initial, I don't want to say stereotypes, but initial, you know, everybody's brought up with, I think these biases. Um, but I really tried to do my best to change or allow my perspective to be changed and understanding these students... I'm not going to lie. I still, you still, I still like fight against these things like where I know people have these classes and it's like every class, I really almost mentally like clean slate... so I'm fighting against my natural biases, I think, and probably stereotypes and everything else out there. And I really do my best to see these people with people, these students, and not have that." "I'm also much more aware that my identity is vastly different and experiences vastly different than my students." "Everybody is always like oh, you're a woman. So you don't have to worry about your job. So like, that's kind of annoying because I still feel like, you know, I do have to worry about my job. Everybody has to worry about their job. I'm not the only woman tech ed teacher in the world."
Affinitive	Unique, only in TEE, tasks	"Definitely the ability for career development. You know, I feel that with our discipline specifically, we are able to have a more obvious bridge to post-secondary careers." "You got the real-world experience while still learning everything else. So, you got to utilize more parts of your brain and body than just sitting there writing all day." "We are supposed to stay abreast of technology period because each we have to know what's out there. But I think a lot of times there is just, you have to be innovative. You have to be a problem solver. You have to be a critical thinker"

Table 3.2 (contined)

Discursive.profession	As a teacher, I am	"People sought me out as a problem solver as a leader, as a trusted confidant." "Our entire major is problem solving. Like we need to problem solve. Like that's what our entire major is." "I'm the smartest teacher at school. I mean, it's like we're constant. I mean because everything we do uses everything they're learning in their other classes."
Discursive.self	I am, self	"I would describe myself to somebody who doesn't know me, as a committed father and husband, um, who loves problem solving, creative problem solving, uh, who seeks to understand, um, other's perspectives and come to an understanding to move forward, um, and to learn together. I see myself as a forever student and forever teacher. I love learning and doing things with my hands" "[redacted] is innovator with a positive mindset, uh, who teaches technology and engineering education through the scope of student future success. Um, he's willing to work with everybody and everyone will have a positive experience, uh, ending with student post-secondary success, I suppose." "I'm [redacted]. I am a Christian, I'm a daddy. Uh, I'm a, a devoted husband, who's frequently in the doghouse. Um, uh, an educator. Uh, I love people. I love, um, uh, technology and, uh, teaching through the application of various technologies."
Institutional	Community, training, degree, administration, district, school	"I have two mechanical engineering, and then the second one is actually in education." "My undergraduate degree provided me like with the foundation, um, that I need, but teaching is so much in my mind about those experiences, and I truly learn from the experiences." "Pennsylvania requires one year, and some schools will do one, two or three depending... But every time you change schools, you have to do it again, which like whatever I'll do it. So, I've done now three programs... but the problem is there is a set of things you're supposed to do in induction programs. And that's it. And it's very like gray. Like there, the fact that I've done three, they're all so different. And I'm like, what is, what is the point of an induction program? If they're not getting the same knowledge from all of them?"

Table 3.2 (continued)

Retention factors

Advancement	Advancement, further employment	"I'm good to gain my master's in technology and innovation from Millersville. Um, I want to have that finished and, um, I would like to be moving into some type of advancing in my career in some way, whether that be in a supervisor position or, um, being like an adjunct at a community college, or even I would love to be a professor at [redacted] that would cause that required me to relocate." "I would eventually like to try and do CTE director stuff." "I think there's a chance I could be a school administrator." "Whether it be supervisor position, higher education, um, or that consultant gig, I want to be advancing into one of those kind of directions within the next five years."
Monetary.Self	Salary, benefits	"More important for me in particular, um, is the, is the benefits because I'm a type one diabetic, so I couldn't really transition to any place or anywhere that didn't have really good, um, sort of insurance for me." "I'm going to start with benefits, health coverage, retirement plans, et cetera. Um, this is hard for me because I want to split these. Health coverage is not important because I have access to that from another avenue. But I think retirement is very important because it shows again the value, um, of how a teacher and their worth are perceived." "Salary of course, is one of those key things because we do have to pay the bills." "I have not cared personally as much, um, about the salary. I know that's a hot topic issue for a lot of teachers and for me, like maybe it's because I'm a little biased with the county I'm in, but I feel well taken care of."
Monetary.profession	Budget, materials, cost	"When you're having to fight for the equipment you need. Yes, it's expensive, but it's used by 200 students, and nobody complains when the science teacher needs beakers, but if you need Legos or if you need, you know, uh, breadboards for wiring and they flip out..." "...if I need something, I can get it. Like I have a budget and I have the resources I need. And I like, if you need anything like that, let us know, if you need different technology help, let us know." "...especially in a materials-based class where you're going to come down with a budget all the time. It's bigger than everybody else's your near administration has to know what you stand for, what you believe is important."

Table 3.2 (continued)

Recognition	Promotion, recognition	"I mean, unfortunately CTE is never going to be good enough. It doesn't seem that way. At least not where I teach. You know, we're and when you consider that, I teach every kind of student in the school and the things that I'm able to do with every kind of student in the school and to get no more recognition than what I do, which is very little, despite self-promotion, it's like, yeah, it ain't going to happen. And I think I do my students do some cool stuff and we have a great, we have great fun with it, and we get a lot done and not much comes to it." "And my first semester I got a hundred percent proficiency and then I learned this doesn't mean shit to anybody. You know, like we've never had a school meeting, a county meeting department meeting, a CTE meeting about what are our test scores like? Ya know? We're all interested in what are the English and math scores." "I think that we are even more susceptible to it where we, uh, you know, and a lot of schools see this administrator that don't seem to really put a lot of emphasis on our program. We are constantly hearing things in faculty meetings that make us feel undervalued. If one more person were, um, says academic classes and they're referring to math, science and social studies, oh, what do you think I do here? This isn't academic? Like I thought that's why the high school exists, you know, so you can't help, but get angry and frustrated"
Relationships.Admin	Administration, principal, super intendent	"My admin, I feel like they could make or break me and my program and my students' learning." "Support from administration. I'm kind of dabbling with the word support because I get funding, right? Um, I have seen the, the school take the initiative and helping me do the things that I want to do, but they don't really support me past that. It's really, it's a lot of freedom and I appreciate all the freedom that they, they give me in the creation of my program, but they really aren't there for teachers, if that makes sense. They're not in the classroom, boots on the ground, seeing how things are going. Um, they're not when it comes to problems. Um, it's really more of a get you in and out of the office, not a let's figure this out together. Let's talk about the best way of doing this. Not the best way to get it off my desk. So I'm going to say no for my current employment, just because anyone can throw around money, but support is a little deeper than that." "So I, you know, I made a lot of decisions about leaving or staying at places almost surely based off of support for administration."

Table 3.2 (continued)

Relationships.Colleagues	Professional organization, colleagues, mentors	"...it's not to say I haven't had meaningful relationships and good, positive working relationships with coworkers on, on site. But most of those significant relationships have been, um, with colleagues and coworkers across the state." "We became real close friends. This was his wife's friend that I actually ended up marrying. So anyway, so, so yeah. I mean, so building those friendships, you know, through colleagues is kind of important to me." "I had no mentors. I taught technology education. I was a single, you know, single teacher when it comes to the area. So, I had no resources, no mentor... The first thing I went to was a summer conference in the county. So I didn't go to the state one. I went to the county has this it's called CTE convocation the week before school starts. And I got tons of stuff like CDs with like, you know, test banks and all this stuff. It was awesome. And that like helped me really a huge amount when I first got here."
Relationship.Coworkers	Coworkers, other teachers, in my school, mentors	"I tend to say it's about the people you work with because when the job, when the honeymoon stage of the job is over with, and, you know, you used to get to work with people, uh, and you got to have fun" "...having someone who is in a similar position, someone who has a classroom of their own, um, having that sounding board is kind of helpful." "...we were like co-teachers, um, work cohorts" "Luckily all of my coworkers that I've worked with in the past have been really good coworkers. Um, they can answer questions, we can share materials, we can brainstorm with each other. Um, if there were any coworkers that I didn't get along with, then I really never talked to them or, or interacted with them."

Table 3.2 (continued)

Relationship.Parents	Parents	"Just the different emails from parents that you get all the bad emails. You never get good emails, or rarely do you get those good emails from parents are like, hey, thank you for what you're doing. It typically Why is my child's grade so bad?" "I would say the positive, um, communication with parents completely outweighs the negative that I've had" "Those parents, they, they can be a little more, let's say involved. Um, sometimes to a negative degree, um, that they're, they're involved." "I think it helps that I am not, uh, I'll call it a nine to fiver. Like I'm active outside of just my classroom. So parents see me at. Like, I'll make a point to try to go to different sporting events. I'll make it a point. I've been a coach, I'm an advisor. I make it a point to try to let, not just my students, but my parents see me in different lights."
Relationship.Students	Students	"And then once they get to know me, um, you know, I, I feel like they get really comfortable. Too comfortable around me and they like to, you know, tell me everything that's going on in their lives." "Building relationships with students extremely important. Um, I think that kind of allows us to grow as well when we have those relationships with students, we grow as, as educators." " If you don't have a rapport with students, you're just a person standing in a room talking if the students don't have buy-in, then education stops." "I feel like there was a expectation that students were there to learn. Um, you know, um, it was only after I became a teacher, that I realized there was that not everyone went to school to learn, you know, there were other things, you know, coming into play, and that, you know, school was school as a place to learn as a place to provide you opportunities to grow. Um, and you know, that's what had been instilled in me." "I just think that overall there, the relationships I've had with students and built up, um, are the main primary reason that I come back"

Table 3.2 (continued)

Support	Mentors, administration, support	"It really felt like, uh, we're going to check off the boxes together and I didn't need that much support, I guess. Um, what support I did need. I went and sought out with other teachers anyway, because it was like content area. I need specific curriculum assistance. Um, which nobody at our school teaches the same stuff. So got to go elsewhere to find it." "My mentor is an English teacher. — She is wonderful, and she has been a great mentor for the school, like in getting me acclimated with this school and getting me acclimated with some classroom management and things like that. And it's been just a great resource for asking other information like that." "I had a great deal of respect from him. And I mean, he stood up. I mean, he stood up for me and other teachers in parent meetings. Like I was in a meeting, he straight up told a parent to get out because they were being ridiculous." "I've been granted a lot of, um, autonomy and being able to choose what I believe is best. Um, as long as I can defend it and defend that it's, what's best for our students. Um, I've been granted the ability to purchase certain things outside of my normal budget, if there's money available. I've been supported to go for grants that might change our curriculum that I just wrote. Right, so, um, that support has allowed our program here to be constantly evolving for the better, instead of maybe being stuck in a rut or being extremely traditional. We've been able to progress forward without also losing those traditional roots. So that would not be possible if our administration didn't see our value and support us."
Time Balance	Balance, tasks, free time	"It's when all of the other things were added on and that pressure to keep providing at the cost of my private time and my, my mental load that I'm supposed to have for family and friends afterwards. That's when it just, it got too great. It's an opportunity, cost issue for me. That's why I left." "Absolutely. Yes. And that was another benefit of going to the job versus the K-12 cause it's a very, you know, restrictive daily schedule that you can't change in the K-12 where this one, you have much more flexibility. You're much more in charge of your schedule." "I think especially at the beginning, I think it gets easier over year over the coming or get over years of your career for a number of reasons. You're better at teaching. It takes less time to plan. You're able to utilize some of what you've already done." "...then I'm always like, well, when I'm sitting at home for two months in the summer and two weeks for Easter and two weeks for Christmas and you know, all that, like I would rather do that, um, then have to work every single day of every single week."

Table 3.2 (continued)

Match of Expectations		
Exemplary	More than need/want, exceed	"in the private school, it was revered. I mean, it was the parents and therefore the students and faculty absolutely wanted it. It was a highlight of the week. It was, uh, my budget tripled for half the number of students that I'd had in the public school system. Um, and we were able to do some really innovative things and that helped reinvigorate what I was doing, but not enough to make me want to stay because the administrative load and the bureaucracy there was still just as bad, just different."
Adequate	Meets, exists, not good or bad	
Shortcoming	Not, need/want more	"One is I told you the curriculum, the curricular understanding was a huge lacking in my, in my program"
		"I'm currently a Singleton and that I'm the only tech ed teacher in the building. And I'm coming from a school where we had a beautiful trio of tech ed teachers that worked very well together. And I know what it can be like. So, the two places that I'm looking to go, one's a middle school, one's a high school, but both of them would be closely working with another teacher"
		"So, I am currently maxed out. Okay. Uh, I've got, I've grandfathered in old masters pay. I've got national boards pay and I am a 12-month employee since I'm at a year-round school. Um, so I, I cannot complain about what I'm making. Now, I am looking at moving to a school because of the conditions I'm looking at taking about a $13,000 a year hit. At that point, yeah, because $13,000 a year is daycare."
Decision		
Future	Future, plans	"I always want to say my passion is teaching not research. Research is nice and I will do research, but the heart of what I would like to do is always going to be teaching. So my primarily thing will always be within teaching, I would say still within the collegiate world."
		"I don't really want to have to work two jobs just to maintain financial stability and whatnot. But if I have to, I guess that's what teachers do."
		"I like what I'm doing. I, I, you know, I'm showing kids how to work software and solve problems using that software or how to manipulate materials, to solve a problem. And it's fun to me and I'm getting paid to do it. That's pretty cool."
		"Yes, because I know that there's a way for, if I wanted to get out there is that opportunity for me to be able to get out."

Table 3.2 (continued)

Exit	Exit, left, change	"I developed a lack of trust for what somebody said to my face versus what they were saying behind my back. Um, again, the, the pay was good, everything seemed good. Um, but I think, you know, lack of trust and everything was a big reason why I left." "I always knew I was going to get my doctorate, but I started getting more and more serious about it. And ultimately, um, you know, I started getting more serious because of how toxic that administration had become. "I think that ultimately the idea was there are opportunities out there that I felt I was directed to, that I needed to take. Um, and the opportunities, yeah are, are, were financially based. You might say it's tied, you might say it's tied to financial reasons, supporting a family, um, and, um, different opportunities." "To leave K12? Better opportunity. Well, I mean, yeah, I mean it has better opportunity, you know, I love doing what I was doing. Oh, I think I was getting kind of feel like I was getting burnt out near the end. Um, really is because we were, we went through a hire freeze for a number of years where we weren't moving forward in the steps. It was because of the, you know, the whole state, uh, you know, that's where our recession happened. And so I was, I just burned out. I was burnt out from teaching living bell-to-bell. I just, you know, you have enough of those things that was co I coached two or three, three sports and I was just getting burnt out."
Stay	Stay, continue	"I say that in the sense that every coming off of summer break, I always have, like I said earlier, kind of an identity crisis where I always feel like I usually am wondering if I meant to stay in the classroom, but I think that I'm always bought, brought back and grounded, um, both, both because of my wife and because of like what she always mentioned about the relationships I have with my students and being in the classroom and the way that I, the way that I enjoy being in that engagement in that profession." "I think just that driving force of making a difference, seeing that difference, um, being able to live your life with of course, you know, meaningful pay. And many of the other things mentioned on the, on the Google jam board activity, uh, ultimately makes me want to go on and I can see myself fulfilling my entire career in technology and engineering education and carrying through with that." "I could easily see myself, same school, same TSA, chapter, same position. I could also see myself moving to a different school within the county. I have an electric car and it uses a lot of battery to go as far as I do now. So I'm kind of, I feel more comfortable teaching and I feel like I could do more challenging. So, um, I would pick a school just close."

Theme Development and Triangulation

In order to triangulate the findings, multiple forms of data were collected and analyzed. In addition to triangulation, the multiple forms of data provided the information necessary for the researcher to put together a series of participant summaries that have been used in the final write up. These summaries seek to describe each of the participants and their experiences to provide the reader with more information to form their own informed positions on the outcomes without having to read the transcripts in their entirety (Seidman, 2019). These summaries can be found in Appendix G.

Triangulation seeks to use multiple sources to provide corroborating evidence for findings (Creswell & Poth, 2018; Miles et al., 2014). To complete this, the researcher analyzed field notes, the card sorting data, and the transcripts using further analysis techniques including focused coding (Saldaña, 2016); in which the researcher categorized any new codes that emerged from the data into themes that were not previously identified before coding took place. This set of codes served to make connections between the different documents and code the data overall as a whole (Saldaña, 2016). This combination of analysis methods allowed the researcher to highlight the commonalities and differences between participants' experiences based on cases, while also specifically coding for factors of teacher identity within the K-12 environment (Demetriou et al., 2017). A specific example of connections created were those made relating the experiences of a participant in their current employment. The researcher analyzed the spoken thoughts during the card sorting activity and the placement of the cards in relation to the responses participants gave when asked about each factor directly during the interview. If a coded statement seemed contradictory or was not consistent between the forms of data, the researcher consulted the original audio as well as her field notes on the participant's tone and

body language to determine how a phrase was said to gain a better understanding of the potential intended meaning. If the contradiction still existed, the researcher had to reconsider how that specific data instance could be coded and contribute to the findings, if at all (Miles et al., 2014; Saldaña, 2016). Connections that were confirmed served to strengthen the findings. Connections across the forms of data brought forth agreements and contradictions in the data, which were necessary to confirm or rule out any assumptions before drawing conclusions (Miles et al., 2014). These connections also served to improve code definitions and the organization of codes into themes. These processes were used to analyze the researcher's notes, the card sorting activity, interview transcripts, and responses to the demographic survey. The phrases coded through deductive and inductive means, retention and identity codes were organized into themes based on the identity categories. Figure 3.4 shows the organization as a graphic. These themes were used to organize and write up the findings, which are found in Chapter 4.

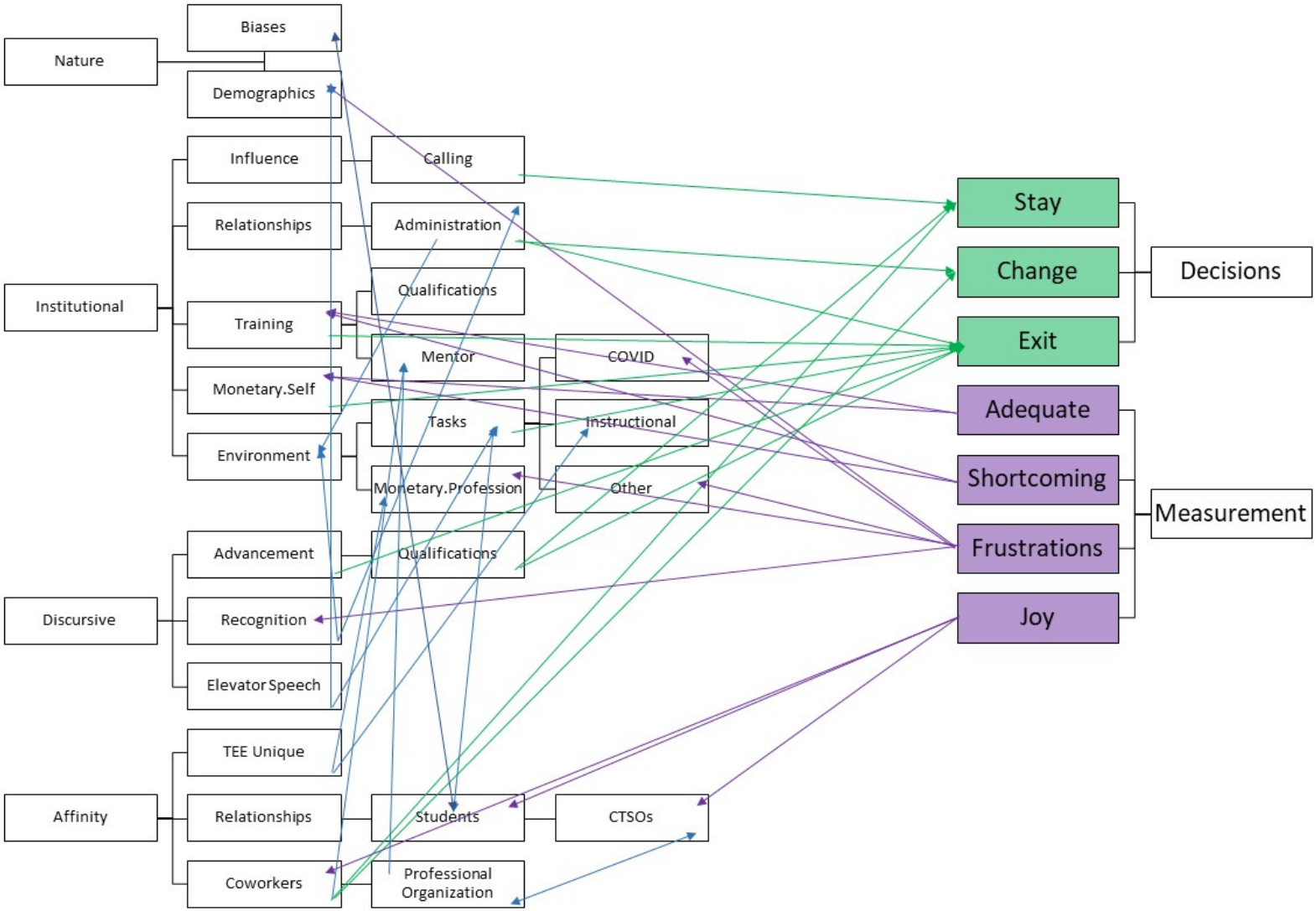

Figure 3.4 Code organization into themes

Researcher Positionality

The researcher grew up as a student within the North Carolina public school system in a rural setting where girls being involved with trade technology or CTE courses other than health sciences or home economics was openly discouraged. She went on to complete a teacher education degree program in technology, engineering, and design education as her baccalaureate degree. She connects with the beginning stages of developing a teacher identity through her student teaching experience as a part of the completion of her degree. Her own identity as a teacher has continued to grow and develop through teaching courses at the collegiate level as a graduate student and coursework taken during the completion of her master's degree and pursuit of her doctoral degree. During this time, there were several individuals who have played a vital role in the development of this identity and the execution of pedagogical methods taught during specific teacher preparation courses. These experiences were enhanced through heavy involvement in creating STEM summer camp experiences while serving in all roles from camp counselor to the camp director over several years.

These experiences and the people along the way have shaped the teacher identity development of the researcher, who plans to continue teaching at the collegiate level upon the completion of her degree. These past experiences have the potential to influence the researcher's analysis of the data collected. To combat any preconceived notions due to the researcher positionality, the researcher has developed a qualitative research study that utilizes multiple stages of coding and will utilize triangulation of the data across the different methods of data collection (Miles et al, 2014).

Credibility, Trustworthiness, and Validity

In the formulation of this study, the researcher strived to follow and incorporate established practices of qualitative investigation to ensure the credibility and validity of the practices being used (Shenton, 2004). Throughout the process, the researcher often returned to the data, both gathered and in published studies used to frame this study. The researcher continually asked if the results of the coding process truly reflect the lived experiences of the participants in the context of the interviews and the research questions asked (Glesne, 2006; Marshall & Rossman, 1989). The researcher also used only the information gathered to create a rich description and focus on the solid details to provide the reader with the best representation of the participants' experiences (Glesne, 2006). This was accomplished by using direct quotes from the interviews, to guarantee that the participants' stories were told in their own words (Shenton, 2004).

The researcher took steps to ensure the interpretation of the participants' words were true to the meaning meant by the individuals. Before the final report, the researcher submitted her findings for participant checking (Glesne, 2006). Participant checking is the act of sharing findings with the participant as an intentional step to confirm that any assumptions or interpretations made by the researcher are conveyed as the participant intended. It also allows the participant to review and assess if any of the information shared could pose a risk whether personal or political in nature (Lincoln & Guba, 1985). As part of the draft, the researcher contacted the participants for a final time for confirmation through participant checking before including the interpretations in the final write-up.

To guarantee the integrity of the results, the researcher has grounded the research process and intent in existing research regarding teacher identity, and understandings of teacher retention

factors. Additionally, the use of a theoretical framework of identity theory has further ground the findings into a structure accepted in research (Gee, 2000). The researcher has also acknowledged the limitations of the study, due to the context and experience of the researcher (Lincoln & Guba, 1985). The researcher also submitted a portion of the collected data to be coded by another researcher to seek intercoder agreement (Creswell & Poth, 2018; Miles et al., 2014). The second researcher used the deductive code list to code 10% of the data collected. The researchers met to discuss codes created within this data sample and determine agreement in how they had individually coded the transcripts. Within this data sample, there was an 80% agreement between the researcher's findings and the additional researcher's findings. Other attempts to ensure integrity through ethical practices included securing IRB approval for methods used and obtaining consent from participants at all stages of collection as well as including participants in validating findings after analysis (Miles et al., 2014).

Ethical Considerations

Approval from the required IRB was obtained to investigate the research questions in the study through the use of teleconference interviews, a card sorting activity, and a demographic survey. Confidentiality was of the utmost importance and was maintained through the use of pseudonyms in all places and all physical and digital data related to the research was kept in a password-protected Google Drive folder and/or in a locked filing cabinet in a locked office. A key listing contact information and pseudonyms of participants was kept and was the only way to identify participants. This key was kept in a separate password-protected folder in Google Drive which only the researcher had access to. Participant identities will not be revealed when the findings of this study are submitted for publication in ETD or academic journals or presented at professional conferences.

An informed consent form was developed using the template provided by the institution's IRB. The form contains study details and was presented to each volunteer participant to fully inform them of the study purpose, the time involved, potential risks, confidentiality, their right to withdraw, and the rewards associated with this study (Miles et al., 2014).

The researcher acknowledges the potential risks that could have been encountered by the participants through the interview process. The researcher has taken great care to review questions posed during the interview protocol as well as the demographic questionnaire to verify that the wording does not cause harm to the participants. Furthermore, during each stage of the data collection, participants were reminded that participation is voluntary, and they may withdraw at any point without fear of retribution.

Limitations

This study is not meant to represent a larger sample, and the results should not be generalized as such. The participants selected for this study met very specific criteria to serve as a foundation for the discussion; the design was intended to allow further exploration into a subject that has not been readily studied within the TEE field at present.

Time served as a limitation within this study. Under a different situation, a similar study could be developed to follow a group of teachers from teacher training through several years of teaching to gain a more personable outlook on how teachers develop a teacher identity in and outside of the classroom. Since this study was performed for a dissertation, this type of research was not feasible or affordable. For this reason, the participant selection included as many participants at different stages of a teacher’s career path as possible in hopes that input from multiple sources would provide a similar spectrum of data. Time also dictated that only one interview would be conducted with each participant. Meeting with the participants multiple times

over the course of several months or years might have allowed additional themes or a deeper understanding of their lived experiences, the development of their teacher identities, and classroom retention factors (Creswell & Poth, 2018).

Another limitation that became apparent during the study was access to qualified teachers for the study. At this time there is no state or national database of contact information for those who are teaching TEE courses accessible to the public. Unfortunately, this meant some current teachers who may have met the outlined criteria were not reached or polled for participation. It also meant that some former teachers who fit the outlined criteria were not polled for participation, as there is not database containing these contacts. With the use of snowball sampling, the researcher relied on personal and professional contacts of current, former, and higher education professionals to share the recruitment information with other potential participants. This resulted in the researcher knowing many of the participants and a number of the participants knowing one another. This may lead to an increased risk of reidentification despite the researcher's best efforts to de-identify the data as much as possible (Seidman, 2019).

Another potential limitation was related to changes in the teaching field due to the Coronavirus Disease 2019 (COVID-19) pandemic (Centers for Disease Control and Prevention [CDC], 2021). Due to safety restrictions, the interviews took place through teleconferencing, which might have influenced the responses and the interviewees' sense of ease. At the time of the interviews, teachers were primarily teaching through online video methods. Adding the additional online time may have impacted the data gathered due to technical difficulties or contributed to virtual fatigue.

Chapter Summary

The researcher developed a phenomenological case study to answer two research questions related to the development of teacher identity in TEE teachers and how the resulting identity factors impact teachers' decisions to stay in the classroom. The phenomenological case study design is influenced by the writings of previous researchers, specifically, Moustakas (1994) and Yin (1984). Once IRB approval was obtained, the researcher utilized the snowballing methodology for sampling (Gyarmathy, 2014; Parker 2019). In line with this methodology, the researcher sent a recruitment email to a small list of TEE professional contacts. This email contained the intent of the study and a link for a demographic questionnaire containing questions about demographic and professional information regarding the participant and their experience. Based on survey results, willing respondents were contacted to schedule a 45 to 60-minute semi-structured interview, which took place through a secure teleconference setting using Zoom. Interviewees were asked to review and sign the informed consent form to participate in the research study (Glesne, 2006). The interviews began with the card sort activity, followed by the interview questions. The interviews were audio recorded throughout the interview session. Additional questions were added if the researcher deemed it appropriate and necessary to gain additional relevant information. At the conclusion of the interview, participants were thanked for their time. They were informed their name would be entered into a raffle for a $75 Amazon gift card and then requested to participate in a follow-up session for participant checking (Glesne, 2006).

Data analysis took place using deductive and inductive coding methods (Saldana, 2016). The researcher used these coding approaches to analyze all data collected including researcher notes, transcripts, screenshots of the card sorting activity, and the responses to the demographic

survey. The resulting codes were organized in a codebook. Reoccurring patterns were organized into themes and will be discussed in Chapters 4 and 5.

Throughout the data collection and analysis process, the researcher took the utmost care to ensure high ethical standards were followed by securing IRB approval and following protocols for storage and confidentiality of data.

CHAPTER 4: FINDINGS

Introduction

This chapter presents the results of the data collected and analyzed throughout the conducted phenomenological case study. The research questions that guided these findings are:

Research Question 1: What aspects of teacher identity are most prevalent in traditionally trained technology and engineering education teachers, current and former?

Research Question 2: What is the relationship between the identified aspects of teacher identity and technology and engineering education teachers' decisions to stay in the classroom?

Professional Identity Factors of TEE Teachers

Using a deductive or a priori method involves processing the data with pre-existing ideas or themes that the researcher could expect to find based on existing knowledge or theory (Saldaña, 2013). In the current study, the researcher investigated the connection between teacher identity factors and if these related to retention factors for TEE teachers. Therefore, the use of Gee's (2000) identity framework was used as a guide to identify parts of these participants' identities. Literature on retention factors (see Chapter 2) was also used to inform preconceived codes of the same name during coding.

Research question one seeks to better understand the professional identity of TEE teachers. Gee's identity theory framework states that identity can be viewed from four different perspectives: nature identity, institution identity, discursive identity, and affinity identity (Gee, 2000). For instance, teachers, regardless of subject area, share the identity of "teacher." This research examined these four parts of identity perceived within TEE teachers as a way to develop a better understanding of "who" these individuals are. The organization of these identity influences is a thematic organization of the influences (Madden & Weibe, 2015). Each of the

influences is situated within the identity perspective in which these influences were first encountered by the participants. Traditionally research use of Gee's theory (2000), focuses on the discourse analysis which involves multiple sources of data to gain several perspectives on the identity being researched.

Nature Perspective

The nature perspective (N-identity) is defined by Gee as a state of being controlled by nature, and not by society (Gee, 2000). The participants in this study are represented by an array of ethnicities, genders, ages, and time spent in the classroom. The majority (90.4%) of the participants in this study are represented by Caucasian males between the ages of 31 to 35 and have taught in the classroom for approximately 6 years. As the nature perspective largely focuses on biological factors, the cross-analysis and categorization of the codes did not find a direct relationship between gender or race/ethnicity in regard to decisions about retention or attrition. Though participants discussed the role these factors have taken in how they have experienced their time in the profession and their approaches in the classroom. The following findings have been separated by gender, followed by race.

Gender

All seven female participants expressed that their experiences in TEE had been impacted by their gender. These experiences were overwhelmingly negative in nature and had the greatest impact on their confidence during the beginning years of their teaching careers. An experience that many could relate to is that of differential mistreatment based on gender. One participant's experience that most of the female participants could relate to was that of Natalie. During her 13 years in the classroom, she has experienced an array of mistreatment and shared how these experiences affected her approach in her classroom. For her, it began during her degree program.

She was often given lots of extra attention and offers of assistance from her professors and classmates. These offers of assistance were not in response to her need for help but the perception that she would need the help to succeed, because she was female. The negative treatment continued after she was hired at her current school. She recalls second guessing her contributions in a curriculum writing committee early in her career, “every idea that I had would be shot down or given reasons why it wouldn't work. And initially I was like, oh, well, this just must be because I'm new.” Until a new male teacher was hired and at her behest, he suggested one of her ideas to the group, where it was met with agreement and support. “It made me question right there and then if I would've said it would've been a really good idea or was it a good idea because it was his idea, or they thought it was his?” Over time, she gained more confidence in herself and has taken on several leadership roles within her school and district, which she credits to helping her colleagues see “I am as capable as they are. And just because I like to wear pink sometimes... does not mean that I don't have the same abilities that they do as educators.” The doubts in her abilities do not come from just adults, but have been voiced by her students, which she meets with the same confidence in rebuttals. She recalled an experience when a male student told her, “...my dad said that you shouldn't be teaching this class... And I can remember saying to the kid really, you should tell your dad to come in and we'll see if he wants to try to teach something a little differently than I do. Maybe we can learn from each other.” As a result of these experiences, she encourages all of her students, but makes a point to be vocal in encouraging her female students.

> Subtle tactics to try to build their confidence so that they know they are worthy and equal to their peers that are also boys. So, yes. And I know that from my own gender and my own experience, when I in school, when I didn't feel that I was equal or worth the same,

> or as good as the men in my class. So now I'm much more vocal because of having that lived experiences as a woman.

The other female participants shared experiences that echoed the sentiments and experiences that Natalie shared. For instance, Holly recalled how she and other female classmates were openly mistreated by professors during her undergraduate program. In her experience, the mistreatment was so severe that a group of female students filed a case against the professor with the school, which ultimately led to his termination. When recalling how they had been treated by students and adults within their schools, Sara and Charlotte shared that when others find out they are CTE teachers, it is common for the reaction to be based in skepticism and shock. Another common reaction is the assumption that they teach other CTE topics such as child development or home economics, because of their gender. Sara shared that "I get a lot of way over explaining of things," when discussing topics related to the content she teaches with parents and colleagues.

Conversely, the male participants often struggled to identify specific ways in which their gender had affected their experience or actions in the classroom. Three participants expressed that they probably have had positive experiences as a result of their gender, since they fit the primary demographic for the field (Williams et al., 2019). Thomas shared he believed his experience had been easier because he wouldn't be questioned about his decisions in the classroom or have to defend his actions.

> I'm probably not going to be asked questions as much about, you know, what I say about the classroom as much as my female counterparts and female colleagues and having to constantly kind of defend what I'm doing for a lesson, and kind of my lesson planning.

In recalling how gender had impacted his experiences in his school, Roger shared "it's easy to get a job at a middle school being a male... Administration sees that as we're going to make sure we

put you in the high-risk monitoring areas." By placing him in high-risk monitoring areas, or places where students are more likely to participate in negative behaviors, Roger felt there was the additional expectation that he would be a better disciplinarian due to his gender. He sees this perspective as a hindrance to his ability to create positive rapport with his students. As a result, he has tried to find ways to turn these potentially negative situations into positives by approaching discipline matters with a "killing it with kindness" approach.

Others, such as Evan and Terry, believed that their gender did not influence their actions, and that it is important as teachers that they remain neutral and focus on the objectives of the class. Still, Terry has worked with the counselors in his school to ensure that any minority students in TEE have priority registration when signing up for his courses. Overwhelmingly, the male participants said their upbringing, or their race/ethnic identification were bigger impacts on their development in the classrooms specifically in attempts to connect with students and how they approached creating learning environments.

Race

When discussing race, participants either saw it as having no effect on their classroom identities, a way to connect with their students, or something they had to actively work to overcome. There were eight participants, five male and three female, who did not believe their race/ethnic background affected their experiences as teachers, their classroom practices, or student experiences. These Caucasian participants felt they fit in the same demographic as their students and other professional within TEE, therefore their race/ethnic background was not something they needed to take into account for their teaching practices.

Sara shared how during her time in her position as an African American female has affected the demographics within her classroom and her connection with her students. When

compared to the demographics of the classes taught by her colleagues that teach similar content, her classroom has a greater percentage of students of color and females. She tries to incorporate things into her lesson that she cares about and reflected on an experience that reminded her the difference she makes for her students in TEE. This was confirmed through an email from a parent in response to her incorporating lessons related to the Black Lives Matter movement and recognizing the contributions of African Americans to the world of technology. The parent's email said

> ...you have no idea how much it meant to my daughter to finally feel seen and to feel heard. She has spent so much of this year and just her experience as a high schooler, not seen and heard by her teachers. And you did that. And it means a lot, not just to her, but our family and the fact that you recognize that her life, her black life matters. And you are, even if it's just one person or representation of that for her.

Duke also recalled using his experiences as a Latino to connect and find some common understanding with his students, whether that was speaking Spanish with them or using his knowledge of the culture.

There were five participants who did not recognize the effect their race/ethnic background had in their lives until they entered the world of teaching, where they were forced to recognize the impact of students' backgrounds in learning, which subsequently would affect how they needed to adapt their methods to meet the learning needs of these students. Henry, a Caucasian male, recalled struggling to connect with his "non-white students" in his early years of teaching and shared an experience from his first year that shaped his future interactions with all students. He was struggling to get a student to complete work in class. He attributed the student's "hard time" to an unwillingness to complete the work. It wasn't until the student confronted him

and told him “I don't know this computer program. I don't know how to use it. I can't do the work.” This was the first time he recognized that his students’ perspective and access to technology would not match his own personal experiences.

Some participants, such as Reginald and Leroy, who are Caucasian males, mentioned they have sought out professional development opportunities to learn about methods for creating a classroom that is welcoming for all students, “where they feel respected and welcome.” Following feedback after an observation, Aiden, who is also a Caucasian male, now makes a conscious effort to include diverse names in his examples during lessons, sometimes even using the names of past students as a way to connect to those in his current classes. Those that recognize the role their backgrounds have in forming biases that are evident in their classroom were committed to finding ways to ensure these biases did not negatively impact their students learning and were open to finding better ways to support the students with different backgrounds from themselves.

Institution Perspective

The institutional perspective of identity (I-identity) is defined as a part of identity that is determined by a source of power, specifically an institution (Gee, 2000). The I-identity of these participants came from a variety of institutional sources, such as the education programs they completed for their education degrees, the teaching license(s) they obtained through their states, and ultimately their school settings and school administration.

All participants share the I-identity factor of a university education program. Each completed at least one degree in education, with content focused in TEE. Such as Terry who has “a bachelor's degree and two graduate degrees… I have a bachelor's in tech and engineering education. I have a master's in tech and engineering education,” and Christopher who has “two

[undergraduate degrees] mechanical engineering, and then the second one is actually in education." In addition to completing the education programs, each also had to fulfill requirements to earn a teaching license within their respective states. While some of the requirements for licensure vary from state-to-state, every state does require its teachers to uphold and maintain a teaching license for their content area. These differences in requirements can be found in Chapter 2. Therefore, all of these participants share the I-identity factor of their respective states in which they taught. Finally, each has spent at least one year teaching in a K-12 school environment outside of any student teaching experiences. Therefore, they all share the I-identity factor of a hiring committee seeking an individual with qualifications needed to teach TEE content within K-12 education. While the paths taken to these K-12 positions were different, each participant was screened through an application process before being allowed to teach students. To maintain employ, they must meet certain requirements in place by the schools and states they work in, which sustains these I-identities as influences on their experiences.

Education Programs

Each of the participants held at least one degree in TEE. The interview process allowed them to designate if the utilization of knowledge gained in that degree to be important or present in their current employment, as well as discuss what they were taught how to do well, and what areas were lacking. Nine participants did not view the use of their education degree as an important factor for job selection, but it was utilized in their current employment. When discussing how these programs impacted their development as professionals in the classroom, the participants varied on how prepared they felt for their first years. Overwhelmingly, participants opinions of their training did a fair job in exposing them to the content they could be teaching, but lacked in opportunities to develop classroom management skills, as well as how to

navigate the paperwork and school culture. Even so, many of them expressed that these skillsets were not something that could be taught in a university classroom environment or something that could be adequately addressed during the student teaching period. As Janet stated:

> there's no way of teaching it until you have like, really like that firsthand experience of like disciplining or classroom management. Like it's taught in the degree program, but it's really easy to talk about classroom management and how to handle that in the discipline versus actually doing it.

Others, such as Terry, felt their degree programs had been severely lacking in content knowledge, as the subject base for TEE in their current state of employment covers a different content spectrum than the undergraduate program he completed in a different state.

When reflecting on their first year of teaching, 15 participants recalled feeling as though they had to meet a standard of perfection, similar to the level at which they completed coursework for their courses. For 11 participants, this amount of stress and seeing perfection caused their quality of life that first year to suffer. When asked for a piece of advice for their first-year selves, 18 participants offered encouragement and remarks that can be summed up with these two statements: “Don’t sweat the mistakes,” and “not to stress out or not to try to control everything...” While this initial stage involved large amounts of work, the mid-career teachers reflected on it as necessary to build the skills, confidence, and curriculum repertoire needed to adjust how they filled their time outside of paid hours. This period is when many would rely on the influence of mentors or other TEE professionals to ease the burden of the first few years. For instance, Sara mentioned how instrumental her mentor was for navigating the school culture and processes even though her mentor was an English teacher and could not help with the direct curriculum and resources in Sara’s classes, “she has been a great mentor for the school, like in

getting me acclimated with this school and getting me acclimated with some classroom management and things like that." Lucas recalled how instrumental having a mentor outside of his school through a membership in a professional organization was to build the curriculum base he needed to develop content for his students. He was a singleton teacher within his first few teaching assignments and did not have the luxury of consulting with other TEE teachers in the same building. He, like many of the participants, sought out these relationships and resources in his teaching community and the TEE community. Aiden expressed how valuable the relationships he built with the cohort TEE teachers was to his development as a teacher in the classroom. Though some of these connections no longer teach in the same school as he does, he keeps in contact with them and seeks out opportunities for collaboration when he can.

The mid and late-career teachers spoke of how important these mentor relationships were from the standpoint of having served as a mentor. David reflected on how his role in the TEE field has changed in the last two years. He has gone from being a beginning teacher relying on the knowledge of more veteran teachers to now being considered a veteran teacher by the beginning teachers in his district. He commented on the transition saying,

> ...people have started to recognize me as like the expert or you know, like a tenured, like, oh, you've been here long enough. Like, you know, like people are coming to you for things. Um, not just in school, but sometimes in the county like people are coming to me. And I don't know, it's a strange feeling to get that because I'm like, I'm not like I'm not an expert. Like, why are you looking at me? You know what I mean? But I guess I do have a lot of experience compared to a lot of the people.

He called this shift in identity "strange" and "weird," but recognized he has been in the classroom for 11 years, and with that comes a certain level of expertise. Mark does not recall his

time as a mentor teacher fondly, but he noted the important role this relationship takes when introducing new teachers to the classroom because of the significance and value he placed on those he was mentored by.

Teaching Licensure and Advanced Credentialing

The priority of seeking further education after completion of an undergraduate degree varied amongst the participants and the divisions could be seen based on location. A higher-level degree or other opportunities such as completing National Boards Teaching Certifications (NBTC) were seen as necessary if the participants wanted to access more advanced opportunities in their careers such as administration or CTE director positions. Others believed their only options for advancement were outside of the K-12 field, in places like higher education or industry. For the participants from NC, five of eight participants did not see opportunities for advancement as something they could look forward to as part of their time in the classroom; "it is easy for education in North Carolina to be considered a dead-end career." Currently, NC does not offer compensation for post baccalaureate credits completed after August 2013 (NCDPI, 2021). Two of the three NC teachers with master's degrees are eligible for compensation for their degrees. Even so, the one who does not, Aiden, did not believe there were opportunities for advancement within his current employment. Even so, he feels that this degree makes him a better teacher because "the master's program was a lot of well here's why, here's why it works. And here's why it shows that it works," instead of just focusing on the how and what to do. Many of the early career participants in NC did not see a direct benefit to furthering their education to be eligible for positions such as CTE director or positions in administration. The only advancement opportunities they thought might be worth their time and money to further their

education was if it were a necessary part of seeking employment in higher education or possibly completing their NBTC.

Contrastingly, the early career teachers in PA and NJ saw the completion of their master's degrees as a when, not an if, as it is a requirement for PA's Level II (professional) teaching license, which must be completed within the first five years of teaching. One teacher from PA talked openly of how she looked forward to completing her post baccalaureate credits as part of her Level II license requirements, and the endorsements she was looking to add as a part of that program. An early career teacher from NJ held a similar perspective, except her focus was on furthering her knowledge to better prepare herself for her next steps, which may result in her seeking employment outside of the K-12 classroom. Mid and late-career teachers from PA and NJ had already completed their master's degrees and valued the perspective and skillsets they were able to bring to the classroom because of furthering their education. With the completion of a master's degree, they were already qualified to pursue higher level opportunities within K-12 education if they chose to advance in their careers.

Most of the former TEE teachers (6 of 8) hold advanced level degrees in education; the other two are currently completing requirements for doctoral programs. This number does not reflect the current statistics for current TEE teachers according to the SASS data from 2011-2012, which shows that only 5.5% hold degrees beyond a master's degree. Five of the eight former teachers expressed having the goal of teaching in higher education prior to entering the K-12 classroom. Therefore, this educational achievement was an existing professional goal and shaped the actions of the participants within their schools. These participants actively sought out opportunities to advance towards this goal within their schools and communities by seeking out leadership opportunities as well as openings in competitive doctoral programs and higher

education programs. One of the current teachers from PA is currently working towards a doctoral degree in education. Currently, they are unsure if they will be continuing at the K-12 level after conferral of their degree, stating “there's this other part of me that also feels like I was meant to do something more, not away from this, but more.” They want to be in a place where they can continue to influence students, but in a more meaningful way, and are unsure if their current position is the best fit for that.

School Settings and Administration

Overwhelmingly, the factor of “support from administration” was designated as important by the participants. When discussing this support from administration, the experiences that shaped the identity of the participants varied especially for those who have experienced multiple administrations during their time in education. The discussion on the role administration held in the experiences and identity development for the participants primarily could be found in practices regarding communication, professional respect, and useable feedback from observations

From the current teacher participants, nine felt they had at least one truly positive relationship with an administration that impacted their teaching decisions. They described this positive support including actions such as being able to autonomously make decisions in their own classroom, to contact parents about positives and negatives in the classroom, and to petition for resources in the classroom. One example of how administration caused a change within one of the participants was when Aiden changed how he approached incorporation of diversity into his lesson examples after receiving feedback during one of his observations. Since then, he has continued to seek out other ways to integrate diversity in his lessons. Caleb reported having experiences where he was supported by his administration team when dealing with behavior

issues at the classroom level, as well as when parents challenged his grading decisions. As an early-career teacher, having the support from his administration made him feel confident when having to deal with behavior or other classroom management issues within his space. Natalie shared her experience under her current administration in which she feels trusted to make educated decisions about what she does in the classroom. If the administration is not fully convinced something is a good idea, they provide her a platform to explain her thoughts and consider her proposals. This has helped her build confidence in herself and led her to take on leadership roles within her district and community that allows her to make an impact on more students than just those in her classroom. Similar to Natalie's situation, David felt "lucky" in his experiences with his administration team where there was an open platform for discourse and respectful disagreement. Overall, the participants reported a higher appreciation of the role of administration in situations where they felt like they were being treated as qualified professionals, received useful feedback, and there was an established culture of open communication between teachers and administration.

Participants from both cases, nine current teachers and four former teachers, reported less than satisfactory experiences with previous or current administration teams. These relationships were categorized by experiences in which the administration was either only present during meetings and observations or where the administration was conveyed as actively members in creating a negative school culture. For instance, Sara shared that her relationship with some of her administration was in name only. Her primary interactions with parts of her administration team were for observations and occasionally in the hallway or at school events. Some, like Reginald and Charlotte expressed wanting a more "boots on the ground" administration. They felt like the role of the administration was more to scrutinize their lesson plans, even though their

administration had never given them useful feedback regarding content after observations. Terry and Roger both shared that they made the decisions to switch schools based on previous administrations with which they did not feel as though they had adequate support. Christopher reported two of his three administration teams created "extremely toxic" workplaces which was reflected in their actions and vocabulary when discussing students. For him, this would be one of the major influences when considering leaving the K-12 classroom to pursue a different professional goal.

Entering the Profession: Calling and Influences

Gee further discusses the I-identity as something that can be a calling or something that can be an imposition (Gee, 2000) All of the participants in this study (even those that eventually left the K-12 classroom) entered the TEE field of their own decision, but with external influences that led them to this career choicse. When discussing the "calling" they felt for teaching, the responses fell into three categories:

1. The Called – those who always wanted to be a teacher and would eventually decide on the content area
2. The Helpers – those who have a deeper need to help others, and teaching is their chosen way of doing that.
3. The Technologists – those who have a passion for the content of the courses and found teaching as a way to practice in this passion.

For the Called, teaching was something they knew they wanted to do from a young age. Completing all the steps to becoming a TEE teacher was an advancement towards fulfilling another part of who they are. Examples such as Leroy who said, "It's a calling; it's in my blood.

It's something that I feel passionate about and that I'm, that I'm good at and I'm decent. Um, but I was always in that thinking about the what's next." Likewise, Morgan said

> I feel like teaching is a calling. I definitely do. And I felt like, um, you know, I really feel like even though my mom had said, you know, don't go into teaching. It was still one of those things that I was called to do.

Holly and Charlotte recall stories of their family members telling them how they knew from a toddler age they wanted to be teachers. While some of the participants that felt this way are no longer in the K-12 classroom, they are still connected to education through positions in higher education where they are actively utilizing their skills and teaching experiences to impact students.

The Helpers did not view teaching as a calling, but rather a profession that best fit their "nature" and their need to help others. For example, Natalie said

> [I] don't know if I was called to it. I just don't think I ever really thought about wanting to do anything else. So, like I loved, um, like playing with my cousins and like teaching them stuff from very younger, young age. My sister, um, I loved being like the camp counselor for sports. Like I just always liked helping. So, I don't know that it was a calling maybe, but I didn't feel called to it. I just felt like that's what I'm meant to do.

This sentiment was echoed in Roger's perspective when he shared a similar take, sharing his desire to help his those in his community:

> My calling has been doing what I can for whatever community I'm in. Um, I don't, I don't like wasting time. So, if I'm going to be doing something, I'm gonna try to do the best I can. And it just happens, I'm teaching. So, there we go.

His perspective is slightly different, as he identifies teaching as one way to do this, not the only way to achieve the end goal of helping. Other individuals that fit into this category are often involved in their classrooms and school communities going beyond what is required. They give their time volunteering in afterschool programs such as coaching, leading career and technical student organizations, or assisting with other programs.

For the Technologists, their sense of belonging in the classroom developed with time in the profession after originally pursuing the content area due to a fascination or passion for the content. While they enjoyed their learning experiences in their education programs, many felt the additional responsibilities that accompany teaching were burdensome and interfered with their ability to fully enjoy what they did. For example, Greta said

> …it definitely felt like it [was a calling] when I was going into it during that long-term subbing, I felt like I had found where I was supposed to be because I was. As a long-term sub, I was, I was focusing on the kids. I didn't have all the additional things that I had to do. And so when I, when it was pure and I was just focused on the lessons and the kids, then it felt amazing. It's when all of the other things were added on and that pressure to keep providing at the cost of my private time and my mental load that I'm supposed to have for family and friends afterwards. That's when it just got too great. It's an opportunity cost issue for me. That's why I left.

Caleb also felt his passion and love for the classroom was situational and conditional. He shared:

> I've never really thought it was a calling. I did. That's something I fell in love with at the time. Um, I could see myself doing other things, so that's why I don't want to say it's my calling to do.

Many of the professionals in this category either have plans to transition from K-12 education or have already done so. They tend to hold one of two viewpoints. The first being they can either provide greater good reaching a larger population through a different career such as higher education or trade training program. The second is that education is just a job that matches the degree they earned, and if they are unhappy where they are, they have a skill set that will transition to other professions.

Different from a calling were the influences for these participants seeking out TEE as a profession. As each participant shared how they entered the profession a common story emerged: an enthusiasm for the content within TEE and mentors who encouraged them along each step to becoming a TEE teacher. Some of these mentors were family, others were teachers or professors, and some were even friends. This narrative did not fit every participant's experience, but it was overwhelmingly common across participants.

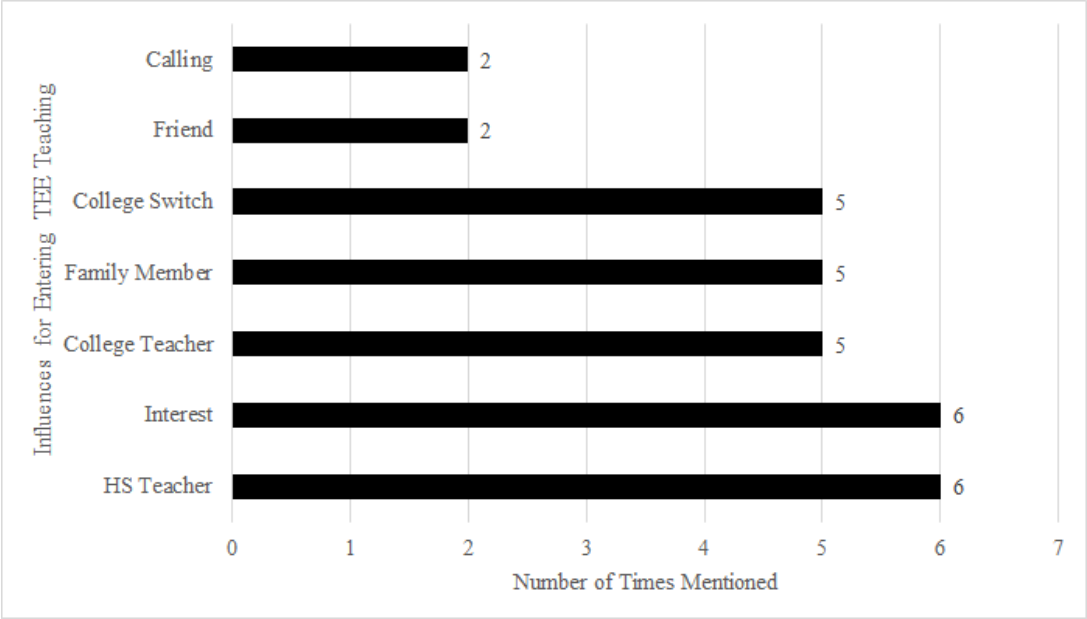

Figure 4.1 The number of times influences were cited by the participants during the interviews

When discussing who influenced the participants the most, it was primarily a teacher, professor, or family member who would influence the choice to pursue TEE. Those participants

influenced by their teachers took CTE courses as part of their middle or high school experiences. They mentioned courses included drafting, graphic design, and materials processing. Many of the participants would attend the same programs as their teachers. Similarly, those who were influenced by professors often began their collegiate journeys pursuing degrees in science, engineering, mathematics, or even other education content areas. They found these areas were not the best fit either academically or for their passions. After searching for other areas that matched their interests, participants recall similar stories of meeting with professors within the TEE programs. Their initial interactions with these professors would be the reason they gave the programs a trial period and eventually made the switch. The commonality between these experiences was that the aforementioned teachers and professors worked to build relationships with their students similar to that of a mentor. They also found the focus of the coursework on teaching hands-on skills attractive as all of the topics were directly relatable to real world experiences and reinforced content they were learning in other areas. These relationships and the enjoyment of the content is what influenced the participants to want to do the same.

Participants who were family or family friends with other TEE teachers seem to follow two paths to becoming TEE teachers. Firstly, they share fond memories of working with their parents and watching them work as children. This eventually led them to decide that's what they wanted to do when they grew up. Christopher's experience is one such example.

> So, I'm actually third generation engineer to teacher. So, you know, my grandfather was an engineer. He never worked in industry. So he, he got his engineering degree, um, uh, moved to a small town in Pennsylvania and started that, uh, um, started a construction company, got his master's and started teaching. Okay. My father got his engineering

degree, worked as an engineer for two years or so, two and a half years, and then started, um, started teaching, you know, made the transition. So I'm third generation to do that.

He did complete both an engineering degree and TEE degree as part of his undergraduate experience, as well as go on to earn his master's and doctoral degrees. Lucas also shared his story of helping his dad, who was a TEE teacher, in the classroom and it being the first time he got excited about school.

Others openly shared how they tried to forge their own paths, different from their family members but eventually found themselves sharing the same passions and making the choice to become TEE teachers themselves. Natalie shared a story of how her dad was a TEE teacher, and how she originally wanted to become a science teacher. She chose to attend the same university as her father, and when he suggested they take a tour of the building where his classes were during her freshman orientation, she agreed. After the tour, she adjusted her field of study to dual major in science education and TEE. However, it only took one semester of coursework for her to make the decision "I'm just going to be a tech ed teacher. I just loved it. I loved every part of it. It was like science on steroids."

Those enamored with the content often found their way to TEE after trying to pursue other similar interests. They entered programs such as engineering, construction, mathematics, or science as those were the areas they enjoyed in their K-12 education experiences. However, passions for these subjects do not always translate well to the collegiate environment. Janet's experience is one such example. She wanted to be a math teacher, but college math was mostly letters instead of numbers, which was not the math she loved. Henry, David, Sara, and Reginald started in engineering programs but eventually began to struggle academically or the engineering courses did not hold their interests as they did not match what they were told engineering was

during their K-12 experiences. How they were introduced to TEE does vary, but each was seeking a program that better matched their interests and found the TEE program. Thomas and Aiden share similar experiences, but they would enter their TEE programs as a way to continue their education after completing associate degree programs.

Discourse Perspective

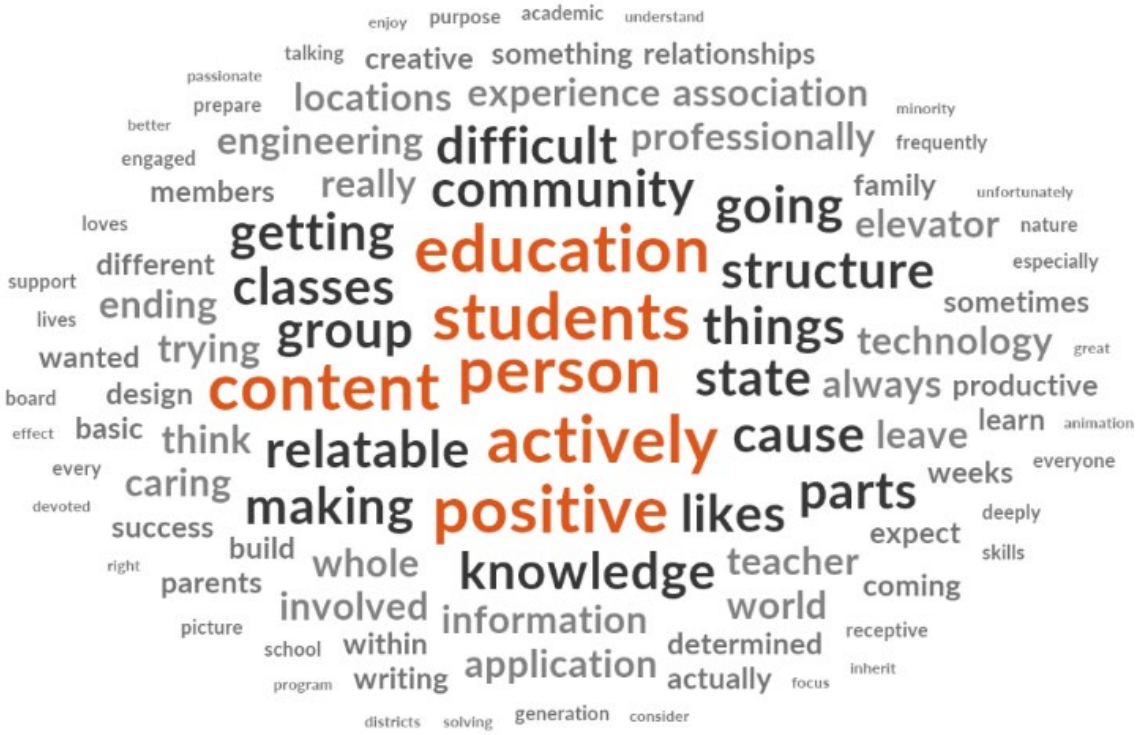

Figure 4.2. A world cloud diagram showing the most used words by the participants to describe themselves.

Characteristics recognized in an individual by those interacting with that individual make up the discourse perspective of identity (D-identity). For this study, the only source for discussing these D-identities was through the lens of the participants and their observations of themselves and others in the TEE field. This made it more difficult to identity the factors to support these D-identities as the interviews were heavily discussed through the lens of I-identities and the relationships held within their institutions. Gee (2000) supports this as a type of

discourse, as these positions of authority and power exist because of dialogue. Therefore, these factors are those characteristic qualities including leadership, problem solving, resourcefulness, and adaptability.

TEE Teachers as Resources in Schools

TEE teachers are the wearers of many hats and a resource within schools to more than just the students. Some of these reported hats have served as pathways to building relationships with students and coworkers. In this sample of TEE teachers, many of the participants referred to themselves as problem solvers or lifelong learners. Duke said

> I would describe myself to somebody who doesn't know me, as a committed father and husband, um, who loves problem solving, creative problem solving, uh, who seeks to understand, um, other's perspectives and come to an understanding to move forward, um, and to learn together. I see myself as a forever student and forever teacher. I love learning and doing things with my hands.

Leroy recalled his positions in the K-12 environment where “people sought me out as a problem solver as a leader, as a trusted confidant.” For him, as well as other participants, being seen as a problem solver as well as someone with a certain level of technological skill allowed him to form relationships with teachers in his school that he otherwise would not have. For instance, Sara shared she has been able to meet more of her coworkers outside of CTE because teachers have sought her out for help with technical problems, which turned into collaboration on projects within the school.

Adaptability to Meet Student Needs

The participants indicated needing to use these skills in many ways including overcoming obstacles they encountered such as a lack of resources, whether that be space or materials. One

example from Henry's experience indicated a need to plan lessons sometimes an entire year in advance, as well as a need to be flexible in project timelines, due to the time it took for material orders to be filled. There were several reported cases in which the participants recalled not having access to the materials they would like to have whether it was due to a lack of funding, accessibility to material ordering, timeline of order fulfillment, lack of space, or any other number of scenarios that impeded their ability to access what they deemed necessary to have in their classrooms. Natalie recently had to move her classroom to a different location within her school due to the new restrictions in place due to COVID-19 and was not in her typical teaching environment. She is now teaching materials processing in a science lab instead of her typical classroom. She remarked on the experience saying

> I've got no machines. I don't have the storage area. I don't have the materials that I typically would be using. So, in the past two weeks, since moving up here, I've had to figure out how can I keep the core values of what I want students to learn, whether that be problem solving, engineering, design, some sort of software. What can I do in this space?

The core values of the course were often influenced how participants set up their classroom spaces and are the reason why many of the participants often referred to themselves as facilitators and guides for student learning rather than as teachers of knowledge. For instance, David is a teacher in a school where many of the students in his program have the goal of entering a collegiate engineering program. Therefore, his courses focus on the "hard" technological skills, but also the "soft" skills such as resume development, interview and job communication, and public speaking. This is different from a program such as the one Terry is in, where the core values focus on construction and materials processing. In a previous program

Terry had a different prep for each course, in which the core values were different for every-one as they each addressed a different area or level in TEE. Their descriptions of their classroom environments prioritized developing skills and making connections with students rather than test scores. Many of the assignments discussed were project based and required students to tap into knowledge from many areas of their schooling. Mark likes to joke with his students saying "I'm the smartest teacher at school. I mean, it's like we're constant. I mean because everything we do uses everything they're learning in their other classes." Another current teacher recalls how instead of putting pressure on state testing and grades, they try to stay "focused on making sure that they [students] at least can walk here out and walk away feeling like they accomplished something." They work to provide a place where students can succeed, and teacher and student work together to learn more together.

Affinity Perspective

The affinity perspective (A-identity) is based on a set of practices dictated by a group of individuals that share an "affinity group." For TEE teachers, some shared actions that are dictated by their institutions such as making lesson plans or delivering content and do not classify as practices of an affinity group. However, other practices that are shared and not dictated by an institution could allow for a teacher affinity group to develop (Gee, 2000). For this sample of TEE teachers, some of these shared practices were described: staying abreast of changes in all areas of technology, overcoming a perceived lack of resources (space, materials, and/or software), developing different classroom management practices to ensure safety in a unique learning space, creating career connections (with their own skill base and for student networking), being expected and feeling compelled to try to fix something at the request of

others because the teacher knows technology and has the tools, and routinely explaining what TEE is to others.

Staying Abreast of Changes in Technology

The participants in this study taught a spectrum of TEE topics including software, drafting, material processing, construction methods, robotics, engineering problem solving, and general technology skills. Morgan, a professor in a TEE preparation program shared her thoughts,

> Technology education is so broad... It covers so many content areas and there's no way that we could ever be an expert in all of the areas of technology. I mean, we have to learn how to use it and adapt to it and analyze it and manage it.

As technology evolves, the courses these professionals teach also evolve. Leroy shared how much he has seen technology change during his time in TEE and school systems since the early 1990s. He stated, “the technologies have changed and there's been such radical change in the, our technology... it’s been truly exponential.” As a materials processing and fabrication teacher both in his time in K-12 and now at the collegiate level, he explained how his classroom has changed with the introduction of 3D printing technology, and how the core-values and focus within the course has shifted based on technology available. The result is a combined focus not only on the ability to work only with materials such as wood or metals but incorporating these emerging fabrication methods and technologies. Similarly, many of the early-career teachers who teach courses in software, like Sara and Caleb, maintain certifications in the courses they teach; as such they seek out professional development opportunities to maintain these certifications as the software is updated or changed. Others, such as Aiden and Thomas who teach graphic design

software and skills not only have to maintain knowledge in the software, but the advances in cameras, as those are used by the students to create the graphics used in their projects.

Access to Resources

New technology is expensive and often hard to get in education. The budget and space needed for these courses so that students can learn by doing and interacting with what they are learning about can be demanding. A shortage or inadequate level of resources often leads these professionals to have to adapt and problem solve to create a successful learning environment. For instance, Sara recalled an experience in which she was supposed to be teaching a specific district approved software to her students. Her school district had a course goal of certification for students enrolled in that course. Unfortunately, there was an issue with gaining access to the software within her school, even though other schools in her district managed to secure access. For a large portion of the semester, she took a risk which could have negatively affected her employment and found an alternative free software that was comparable for her students to use. Access to needed materials can also require some problem solving since it can be expensive and the wait times can be long. Greta recalled a time during her teaching experience when she was denied a request for new equipment, and was met with comments such as ““well, why can't you do it without it? Why can't you just draw it?” She was trying to order Legos for Lego robotics as well as breadboards and wiring; her frustration was evident as she stated “...you're having to fight for the equipment you need. Yes, it's expensive, but it's used by 200 students, and nobody complains when the science teacher needs beakers.” Henry recalled a common occurrence he would have when ordering equipment for his students.

> ...you order your equipment anywhere between August and December, and you don't know when you're going to get it. And it just shows up whenever it shows up. And there

> have been times where I planned on doing a, like an Arduino lesson in the spring with students expecting to have my Arduino kits by say, February. And it gets to be January, and the new semester is about to start at the end of January. And I come to realize my equipment still hasn't shown up. ...that's something tough that teachers have to deal with is that you are having to order equipment and you may not get it until the end of the year. So, you kind of need to plan your equipment orders for almost the following year.

At this time, he was a veteran teacher and did not have trouble rearranging his own schedule of projects, but he has seen this cause issues for newer teachers. Often these beginning teachers are left with what was left from a retired teacher or what they can get from other TEE teachers within their schools.

However, the resource strain goes beyond what students use to complete course work but can extend to the learning space as well. Sara, Caleb, Reginald, and Natalie discussed either having to share classrooms with other teachers or not being in a classroom that fit their needs. For Reginald, there is another teacher using his classroom during his planning period, so instead of getting ready for his next class, “I will end up helping their class or getting distracted.” The teacher that comes into his space teaches a different TEE topic than he does, and they often have to rush between class changes to rearrange the room accordingly.

Classroom Management Techniques

Classroom management within these spaces can be a little different from the classroom management needed in traditional cores subjects within K-12. On top of maintaining the order in the classroom, some of these courses require the use of materials that students can get hurt in, so it is important that these teachers remain vigilant. As David said

> "you've got kids that are in 10 different places working on 10 different steps, all on the same project. Um, so, you know, classroom management looks a little bit different than, you know, math tests or history paper or whatever, you know what I mean?

When asked to provide an example of what he meant, he told a story of a day his students were working on a project that required using spray paint. His school did not have a paint room, so the students were outside painting their projects on top of cardboard. He would routinely check on them, but at one point in the day, he checked, and found that someone had graffitied on the school wall. It ended up being student from a different TEE class, but despite trying to keep an eye on every student's progress, he still ended up being reprimanded by the principal for not having better control over his students. During Caleb's first year, he learned the level at which he would have to manage the students in his classroom. His students were working on a project using Exacto knives, and he "looked away to help some other groups with their stuff. And all of a sudden, I see a kid throw one of them." His administration was supportive and helped him get through the disciplinary process with the student, but he later found out from the students in his class that all of them had been throwing knives whenever he looked away. He has since developed techniques he uses to keep a better eye on the students.

Career and Community Connections

As Evan said when speaking of TEE, "I feel that with our discipline specifically, we are able to have a more obvious bridge to post-secondary careers." Many of the courses within TEE have direct connections with careers outside of the classroom, which the participants sought out ways to incorporate that into their courses. For instance, Terry's students are currently working with a local non-profit on a project that allows his construction students to work alongside professionals in their community. He said

> We don't see any other, there's certainly no other program at my school here that really could take on. This is a two-year long project and better our community. That's bringing together skills of a lot of different people. And along the way, teaching all elements of the curriculum.

Terry teaches in a community where the majority of his students will enter into “blue collar” professions after high school, so he has made an active effort to bring industry professionals from his community to meet his students and teach them about what it is they do. Knowing many of his students will enter these fields either after college or after graduation, he tries to expose them to a wide variety of skilled trade careers to help his students make connections between what they are learning now, and how it could be useful in the real world. Which is how Janet describes TEE, as a place where students get “...the real-world experience while still learning everything else.” David’s teaching practices seek to connect his students to the world after high school by incorporating practice interviews, resume building, and presentation public speaking as many of his students have plans to enter collegiate engineering programs after school. Many of Evan’s students seek positions in industry post high school or trade training programs, so he finds ways to incorporate those needed skills into his courses while making direct connections to the potential trade industries or professions that use those skills.

Mistaken TEE Identity

In teaching their students hands-on skills many of the participants shared that their coworkers or people in the community do not know what they teach, just that they work with tools and technology. This leads to two common interactions, having to explain what they teach repeatedly, or requests for help in fixing something. Lucas and Greta shared similar frustrating

sentiments based on their experiences in TEE from others misunderstanding what they do. Greta said,

> the level of misunderstanding of what career and tech ed did and the value that we had for students and what kinds of students could thrive in our classroom and what kinds of students deserve to have access to what we were teaching in the classroom.

Lucas has found that despite "a great deal of educating people who we are," many of the people that work in the same building as him at the collegiate level do not know who they are or understand what it is their students do. Terry who has worked hard to promote his students' work and accomplishment in his classes frustratingly expressed

> My students do some cool stuff, and we have great fun with it, and we get a lot done and not much comes to it. Counselors don't know, teachers don't know. I have support staff within CTE, even tell me, I don't know what you teach.

While most of the participants had at least one story to tell of TEE mistaken identity, they also had experiences in which they were approached by coworkers with the request to fix something. This quote from Natalie sums up most of their experiences best,

> ...for some reason your people around you think that you can just fix whatever, because, you know, apparently you have tools. Unfortunately, that's a little bit, a bit of a stereotype, but I also think that points to the ability that we have as tech and engineering teachers, that we are natural problem solvers. So, we might not know how to do stuff, but we are typically willing to figure it out and help when we can.

For some the experiences have been mostly positive leading to connections and improved relationships with coworkers in their school. In a large school where coworker relationships are primarily separated by subject, Sara was able to make connections that turned into collaborative

projects with teachers in other subjects as a result of being willing to help. Unfortunately for others, it was viewed more as a burden. For instance, Greta was assigned to facilitate a before and after school program that did not directly connect to her class, but no one else in the school had the skills to take it on.

Summary

Using Gee's identity framework as a guideline for the source of each influence, the factors related to teacher development have been discussed above. Within the N-identity, the factors of gender and race were identified as influencers for the experiences and subsequent development of the participants in this study. Within the I-identity, influences that were introduced to the participants based on their places of work were identified and discussed. These influences included their preservice education programs, any state mandated teaching license and credential requirements, school settings and administration teams, and influences for entering the profession. Within the D-identity, descriptors of TEE professionals were identified through the perspective of the current and former teachers. Some of these characteristics include qualities of leadership, problem solving, resourcefulness, and adaptability. Many of these qualities emerge to meet the needs of their students in their creation of a positive learning environment. Finally, within the A-identity, a list of affinitive practices for TEE were listed and discussed. These practices were found to be a part of the TEE experience shared by the current teachers and echoed in the past experiences of the former teachers. Again, many of these practices are developed as a response to problem solving to meet the needs of their students or the expectations placed on them professionally.

Each of these identity factors is multifaceted and impacted multiple areas of the identity development of the teachers in this study. For instance, the relationships with students impacted

the development of affinitive practices held by the participants such as classroom management practices and addressing course content needs. Nevertheless, these practices are intertwined with the discourse from the participants and how they view their profession and purpose as teachers. Many of the participants' actions were the result of actions or attitudes of bettering themselves to be better for their students. Similarly, relationships with colleagues and coworkers can also be discussed within the development of the discursive identity and the institutional identity. These relationships were a key theme in how the participants chose to describe themselves, often using phrases that included "we" instead of "I"; seemingly implying that what they were saying applied to all TEE teachers and not just themselves. This discourse and how these participants chose to refer to themselves and their coworkers puts those relationships into the scope of the discursive identity (Gee, 2000). Participants cited heavily relying on other colleagues either within their schools or within professional organizations during their first years to develop course content and navigating their school environments. Discussion around mentor teachers was centered around this navigation and how it impacted their comfort levels and development during their time in the classroom. Therefore, it could also be viewed as part of the institutional identity as these coworkers and colleagues contribute to the school culture and environment, similarly as the administration does (Gee, 2000; Wolgast & Fischer, 2017).

Factors Related to Retention & Attrition

Research question two seeks to explore if and how the emergent identity factors affected participants' decisions to remain in the classroom. There were five identified factors that were of the greatest impact to the participants' identities and their decisions to stay or exit the professions. Additionally, these results were explicitly identified from experiences held by the participant in both, the current and former teacher, cases. The five factors are relationships with

colleagues and coworkers, relationships with students, relationships and support from administration, work-life balance, and financial compensation.

Relationships with Colleagues and Coworkers

When discussing longevity in the classroom, seven current teachers specifically stated that their coworker and colleague relationships were the primary reason they have persevered in the K-12 teaching environment and were the most influential relationships to their development as teachers. During the interview, many of the current teachers shared the experiences in which they valued being able to rely on their relationships with their colleagues and coworkers, especially those in TEE. For current teachers, this reliance took on different shapes varying from curriculum and skill supports to more personal and social forms of support. As a field, many TEE teachers have the experience of being singletons, or the only TEE teacher within their schools; in this study this was the experience of 25% of the participants. For this reason, many of the participants recalled working hard to make connections with those outside of their schools, as well as those in their schools if they were able.

The participants valued these relationships for a variety of reasons. One such reason was the role these relationships held as sources for curriculum resources and project collaborations. Mark, Leroy, and Lucas recalled heavily leaning on support from colleagues in a professional organization for curriculum support during their early years as there were no other TEE teachers in their schools. In his early days in the classroom, Lucas struggled to develop measurable content outcomes for the courses he had been charged with until he made connections with other teachers with more experience and was able to find more resources to use in his classroom space. Sara discussed her experience having a mentor teacher that was not in CTE and how this relationship was vital for learning about her school culture. However, the relationships she most

valued were with the other TEE teachers and their ability to share and trade course ideas. As such, support from these professional organizations holds a special place for Sara, as it gives her the opportunity to connect with other female TEE professionals.

> I do think a lot of times there's a lot of strong like comradery with other female teachers and sometimes just younger teachers in general. Um, and it's very, very positive like, oh, you teach tech ed too? And then immediately you click because in a lot of other schools, there's only one TED teacher. So, when you go to these conferences and these conventions, and they're like, you're a TED teacher too. And you just click because you're like, I need more of you, and I need to like build this little group. So, there's the negative end of it, I think. Um, but there's also definitely the very positive end of it, where there are very strong relationships that get built.

For Sara, these coworker relationships help her be a “better teacher” for her students, which in turn betters her relationships with her students, which carried a high level of importance for her.

For one group of participants, Mark, David, and Roger, specifically shared how their networks of colleagues and coworkers within CTE have been the source of some of their most influential relationships inside and outside of education. While these relationships began with the focus of succeeding in the classroom, they have transitioned into friendships that extend beyond their professional commitments. Mark recalled his formative years in the classroom and how instrumental these interactions were to his success as a TEE teacher. Some of these relationships went beyond the classroom and turned into lifelong friendships. For instance, David met his wife through one of his colleagues and Roger had a colleague throw his bachelor party. Thomas, Natalie, and Holly shared how they have built friendships within their schools that serve as “safe places to vent” when the days are hard but are also places for gentle reminders to keep going

because they've made it through more trying times. These friendships and relationships do not always extend to places outside of school topics but provide a sense of comradery for these professionals. Morgan recalled her male colleagues being brotherly towards her as a female in her schools, which made her feel safer in a school environment that was deemed unsafe by many of those around her. Mark, Roger, Aiden, David, and Holly all keep in touch with previous colleagues that they stated were crucial parts of their development as teachers and decisions to remain in the classroom. These connections provided structural and emotional support and have continued to be sources for these individuals, even though they no longer work in the same schools.

These colleague and coworker relationships provided professional and emotional support during the early years of development for these current teachers. Three of the four mid-career and late-career teachers have a professional support system built from current and previous coworkers that they feel they can still rely on for a variety of supports. For three of the former teachers, these relationships were viewed as crucial to their development and success as teachers during their time in the K-12 classroom and they maintain their contacts and connections from their time in K-12 education. They place a high value on the role these relationships served in their development as professionals and continue to seek out opportunities in their current professions both to improve themselves and others in the field.

Relationships with Students

In the card sorting activity, the majority (19 of 21) of participants sorted impacting student achievement as important and (20 of 21) sorted building relationships with students as important. Those two who did not rank student achievement as important, offered the clarification that the reason was based in the definition of student achievement in their

environment, which is something only measured through grades and testing. For these participants, this definition was not adequate as these measurements were not always a good indication of their students' learning or a good fit for how students demonstrate learning in their classrooms. When discussing students, 19 of the participants recalled seeking those "aha moments." They saw utilizing the resulting sense of discovery and creativity within their students in their classes as a point of pride and joy. In fact, when given the opportunity to talk about their students, 16 participants' body language changed to reflect the pride and joy they felt. Terry and Evan specifically spoke of the importance of developing the career skills in their students, as it was likely that many of their students would go into "blue-collar" trades and training programs after graduation. For them, ensuring their students had hard skill sets and fostering an understanding of these trades was a large part of how they work toward student success. For those like David, where many of his students are in college-prep courses, the focus on hard skills is still there, but with the additional expectation of some soft skills such as communication and time management. Each sought to create a learning environment that was physically and mentally safe where the future career needs of students could be addressed regardless of what their plans after high school entailed.

When considering how they work to build relationships with their students, seven of the current high school TEE teachers offered their strategies for building rapport with their students. David enjoys talking about food; Aiden works to provide a relaxing atmosphere with calming music and adjusted lighting; Reginald uses games and artwork; Thomas uses "nerdy" topics like Pokémon; Sara uses music and talks about real world happenings; and Evan has tried their hobbies and will share his experiences with them.

While the majority of the participants focused on discussing the positives of their interactions with students, it is important to acknowledge the negative relationships too. Morgan recalls working in a school that was known for having a large amount of gang activity, which prompted concern for her safety. While she personally did not have any problems with her students, she recalls having to be careful navigating discipline problems in her classroom for fear that certain students would follow through on their offers to "take care" of anyone who gave her trouble. Three of the current teacher participants shared stories where students had either put themselves or others at risk of injury due to improper use of equipment; there were also stories of students defacing school property. This added layer of classroom management reinforced their need to create rapport and trust with the students in their classrooms and was also a major source of stress in the early years of their careers.

When discussing longevity, four of the current teachers saw their relationships with students as their greatest influence for how they developed as teachers and were their primary reason for staying in the classroom long-term. Each of the teachers had a way that their students impacted their journeys to find different ways to serve in their school communities and to be "better" to meet the needs of their students. For Reginald, his students are the driving factor behind improving his mentorship abilities and how to improve his student interactions to ensure he is meeting students' needs. These teachers voiced that they felt a responsibility to their students because their students rely on them, which Charlotte explained as "those relationships make me better, they make them better, and that's how it should be." For Thomas, this sense of responsibility and these relationships form the key component to why he comes back each year.

For one of the former teachers, she credits her relationship with her students for the reason she stayed longer than it was good for her work-life balance. Greta echoed the sentiment

from the current teachers that her students needed her and were her driving factor for her perseverance. These relationships also influenced her decision to pursue a doctoral level degree in education, in hopes to create reforms at the classroom level to make it better for students and teachers. Other former teachers who currently teach within higher education, related their current student relationships to those when they were in K-12. For Janet, she sees her students still as tiny adults in need of guidance through a difficult stage of life and works to create a learning environment to help them succeed. Janet, Morgan, and Lucas are often frustrated at the bureaucratic tasks that govern their interactions with their students within higher education. Each of them expressed a desire to change these environments in a way that would allow them to focus solely on their students and their achievements.

Relationships with Administration

Participants across both cases had experiences in which they saw their administration as absent or dismissive. Other administration experiences were labeled as toxic or unprofessional. Three of the former teachers shared specific negative experiences with their administration during their teaching experiences. Christopher shared his experience at one of his schools in which the administration would discuss female students in the school in a "problematic" way. In other schools where he worked, he enjoyed his time interacting with students and administration, until there was a leadership change that transformed the school into a "toxic" workplace. These negative administration experiences would ultimately be a large part of his decision to exit K-12 education to seek other opportunities. Roger was looking to move to a new school, after only teaching in his current school for a year, because of the relationships administration had with the teachers in his school, "there is a deficit of leadership in the school. I have tried to step up and help on multiple occasions in whatever way I can, and it gets shot down." This move does come

with a significant pay cut, but for Roger it was worth it to have the support that he needs day to day. Terry also made the move to teach in a different school because of the difference in administration relationships. He felt more supported from the administration during the hiring process at his current school than he did during his time at the school he left.

There was a noted difference between the relationships within different levels of administration, stating that relationships with assistant principals were a different experience from relationships with head principals. Three of the early-career teachers expressed that they did not have relationships with the head principals at their schools. They saw their principals as people who kept mostly to their offices except for meetings or routine observations. Their primary interactions were with assistant principals, which for those with positive relationships, looked more like their other coworker relationships. Overall, both of these types of relationship shaped how teachers structured their classrooms when it came to classroom management, curriculum changes, resources and materials for activities, and improved their teaching skills. Natalie felt like her admin could “make or break me and my program and my students' learning.” All of the mid and late career teachers felt these relationships were necessary and recommended that new teachers should not be afraid of getting to know their administration.

There was an overall consensus that teaching in a school where administration knew about TEE, or even just CTE, made a difference in how they experienced the school. For instance, when seeking feedback on how to improve in his instruction, Reginald’s administration could not offer ways to improve in his content knowledge, only his classroom practices. His administration is not familiar with the content he teaches which he felt limits his ability to grow under their guidance. Even in schools where the principals may not have known much about CTE, the participants placed a value on there being a structure for communication and the

administration being open to learning more about the field to make it a better place for learning. Five current teachers felt comfortable going to their current administration if there was a problem in their classrooms or to propose ideas for future projects. Those that felt uncomfortable with their current administration, felt comfortable with the idea of seeking out employment within different schools or different areas, or felt there was a mutual understanding of boundaries that they could continue working until that administration left.

Work-Life Balance

Additional duties to teaching vary by school and district. The COVID-19 pandemic introduced a new layer of these. New regulations were added to tasks for teachers as a part of maintaining a safe learning environment for students and staff. Caleb reflected on these new tasks that were in place such as “dooty duty,” or being required to supervise outside the bathrooms to ensure that students were following protocols such as mask wearing and proper hand washing during these traditionally unsupervised spaces. Some of these new tasks were assigned during the teacher's planning periods, which participants felt took precious time away from what they would have used to prepare for courses. In Thomas’ situation, having an early morning planning meant he is assigned morning specific tasks that other teachers cannot perform since they have students. While only done three to four weeks during the school year, some of these tasks require a significant portion of his planning time, reducing the time he has to prepare for his students. Reginald felt even though he was assigned a planning period, because he has to share a classroom, he is often unable to use it to plan for future classes due to distractions. His school does have teacher workrooms that could be used, but he shared that these spaces are not respected as teacher only spaces for work. It is not uncommon for him to find students testing or teachers interacting socially in these spaces which means he has to use time outside of his paid

hours to plan for his courses. Roger views some of these tasks as a burden because they negatively impact his relationships with his students as many of his interactions in these surveillance positions are negative. He has tried to turn these interactions into constructive positive situations but recognizes that for many of the students any corrections may be viewed negatively and therefore impact his ability to create positive working relationships in the future.

Ten of the current teachers contribute to outside of school programs, such as leading career and technical student organizations (CTSO), coaching teams, or assisting with programs in areas outside of TEE. For most, service time was expected by their schools, but participants had the option to choose how they serve. For eight of these individuals, this service is a source of enjoyment and pride for the teachers. Aiden fondly recalled an experience at a national level competition for a CTSO in which his students toured the Coke Museum in Atlanta between competitions. His students watched in horror and amazement as he drank a concoction containing a sample of every flavor available. Thomas volunteers his time as support of the marching band and drives the bus for most games and competitions. Sara, and Natalie both work with competitive teams within their schools and make a point to attend their schools' sporting events to support their athletic students. Morgan, a former teacher, still gives her time and service to CTSOs in her position in higher education. However, for those like Greta, these outside of school commitments were not something she chose, but rather were assigned by the school. In her case, the teacher previously in her position served to support a program that wrote and performed the morning announcements in addition to a CTSO, primarily focused on robotics. These commitments were assigned to her as it was something done by the previous teacher in her position and no other teacher had the skill set required or wanted to take over. Sometimes these assignments added an additional 10 to 12 hours a week to her normal school

hours that was uncompensated, and occasionally required six hour to eight hour days on weekends. This additional demand on her time was a large factor for her decision to exit education as she desired to spend more time with her family. For three other former teachers who have young children, their decision to exit K-12 education has been further supported by the flexibility their current careers provide. Janet shared that she appreciated being able to switch how her classes are conducted if needed due to emergencies or commitments without having to worry about repercussions or logistics such as finding a substitute teacher and creating alternative lesson plans. Another voiced appreciation for the control he has over his schedule, which allows him to set his courses in a way to support his family not just financially but in taking an equal part in the childcare and household responsibilities. For these participants, working in an environment that supports their professional needs and their social needs is a contributing factor in their decisions to remain in higher education or other opportunities that are not the K-12 classroom.

Financial Compensation and Alternative Job Opportunities

There were five different states that represented in this study with K-12 teachers, current or former, were NJ (3), NC (13), PA (3), VA (1), and UT (1). These states' political stance and policies surrounding teacher compensation were varied. One emergent policy that influenced job satisfaction was how the teachers viewed their provided salary and compensation for their work. This difference emerged primarily during the card sorting activities and was reinforced with discussions during the interviews. When discussing the importance of annual salary and benefits in regard to making career decisions, 16 participants, both current and former teachers, cited these categories as important. Five of the 21 participants did not feel annual salary was an important factor when making career decisions, all five were current teachers. Two were veteran

teachers with over 12 years in the classroom, and felt their salaries reflected their skills and time. The others were teachers who had been in the classroom for less than seven years and felt "no one goes into teaching for the money." Even so, two of the current teachers that marked the salary as not important, offered contradicting opinions when discussing their professional plans for the future. One of their cited reasons as to why they were considering opportunities outside of K-12 education, was because of the potential for more income. Among the rest of the participants, the cards for salary and benefits were some of the first to be sorted and given a rank of high importance, usually within the first five cards of the activity. According to the National Center for Educational Statistics (NECES), the United States national average annual salary for public school teachers for the 2019-2020 school year was $63,645 (NCES, 2020). The average annual salaries public school for the states represented in this study for that school year can be found in Table 4.2 (NCES, 2020).

Table 4.2

Estimated Average Annual Salary in United States Public Schools, 2019-2020

Location	2019-2020 Average Annual Salary
New Jersey	$76,376
North Carolina	$54,682
Pennsylvania	$70,258
Utah	$52,819
Virginia	$53,933

For many of the NC participants, especially the early-career teachers, participants often stumbled or hesitated when sorting "annual salary" into present or not present. The following are a series of quotes from the NC participants. Aiden said, "So present as in it's there, or as in it's where I want it to be... like the salary one. Yes, there is a salary. Is that where the salary should be or not, — you know..." Caleb jested, "There's *an* annual salary, hahah." Thomas said, "Um,

annual salary. I mean — it it's present." And Sara said, "I kind of moved the annual salary all the way over to not present."

Half of the current teachers mentioned they could not afford to live in the communities they worked in and felt more connected to the communities they commuted from than the ones where they taught. One of the teachers has been particularly impacted as a result of the salary he receives. Shortly after beginning his job as a teacher, Reginald moved into an apartment with a roommate to be closer to his school and its community. However, after that roommate moved out and he was unable to find a replacement due to the pandemic, Reginald found himself having to either take on a second job or move back in with his parents. His workload at his school did not allow time for a second job. Now he commutes a fair distance to school every day to work in a community he cannot afford to live in. This inability to access things he desires, and freedoms that come with financial success has him considering if he will still be in the K-12 classroom in five years. Several of current teachers in NC relied on economic and demographic factors to describe their teaching communities and saw their role as "just a teacher" in these communities. Most of the current NC teachers could not financially afford to live in the communities where they taught, actively commuting upwards of 45 minutes one way daily. Some, like Aiden, saw their commitment to the school community as "just a job" that ended when they were not in the school building. This commute was also a factor for the participants when considering longevity in the classroom, with four participants considering a change in schools or profession to lessen their time spent traveling daily.

Whereas current teachers in other states, such as PA or NJ, where the compensation for teachers is significantly higher, the participants either had nothing to say on the salary or the anecdotes were neutral surrounding financial compensation such as, Evan who said, "Pays a

pretty good wage, good health benefits" and Holly who shared, "They pay me, so that's cool. Um, and I have benefits, so that's cool." When asked about their future plans in education, these teachers stated they could see themselves fulfilling their entire careers in education. One current teacher out of the five between NJ and PA, did not live in the community they taught in, but this was by choice as the place they lived was a central point for the commutes they and their significant other had to make for work. The other four teachers spoke of their communities and the active roles they fill inside and outside of the schools, and how these roles are blended instead of separate worlds.

When further discussing longevity in the classroom, and the potential for seeking employment outside of K-12 education, several of the participants felt confident in their ability to find alternative jobs if they determined the conditions in their current positions were not suitable. Some of this confidence came in the knowing someone who had successfully left the classroom for another job. For instance, Caleb recalls a previous coworker of his who decided TEE was not the position they wanted to be in as it was not financially supportive of a family. As such, this coworker left secondary education to pursue a position in industry. For Caleb, personally knowing someone who has successfully exited education for a position in industry using the same skills he teaches to his students daily is a huge affirmation for him when he thinks of seeking positions outside of K-12 education. Holly shared a similar story. During her collegiate program, she had classmates who did not have positive student teaching experiences, and as a result determined they did not want to teach. After graduation, these classmates found positions in industry using skills they learned as part of their teacher preparation programs. While Holly does not see these other positions as something she wants to pursue at this time, it is a reminder that she has a skillset that is valuable in other places. This non-entrance to teaching

was a source of frustration for those like Terry who is actively trying to recruit more qualified TEE teachers to his state but has been unable to meet the needs of programs around him. He shared that some of these unmet needs have led to some schools having to close their TEE programs and are no longer offering these courses to their students.

Seven of the eight former TEE teachers left education to pursue doctoral degree programs or positions in higher education. Even so, those like Christopher do not feel trapped in higher education because they know they have the technical skill sets to enter into other opportunities. His stance on seeking other opportunities is

> …since I've become a faculty member, I consider going back into the classroom and I have the opportunity to do that. So, I could easily do that. Um, I could easily go back into the engineering profession. And at the end of every year, I consider those options. So, um, I will likely, probably stay as a faculty member.

For most of these, the goal of completing a doctoral degree was a long held professional goal, and they left when the timing was right and there were openings in their desired programs. For others, like Duke who worked in Utah, the decision to leave the K-12 classroom for a doctoral program opportunity was heavily based in the opportunities for better financial compensation upon completion. For Duke, the opportunity required he and his family relocate and take on further debt, but it was still deemed a better move for future financial freedom than remaining in the classroom. Sara, Caleb, and Reginald, who currently are early career teachers in NC, have also heavily considered seeking employment outside of education as their current salaries are not supportive of their desired lifestyles.

Summary

Factors for retention and attrition were identified, revealing that professionals both currently in and out of the classroom placed a high value on the relationships within their professional settings. These relationships can be heavily influenced by the culture within a school which are largely set and maintained by the leadership structures within the school and the community. While these factors held a different level of importance for members within both the current and former teacher cases, it was revealed that the majority of those in the former case entered the TEE profession with goals that would ultimately remove them from the classroom regardless of their environments. Others would leave with a need for more as a result of their experiences. Those current teachers who choose to remain in the classroom, despite negative experiences, do so out of loyalty to their students and coworkers. Many feel they can create change for their students and seek the chance to do that through their day-to-day interactions. However, if deemed necessary, these professionals will seek out better opportunities in different schools and communities under different leadership to have their personal and professional needs met.

Chapter Summary

In this chapter, findings from the data analysis are discussed over two main areas. Deductive themes, which are those that were found using a predetermined list of codes, were found pertaining to participants' identities as TEE teachers. To answer research question one, each of the four identity perspectives were discussed along with the sources of power that influenced these perspectives. There were four main institutional perspectives discussed; education programs, state licensures, the current schools of employment, and a "calling" to teaching. This set of participants frequently referred to themselves as problem solvers and saw

themselves as facilitators of learners. They work alongside their students to help them develop skills sets that will prepare them for their next steps after completing the participants' courses. For the affinity perspective, six affinity practices of TEE teachers were identified and supported with excerpts from participant interviews. These practices were deemed actions that are performed by TEE teachers outside of their institutional tasks.

To answer research question two, retention factors found through the literature review process were discussed as they were found to affect the career decisions of the participants. There were five factors, relationships with colleagues and coworkers, relationships with students, relationships with administration, work-life balance, and financial compensation and alternative job opportunities. Each of these were a consideration in why a former teacher had left the K-12 education platform and were cited reasons why current teachers chose to stay in the classroom. Each factor was discussed from a retention and attrition perspective.

CHAPTER 5: DISCUSSION AND CONCLUSIONS

Introduction

This study was developed to explore the professional identity of technology and engineering education (TEE) teachers and how different influences of that professional identity contribute to decisions about remaining in or exiting from the K-12 classroom. The researcher interviewed 21 TEE teachers, past and present, matching the study requirements to gain an understanding about their experiences and decisions. These experiences were analyzed using the framework of Gee's identity theory (Gee, 2000). This chapter discusses the findings in relation to each of the research questions and investigates how the findings fit into literature. Limitations, implications, and suggestions for future research are also discussed.

Connection to Research Questions

Research Question One

The first research question, what aspects of teacher identity are most prevalent in traditionally trained TEE teachers, current and former, was approached during the interview process through questions that were intended to discuss information about potential influences within each of the identity perspectives. The data was then coded for these influences and power sources. The following provides a discussion of the identity factors that emerged from the experiences of the participants.

Nature perspectives regarding the biological factors of gender and race were explored. Based on participants' responses and demographic information, it is a field primarily comprised of Caucasian males between the ages of 31 to 35 with 6 years of teaching experience. This matches existing data on the ethnic and gender demographics of TEE teachers which are 91.9% Caucasian, 4.8% African American, 7% Hispanic, 2.3% Asian, 0.5% Native Hawaiian, and 2.7

% Native American, with 24.6 % reported as female (Williams et al., 2019). However, this information should not be used as an indication or generalizable way to identify TEE teachers or their potential success in the K-12 teaching environment. There is no research that supports a direct connection between longevity in the classroom and demographic information within TEE, but there is research on this within general education. Consistent with the participants experiences based on gender, research conducted regarding the gender of teachers by Klassen & Chiu (2010) found female teachers had higher levels of classroom and workload stress. Natalie's experiences of differential and mistreatment from professors, coworkers, administration, and colleagues throughout her time in TEE, were echoed by the other females in the study. For each of them, these impacted their confidence in their ability to teach the content and in themselves as teachers. The research study found that stressors improved with time, as it did for the participants in this study, as their self-efficacy improved (Klassen & Chiu, 2010). With regards to race/ethnicity, research conducted by Olsen & Huang (2018) sought to see if there was a perceived difference in job satisfaction between teachers of color and Caucasian teachers. Using information from a national data set, their findings support the narrative that teacher cooperation and principal support were positive factors for job satisfaction for all participants in their study regardless of race (Olsen & Huang, 2018). For the participants in this study, their race/ethnicity was seen as a way to build relationships with students, as well as an area that may need overcoming and exploring to become better teachers to diverse student groups. For a selection of the Caucasian male participants, they did not see any influence, positive or negative, of their race/ethnicity or gender, in their classrooms or school experiences.

All participants held institutional identities that shaped their experiences and development as TEE teachers. These institutional identities were primarily rooted in their places

of employment and the completion of the tasks and expectations in place by their employers. Beauchamp & Thomas (2009) support this aspect of professional identity and the central role day to day experience holds in the development of a teacher.

The institutional identities of the participants were also rooted in their training and experiences influenced through schooling and mentorships. Hammerness et al. (2007) highlight how this time shapes the identity of teachers and can impact how they ultimately shape their careers. Some of the specific ways they call to attention are how teachers define their classroom management styles, seek out professional development opportunities, assimilate to professional norms, and which tasks they see as intrinsic to their jobs. This is consistent with the experiences of participants in this study who relied on their mentorships, administrations, coworkers, colleagues, and degree program training to develop their own classrooms and navigate their school cultures and environments. One such example is the value placed on curriculum supports from colleagues and professional organizations. Many of the participants sought out these resources if they were not available to them within their schools. Another example is how these teachers structured their classrooms based on the support provided through administration and mentorship. Four of the early career teachers felt more comfortable with classroom management and making hard calls, while the other three actively avoided contacting parents or administration unless absolutely necessary. Beijaard et al. (2000) suggest the only way to fully know the impact of these beginning steps and experiences is by comparing expert teachers, experienced teachers, and novice teachers. Another way they suggest this can be done is by following a series of individuals over time and documenting changes and similarities. For the participants in this study, it was apparent in the mid-career, late-career, and former teachers how much they valued their beginning teacher years and how these experiences impacted their self-

efficacy, professional goals, and current professional relationships, such as Leroy and Mark who maintain working relationships with their connections from the beginning of their careers even though their teaching experiences took different paths. This was also apparent in experiences such as David's who is currently seeing his role change as he transitions from a mid-career teacher to a late-career teacher and how this affects how he is treated by colleagues and coworkers.

To discuss the "calling" to teach, teachers fell into three categories, the Called, the Helpers, and the Technologists. This matches the findings from Madero (2021) which categorizes this call to teach into five archetypes, listeners, martyrs, embedders, builders, and chosen ones. While these archetypes are embedded in religious private education in the original study, there are several crossovers amongst the characteristics of each archetype with these TEE teachers' experiences and reasons for teaching. This calling can also be viewed from the perspective of a sense of belonging in the classroom which has been extensively explored in relation to job satisfaction (Skaalvik & Skaalvik 2010, 2011, 2015, 2017).

For the discursive identity, TEE teachers saw themselves as natural problem solvers and facilitators of learning. Lemons, et al. (2015) echo this sentiment of CTE teachers who teach because of the intrinsic value of helping students succeed in their own goals and a passion for a place to utilize their own skill sets. The TEE teachers, both current and former, sought out "aha" moments in facilitating student learning by focusing on the core values of the courses they taught through instruction and assignments. Gill (2018) states TEE teachers should "focus on problem solving, design, and fabrication to solve technological problems within the scope of the broader interconnected and cross-curricular nature of technology education" (p. 677). This matches the goals set by the participants in doing their best to set up environments where their students can

practice hard skill sets and soft skill sets, not just to achieve high marks on a test, but also to "prepare them for life." The participants sought to provide classroom settings in which students and teachers worked together to learn more based in real-world experiences.

In addition to completing daily tasks and teaching in the TEE content area, the following were identified as affinity group practices of TEE teachers: staying abreast of changes in all areas of technology, overcoming a perceived lack of resources (space, materials, and/or software), developing different classroom management practices to ensure safety in a unique learning space, creating career connections (with their own skill base and for student networking), being expected and feeling compelled to try to fix something at the request of others because the teacher knows technology and has the tools, and routinely explaining what TEE is to others. These practices match reports from other research into the tasks and common practices of STEM teachers and CTE teachers (Gill, 2018; Lemons et al., 2015; Torres et al., 2008). Seeing these practices in other publications of similar populations, reaffirms these practices as part of an affinity group as these are practices that are recognized by that population as important and central to the group.

These individual parts of identity work together to create a larger teacher identity and provide a glimpse into how the experiences of TEE teachers impact the development of their teacher identities. It also provides a brief understanding of how the identities can be individually impacted by different retention factors.

Research Question Two

To answer the second research question, what is the relationship between the identified aspects of teacher identity and technology and engineering education teachers' decisions to stay in the classroom, the data was coded for retention factors, retention and exit decisions, and

measurement of satisfaction. These results were further enriched through the experiences of members from both cases, as each of the following were observed within both the current and former teachers as factors for retention and attrition decisions.

Relationships With Colleagues and Coworkers

Research studies have shown favorable colleague relationships have a positive effect in increasing teacher commitment (Coladarci, 1992; Jo, 2014). Many of the participants have sought out these relationships through memberships with professional organizations or volunteer for career and technical student organizations (CTSO) and use these opportunities to develop close ties with their colleagues. These are often the primary way content specific relationships are formed as 25% of the participants discussed their experience of having at least one teaching assignment in which they were a singleton, or the only TEE teacher in a school, which is a common occurrence for those in TEE. Research has shown these types of working relationships have the ability to affect teacher retention for a variety of reasons (Barrera et al., 2010; Coladarci, 1992; Goodpaster et al., 2018; Jo, 2014). One such reason is the ability to collaborate and share resources, which can be a source of great stress for an early-career teacher (Barrera et al., 2010; Goodpaster et al., 2018). Both current and former teachers shared experiences in which they leaned heavily on support from colleagues during their early years to develop appropriate curriculum content and outcomes for the courses they taught. They also relied on the mentors and colleagues they worked with in their schools to navigate the day-to-day requirements and culture within their schools. This matches the research on the indispensable role mentors take on in shaping the experience of early career teachers (Andrews & Quinn, 2005; Flores & Day, 2006; Hiffman & Leak, 1986).

Building relationships with coworkers and colleagues allows for these teachers to have a safe place to vent frustrations which can be a form of stress relief (Lemons et al., 2015; Wolgast & Fischer, 2017). Thomas recalls how prior to COVID-19, it wasn't unusual to step in the hall and exchange a frustrated look with another teacher where it would be met with an understanding nod. Additionally, each of the TEE teachers shared frustration related to the identity crisis over what TEE is and having to explain what it is TEE instructors teach. Many of them found it reassuring having a group of people who know what they do and the joys and struggles that come with it.

Relationships With Students

Previous research identified teacher relationships with students as an important part of teacher wellbeing, which, in turn, affects teacher retention (Spilt et al., 2011). It can also be a source of high stress and burnout (Skaalvik & Skaalvik, 2017; Torres et al., 2018). Student achievement was marked of high importance by the majority of the participants, usually with the clarification that it did not include student testing but rather whether the students learned something in their course. Many participants in this study recalled the "aha" moments as a bit of joy that helped them get through the tough days. Skaalvik & Skaalvik (2017) support the argument that when teachers' goals for student achievement are met, and teachers perceive appreciation from the students, they feel more positively about the work they are doing. Other participants discussed the stressors they experience over classroom management and the importance student rapport holds in maintaining a safe learning environment for all. For Morgan, her perceived safety was one of her deciding factors for leaving the classroom when she did. These stressors are consistent with existing research on criteria impacting teacher decisions to remain or leave the classroom (Lemons et al., 2015; Skaalvik & Skaalvik, 2017).

Relationships With Administration

Previous research has shown that principal support is important for retaining TEE teachers and the sustainability of these programs (Williams et al., 2019). It is understood that principals who create supportive environments to foster recognition and appreciation, as well as commit to personal growth through actively supporting teachers have a higher teacher retention rate (Brown & Wynn, 2009; Petzko, 2004).

The results from this study affirm these teachers place a high value on the administrative support within their schools and how that support, or lack thereof, can impact their experiences. For instance, Natalie has been in the same school for 13 years; her current administration has allowed her to do more than she might be able to in another school or under past administration because of the relationship they have built. Her administration trusts her to make educated and good decisions about what she does in the classroom and, in turn, allows her elbow room to make "cool" things happen. If the administration is not fully convinced something is a good idea, they provide her a platform to explain her thoughts and consider her proposals. Conversely, in the case of Roger, who has previously worked for administration like Natalie's in other schools, was very open that he would be looking for employment in a different school because he found his current administration lacking. Switching schools could mean taking a significant pay cut, but Roger said the pay cut was worth having the support of his administration. Having negative experiences or feeling as though the interactions with administration are inadequate can cause teachers to leave the classroom (Grissom, 2011). This was the experience of Christopher, who after dealing with multiple toxic school cultures which he attributed to administrative leadership, decided to leave education for other opportunities earlier than he initially planned.

Work-Life Balance

The tasks and responsibilities for current teachers grows every year, requiring more and more from teachers and their time and contributes to emotional exhaustion and teacher burnout (Skaalvik & Skaavik, 2017). With the addition of tasks related to COVID, on top of the already stressful workloads, the early-career current teachers in this study often felt like their time in the school building is not respected or could be used in a better way to serve their students. Some of the mid-career teachers saw the additional tasks, such as surveillance, as counterproductive because of the how they interact with students, leading to a surplus in negative interactions instead of allowing for constructive positivity. While many of the participants volunteer their time for career and technical student organizations (CTSOs), which allow them to build stronger relationships with students and provide a external structure for career connections and competitions. These CTSOs can take up a considerable amount of time outside of the classroom, and the teachers who participate in them try to find ways to allow students to work on these commitments during class time. In a study conducted by Lemons et al. (2015) in retired CTE teachers expressed an appreciation for the relationships held during their teaching careers but shared a dislike for the rigorous schedules that were a part of the professions stating, they had to putting in 16 to 18 hour days, 7 days a week to meet the expectations placed on them. This was echoed in the experience of Greta, who made the decision to leave education due to the demand on her time, and the impact it was having on her family. Four of the previous teachers agreed leaving K-12 education has improved their quality of life by providing a better structure that allows them balance focus on their families as well as their professional goals.

Financial Compensation and Alternative Job Opportunities

A quick search of a scholar database reveals that the conversation around how to financially compensate teachers for their workloads has been debated in the United States since the 1920s and is still a factor in the discussion around the retention of teachers today. The United States national average annual salary for public school teachers for the 2019-2020 school year was $63,645 (NCES, 2020). However, teacher salary differs significantly by state. The average annual salaries public school for the states represented in this study for the 2019-2020 school year can be found in Table 4.2 (NCES, 2020).

While mainly a reported inadequacy for the participants from NC, their annual salary was a consideration when making retention decisions. Half of the current teachers mentioned they could not afford to live in the communities they worked in and felt more connected to the communities they commuted from than the ones where they taught. For the former teachers from NC, this perceived insufficiency was a factor in their decisions to continue careers outside of K-12 education, even if their current employment were to end for some reason. Imezeki (2005) discusses the importance of not just raising teacher salaries but doing so with consideration to their living costs to live in the communities they teach in as a way to minimize overall exit, but also transfer attrition (when teachers transfer between school districts). In Reginald's situation, he enjoys teaching but realistically sees himself needing to seek employment either in a different school district or outside of education as a result of the financial hardships he has endured. For Duke, the opportunity for better financial compensation would be his deciding factor to leave K-12 education. The need for stability for himself and his family caused him to seek other opportunities. These findings support the existing research that suggests increased salaries, especially in rural or underserved areas, could attract more highly qualified teachers and lessen

turnover when competing with pay in surrounding areas (Imezki, 2005; Lemons et al., 2015; Ruhland, 2001). Contrastingly, for teachers in other states, such as Terry who teaches in NJ, salary was not a component considered for retention and was used as a selling point to recruit new teachers to the profession. Unfortunately, the salary has not been enough to fill the empty positions in his state as TEE graduates are pursuing other opportunities, resulting in some schools having to close TEE programs.

Existing research has shown that the profitability of these skills due to the shortage in the STEM workforce can be an attrition factor for CTE educators (Lemons et al., 2015). For current teachers like Caleb and Holly, knowing others who have the same credentials as them who have successfully transitioned out of the classroom into positions in industry gives them validation to know they could transition themselves. For Caleb, this transition isn't so much an "if," but a "when." Even Christopher, a professor in higher education, mentioned his skillset as an asset for "keeping his options open," so he doesn't feel "trapped" in his current workplace. Most of the former teacher participants left the classroom to pursue a specific opportunity outside of K-12 education. For the participants in this study, these opportunities were usually related to completing or utilizing a doctoral degree. For some, these opportunities were sought out, while others had long-term goals and the timing fit.

Discussion

Gee supported the concept that identity is not a static one-dimensional entity, but a kind of person within a context (Gee, 2000). Furthermore, Beauchamp and Thomas (2009) determined that teacher identity is a dynamic concept influenced by a range of factors including internal emotions as well as external job and life experiences in particular contexts relevant to the personal and professional aspects of teaching often based in the who and what a teacher is in

the role of education or in the function of a classroom (Beauchamp & Thomas, 2009). Each of these retention factors is multifaceted and impacted multiple areas of the identity development of the teachers in this study. For instance, the relationships with students impacted the development of affinitive practices held by the participants such as classroom management practices and addressing course content needs. Nevertheless, these practices are intertwined with the discourse from the participants and how they view their profession and purpose as teachers. Many of the participants' actions were the result of actions or attitudes of bettering themselves to be better for their students. Similarly, relationships with colleagues and coworkers can also be discussed within the development of the discursive identity and the institutional identity. These relationships were a key theme in how the participants chose to describe themselves, often using phrases that included "we" instead of "I"; seemingly implying that what they were saying applied to all TEE teachers and not just themselves. This discourse and how these participants chose to refer to themselves and their coworkers puts those relationships into the scope of the discursive identity (Gee, 2000). Participants cited heavily relying on other colleagues either within their schools or within professional organizations during their first years to develop course content and navigating their school environments. Discussion around mentor teachers was centered around this navigation and how it impacted their comfort levels and development during their time in the classroom. Therefore, it could also be viewed as part of the institutional identity as these coworkers and colleagues contribute to the school culture and environment, similarly as the administration does (Gee, 2000; Wolgast & Fischer, 2017).

Implications

With the industry demand for skilled workers and a call for more STEM professionals, it is vital to understand the experiences of TEE teachers from how they enter the profession to why

they stay or leave. The essence of the study has shown those who enter TEE are just as unique and varied as the topics and skill sets they teach. However, the recurring theme that shines through is the important role of the people in these teachers' lives. Relationships alongside a loyalty to themselves and others, have the greatest impacts on their experiences and identities. This is true of those who have remained in the classroom and for those who have left the classroom. All the interviewed teachers who have stayed often placed high value in their work-based relationships, but also hold positions that support the development of a work-life balance that fits their needs. The school culture in their positions support the development of these relationships and limits the demands of time not voluntarily given.

When gauging if a participant would leave the profession, the majority of the former teachers in this study held alternative goals outside of the classroom prior to their experience as TEE teachers. Others felt restricted by their placements and felt they were unable to fulfill their perceived potential with the content and its application, or their innate need to do good. In these instances, negative associations and goals requiring more caused these participants to seek out different opportunities that better meet these needs and passions. Based on this group of participants, there may be the potential to determine early in a TEE teacher's career if they plan to stay or leave the profession based on their personal goals for advancement or need for creative freedom and the environment of their school. While the data from this study is not generalizable, it does provide a glimpse into why some TEE professionals seek careers outside of the K-12 classroom.

The top three influences outside of financial compensation that impacted the beginning development of the teachers and their sense of belonging in the classroom were administrative support, mentor teachers, and foundations from their preservice training.

When discussing administrative support, participants felt support from the entire administrative team impacted their development, not just the relationship with the head principal. These supportive relationships relied on structures of open communication, professional respect, and useable feedback from observations. Open communication went beyond the day-to-day greetings. For the participants in the study, it included maintaining a culture and system in which the teachers could approach administration members with ideas, requests, and problems or concerns. Professional respect was conveyed through appreciation, confidence, and trust in the teachers as qualified professionals. This was shown in matters with not only through student management and parent relationships, but also in recognizing the strengths and achievements of the teachers within the school. Finally, feedback from observations could be content specific or pedagogical in nature. However, for it to be considered good feedback, teachers appreciated a mix of positives practices to continue with alongside areas of improvement accompanied by suggestions or clear actions to bring about change. Vague feedback without actionable items or only positives often left the early career participants with more stress and wavering confidence in their abilities as it made them feel their administration did not care enough to give them areas to improve.

Another area for consideration in practice is access to mentor teachers. It is common practice for beginning teachers to be assigned a mentor within their schools when they first begin teaching. They will work with this mentor for an amount of time to learn more about navigating their school and their skills. For the participants, having a mentor teacher both within their schools as well as within the content area held a great impact on their development. So much so that those singleton teachers, or those with assigned mentors outside of their content area, would join career and technical student organizations or other professional organizations to create

connections and seek out these TEE content area mentors. These mentors, both assigned and sought out, help guide beginning teachers in the day-to-day operations within their schools and develop curriculum resources. Content area specific mentors were perceived as having a greater impact on stress levels of the beginning teachers, as the curriculum resources and content specific practices were often high-level stressors for these individuals.

When discussing their greatest challenge during their beginning years of teaching, one of the highlighted experiences was learning how to put the preservice training into action, primarily in classroom management and lesson plan development. Participants often felt their programs gave them a knowledge base to cover the content but left them unprepared to create a classroom culture of their own. Their experiences focused primarily on the study of theory or relying on existing structures when observing or student teaching. This impacted their comfort levels in establishing their own student relationships and developing classroom management techniques. Furthermore, they felt an extreme amount of pressure to continue performing at the level required during their preservice programs for lesson planning and lesson documentation, which many found to be unsustainable beyond the first few weeks. One possible suggestion, supported by Stein & Stein (2016) is increasing the amount of time and practice these preservice teachers experience prior to their student teaching experience(s). More practice of theory alongside learning these techniques could increase the self-efficacy in these individuals when it comes time for them to work independently. Furthermore, more exposure to the realities of teaching and the demands the profession has of its members could allow them to create more informed decisions about it teaching is the right place for them to be and may prevent teachers leaving within the first five years due the job demands.

Other implications can be drawn from the reaction of a portion of the sample that felt their gender and race had little to no impact on their students or their teaching experiences. These participants were Caucasian and male, which fits the primary demographic of the field of TEE. It speaks volumes that these participants did not recognize their race and ethnic backgrounds as impactors on their development, while others who did not fit the primary demographic did. Furthermore, the few Caucasian male participants who did acknowledge the impact their race/ethnic backgrounds held on their students and their development as TEE teachers, and sought to learn ways to combat this, have seen changes in their classroom demographics. This indicates that those in TEE may have different experience based on their gender and race, the ability to recognize these influences, and their commitment to recognize those influences and ultimately take action to learn more on how to create a more inclusive space for all.

Recommendations for Future Research

While the participants did not feel their gender or race were defining reasons for seeking positions outside of education, future research could be conducted to further understand the experiences of non-white and female TEE teachers as it is a field that is predominantly Caucasian and male. This research would provide a unique perspective into the TEE world that is not readily available to most of its constituents.

Most of the participants in this study taught and/or attained their degree in NC, and therefore this study is a greatest reflection of the teaching environment in NC. The focus of TEE content can vary in location as it often takes on the role of meeting the needs of manufacturing and industry within a region. Therefore, it is recommended that future studies consider a larger population to compare the unique experiences of participants based on regions and the accompanying content focuses. By including members from different regions, a cross

comparison of the experiences within these areas could be conducted to determine if an experience is localized to the region, the content being taught, or a generalizable part of the profession.

As the participants in the former teacher category were largely higher education professionals with advanced degrees, the demographic data of this study was not a direct representation of the TEE populations within K-12 education. Additionally, over 60% of this case sample were active teachers in NC during the time when teachers were encouraged to attain master's degrees, which is no longer the policy within the state. Having these degrees made achieving the goals of further advanced degrees a reachable possibility. Many of these individuals did not plan to spend full careers in education as they had goals to eventually seek other employment through further education. While this sampling was an effect of the snowball sampling technique, future studies should include a larger sample of former TEE teachers who left education for professions other than those in higher education to consider if leaving was always an intended goal or a side-effect of their experiences. Another area of study could additionally consider the state policies on how those with advanced degrees are treated and the attrition rate amongst those who have these educational goals and their professional prospects due to holding these degrees or certifications.

As each participant shared how they entered the profession, a common story emerged: an enthusiasm for the content within TEE and mentors who encouraged them along at each step to becoming a TEE teacher. Some of these mentors were family, others were teachers or professors, and some were even friends. This narrative did not fit every participant's experience, but it was overwhelmingly common throughout this population sample and matches existing research on the topic (Kelly, 2020; Wright & Custer, 1998). Kelly's (2020) research specifically explores the

influences of first-generation college students already enrolled in a TEE collegiate program. Wright & Custer (1998) had a broader population, and the personal influences were similar across populations between the two studies. However, since 1998, changes in the TEE field and content covered may indicate a need to reevaluate what attracts individuals to becoming TEE teachers and how to recruit them into the profession.

Limitations

This study is not meant to represent a larger population, and the results should not be generalized as such. The participants selected for this study met very specific criteria to serve as a foundation for the discussion; the design was intended to allow further exploration into a subject that has not been readily studied within the TEE field at present.

Time served as a limitation within this study. Under a different situation, a similar study could be developed to follow a group of teachers from teacher training through several years of teaching to gain a more personable outlook on how teachers develop a teacher identity in and outside of the classroom. Since this study was performed for a dissertation, this type of research was not feasible or affordable. For this reason, the participant selection included as many participants at different stages of a teacher's career path as possible in hopes that input from multiple sources would provide a similar spectrum of data. Time also dictated that only one interview would be conducted with each participant. Meeting with the participants multiple times over the course of several months or years might have allowed additional themes or a deeper understanding of their lived experiences, the development of their teacher identities, and classroom retention factors (Creswell & Poth, 2018).

Another limitation that became apparent during the study was access to qualified teachers for the study. At this time there is no state or national database of contact information for those

who are teaching TEE courses accessible to the public. Unfortunately, this meant some current teachers who may have met the outlined criteria were not reached or polled for participation. It also meant that some former teachers who fit the outlined criteria were not polled for participation, as there is not database containing these contacts. With the use of snowball sampling, the researcher relied on personal and professional contacts to share the recruitment information with other potential participants. This resulted in the researcher knowing many of the participants and a number of the participants knowing one another. This may lead to an increased risk of reidentification despite the researcher's best efforts to de-identify the data as much as possible (Seidman, 2019).

Another potential limitation was related to changes in the teaching field due to the Coronavirus Disease 2019 (COVID-19) pandemic (Centers for Disease Control and Prevention [CDC], 2021). Due to safety restrictions, the interviews took place through teleconferencing, which might have influenced the responses and the interviewees' sense of ease. At the time of the interviews, teachers were primarily teaching through online video methods. Adding the additional online time may have impacted the data gathered due to technical difficulties or contributed to virtual fatigue.

Conclusions

As previous research has not fully addressed the experiences and needs of technology and engineering educators, this study was developed using research generally addressing teacher retention in other STEM education areas to provide insight into why teachers may choose to stay or leave the educational profession. Using Gee's (2000) identity framework as a guide for understanding the development of identity within the experiences of TEE teachers, this study

sought to understand the components within the professional identity of TEE teachers and how these characteristics may relate to retention and attrition decisions.

Findings related to the identity factors showed that each of these perspectives had an impact on teacher development. Within the N-identity, the factors of gender and race were identified as influencers for the experiences and subsequent development of the participants in this study. Within the I-identity, influences that were introduced to the participants based on their places of work were identified and discussed. These influences included their preservice education programs, any state mandated teaching license and credential requirements, school settings and administration teams, and influences for entering the profession. Within the D-identity, descriptors of TEE professionals were identified through the perspective of the current and former teachers. Some of these characteristics include qualities of leadership, problem solving, resourcefulness, and adaptability. Many of these qualities emerge to meet the needs of their students in their creation of a positive learning environment. Finally, within the A-identity, a list of affinitive practices for TEE were listed and discussed. These practices were found to be a part of the TEE experience shared by the current teachers and echoed in the past experiences of the former teachers. Many of these practices were developed as a response to problem solving to meet the needs of their students or the expectations placed on them professionally. These experiences and findings were further echoed in research in the experiences of teachers in other CTE and STEM education areas.

Findings related to retention and attrition showed that those currently in the TEE classroom and former TEE teachers placed a high value on the relationships within their professional settings, which have been shown to be heavily influenced by the culture within a school. This culture is largely set by the leadership within the school with individuals such as

experienced teachers and administration having the most impactful roles. Members of the community also influence a school's culture as it frames the needs of the students. Teachers work within the culture of their schools to meet the educational needs of their students. While these factors play a large role in the development of the participants, some acknowledged that they entered the profession with existing goals that had the potential to remove them from the classroom regardless of their environments. If the environments did not meet their professional needs, these situations encouraged them to seek out alternative experiences to meet those needs. Others would leave to meet a need that could not be met within their experiences; such needs included financial needs, personal life balances, and further professional goals outside of education. Those who remain in the classroom despite negative experiences did so because of the relationships they have built within their school with their colleagues, coworkers, students, and administration. Some feel they can create change for their students, and these relationships are the motivation to return even in less-than-ideal conditions. Others find themselves returning every year due to the comradery felt in their coworker and colleague relationships. While many of the current teachers said they wanted to remain in the profession for the foreseeable future, they also shared that they would seek out better opportunities in different schools and communities under different leadership, if necessary, to continue making an impact on students and continuing their work relationships. Many of the former teachers felt the same about their current positions. They enjoy the work they are doing now, and while most do not see themselves making career changes in the near future, some keep a watchful eye on better opportunities.

Recommendations for practice, to increase teacher retention were made regarding administrative support, mentor teachers, and foundations from preservice training. For beginning

teachers, these were areas that impacted their confidence and sense of belonging in the classroom the first years in the classroom. For the mid and late career teachers, these supports were areas that made a large impact on their initial decisions to continue teaching beyond the first five years and gave them the confidence to continue. These recommendations were based in participant experiences and the findings in other research as practices for improving teacher retention.

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APPENDICES

Appendix A: IRB Approval

NC STATE

Teena Coats <tlcoats@ncsu.edu>

Clark - 21203 - IRB Protocol approved
1 message

IRB Administrative Office <pins_notifications@ncsu.edu> Tue, Mar 16, 2021 at 10:04 AM
Reply-To: ncsuirboffice@ncsu.edu
To: tlcoats@ncsu.edu

Dear Teena Coats:

IRB Protocol 21203 has been approved

Title: Carter Technology and engineering education teacher identity factors: an exploration and examination of teacher retention

PI: Clark, Aaron Catron

The project listed above has been reviewed by the NC State Institutional Review Board for the Use of Human Subjects in Research, and is approved for one year. This protocol will expire on 01/01/2100 and will need continuing review approval before that date.

NOTE:

1. This board complies with requirements found in Title 45 part 46 of The Code of Federal Regulations. For NCSU the Assurance Number is: FWA00003429.
2. You must use the approved consent forms which are listed as "approved" in the eIRB protocol.
3. Your approval for this study lasts for one year from the review date in this letter and listed on the "Title" page of the eIRB. If your study extends beyond that time, including data analysis, you must obtain continuing review approval from the IRB.
4. Any changes to the protocol and supporting documents must be submitted and approved by the IRB prior to implementation.
5. If any unanticipated problems or adverse events occur, they must be reported to the IRB office within 5 business days by completing and submitting the unanticipated problem form on the IRB website: https://research.ncsu.edu/sparcs/compliance/irb/submission-guidance/.
6. Any unapproved departure from your approved IRB protocol results in non-compliance. Please find information regarding how to avoid non-compliance on our website.

If you have any questions, please don't hesitate to contact us.

****

NCSU IRB Office

Please contact ncsuirboffice@ncsu.edu if an official PDF approval letter with signature is required by your funding source.

Appendix B: Participant Recruitment Email

Subject: Dissertation Participation Interview Request

Greetings,

I am a doctoral student in the Learning and Teaching in STEM: Engineering and Technology Education program at North Carolina State University. For my dissertation research, I would like to interview current and previous technology and engineering education teachers who completed a formal teacher education preparation program (bachelor's degree from a four-year university in education).

Participation would require filling out the attached survey, and possibly an interview over Zoom. The interview should take no more than 60 minutes. Volunteers who complete the interview will be compensated with an entry into a raffle for a chance to win a $75 Amazon gift card code upon completion. The full-time commitment for participation will not exceed more than 90 minutes.

Any information you share will remain completely confidential. If you fit the above description and are willing to participate, please complete the attached survey.
If you know of individuals who fit the above description who may be interested in participating in the study, please share this email with them.

Please let me know if you have any questions or concerns. Thank you for your time and consideration.

https://ncsu.qualtrics.com/jfe/form/SV_6RV6P0WTop4zwod

Best wishes,
Teena Coats
Doctoral Candidate
Learning and Teaching in STEM
NC State University
tlcoats@ncsu.edu

Dr. Aaron C. Clark, DTE
Professor and Department Head
Dept. of STEM Education
NC State University
aclark@ncsu.edu

Dr. Cameron D. Denson, Ph.D.
Technology, Engineering and Design Education
NC State University
cddenson@ncsu.edu

Appendix C: Informed Consent Form for Research

NC STATE UNIVERSITY

Informed Consent for Participation in Research
Adult Consent Form

Title of Study: Technology and engineering education teacher identity factors: an exploration and examination of teacher retention **(eIRB #** 21203**)**
Principal Investigator(s): Teena Coats, tlcoats@ncsu.edu, (252) 560-9273
Funding Source: none
Faculty Point of Contact: Dr. Aaron Clark, aclark@ncsu.edu, (919) 515-6900

What are some general things you should know about research studies?
You are invited to take part in a research study. Your participation in this study is voluntary. You have the right to be a part of this study, to choose not to participate, and to stop participating at any time without penalty. The purpose of this research study is to gain a better understanding of the experiences of teachers in the technology and engineering education field. We will do this through responses to survey and interview questions, as well as a card sorting activity.

You are not guaranteed any personal benefits from being in this study. Research studies also may pose risks to those who participate. You may want to participate in this research because of your experience as a technology and engineering educator. You may not want to participate in this research because you do not wish to discuss this part of your life, you have never been a technology and engineering educator, or a perceived risk to discussing your current/previous employment.

Specific details about the research in which you are invited to participate are contained below. If you do not understand something in this form, please ask the researcher for clarification or more information. A copy of this consent form will be provided to you. If, at any time, you have questions about your participation in this research, do not hesitate to contact the researcher(s) named above or the NC State IRB office. The IRB office's contact information is listed in the *What if you have questions about your rights as a research participant?* section of this form.

What is the purpose of this study?
The purpose of the study is to explore the professional identity of active and previous technology and engineering education teachers. Furthermore, this study aims to explore if these identities have an effect on the decision to remain or leave the teaching profession. For this study, the researcher will collect demographic information in a survey, and conduct in-depth interviews with a card sorting activity.

Am I eligible to be a participant in this study?
In order to be a participant in this study, you must agree to be in the study, and either be an active or previous K-12 technology and engineering education teacher who completed an education degree program.

You cannot participate in this study if you do not want to be in the study or do not meet the above criteria.

What will happen if you take part in the study?

If you agree to participate in this study, you will be asked to do all of the following:

1. To sign this Informed Consent Document for Research Participation
2. Participate in a preliminary survey to collect demographic and background information.
3. Participate in an audio recorded, semi-structured interview lasting a maximum of 60 minutes. The interview will consist of a card-sorting activity and answering questions. See the next section for information about the storing of audio recordings.
4. Complete a member-checking of the researcher's findings.

The total amount of time that you will be participating in this study is approximately 90 minutes.

Recording and images

If you want to participate in this research, you must agree to be audio recorded. The audio recordings will be used to transcribe the interview. Recordings will be made through Zoom as well as on a digital voice recorder and stored in a locked location and a password protected file. Identifying information will be deidentified in transcriptions, as computerized transcription service will be used. Complete transcriptions will be stored on a 2-step password-protected computer in a 2-step verified cloud space. Screenshots of an online activity may be taken during the interview but will be only of the activity and not of the participant or any other identifying information. Saved screenshots will be saved in the same location as the recorded audio files.

I give you permission to make audio recording(s) of me during this study.
"Yes" <Qualtrics button>
"No" <Qualtrics button>

I give you permission to take screenshots of the activity during this study.
"Yes" <Qualtrics button>
"No" <Qualtrics button>

Risks and benefits
There are minimal risks associated with participation in this research. The risks to you as a result of this research include discovery of your participation due to your current/previous employment status as a technology and engineering educator.

There are no direct benefits to your participation in the research. The indirect benefits are contributing to the study of teacher retention and attrition in Technology and Engineering Education.

Right to withdraw your participation
You can stop participating in this study at any time for any reason. In order to stop your participation, please contact Teena Coats, tlcoats@ncsu.edu, (252) 560-9273 or Dr. Aaron Clark, aclark@ncsu.edu, (919) 515-6900. If you choose to withdraw your consent and to stop participating in this research, you can expect that the researcher(s) will redact your data from their data set, securely destroy your data, and prevent future uses of your data for research purposes wherever possible. This is possible in some, but not all, cases.

Confidentiality, personal privacy, and data management
Trust is the foundation of the participant/researcher relationship. Much of that principle of trust is tied to keeping your information private and in the manner that I have described to you in this form. The information that you share with me will be held in confidence to the fullest extent allowed by law.

Protecting your privacy as related to this research is of utmost importance to me. There are very rare circumstances related to confidentiality where I may have to share information about you. Your information collected in this research study could be reviewed by representatives of the University, research sponsors, or government agencies (for example, the FDA) for purposes such as quality control or safety. In other cases, I must report instances in which imminent harm could come to you or others.

How I manage, protect, and share your data are the principal ways that I protect your personal privacy. Data that will be shared with others about you will be de-identified.

> **De-identified**. De-identified data is information that at one time could directly identify you, but that I have recorded this data so that your identity is separated from the data. I will have a master list with your code and real name that I can use to link to your data.

Future use of your research data
To help maximize the benefits of your participation in this project, by further contributing to science and our community, your information will be stored for future research and may be shared with other people without additional consent from you.

Compensation
Upon completion of the interview, you will be entered for a drawing of a $75 Amazon gift card code for participating in the study.

If you withdraw from the study prior to the completion of the interview, you will not be entered into the drawing.

What if you are an employee?
Your participation in this study is not a requirement of your employment, and your participation or lack thereof, will not affect your job.

What if you have questions about this study?
If you have questions at any time about the study itself or the procedures implemented in this study, you may contact the researcher, Teena Coats, tlcoats@ncsu.edu, (252) 560-9273 or Dr. Aaron Clark, aclark@ncsu.edu, (919) 515-6900.

What if you have questions about your rights as a research participant?
If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the course of this project, you may contact the NC State IRB (Institutional Review Board) Office. An IRB office helps participants if they have any issues regarding research activities. You can contact the NC State IRB Office via email at irb-director@ncsu.edu or via phone at (919) 515-8754.

Consent To Participate
By signing this consent form electronically, I am affirming that I have read and understand the above information. All of the questions that I had about this research have been answered. I have chosen to participate in this study with the understanding that I may stop participating at any time without penalty or loss of benefits to which I am otherwise entitled. I am aware that I may revoke my consent at any time.

"I consent to participation in this research study" <Qualtrics button>
"I do not consent to participation in this research study" <Qualtrics button>

Appendix D: Demographic Questionnaire

Technology Ed Teacher Dissertation Study Recruitment Survey

iQ Score: Fair

Screen 1

Q1

Name

Q2

Preferred Email:

Q42

Please select your age group.

- 20-25 years
- 26-30 years
- 31-35 years
- 36-40 years
- 41-45 years
- 46-50 years
- 51-55 years
- 56-60 years
- 61-65 years
- 66+ years

Q4

With which gender do you most closely identify?

- Male
- Female
- Nonbinary
- Other:
- I prefer not to answer

Q5

With which ethnicity do you most closely identify?

- American Indian or Alaska Native
- Asian
- Black or African American
- Caucasian
- Hispanic
- Multiracial
- Native Hawaiian or Pacific Islander
- Other
- I prefer not to answer

Import from library | Add new question

Add Block

Screen 2

Q40

What is the highest level of school you have completed or the highest degree you have received?

- Less than high school degree
- High school graduate (high school diploma or equivalent including GED)
- Some college but no degree
- Associate degree in college (2-year)
- Bachelor's degree in college (4-year)
- Master's degree
- Doctoral degree
- Professional degree (JD, MD)

Q15

Was your degree(s) focused in education?

- Yes
- No

Q12

Display this question

If Was your degree(s) focused in education? Yes Is Selected

Where did you complete your education degree(s)?

Q28

Are you an active K-12 technology and engineering education teacher?

- Yes
- No
- I have never been at technology and engineering education teacher

Import from library | Add new question

Add Block

Active Teacher

Q13

How long have you been a technology and engineering education teacher?

- < 1 year
- 1-3 years
- 4-6 years
- 7-9 years
- 10-12 years
- 13-15 years
- 16+ years

Q19

Which courses do you currently teach?

Q17

What grades (age groups) do you currently teach in your courses?

- [ ] 6th grade
- [ ] 7th grade
- [ ] 8th grade
- [ ] 9th grade
- [ ] 10th grade
- [ ] 11th grade
- [ ] 12th grade

Q16

How would you describe the setting of your school?

- ○ Urban
- ○ Suburban
- ○ Rural

Q18

Approximately what percentage of the students at your school receive free or reduced lunch?

- ○ 0% - 25%
- ○ 26% - 50%
- ○ 51% - 75%
- ○ 76% - 100%

Import from library | Add new question

Add Block

Non-Active Teacher

Q43

How long were you a technology and engineering education teacher?

- ○ < 1 year
- ○ 1-3 years
- ○ 4-6 years
- ○ 7-9 years
- ○ 10-12 years
- ○ 13-15 years
- ○ 16+ years

Q34

iQ

Which courses did you teach?

Q45

What grades (age groups) did you teach in your courses?

- ☐ 6th grade
- ☐ 7th grade
- ☐ 8th grade
- ☐ 9th grade
- ☐ 10th grade
- ☐ 11th grade
- ☐ 12th grade

Q33

How would you describe the setting of the school you taught in?

- ○ Urban
- ○ Suburban
- ○ Rural

Q36

Approximately what percentage of the students at your school received free or reduced lunch?

- 0% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

Import from library | Add new question

Add Block

Screen 3

Q21

The following criteria has been identified to influence teacher retention in the classroom. Based on your personal judgement, please rank the criteria from MOST to LEAST important.

Monetary compensation	1
Benefits (health, retirement, etc.)	2
Usefulness of my degree	3
Building relationships with students	4
Support from administration	5
Support from family/friends	6
Opportunities for advancement	7
Impacting student achievement	8
Recognition in school/community	9
Building relationships with fellow staff members	10

Q22

Briefly explain why you chose the order in which you ranked the criteria. Were there any listed that do not matter to you? Are there any that are critically important?

Import from library | Add new question

Add Block

Screen 4 - End A

Q25

I would like to interview participants to gain a better understanding of your professional identity related to your teaching experiences. Would you like to be contacted to participate in an interview?

- Yes, please contact me for an interview. The best email to contact me is:
- No, I would not like to participate in an interview.

Q41

Thank you for participating

Teena Coats
31 Jan 2021 9:01am

Thank you message

Hide Discussion | Add a Comment

Import from library | Add new question

Appendix E: Interview Protocols

Interview Protocol for Active Teachers

Time of Interview:
Date:
Place:
Interviewer: Teena Coats
Participant ID:

1. Introductions
2. Informed Consent for completion
3. Card Sort

Sort the following items into two categories: those that are most important to you, and those that are least important to you. Please voice your thought process aloud as you complete this task.

- annual salary,
- benefits (health coverage, retirement plan, etc),
- opportunities for advancement,
- usefulness of education degree,
- recognition in school/community,
- support from administration,
- support from family/friends,
- building relationships with students,
- impacting student achievement,
- building relationships with coworkers,
- mentor relationships

Briefly explain why you chose to place these items in those categories.

Resort the items into which ones currently reflect your present employment situation and which ones do not. Please voice your thought process aloud as you complete this task.

4. Interview Questions

- Tell me about yourself. How would you describe yourself to a stranger?
- Has your ethnic background influenced your actions in the classroom? Gender?
- Have you noticed any differential treatment in how others view you?
    - If so, can you describe that for me? How does that impact you?
- Describe the community you teach in. How do you view your role within that community?
    - Recall how teaching in this setting has affected your teaching.
- Describe your job responsibilities to me. How do these affect you as a teacher?
- How have the relationships with students/administrators/coworkers/parents impacted you as a teacher?
- Which relationships (students/administrators/coworkers/parents) have been the most influential to you? To your decision to continue teaching?
- Who/what influenced your decision to become a teacher? A technology and engineering education teacher?

- Did you feel teaching was a calling?
- Where do you see yourself professionally in 5 years?
- Tell me about an experience that taught you something about being a teacher that you didn't learn in your educational degree program.
- If you could give advice to yourself as a first-year teacher, what would you say?
- Has there ever been a time where you thought you may leave the profession?
    - Can you describe that time in your life to me?
    - For professional teachers: Many teachers choose to leave the classroom within the first 5 years, why have you stayed?

5. Closing

Thank you for your participation. Again, your responses will be kept confidential. Do you have any final questions for me?

In the next few weeks, I will be emailing you to review the notes I have made related to this interview. I would appreciate it if you would take the time to ensure I have represented your thoughts and feelings accurately.

Thank you again. Your name has been entered into a drawing for a $75 Amazon gift card code. If you have any questions, please don't hesitate to contact me using the information on the consent form.

Interview Protocol for Former Teachers

Time of Interview:
Date:
Place:
Interviewer: Teena Coats
Participant ID:

1. Introductions
2. Informed Consent for completion
3. Card Sort

Sort the following items into two categories: those that are most important to you, and those that are least important to you. Please voice your thought process aloud as you complete this task.

- annual salary,
- benefits (health coverage, retirement plan, etc),
- opportunities for advancement,
- usefulness of education degree,
- recognition in school/community,
- support from administration,
- support from family/friends,
- building relationships with students,
- impacting student achievement,
- building relationships with coworkers,
- mentor relationships

Briefly explain why you chose to place these items in those categories.

Resort the items into which ones currently reflect your present employment situation and which ones do not. Please voice your thought process aloud as you complete this task.

4. Interview Questions

- Tell me about yourself. How would you describe yourself to a stranger?
- Did your ethnic background influence your actions in the classroom? Gender?
- Did you notice any differential treatment in how others view you?
    - If so, can you describe that for me? How has that impacted you?
- Describe your current job. Where do you see yourself professionally in 5 years?
- Describe how your current job responsibilities differ from when you were a teacher. How has that affected you?
- Describe the community you taught in. How did you view your role within that community? How has it changed?
- How did the relationships with students/administrators/coworkers/parents impact you as a teacher?
- Tell me about an experience that taught you something about being a teacher that you didn't learn in your educational degree program.

- Who/what influenced your decision to become a teacher? A technology and engineering education teacher?
- Did you feel teaching was a calling?
- If you could give advice to yourself as a first-year teacher, what would you say?
- How long were you a teacher? What ultimately was the deciding factor to leave?

5. Closing

Thank you for your participation. Again, your responses will be kept confidential. Do you have any final questions for me?

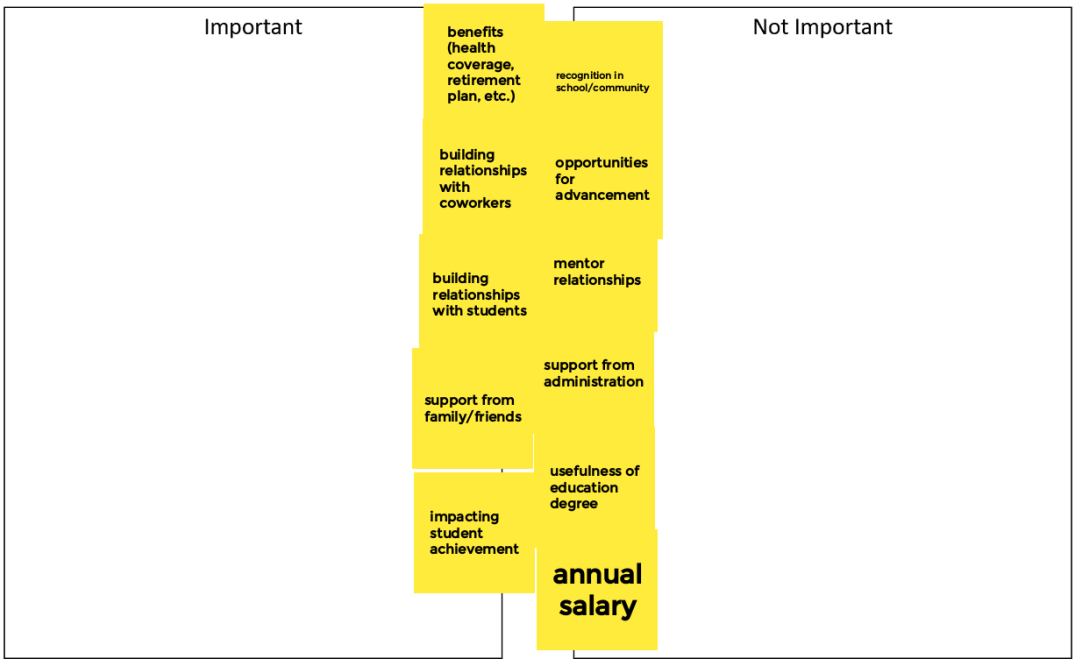
In the next few weeks, I will be emailing you to review the notes I have made related to this interview. I would appreciate it if you would take the time to ensure I have represented your thoughts and feelings accurately.

Thank you again. Your name has been entered into a drawing for a $75 Amazon gift card code. If you have any questions, please don't hesitate to contact me using the information on the consent form.

Appendix F: Card Sorting Activity

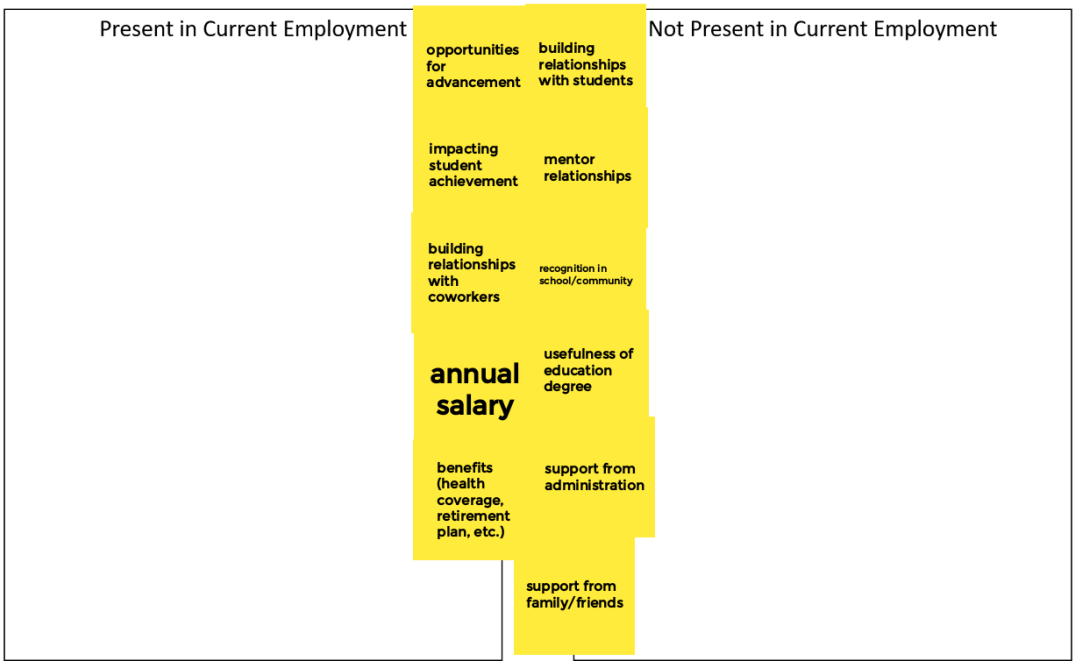
Step 1:

Sort the criteria into the two boxes. Please voice your thought process aloud as you complete this task.



Step 2:

Sort the criteria into the two boxes. Please voice your thought process aloud as you complete this task.



Appendix G: Participant Profiles

Aiden

Aiden has been teaching for four years. He currently teaches topics such as software usage and design principles in a high school setting. He views himself as a laid-back teacher who prides himself on creating a relaxed and comfortable classroom setting for students to learn. He has completed both a bachelor's degree and a master's in technology and engineering education. Aiden knew in high school that he wanted a career doing something in technology after his experiences with the Project Lead the Way curriculum. He did not feel financially confident to enter a university program directly after high school and would work full time while completing his associate degree at a local college. He recalls his decision to attend university was heavily influenced by a love for the city where it was located, in-state tuition, and where he could continue working at his current job to cover associated costs. After doing some research on what programs he could enter that matched his interests and on paper would accept courses he had already taken, his top choice was the TEE program. He was able to see the fun side of teaching during his student teaching experience, and following graduation was able to have his pick of which school he wanted to work at. Aiden's decision to remain in the classroom thus far has been fueled by an enjoyment of his current job and tasks. Though, part of it also stems from not knowing what else to do with his degree training. He currently plans to remain teaching in the K-12 classroom for the foreseeable future but could see himself transitioning to a different school as the current commute is longer than he desires.

Caleb

Caleb has been teaching at the high school level for three years. His decision to enter teaching evolved from a desire to enter engineering at a university. He did not meet the qualifications to enter the engineering program directly, so he planned to complete courses initially in the TEE program and transfer. However, he ended up enjoying the curriculum and direction of TEE. At the time of the interview, Caleb expressed that he would like to seek other employment outside of K-12 education within the next five years. He enjoys teaching and values his relationships with students and coworkers, but finds the resources offered to him as a teacher are inadequate. He has to share a classroom with other teachers in his school and there is no private area for his planning time, when it's not taken up with meetings or other assigned duties. In addition, he finds the relationships with the parents of his students to often be discouraging. While his administration does support its teachers and the decisions they make, it isn't enough for these interactions. He hopes to either find a position in higher education or within a company using the software he teaches and maintains certifications in.

Charlotte

Charlotte recalls always wanting to be a teacher. For a brief time, Charlotte considered going to school for architecture instead because of a positive experience in her high school drafting class. She did not know becoming a TEE teacher was an option until she began discussing her change in plans with her teacher. She began looking at universities that offered degrees in TEE, which led to her current career path.

Charlotte has been a teacher for three years in her school. She finds building relationships with her students to be incredibly important and has strong opinions about how administration should be involved to best support teachers in the classroom. She is working hard to build her current program for the benefit of her students but would like to advance in her career outside of the K-

12 classroom. She is currently working on her master's degree, which puts her closer to her goal of working in higher education. She would love to be a professor at her alma mater even if it required her to relocate. She has also considered the idea of becoming a consultant where she could further utilize her skills for curriculum and program building to help other TEE teachers.

Christopher

Christopher is a third-generation engineer turned educator, following in the footsteps of his father and grandfather. After completing two bachelor's degrees, one in engineering and the other in TEE, Christopher spent six and a half years as an educator in the K-12 classroom. During this time, he spent time in a variety of schools and completed his master's degree. His decision to leave each school would vary; some reasons he gave included a lack of trust of coworkers, problematic administration, and a lack of professionalism resulting in what he describes as a "toxic work environment". Ultimately, the repeated unfavorable environments of the K-12 classroom is what led him to seek other opportunities and he began to pursue a goal he had set for himself when he was a teenager: completing a doctoral degree.

He is now an associate faculty member at a university where he can influence students pursuing engineering degrees and cares deeply about ensuring the success of these students entering a challenging field. Every year, he considers leaving higher education to return to K-12 education or the engineering profession but states he will probably remain a faculty member for the time being. He does not feel stuck in the position and is comfortable with the idea that if he decided to leave his position, he could comfortably find an alternative.

David

David has been teaching for 11 years. A self-described foodie, he enjoys using his interest in food to connect with the diverse student body he works with daily. David sees himself as a demanding teacher with high expectations of his students as his job is to prepare them for college. He wants to ensure they are ready for the challenges ahead of them. Even though he's spent over a decade in secondary education, when making an initial career choice he did not pursue a degree in education. It wasn't until a fraternity brother, who was an upperclassman in the TEE program, introduced him to the program that he considered teaching as a career path. He really enjoyed the courses and eventually made the transition from engineering to technology education. This was the start of many connections David would make to build a network of coworkers and colleagues that he values greatly. He uses these connections to better his courses, though some of them go beyond the classroom; one connection introduced him to his wife. When he looks to the future, David sees himself remaining where he is: "I enjoy where I teach. I enjoy the students I teach; I enjoy the people I work with." There he can continue to "break in the freshmen" and continue preparing future engineering students for the rigorous college experience ahead of them.

Duke

Before leaving the classroom to pursue a doctoral degree, Duke taught materials processing for four years in a junior high environment. In addition to teaching, he also served as the basketball coach at his school. He is still working towards finishing his degree while working for a company where he works with students and develops content in a less restricted way than when he was in the K-12 classroom. He cites the restrictions and "red tape" as part of the reasons why he decided to find the joy in teaching outside of a K-12 classroom. Additionally, as a family

man he has a high priority of being able to financially support his family, and teaching did not meet those needs. He saw the decision to complete his doctoral degree as a step to a better financial place for his family, and a step towards more autonomy in doing the parts of teaching he loved. The current position he holds allows for more financial freedom where he can continue utilizing his creativity and love of learning and teaching without the inflexible system of state testing and rigid grading and standard systems.

Evan

Evan has been teaching at a rural high school level for five years. He sees himself as an innovator with a positive mindset. He works hard to teach his courses with a scope of student future success and to build a rapport with his students and their parents. Just as he values connecting with students and their families, his own family has been influential in his decision to enter teaching as a profession. Family and past teachers are what drove him in the direction of education and the undergraduate TEE program he completed. He values that teaching has allowed him to make a difference. He holds an intrinsic value of seeing students succeed and enjoys the day-to-day changes and challenges it brings, “it's just not punching a clock.” While Evan can see himself fulfilling a career in TEE, he does express concern that he may have to leave education due to circumstances outside of his control. He has seen programs close due to changes in how CTE programs are funded near him and wonders how further changes due to COVID-19 will continue to have an impact.

Greta

Greta was a technology and engineering education teacher for three years. She began her career in TEE by filling in as a long-term substitute teacher for her mother. During this time, she got to experience teaching at two different schools, one public and one private. These were completely opposite worlds when it came to TEE. She describes her experience in the public school as “atrocious” due to the minimal value the school held for her subject area. Additionally, she was tasked by the administration with non-compensated duties before and after hours to sustain a student organization that did not fall into any of her covered content. A stark contrast to her private school environment in which the CTE programs were “revered” by students, parents, teachers, and administration. She had less students and a larger budget to meet the needs and wants of the school. Eventually though, she wanted to make a greater difference than she felt she could at the K-12 level. She completed her master’s and her doctoral degree with the hopeful goal of bettering education through research and service. Currently, Greta is managing a couple of different jobs and is enjoying the variety and challenges that each of these brings. By exploring these different positions, she has been able to better define what it is she truly wants to do and pursue. Currently, her professional goals for the future are to be happy as she continues to find new ways to use her skill set to make a difference.

Henry

Henry sees his decision to enter TEE as a creative way of combining the worlds of his parents. His mother is an elementary school teacher, and his father is an electrical engineer. They were his primary influence when choosing what he wanted to do with his life. Though he was originally pursuing a degree in textile engineering, it did not feel like it was a good fit. He began seeking another program that fit his needs at the university he was attending. This is how he learned of the TEE program, as he did not know anything about such a profession or program

before entering college. This led to Henry's career in multiple roles in the K-12 classroom for eight years. During this time, he would serve in positions teaching, researching, coordinating, and other leadership roles. Ultimately, he chose to leave the classroom to better himself professionally by pursuing a doctoral degree program. He is now in the process of completing his coursework for the doctoral program, while completing research as a graduate research assistant. Upon completion of his degree, he would like to be hired on as a professor within the same program. If a position is not available, he plans to find a position at a community college or with a program doing community outreach.

Holly

Holly's journey as a teacher has been an adventure. Holly knew from a very young age that she wanted to be a teacher. However, after an initial student teaching experience, she almost didn't go into the K-12 classroom. This placement taught her a style of teaching that was "everything I didn't want to do." Thankfully, she was able to experience a second placement where her experience was completely different. It wasn't a smooth transition, but Holly was able to complete her student teaching. After taking a year to participate in an internship, Holly found her first position as a long-term substitute. This began a whirlwind over the next two years where she would get to experience a variety of different schools and positions. During these positions, she consistently volunteered her time with a theatre club at the local high school near where she lived. So when a position became available at that school, Holly applied and made the transition. Her time in these places allowed her to build and develop a network of coworkers and colleagues that have influenced her experience. This network has continued supporting her and has helped her be a better teacher to the students. Her desire to be a better educator and to learn all she can about bettering herself and the systems in place, she has recently begun a graduate program for educational leadership. In the future, she is looking forward to using all that she has learned, and will learn, in the classroom to make the best learning experience she possibly can for her students.

Janet

Janet recalls always wanting to be a teacher. She started her collegiate journey in math education, partially from a love of math, and also in part to the influence of a calculus teacher in high school. However, after finding that math at the collegiate level did not contain as many numbers as it did letters, she decided to look for a different subject within education. She loved the hands-on experiences the technology and engineering education program offered and was happy to make the switch. She continued her schooling to obtain her master's and doctoral degrees in this area as well. She is currently an assistant teaching professor within this same TEE program. She always planned to teach in higher education but saw value in gaining teaching experience in secondary education before pursuing a career teaching future teachers. Therefore, she took the time to better prepare herself and taught for five years before applying for her current position. During this time, she taught at two different schools, a middle school and a high school. Janet views her current position as being not so different from her job as a K-12 educator; "it's just teaching different topics" and "getting students prepared for different parts of their life." She is looking forward to serving in this position and preparing future teachers in the years to come.

Leroy

Leroy was an active member in the K-12 public school system for many years, both as a teacher and in roles of administration. As the child of educators, he knew he wanted to complete the TEE program at a nearby university from "when I was eight years old." After high school, Leroy served 2 years in the active-duty United States Army and then four additional years in the United States Army Reserves as he completed his undergraduate IA-TEE education program and degree. After nearly two years of employment in a CNC and tool and die shop, Leroy spent the next six and a half years in the classroom. He switched schools a number of times due to commute times and demands of the positions, but overall enjoyed his time in this area. He would eventually leave K-12 teaching to pursue a doctoral degree in school administration, which continued his career in K-12 education, this time as an administrator. Currently, he is now an assistant teaching professor at his alma mater focusing on teaching undergraduate courses in a TEE program. His role in this position is not drastically different from his role as a teacher as his primary focus is on student learning and developing a welcoming classroom for all students. His biggest challenge has been navigating the advancements in the technology these subjects now focus on. When he began teaching, most schools did not have computer labs, much less access to the internet. Now, all of his courses require an online component, and others focus on software and manufacturing technology that did not exist 20 years ago. As a lifelong learner, challenges have not discouraged Leroy. He looks forward to spending the next several years preparing the next generation of TEE educators for their own journey's as lifelong learners and influencers of change.

Lucas

Lucas was a technology and engineering education teacher for 11 years before he left the K-12 classroom to pursue a TEE doctoral degree program. He was influenced to become a TEE teacher by his father and grandmother, who were both Career and Technical Education (CTE) teachers. During his time in education, he taught in multiple states and at multiple grade levels. Lucas now teaches in an undergraduate TEE program where he serves in roles as the program coordinator and an assistant teaching professor. The biggest difference he finds between his current and previous career paths are primarily the administrative tasks as the coordinator. He does not enjoy these administrative tasks as they are not the reason he got into teaching. His greatest priority is student learning and would like to be able to give more of his time and energy to his courses where he values building relationships with the students. When considering his future in this position, he was unsure what path he would take. At the time of the interview, he had other education-based prospects he was considering and was actively weighing the pros and cons compared to his current position. Some of these considerations included financial compensation, schedule flexibility, time demands, and job stability.

Mark

Mark has been a TEE teacher for over 16 years. During this time, he has worked in rural, urban, and suburban schools at both the middle school and high school levels. He is looking forward to moving towards retirement and has begun exploring hobbies and activities he enjoys outside of teaching. He enjoys incorporating some of these passions into his courses including his love of art and design. He even teaches art classes at the local arts center. Throughout his time in education, Mark has built a network of colleagues and coworkers across the state to which he credits much of his success and longevity in the classroom. He did leave education for a short time at the beginning of his career due to personal reasons and considered not returning to

the classroom. After two years, Mark eventually returned as "there seems to be some evidence I was pretty good at it. I liked it well enough. Let's give that another shot." Since then, he has served as a mentor teacher for the state's beginning teacher program, as an advisor to student organizations within his schools, and worked on curriculum teams. Mark has enjoyed the interactions with people, colleagues, and students, throughout his career and likes to joke with his students that he's the smartest teacher in the school. It's the relationships that have kept him going and the reason why he still does what he does.

Morgan

When Morgan made the decision to seek an industrial education degree, she was discouraged by her mother who was a math teacher. Due to the influence of her drafting teacher in high school, she recalls wanting to attend the same program he did. She had plans to teach drafting during the school year and draw blueprints over the summer to become an architect. Her passion for the subject area eventually convinced her mother that the career choice wasn't so bad. Morgan taught TEE at the middle and high school levels for a combined six years. She enjoyed her time in the classroom and learned a lot about being a teacher that prepared her for her current position as a professor in a TEE teacher preparation program. She had always planned to go into higher education but knew there was value in having teaching experience. These two schools offered differing experiences as the populations and community settings of these schools were quite different; one was in a very affluent neighborhood, while the other was not. These differences did present unique challenges at the classroom level but did not discourage her from working to create opportunities for her students. Ultimately, her decision to leave K-12 education came from a concern for her safety in the school she was in and the opportunity to pursue a doctoral degree under an NSF funded grant became available.

Natalie

Natalie has taught middle school TEE for 13 years. As "a woman in a male dominated field" she has had to persevere and prove herself to individuals at all levels along the way. Taking on leadership roles and gaining confidence in herself has helped others see past the "pink safety glasses" to know that she is a passionate, caring, and fully capable teacher and leader. She is very involved in her school community and works hard to create and sustain relationships with her students and their parents. These relationships, along with support from her family and coworkers have helped her continue when the days in education get hard. This family connection is what began her path in TEE; her father was a TEE teacher. While she originally wanted to become a science teacher, she looked into the TEE program at her university at the encouragement of her father. There she found the TEE courses were "like science on steroids" and she was hooked. Since then, Natalie has completed her master's degree and is working to complete her doctoral degree. For now, she plans to stay where she is in education, but is trying to determine what the future holds for her: "I have the best job in the world, but there's this other part of me that feels like I was meant to do something more." She wants to continue being connected to education but feels she may need to be connected with students at a higher level, whether that be in higher education or at the high school level.

Reginald

Reginald is unsure where he sees himself professionally in the next five years. For the past four years he has been teaching TEE at the high school level. As a "nerdy, funny" and

"caring" person, he enjoys using common interests as a way to connect with his students through the game design curriculum and serving as the robotics coach; however, the cost of living in the area is higher than he can afford with teaching alone. In a school where CTE teachers share classroom spaces and work rooms are filled with distractions, he is unable to use his planning period effectively to prepare for each school day. These time demands make it difficult for him to consider balancing a second job. He has a desire to continue utilizing his technical skills in the software and design that he teaches and has considered changing schools or even seeking a position in industry if it means finding a better financial situation.

During his undergraduate education, Reginald originally began a degree in engineering. However, as he progressed, he found that his coursework was not what he wanted it to be, and academically his grades began to suffer as a result. He began to look within his university for a program that would accept as many of the credits he had already completed and would be a better match for him. Reginald found the TEE program, which allowed students to choose between industry certifications or a teaching license pathway. Initially, he chose to pursue just the industry certifications, but found himself enjoying the teaching assignments for the licensure students in the shared courses. Between the relationships with his professors, and determining he "liked this stuff," he made the decision to switch focus to complete the licensure program.

Roger

Roger had no intentions of going to college; he was going to enlist. Until one day his best friend's mom took his keys and said he needed a different plan. She helped him find a program and a place to apply. He knew his favorite courses in high school were the graphic courses, so he decided to go to the same school and program as his teacher. As a "17th generation American", Roger became the first person in his family to graduate from college. Since then, he has spent 11 years teaching students skills that he "would want my family members to learn to make their lives better." He has taught in multiple schools during this timeframe and plans to continue to remain in education but is unsure if he will stay at his current school. He values being able to create relationships with those around him in his schools, and while he is able to do that to a degree in his current school, it is not at a satisfactory level. He also believes teachers should be "given and rewarded for new responsibilities," which can be difficult as education in his state is not known for compensating teachers and is considered for many in the state as a "dead end career." Nevertheless, "every other job is like work" and while he may look for a change in placement, he has no plans to leave education.

Sara

Sara has been teaching at the high school level for three years. She sees herself moving away from K-12 education in the next five years as she enjoys the content area, she teaches but is looking for a "higher caliber" experience. For her, this path may include looking into positions within higher education or community colleges, or even trainer positions in industry. For now, she strives to create a safe and welcoming learning environment for her students, which is a constant challenge as she is a mobile teacher within her school. She has also struggled to get access to technology and software required to teach her courses, even though other schools in her district have access to similar resources. She works hard to be involved in the school's community and loves finding creative ways to connect with her students in the classroom.

Sara's original plan for her career path was to double major in computer and electrical engineering. However, after two years pursuing these programs, she realized she did not enjoy

what she was doing. When completing an assignment for a course to attend an event on the university campus, she saw a notice on a bulletin board for an open house for the technology education program. It was similar to what she was already studying, so she went to the open house. There she met the professors within the TEE program and decided it was a switch she wanted to make. Even throughout this program, she recalls she was not a fan of the idea of being a teacher. It would be conversations with her professors that ultimately led her to earn her teaching license along with other industry certifications in software.

Terry

Terry is an Eagle Scout. He credits the teaching opportunities in the scouting program for guiding him towards the career choice of becoming a teacher. By high school, he knew that's what he wanted to become, but was unsure of the content area. After taking courses in woodworking, drafting, and architecture, he knew he wanted to teach these subjects as well. He found out where his teacher went to school and only applied to that program and that school. He has taught TEE for the past seven years in multiple school environments. His most recent transition took place due to a lack of support from administration and supervisors. At his current school, he enjoys teaching students structural design and fabrication. In these courses he works with members from the community to connect students to opportunities around them. Terry has had times where he questioned if what he was doing was worth the aggravation and has taken a glance at other opportunities around him, but he has never seriously gone on an interview for a non-education job. While he does not see himself moving out of K-12 education in the future, he has considered seeking opportunities to advance within secondary education through positions such as school administration.

Thomas

Thomas is "a nerd in the classroom with other nerds." He has been an active member in the same high school for the past seven years. His courses cover graphic design and animation. He remains active in the school community by helping with the band and other afterschool activities. While he enjoys being a part of the community and making connections with students, he does find the additional responsibilities placed by the school can negatively impact time he is supposed to be guaranteed throughout the day. Most of these duties take place during the school day and can interfere or completely replace his designated planning time, which directly impacts his ability to be as prepared as possible for his students. Even with this frustration, Thomas sees himself remaining in a classroom for the foreseeable future. Where that classroom will be, is yet to be seen. He has considered staying at the high school level, but also remembers how influential his teachers were during his community college experience. It was a mix of high school teachers, and his community college experiences that eventually led to him pursuing a TEE program at a university. The community college provided him a place to pursue his passions in graphic design and creative writing. He doesn't remember what it was, but eventually it clicked that if he were to teach, he could combine his passions and create a space for students to grow in their own similar passions. So, he found the TEE program that gave him the tools to do just that. His time in the program would introduce him to more influential teaching role models that shaped how he conducts his own classrooms and engages with students.

Appendix H: Example Codebook

Research Questions	Holistic Coding	Definition	Descriptive Coding	Sample
Research Question 1: What aspects of teacher identity are most present in traditionally trained TEE teachers, past and present?	Identity-Nature	Demographics based experiences	Background Biases	Aiden - "I'm just trying to think of Tech Ed teachers in our county, and most of them are white male." Christopher - "I would say for the majority of my teaching experience, I was, I was blinded to what individual student experiences where like outside of the classroom. Right. And so, you know, there's, there's some blissfulness in ignorance. Um, and I, you know, being blissfully unaware." Duke - "My personal experience with my Latino background. Um, I don't totally identify with them, but to anybody who has, you know, has a little bit of that, um, pull some out and make a common, common understanding somewhere." Leroy - "Oh, definitely. Yeah. I'm full of biases. Uh, but I, I have worked, uh, my, uh, my move from Pennsylvania here to North Carolina was a culture shock in so many different ways. And so, so many different ways, but I try to be a lifelong student." Sara – "I have seen an increase in my female students and my minority students within those three years, I have students that like, didn't even know these classes existed. I know part of it is because they're like, oh, there's a black teacher.

Research Questions	Holistic Coding	Definition	Descriptive Coding	Sample
				I'm going to go to that class. Um, but I've had students who literally have just come to me and said, it is so nice to see someone that looks like me doing something I want to do.”
	Identity-Institution	Positioning of TEE teachers and the authorities that went into making these participants TEE teachers	Training Qualifications Tasks	Terry - “I have a bachelor's degree and two graduate degrees… I have a bachelor's in tech and engineering education. I have a master's in tech and engineering education,” Christopher - “I actually have two [undergraduate degrees] mechanical engineering, and then the second one is actually in education.” Henry – “Admin even stated this is that there really isn't that much of a community there because it's, it's not in a central location. They're bringing in students from all over the area. So there's not really a strong community. When I was at the high school, I did not have that strong sense of a community. I pretty much just thought, Hey, I'm a teacher at this high school. This is what I teach. And that was it.” Roger – “well, the first one's obviously delivering and assessing content, providing feedback, feedback, feedback, lots of stars around that one. Um, second one is ensuring safety, right? So that, that whole, maybe not physical safety, but in making sure everyone feels safe in the room. So you can try and build a sense of community. Um, when it comes to TSA, as I'm getting older, I'm trying my best to integrate it in the classroom. So it's not an extra thing, just the thing. But that's definitely a forefront of my mind. Uh, duties, lots of duties. I get to stand

Research Questions	Holistic Coding	Definition	Descriptive Coding	Sample
				in the hallway. I get to call buses when they're here. I get to watch kids when they eat unmasked. All kinds of things.”
	Identity-Discursive	Traits recognized by others in TEE teachers	Parent Student Self	Natalie - “A manager. Leader. Tear wiper. Um, cheerleader, parent, dictator, um, friend, um, educator, obviously, um, comedian. Rule enforcer and coach.” Evan – “innovator with a positive mindset, uh, who teaches technology and engineering education through the scope of student future success. Um, he's willing to work with everybody and everyone will have a positive experience, uh, ending with student post-secondary success, I suppose.” Mark – “Artist. Designer. Educator.” Duke – ““I would describe myself to somebody who doesn't know me, as a committed father and husband, um, who loves problem solving, creative problem solving, uh, who seeks to understand, um, other's perspectives and come to an understanding to move forward, um, and to learn together. I see myself as a forever student and forever teacher. I love learning and doing things with my hands.” Holly – ““our entire major is problem solving. Like we need to problem solve. Like that's what our entire major is.” David – ““we focus a lot on some soft skills, you know, interviews, job related stuff. I mean, you know, just the soft skill stuff, presentations speaking

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				in a public like those types of things. So, uh, so yeah, I, I. As much as I love the trades, we don't focus as much on preparing students to go into a trade as we do getting them prepared for college. So study skills, things like that, how to read rubrics." Charlotte – "Building relationships with students extremely important. Um, I think that kind of allows us to grow as well when we have those relationships with students, we grow as, as educators. Um, and it's much more rewarding for us as well when we have those relationships to lean on. Um, I think that when we have those types of relationships, it makes our job easier in so many ways, um, because we're able to. The students rely on us, but then we can rely on the students as well. And when we had that type of dynamic, um, I think we've fostered in an environment of learning, not only from the direction of which the teacher gives the student instruction, but the students are instructing other students and students are informing the teacher. Um, so I think it just has a better, creates more productive learning environment." Janet – "Cause it was all hands-on. You got the real world experience while still learning everything else. So you got to utilize more parts of your brain and body than just sitting there writing all day"
	Identity-Affinity	Experiences shared by TEE in the practice of teaching in a K-12 classroom	Coworker Unique	David – "you've got kids that are in 10 different places working on 10 different steps, all on the same, same project. Um, so, you know, classroom management looks a little bit different than, you

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				know, math tests or history paper or whatever, you know what I mean?” Greta – “the level of misunderstanding of what career and tech ed did and the value that we had for students and what kinds of students could thrive in our classroom and what kinds of students deserve to have access to what we were teaching in the classroom. It was just abysmal” Lucas - “we're still not understood. I mean, we've done a great deal that educating people who we are” Natalie – “a lot of teachers in tech ed have experienced where you have teachers, colleagues, staff, members, students just come to your room with something and say, this is broken, can you fix it? And I'm always like, well, I can try. And I think that is something that all tech ed teachers probably at some point in their career will experience and for the good or the bad it's, for some reason what your people around you think that you can just fix whatever, because, you know, apparently you have tools.” Sara – “I know part of that is because I am the computer teacher, the computer teacher, but I have a room with computers. So they're like, you're the computer teacher. So I know a lot of that just from like, Hey, can you help me with this? And then that helped me with this, that turned into a relationship.”
Research Question 2: How do different	Identity-Retention	The retention factors associated within	Goals (Advancement) Benefits	Charlotte – “teaching at the higher education level would, is a goal of mine, um, and kind of settling into

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aspects of teacher identity influence TEE teachers' decisions to stay in the classroom?		forming the teachers' identities and decisions to remain in the classroom	Recognition Relationship.Coworkers Relationship.Admin Relationship.Parents Qualifications Joy	a, um, a part of my career that it has me continually advancing." Christopher – "every year, since I've become a faculty member, I consider going back into the classroom and I have the opportunity to do that. Um, so I could easily do that. Um, I could easily go back into the engineering profession. Um, and I consider every year, at the end of every year I consider those options. So, um, I will likely, um, probably stay as a, as a faculty member. Um, but I do consider, I consider" David – "I enjoy where I teach. I enjoy the students I teach, I enjoy the people I work with. Um, so I don't see myself leaving unless something just drastically changes in life." Natalie – "Um, man, so there's a part of me that loves what I do and day in and day out. I'm like I have the best job and then there's this other part of me that also feels like I was meant to do something more, not away from this, but more. And I don't know if that's higher ed, I don't know if that's helping other teachers or undergrads find that like, love that had I not had, had I been like, I feel like the stars aligned, like I was in the right place at the right time." Aiden – "the ones in my department, um, for the most part. Very great. Um, I like everybody that I work with and the ones that are in the same PLT as me, um, very strong. Um, I still talk to past PLT members almost every day. Um, the ones that do

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				TSA and help chaperone. Um, we are very friendly and all that with each other. “ Mark – “Coworkers. And not necessarily ones at my site, not necessarily ones, I'll like, um, not just the ones in my building. In fact, that's rarely been, that's rarely the case because as you may be aware of most tech ed teachers are the only tech ed teacher in their school. And it's not to say I haven't had meaningful relationships and good, positive working relationships with coworkers on, on site. But most of those significant relationships have been, um, with colleagues and coworkers across the state.” Evan – “If you don't have a rapport with students, you're just a person standing in a room talking if the students don't have buy-in, then education stops.” Greta - “I think the most powerful moments I've had as a teacher are when I have been honest with students and said, I don't know, let's figure it out because it's modeled that lifelong learning to them and help them see that I could see that light bulb that switched that it was okay to not have the answers and still be interested in this content to not have to be an expert, especially as a female in the classroom, doing that with girls and, and those that have been historically marginalized in these fields, um, is huge because when they see me being successful in pushing through, when it gets hard, that made a big difference in their efforts and that showed through. And that was part of when I started thinking about broader impacts and deciding to go into research is when I saw those little light bulbs and I wondered if

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				that was, if that could be capitalized on a bigger scale.”
	Identity-Exit	Specific reasons cited by participants related to retention or exit decisions.	Exit Frustrations Decision	Caleb – “I love using software. So if I could find a company, um, that uses a software like AutoCAD or Inventor or something like that, um, because I've actually gotten certified in those programs.” Christopher – “So I, you know, I made a lot of decisions about leaving or staying at places almost surely based off of support for administration.” Duke – “I think that ultimately the idea was there are opportunities out there that I felt I was directed to, that I needed to take. Um, and the opportunities, yeah are, are, were financially based. You might say it's tied, you might say it's tied to financial reasons, supporting a family, um, and, um, different opportunities.” Janet – “I had always planned on doing higher education with getting my doctorate and whatnot, but I wanted the experience of a K-12 classroom teacher prior to teaching higher education, because I feel like it's very evident when higher education people that are teaching teachers do not have that previous experience. And it's not as useful if you're trying to educate future teachers to not have that experience. So I wanted the experience there, but I knew that I, you know, it was always like I wanted to teach the higher level. So I felt like I could reach more people by teaching future educators to be successful. “

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				Lucas – "To leave K12? Better opportunity. Well, I mean, yeah, I mean it has better opportunity, you know, I love doing what I was doing. Oh, I think I was getting kind of feel like I was getting burnt out near the end. Um, really is because we were, we went through a hire freeze for a number of years where we weren't moving forward in the steps. It was because of the, you know, the whole state, uh, you know, that's where our depression or not depression but our recession happened. And so I was, I just burned out. I was burnt out from teaching live in bell-to-bell. I just, you know, you have enough of those things that was co I coached two or three, three sports and I was just getting burnt out"