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Teachers' Multiculturalism and Digital Learning Choices for Students with Limited or Interrupted Formal Education

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This is to certify that the doctoral dissertation by

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Walden University
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Abstract

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Dissertation Submitted in Partial Fulfillment

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Abstract

The English language learner environment in U.S. secondary schools is increasingly complex due to the growing numbers of students with limited or interrupted formal education (SLIFE) who require a culturally responsive approach. Teachers are not prepared to meet the needs of SLIFE, especially in the technology-enhanced classrooms. A gap in the literature exists regarding the culturally responsive use of digital learning resources (DLRs) with high school SLIFE. The purpose of this quantitative study was to examine whether the teachers' self-reported multicultural teaching competencies (skills and knowledge) predict the choice of DLRs used with SLIFE. The study was grounded in Vygotsky's sociocultural theory of cognitive development (SCT). Through professional organizations and social media postings, the survey was accessible to approximately 165 schools and 1,500 member educator networks. The anonymous instrument was used to collect $N = 37$ viable responses. Multiple linear regression analysis showed a statistically significant positive predictive relationship with varied levels of degree to which the multicultural teaching competencies predicted the frequency of DLR utilization, underscoring the difference between how teachers operationalized their multicultural teaching competencies in relation to the choice of the DLRs (content, productivity, communication) tools. While the study was underpowered, the statistically significant results for all 16 regression models yielded a large (> 0.35) Cohen's f effect size, proving the results meaningful. The potential for positive social change is the empowerment of educators, program directors, and technology creators to select, plan, and develop more culturally responsive, equitable, and inclusive technology supports for SLIFE.

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Dedication

"El barco que no anda, no llega a Puerto."

The ship that doesn't sail never reaches port.

- Spanish Proverb

This study is dedicated to every migrant, immigrant, refugee, unaccompanied minor, and asylum seeker who walked through the door of my classroom and taught me our differences, the differences for which I could then seek the answers. Just like they had embarked on their many new journeys, so did I, and while my port is near, they still have ways to go. To all of my port-seekers, I have eternal respect for you and owe you my gratitude.

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I also want to recognize Walden University for offering this opportunity to me and for facilitating abundant resources and flexibility in accommodating my needs along the way. Thank you for allowing me to exercise my fullest potential and recognizing me for attaining my fullest academic stature.

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Chapter 1: Introduction to the Study

In the United States, as well as globally, secondary schools are receiving large numbers of English language learners (ELLs), who are students with limited or interrupted formal education (SLIFE), and the secondary teachers are not prepared to meet the needs of this unique subgroup of ELLs (DeCapua, 2016b; DeCapua et al., 2020; Doran, 2017). Generally coming from high-context cultures, SLIFE experience a range of cultural factor-related barriers in learning that lead to the feeling of cultural dissonance and to the need of culturally responsive teaching (DeCapua & Marshall, 2010, 2011a, 2011b, 2015a, 2015b, 2023; DeCapua et al., 2020; Gay, 2000, 2002, 2018). As these ELLs enter the 21st century classrooms, the assumption is that every student in the U.S. educational system participates in some form of online digital experience (U.S. Department of Education, 2016). In a U.S. Department of Education (2019) report, 85% of teachers reported using digital learning resources (DLRs) to enhance and differentiate their students' language and content area instruction. Unfortunately, there is limited information about how to best prepare and facilitate educational experiences for SLIFE, and what determines the selection of the most appropriate digital resources that also support culturally relevant pedagogy and mitigate the cultural dissonance effect on SLIFE are the educator's competence and skill (Cohan & Honigsfeld, 2017).

According to the U.S. Department of Education (2016), the districts that had high school ELLs reported that 58% of the ELLs worked with online or computer-based programs for English language acquisition, 56% worked with online or computer-based programs for English language and literacy instruction, and 47% worked with online or

computer-based programs for content area instruction. Additionally, 16% of the districts that had high school ELLs had a newcomer program in the high school, and 52% of those dedicated that program to SLIFE. What is not known is what DLRs are used by high school teachers when working with SLIFE and whether the DLR choice correlates with the teachers' multicultural teaching competencies – skills and knowledge, as defined in the Multicultural Teaching Competency Scale (MTCS) developed by Spanierman et al. (2011).

While there is literature about the use of specific DLRs and mainly for the purpose of English language acquisition with ELLs at the elementary (e.g., Darling-Aduana & Heinrich, 2018; Miller, 2018), middle (e.g., Andrei, 2017; Seifert et al., 2019; Ullman, 2010), and minimally at high school levels (e.g., Andrei, 2019; Love, Spies, & Morgan, 2017; Shahbazi, 2019) and mainly focused on ELLs in general (Andrei, 2017) and studied through various qualitative methods, few studies answer the question about which DLRs are used specifically with high school SLIFE and what informs the choice and the integration of these resources. In addition, high school teachers' implementation of DLRs with SLIFE has not been explored through the lens of the teachers' multicultural acumen using quantitative methods. Even after COVID-19 forced schools to move from in-person to fully online instruction, which accelerated the integration of DLRs with all students, the use of DLRs with ELLs presents unique challenges and struggles for educators of ELLs, who report lack of training of how to incorporate DLRs with ELLs (Sugarman & Lazarín, 2020). By examining whether high school teachers' multicultural teaching competencies are operationalized when selecting and integrating DLRs that are

most appropriate for and most effective in SLIFE education, this study attempted to address the significant gap in literature in the area of integrating technology with ELLs who are SLIFE. This study has potential social implications for students, teachers, school leaders as well as technology developers. From the educational leadership standpoint, identifying the relationship between teachers' multicultural competencies as a precondition for culturally responsive teaching (Spanierman et al., 2011; Walter, 2018) and their choice of DLRs for SLIFE can contribute to more effective teacher preparation and more targeted professional development. Consequently, teachers can gain more confidence in their ability to provide more effective, and in the case of SLIFE, more culturally responsive technology-supported educational experiences. Finally, by identifying which DLRs can assist with education of SLIFE in a culturally responsive way, the results of this study can inform the design, implementation, and evaluation of the use of the DLRs in SLIFE multiculturally diverse environments. All of the above-mentioned potential social implications may mean that SLIFE will be able to strive in more equitable, more inclusive, and more culturally appropriate technology-supported educational environments.

In Chapter 1, I begin with providing an overview of the background literature and identifying the major themes of the study. Then I follow with the research problem, the purpose of the study, and the research questions. I also outline the theoretical framework for the study. Additionally, I introduce the nature of the study and key concept definitions. To conclude Chapter 1, I discuss the assumptions, scope and delimitations, limitations, and the significance of this study to the field of education.

Background

Multiculturalism is a highly contested term and has varying definitions in multiple disciplines. In education, its goal is to remove barriers and ensure academic success for students from diverse cultural backgrounds (Multicultural, 2013). Applied in practice, *multicultural teaching* is any form of teaching that ensures social justice and educational equity for all students by placing their life histories and experiences at the center of the teaching and learning, by presenting material within a context that is familiar to students, and by incorporating multiple ways of thinking (National Association of Multicultural Education [NAME], 2021). With a fast-growing number of diverse students in the U.S. classrooms whose needs require a culturally responsive approach (DeCapua & Marshall, 2015; DeCapua, 2016; Dover, 2013; Ladson-Billings, 1994, 1995, 2006, 2014), there is an increased need for a multicultural approach in all areas of curriculum, instruction, and assessment, and a number of scales to measure teachers' multicultural teaching competencies have been developed. The Multicultural Teaching Competency Scale (MTCS; Spanierman et al. 2011) was identified as the measure most appropriate for the problem and purpose of this study. Contrary to other multicultural competency measurements, MTCS was developed for pre and in-service teachers at both elementary and secondary level (Spanierman et al., 2011) and it is to date the only instrument developed for *general* teachers as compared to special needs teachers and/or other school professionals (Saraj et al., 2015). Additionally, according to the team of developers, MTCS is verified to measure (a) "self-reported skills or behaviors in implementing culturally sensitive teaching practices" and (b) "self-reported knowledge of culturally

responsive theories, resources, and classroom strategies" (Spanierman et al., 2011, p. 457); therefore, the language of the instrument establishes a link between teachers' multicultural teaching competencies (skills and knowledge) and the ability to create culturally responsive environments. With the increasing diversity of learners, the demand for culturally responsive approach is evident; however, the gap exists in knowledge about whether the teachers are able to operationalize what they know and/or learn about multicultural and culturally responsive teaching and how/whether they are able to apply this knowledge in their practice (Pourdavour & Yan, 2020). My study contributed to this gap by examining whether the high school teachers operationalize their multicultural teaching competencies in culturally diverse and technology-supported learning environments.

Technology-supported learning environments incorporate technology that can enhance knowledge, skills, and attitudes, as the students conduct learning activities with the help of teacher, peers, supporting tools, and technological resources (Chang et al., 2015; Wang & Hannafin, 2005; Wu et al., 2013). The dynamic technology development and integration as well as Covid-19 accelerated the use of various digital resources in the in-person and remote learning environments (Francom et al., 2021), but teachers and scholars identified the rapid transition to be difficult and stressful (Hoghes et al., 2020; Marshall et al., 2020; Tate, 2020) and documented various levels of confidence in integrating technology and consequently various levels of the use of technology in their practice (Sarker et al., 2019). Teachers' digital competence, digital self-efficacy, and techno-pedagogical preparedness are among the most frequently stated barriers to the use

of DLRs in the classroom (Gomez, 2022; Moreira-Fontán et al., 2019). Adding technology to teaching and learning environments increases the complexity of the educational process, and it also further complicates the culturally responsive teaching (Frederick & Shockley, 2008; Nilsen et al., 2020). According to Darling-Aduana and Heinrich (2018), the use of digital learning tools has been shown to be the best practice when teaching in a multicultural classroom, but teachers of diverse students have to make additional instructional and pedagogical choices (Halvorsen, 2017) and need to have knowledge of and access to a variety of these digital learning tools (Darling-Aduana & Heinrich, 2018) as well as opportunities to engage in culturally responsive technology integration professional development (Cheng et al., 2022). To date, the leading effective technology integration framework (TPACK; Mishra & Koehler, 2006; Koehler & Mishra, 2009) has been frequently used in the studies focused on educational technology integration; but the studies have not been consistent in considering the context of teaching and learning (Rosenberg & Koehler, 2015). The original model considered context as subject matter, grade level, student background, and types of available technology (Mishra & Koehler, 2006, p. 1032). However, after Angeli and Valanides (2009, 2013) advanced the discussion about technology integration by proposing that learner and context are integral parts of the teacher's technological, pedagogical, and content knowledge, Mishra (2019) updated the model with the term ConteXtual Knowledge and recognized that the teacher's contextual knowledge is primary, as it represents the teacher's organizational and situational constraints. With the rapidly changing demographics of schools, those constraints are highly variable and always

changing (Zhang & Tang, 2021) and warrantied at all levels of education. In the context of implementing DLRs in a multicultural classroom, Kelly (2007) highlighted cultural sensitivity, Chuang et al., (2020) underlined constructs of culturally responsive teaching in technology-supported environments, and Kumi et al., (2020) cited constructivist learning theories and Vygotsky's (1978) sociocultural theory of cognitive development (SCT) to emphasize the importance of the consideration of the sociocultural context when creating learning experiences online and selecting DLRs that help diverse learners to engage, participate, and contribute to knowledge creating in the online spaces. Especially the teachers of ELLs who are SLIFE need to consider culturally relevant pedagogy when selecting DLRs based on the sociocultural context of their classrooms and the needs of their learners.

When investigating diverse learners' perceptions of the use of technology and online learning, *interactivity* was identified as being a critical component of online interaction and having positive influence on constructing knowledge and increasing participation and academic achievement (Kumi-Yeboah et al., 2020). The interactive ability of certain DLRs also directly satisfies the fundamental constructs of SCT (Balbay, 2018; Vygotsky, 1978). In an interactive use of DLRs, students can use their culturally specific language and tools to make meaning of learning tasks in an environment that is scaffolded through the assistance of peers, teachers, and technology and self-regulate their learning through the dynamic assessment within the zone of proximal development (Vygotsky, 1978). In this way, some DLRs can act as a mediation tool for scaffolding learning (Morossan et al., 2017) and ensure meeting the needs of all students in culturally

responsive ways (Jackson et al., 2021). As the connections between the SCT, multiculturalism, culturally relevant pedagogy, and DLRs were outlined by existing research, fewer studies examined how teachers engage DLRs in a unique context of a multicultural SLIFE classroom. Various DLRs have been investigated with ELLs (Arce & Valdivia, 2020; Darling-Aduana & Heinrich, 2018; Mendoza, 2019, Prince, 2017), and there is a lack of consensus about the use of educational technology with ELLs in general (Lee et al., 2022) and with SLIFE more specifically. Multiple scholars cautioned that not all educational technology supports the diverse learners in an equitable and culturally responsive way (Chisholm, 1998; Dolan, 2017; Greene-Clemons, 2016; Morgan, 2014) and that in order to ensure equitable access to technology, effective multicultural teaching strategies need to be implemented (Chisholm, 1998). Yet, teachers reported lacking the knowledge and skills to use DLRs in culturally responsive ways (Chuang et al., 2020; Darling-Aduana & Heinrich, 2018). Therefore, the results of this study illuminated which DLRs high school teachers of SLIFE use to support SLIFE language and academic development and propounded that applying the SCT lens and the principles of culturally responsive pedagogy can assist in evaluating the appropriateness of the use of these DRLs in the highly unique context of a multicultural SLIFE environment.

SLIFE are students who are ELLs without age-appropriate formal education and first language literacy (Custodio, 2011; DeCapua et al., 2007, 2023). The common characteristics of this unique and fast-growing subgroup of ELLs are that they:

- have home language other than English, entered the United States after the second grade, and had at least 2 years less schooling in their home

country/academically are at least 2 years below grade level (Custodio, 2011; DeCapua et al., 2020; Potochnick, 2018)

- have low or no literacy skills and many arrive from and display characteristics of high context cultures, have a collectivist orientation, prefer oral transmission of information, and interpret the world in pragmatic ways through their *funds of knowledge* (DeCapua & Marshall, 2010, 2011, 2015; González et al. 2006; Hall, 1976, 1992; Moll et al., 1992, 2006; Rothstein et al., 2009)
- have experienced emotional and psychological distress due to interrupted schooling and relocation-related trauma (Custodio & O'Loughlin, 2017; Namer et al., 2022; Newcomer et al., 2021)
- experience *cultural dissonance* (Ibarra, 2001)
- require *interconnectedness* and *immediate relevance* as two important conditions of learning (DeCapua & Marshall, 2011)
- are not always prepared to reenter school (DeCapua & Marshall, 2015; González et al., 2006; Hos, 2020; Mott et al., 1992), especially when 65% of them enroll in the United States school at the age of 12 or older (Potochnick, 2018)
- are difficult to identify and track due to the use of inconsistent indicators (Arundel, 2022) and out of date or limited data (Bowder, 2014; Potochnick, 2018; Ruiz-de-Velasco & Fix, 2000)

Further, SLIFE are defined as ELLs who have experienced various formal schooling interruptions or have had no formal schooling at all prior to their enrollment in U.S. schools (DeCapua, 2023; DeCapua & Marshall, 2010; DeCapua et al., 2007).

What is known is that these unique features make the work with SLIFE complex, and the mutually adaptive learning paradigm (MALP: DeCapua & Marshall, 2010, 2015, DeCapua, 2023) is the most recommended approach in serving this subgroup of ELLs. MALP is rooted in research on culturally responsive teaching (Gay, 2000) and was developed specifically with SLIFE students in mind and confirmed by SLIFE themselves as an effective teaching strategy (Daniel & Zybina, 2018; Daniel & Zybina, 2019). It validates SLIFE unique learning paradigm, as it ensures relevance, relationships, oral transmission of information before written practice, and group before individual responsibility (DeCapua & Marshall, 2010), and as such acts as a bridge to formal education (DeCapua, 2016; DeCapua & Marshall, 2015). As many incoming SLIFE enter the U.S. educational system at the high school level, they are learning English as a new language and the language of many high school content area concepts for the first time (DeCapua, 2011, 2015, 2016; Hos, 2020; Potochnick, 2018). When placed in a technology-supported environment, additional barriers, such as lack of digital literacy skills arise and, although not with SLIFE, was documented with refugee students (AbuJarour, 2020; Drolia et al., 2020; Hsu, 2016; Smyser, 2019). This complicates successful technology integration and use (Andrei, 2017).

The literature on SLIFE and the use of technology with SLIFE is sparse especially at the high school level with the exception of the study of Carhill-Poza et al. (2020). The

team of researchers identified and acknowledged the effects of the diversity within the ELL population on their academic achievement and engagement and therefore indirectly recognized the SLIFE learning challenges being affected by external factors such as prior educational experiences, socio-economic position, employment, opportunities to practice English outside of class, and access to technology (Carhill-Poza et al., p. 17-25). What is known is that technology integration with the linguistically diverse students must be purposeful and intentional (Altavilla, 2020; Miller, 2018; Siefert et al., 2019); provide opportunities for hands-on, students-centered knowledge construction (Andrei, 2017; Darling-Aduana & Heinrich, 2018; Miller, 2018); should match students' learning needs and preferences; and enhance learning (European Comission et al., 2017; Darling-Aduana & Heinrich, 2018; Miller, 2018; Prince, 2017). It should be used as a tool for learning (Siefert et al., 2019) and as a tool to incorporate culturally responsive teaching (Jackson, 2021). By investigating whether high school teachers operationalize their multicultural teaching competencies (skills and knowledge) when using DLRs with SLIFE, I enriched existing scholarly work in the areas of multicultural education as a precondition of culturally responsive teaching and advanced knowledge about culturally responsive integration of DLRs in a multicultural environment with a specific focus on high school ELLs who are SLIFE. Of equal importance is the potential of the results of my study to fill the gap in the understanding of which DLRs are better positioned to serve SLIFE in a way that acknowledges their unique characteristics and needs, increases their engagement, improves their academic achievement, and overall provides equitable and inclusive learning experience.

Problem Statement

The problem that relates to this study is that the ELL environment in U.S. secondary schools is becoming increasingly complex due to the advancing numbers of SLIFE who require culturally responsive approach (DeCapua, 2016). The central problem of this study was that the secondary teachers are not prepared to meet the needs of this unique subgroup of ELLs especially in the increasingly more technology-supported classrooms. The situation has been exacerbated by the increased use of distance learning technology during the COVID-19 pandemic and beyond, and the gap in research exists regarding the culturally responsive utilization of educational technology with SLIFE, especially in the high school language: English as a second language (ESL) and/or English as a new language (ENL) and content area (math, science, social studies, etc.) classrooms.

Research shows that this problem is current, relevant, and significant. First, the problem is current and ongoing as are both the influx of SLIFE in the U.S. schools and the development and integration of technology. According to the Center for Immigration Studies research (Camarota et al., 2023), immigration has increased the number of public school's ELLs (students who speak a foreign language at home) from previous 9% in 1980 and 14% in 1990 to 22% in 2021, not reflecting the border crisis of the last 2 years. Identifying SLIFE is complicated because of inconsistent indicators across the nation (Arundel, 2022; WIDA, 2015) and consequently out-of-date or limited data (Browder, 2014; Potochnick, 2018; Ruiz-de-Velasco & Fix, 2000). However, it was estimated that between 10 and 20% of ELLs in U.S. schools are SLIFE (Advocates for Children of New

York, 2010; de Velazco & Fix, 2000). As the increased numbers of ELLs and SLIFE became a reality in schools across the country, research on SLIFE, that is currently sparse due to the aforementioned tracking, is needed.

The study was also relevant to both SLIFE and their teachers. Pedagogical practices are culturally embedded (DeCapua & Marshall, 2011), and culture provides the context for teaching and learning (Byrd, 2016). While the cultural diversity in U.S. classrooms is increasing, there continues to be a mismatch between students' and teachers' race and ethnicities (Tanase, 2022). The most recent available data documented that 79% of the elementary and secondary teachers were non-Hispanic White in 2017-2018 school year (National Center for Education Statistics [NCES], 2020), but the recent statistics display the average student classroom diversity reaching a 50% split between non-Hispanic White and ethnically diverse. Within this diversity, the percentage of ELLs varied between 0.7% to 20.1% in different states in 2020 (NCES, 2023) with the parallel growth in the numbers of SLIFE estimated at 10 to 20% of the ELL population (Advocates for Children of New York, 2010; de Velazco & Fix, 2000).

Many SLIFE identify with the collectivist approach to achieve results and do not identify with the dominant culture's individualist approach to teaching and learning, and the secondary teachers are not prepared to meet the needs of this unique subgroup of ELLs (DeCapua, 2016; DeCapua et al., 2020; DeCapua & Marshall, 2023). This can have negative consequences. ELLs show statistically significant gap in achievement when compared to English-speaking students (National Center for Education Statistics, 2019) and to date the only available statistic on SLIFE high school dropout rate (Fry, 2005, as

cited in Potochnick, 2018, p. 859) is seven times higher for SLIFE than those ELLs without interrupted schooling.

Although the literature on ELLs is well established, research and research-based recommendations are not currently available for SLIFE students and teachers, including the best practices for the selection and use of DLRs (Altavila, 2020). As schools continue integrating more technology and rely on remote use of digital resources, a situation exacerbated by the use of distant learning technology during the COVID-19 pandemic, there is a need to understand whether high school language and content area teachers' self-reported multicultural teaching skills and multicultural teaching knowledge predict their selection of DLRs when working with ELLs who are SLIFE. Understanding the relationship between teachers' multicultural teaching competency and consequently their ability to create culturally responsive multicultural learning environments and their choice of educational technology for SLIFE may help the educators in making DLR choices that warrant SLIFE the opportunities to engage, participate, and contribute in a meaningful and productive way and feel supported in their efforts to achieve academically. It may also guide the direction of future teacher training and professional development in the area of technology integration while considering the cultural, linguistic, socioeconomic, socioemotional, and relocation-and-school-reentry experiences as well as the significant academic gaps of SLIFE (Custodio, 2011; DeCapua et al., 2009; Herrera et al., 2022; Hoss, 2020; Marshall, 2018; Potochnick, 2018).

Purpose of the Study

The purpose of this quantitative correlational predictive study was to examine whether the high school language and content area teachers' self-reported multicultural teaching competencies (skills and knowledge) predict the choice of DLRs they use with ELLs who are SLIFE. To fulfill this purpose, I developed research questions that examined the relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge, as measured by the Multicultural Teaching Competencies Scale (Spanierman et al., 2011), and the DLRs they use when working with high school SLIFE.

Research Questions and Hypotheses

To address the problem and purpose of this study, the following research questions (RQs) and hypotheses were used to guide my study.

RQ1: Do high school language and content area teacher's self-reported multicultural teaching skills and multicultural teaching knowledge (measured by MTCS; Spanierman et al., 2011; Appendix E) predict the utilization of *digital academic content tools* (measured by National Student Loan Data System [NSELD], Zehler et al., 2019; Appendix F) when working with SLIFE?

$H_0$1: There is no statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital academic content tools when working with SLIFE.

$H_1$1: There is a statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital academic content tools when working with SLIFE.

RQ2: Do high school language and content area teacher's self-reported multicultural teaching skills and multicultural teaching knowledge (measured by MTCS; Spanierman et al., 2011; Appendix E) predict the utilization of *digital productivity tools* (measured by NSELD; Zehler et al., 2019; Appendix F) when working with SLIFE?

$H_0$2: There is no statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital productivity tools when working with SLIFE.

$H_1$2: There is a statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital productivity tools when working with SLIFE.

RQ3: Do high school language and content area teacher's self-reported multicultural teaching skills and multicultural teaching knowledge (measured by MTCS; Spanierman et al., 2011; Appendix E) predict the utilization of *digital communication tools* (measured by NSELD; Zehler et al., 2019; Appendix F) when working with SLIFE?

$H_0$3: There is no statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching

knowledge and the utilization of digital communication tools when working with SLIFE.

$H_1$3: There is a statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital communication tools when working with SLIFE.

Theoretical Framework

The theoretical framework for this study was Vygotsky's (1978) SCT. Although criticized for known deficiencies in terms of access to complete works and accurate translation (Gillen, 2000), Vygotsky's seminal work has had significant influence on the fields of developmental and educational psychology. Concerned with the process of learning, Vygotsky studied infants, children, and adolescents and determined that learning is a transformational process during which culturally and historically contextualized and socially shared activity determines what learning will occur and be internalized by the learner (Vygotsky, 1978, 1986). With its three key tenets being (a) culture that provides historical context and a social source of individual development, (b) language, symbols and other tools of the culture that mediate human development, and (c) genetic factor that determines the varying capacities for learning that have a potential for developing within the zone of proximal development (John-Steiner & Mahn, 1996), SCT provides a holistic view of learning. Vygotsky's theory inspired a number of modern theoretical perspectives and is linked to the concepts of cognitive apprenticeship and guided participation (Rogoff, 1990), situated cognition (Lave & Wenger, 1991, as cited in

Daniels, 2001), household funds of knowledge (Greenberg et al., 2006; Moll & Greenberg, 1992), and distributed cognition (Hutchins, 1995, as cited in Daniels, 2001). All the above concepts complement each other in the assumptions that learning is a process that happens within a social interaction and involves collaboration and engaging in problem solving of ongoing, real life, goal-oriented activities while using the tools of the culture, in which the learning occurs.

What related SCT to my study's approach and research questions were Vygotsky's comprehensive understanding of learning, the recognition of the complexity of the cultural and historical context, and the necessity of social interactions with the more knowledgeable others within the zone of proximal development as necessities for the internalization of knowledge by an individual. These concepts also earned SCT a winning place in the area of second language acquisition (Balbay, 2018; Lantolf & Beckett, 2009; Lantolf & Pavlenko, 1995, 2008) and in the educational technology research in the beginning of the 21st century (Balbay, 2018; Cao et al., 2022; Verenikina, 2010). Most importantly, as a learning theory, SCT best corresponds with SLIFE unique learning style that is rooted in collaborative, apprenticeship models of communal learning rather than learning predicated on literacy (DeCapua, 2016). In order to appropriately serve SLIFE linguistic and culture-specific needs, culturally responsive pedagogical approach is called for by researchers (DeCapua & Marshall, 2010, 2011a, 2011b, 2015a, 2015b, 2020; Gay, 2000, 2002, 2018) and by SLIFE themselves (Daniel & Zybina, 2018). Therefore, I was concerned with the research inquiry into whether secondary teachers operationalize their multicultural teaching competencies (skills and knowledge)

when selecting DLRs that most appropriately fit SLIFE unique learning style, and SCT offers a lens through which the use of DLRs in secondary teaching and learning of SLIFE can be examined. I provide a more detailed explanation of SCT in Chapter 2.

Nature of the Study

The nature of this study was a quantitative correlational predictive study design where I sought to understand whether there is a correlation between the teachers' multicultural teaching competencies (skills and knowledge) and their choice of DLRs for SLIFE, considering multiculturalism as a precondition for culturally responsive teaching (see Spanierman et al., 2011; Walter, 2018). It was a nonexperimental design that did not involve any manipulation of variables.

The data were collected from high school language and content area teachers of SLIFE using a voluntary, low-risk, anonymous online survey. After a closer analysis of the initial data set, a multivariate ordinal logistic regression analysis was substituted with an alternate statistical test. Multiple linear regression analysis was applied to determine whether the high school teachers' self-reported multicultural teaching competencies (skills and knowledge) can predict the choice of DLRs for SLIFE. The teacher's classroom assignment type (language or content area) and the presence of EL/TESOL licensure/certification were operationalized as covariate variables and investigated separately in terms of their influence on the teachers' DLR choices. Further details about the research design and methodology are provided in Chapter 3.

Definitions

Cultural dissonance: Confusion, discomfort, disagreement, and/or alienation someone confronts in a new cultural environment (Ibarra, 2001).

Culturally responsive teaching: Learning situated within the lived experiences and frames of reference for students (Gay, 2000). In literature, *culturally responsive teaching* together with the *culturally relevant pedagogy* framework (Ladson-Billings, 1995) is referenced as *culturally relevant education* (CRE; Dover, 2013).

Digital learning resources (DLRs): *Educational technology* defined and categorized in the U.S. Department of Education Matrix as digital resources (academic content tools, digital productivity tools, and digital communication tools) that engage students in learning activities and support students' learning goals (2018b, p.22). The terms *DLRs* and *educational technology* are used interchangeably.

English as a Foreign Language (EFL): English learning programs in non-English-speaking countries where English is not used as the lingua franca and also used in some U.S. university programs where international students study English (TESOL, 2024).

English-language learners (ELLs): "Students who are unable to communicate fluently or learn effectively in English, who often come from non-English-speaking homes and backgrounds, and who typically require specialized or modified instruction in both the English language and in their academic courses" (Great Schools, 2013, par. 1). Other terms: *English learner* (EL), limited English proficient, non-native English speaker, language-minority students, (emerging) bilingual students, recently arrived immigrants or refugees, adolescent-age students with little or no formal schooling

Funds of knowledge: Historically accumulated and culturally developed bodies of knowledge and skills essential for household or individual functioning and well-being that minority and immigrant students bring to school from their homes and communities (González et al., 2006; Moll et al., 1992, 2006)

Multicultural education: Any form of teaching that ensures social justice and educational equity for all students by placing their life histories and experiences at the center of the teaching and learning, by presenting material within a context that is familiar to students, and by incorporating multiple ways of thinking (NAME, 2021).

Multicultural teaching competency: "An iterative process in which teachers continuously (a) explore their attitudes and beliefs about multicultural issues, (b) increase their understanding of specific populations, and (c) examine the impact this awareness and knowledge has on what and how they teach as well as how they interact with students and their families" (Spanierman et al., 2011, p. 444).

Mutually Adaptive Learning Paradigm (MALP): Culturally responsive teaching model and a concrete set of guidelines that combines the elements of the struggling language learners' prior learning paradigms and the elements of the formal educational paradigm. This model addresses the "cultural dissonance" (Ibarra, 2001) that many of these learners face and helps with the transition to the Western educational model (DeCapua & Marshall, 2011a, 2023).

Students with limited or interrupted formal education (SLIFE): English language learners whose education has been interrupted due to various circumstances (e.g., war, natural disasters, or migration) or due to the lack of resources or prior formal schooling

opportunities (DeCapua, 2023; DeCapua & Marshall, 2010; DeCapua et al., 2007); World-Class Instructional Design & Assessment [WIDA], 2015). Other terms: *newcomers*: students who were born in another country and have recently arrived in the United States (Rasmussen et al., 2012), *refugee*: anyone who has been displaced due to war, natural disaster, or persecution (UNHCR).

Technological pedagogical content knowledge (TPACK): Technology integration framework that identifies the types of knowledge needed for successful educational technology integration (Koehler & Mishra, 2009; Mishra & Koehler, 2006). The updated TPACK includes *contextual knowledge* (i.e. learners, organizational and situational constrains) as primary to the teacher's technological, pedagogical, and content knowledge (Mishra, 2019).

Technology-supported environments: Teaching and learning environments that incorporate technology that can enhance knowledge, skills, and attitudes, as the students conduct learning activities with the help of teachers, peers, supporting tools, and technological resources.

Assumptions

This study was based on several assumptions. The first assumption related to the research design I identified as the most appropriate for the problem and purpose of my study. In order to explore the association between the variables in my study in a quantitative, objective way, the quantitative correlational predictive research design was applied, and the correlational statistical test was used in the statistical analysis process (see Seeram, 2019). As a nonexperimental research design that does not involve any

manipulated treatment variable, the primary assumption of the quantitative correlational predictive research design is that the variables measured are meaningfully related (Warner, 2013). The rationale for employing the quantitative correlational predictive research design was that there is a gap in the literature about the influence of teachers' multicultural teaching competencies as preconditions of culturally responsive teaching (Spanierman et al., Walter, 2018) on the choices of DLRs when working with high school SLIFE in both language and content area classrooms. The correlational predictive research design was the most befitting to the purpose of identifying whether this influence existed. Therefore, the chosen research design was a well-justified tool for solving the research problem. Additionally, due to the influx of ELLs who are SLIFE in recent years, there was a reason to assume that most high school teachers had some form of experience working with SLIFE and a balanced volume of responses from both language and content area teacher groups could be collected. Finally, because the teachers were voluntarily self-reporting their multicultural teaching competencies, it was assumed that they reported the perceptions of their multicultural teaching competencies openly, honestly, and most accurately.

Scope and Delimitations

The scope of this study was based on certain boundaries defined by the purpose of the study. The boundaries and delimitations described in this section are intended to ensure a higher degree of the generalizability of the findings of this study.

Only high school language and content area teachers of SLIFE were able to answer the survey questions. There were no limitations to the geographical location of the

respondents. Another boundary related to the MTCS instrument (Spanierman et al., 2011), as the instrument defines two factor independent variables (a) multicultural teaching skills and (b) multicultural teaching knowledge. The instrument does not include the multicultural teaching attitude as a third factor of multicultural teaching competency (Sue et al., 1992). Finally, a comprehensive description of the term SLIFE was provided to ensure a clear understanding of this unique subcategory of ELLs.

The delimitations of this study involved in the first place a clear understanding of the term SLIFE as it pertained to the scope of my study. There are various reasons for interrupted education to occur, and the argument exists that even COVID-19 caused interrupted education for many students (Chang-Bacon, 2021). In my study, SLIFE were defined by the seminal scholars of this phenomenon as a specific subgroup of ELLs who are immigrant youth whose education was interrupted by migration (Freeman & Freeman, 2002) or by various instabilities or lack of formal education opportunities in their home country (DeCapua, 2023; DeCapua & Marshall, 2010, DeCapua et al., 2007). In this study, SLIFE were not students whose educational interruptions were due to unstable home life, prolonged illness, incarceration, and newly COVID-19.

Another delimitation related to the participants' inclusion and exclusion criteria. Participants (a) had to be high school English language (ENL/ESL) or high school content area (math, science, social studies, etc.) teachers who work with SLIFE in public and private schools nationwide, (b) had to plan and deliver curricula to ELLs who are SLIFE either in SLIFE-specialized environments (ex. newcomer sheltered instruction) or in general education classes, and (c) had to integrate DLRs as tools that SLIFE use to

complete educational tasks. Participants could not be (a) instructional and/or other support staff, (b) instructional coaches, or (c) school or district administrative staff.

The final delimitation was related to a specific participant exclusion criterium. There is a need to distinguish between an ELL student as an English language learner who comes from a non-English-speaking background and is learning English for the first time and in a foreign country and an EFL student who is learning English in his or her home non-English-speaking country (TESOL, 2024). My study was positioned in U.S. high school, which was presumed to be an ELL environment; however, some teachers may had been coming to the survey with the EFL teaching experience. Consequently, the survey included specific instruction for the teachers to ground their responses only in their ELL/SLIFE teaching practice.

Limitations

All social research encounters limitations, and those limitations need to be acknowledged. The limitations of this study were related to methodology, specifically to participant pool and to the instrument. Access to participants presented the first limitation to my study. Initially, I intended to engage study participants in one midwestern state. After seeking advice from the Walden University Institutional Review Board (IRB) office, I modified my approach and opened my study to participants nationwide by using a low-risk online survey measure. However, since the online survey completion was voluntary, and it was the participant's choice to engage with it, a potential participant limitation arose due to the numbers of responses from the two groups of teachers by their classroom assignment – language and content area. The number of responses from each

group was carefully monitored during the data collection process and mitigated by using snowball nonprobability sampling technique to help saturate the sample size from both groups (see Babbie, 2017). Including the teacher assignment type (language or content area) as covariates/moderators mitigated this limitation and increased precision as well as reduced bias when interpreting the results of the study in case of the imbalance in the study population sample as recommended by Samsa (2013). I acknowledge and discuss the accuracy of my studied sample and its limitations in Chapter 5.

There were also limitations related to the nature of the MTCS instrument. Because this scale uses a self-report method to investigate how teachers perceive their multicultural teaching competencies, their answers may not reflect their real ability to create culturally responsive environments and implement culturally responsive teaching, and an inclusion of other indicators of multicultural teaching competence such as classroom observations and/or student and parent opinions could potentially strengthen future research. However, the strength of the instrument is that it measures (a) self-reported skills or behaviors in implementing culturally responsive teaching practices and (b) knowledge of culturally responsive theories, resources, and classroom strategies. The instrument does not include teacher's self-reported multicultural awareness/attitude (Spanierman et al., 2011), which eliminates the possibility of a disadvantage that the teachers with little multicultural teaching awareness training might experience while completing the survey.

The final and critically important limitation related to the instrument stemmed from its development. Contrary to MTCS's major strength of being to date the only

instrument intended to measure multicultural teaching skills and knowledge of *general* pre- and in-service teachers (as compared to special education teachers, school professionals, etc.), as documented in Sarraj et al. (2015), and in both primary and secondary environments (Spanierman et al., 2011), like many other instruments focusing on multicultural competencies, MTCS is criticized for not considering experiences and knowledge of culturally diverse participants and stakeholders during its initial development (Chang & Cochran-Smith, 2022). This means that when initially developing the instrument, the authors did not consider the potentially different cultural lens of the respondents and depending on the diversity of the participants in my study, the instrument itself may not reflected fully the culturally unique living experiences of teachers of diversity. The above limitations meant that the results of my study needed to be interpreted with caution in terms of the validity and trustworthiness (see Chang & Cochran-Smith, 2022), and caution needed to be practiced when making recommendations for the field of education and future research.

Significance

This study was significant in that it provided insight into the current practices of high school teachers of SLIFE in terms of identifying the current DLR use. It advanced the understanding of the importance of multicultural teaching competencies when working with diverse, multilingual students. Applying the SCT lens (Vygotsky, 1978) and the SLIFE collectivist, collaborative learning paradigm to identify which DLRs are culturally appropriate when working with SLIFE may help streamline high school teachers' decision-making process about which DLRs to use in order to better serve

SLIFE in a culturally responsive way. Not only can the results of the study inform teaching choices and practices in a multicultural technology-enhanced environment, but they may also inform the SLIFE program directors when planning for future technology investments. Additionally, this study may inform technology developers about the DLRs that best ensure culturally responsive, equitable, and inclusive access for SLIFE.

Finally, this study has potential implications for positive social change. U.S. classrooms are becoming more racially and ethnically diverse and will continue to do so based on the projections of increase of racial and ethnic diversity in the United States (Colby & Ortman, 2014). According to the authors, the share of non-Hispanic White population will fall by 2060 to 44% of the total population while the Two or More Races population will triple in size, the Asian population will double, and the Hispanic population size will be more than 25% of the total population (Colby & Ortman, p. 9). Based on these projections, by 2060, 64% of children under the age of 18 will be racially and ethnically diverse. However, higher international immigration could change the previous projections and produce even faster growth in diversity of the overall population as well as the growth in the under the age of 18 category of up to 23% (Johnson, 2020). Inevitably and produced especially by the international migration, the increase in numbers of SLIFE in U.S. schools can be expected. These students enroll in school already disadvantaged due to their interrupted education and language as well as other barriers and deserve equitable educational opportunities. Teachers of these diverse students have to make additional instructional and pedagogical choices (Halvorsen, 2017), especially in the SLIFE context of teaching and learning. The potential implication

for positive social change of this study was two-fold. First, the findings of the study quantitatively documented whether the teachers' multicultural competency can be used as an indicator of effective choice and integration of technology for SLIFE. Second, based on the theoretical framework of Vygotsky's (1978) SCT, the study helped illuminate which types of DLRs are the most appropriately matched with the SLIFE culturally unique learning paradigm and therefore help guide the efforts for providing culturally responsive, equitable, and inclusive educational opportunities for these students.

Summary

In this Chapter 1, I described my quantitative correlational predictive study. In the background section, I provided an overview of the research in the key areas that pertain to my study. In the problem statement and purpose of the study sections, I positioned my research in the context of high school language and content area teachers of SLIFE, and in the research questions section, I formulated RQs and hypotheses that guided my study within the quantitative research paradigm and correlational predictive research methodology. In the theoretical framework section, I outlined SCT (Vygotsky, 1978) as a theory at the crossroads of second language acquisition (see Balbay, 2018; Lantolf & Beckett, 2009; Lantolf & Pavlenko, 1995, 2008), educational technology research (Balbay, 2018; Verenikina, 2010), and as best corresponding with SLIFE unique learning style (DeCapua, 2016), and therefore best supporting the aim of my study. In the nature of the study section, I explained the rationale for the research design and methodology for my study, and following with the definition section, I clarified the key terminology. In the assumptions, scope and delimitations, and limitations sections, I defined the

boundaries of the study. I concluded Chapter 1 with the significance and the potential impact the results of the study may have on educational practice and research. In Chapter 2, I deliver a comprehensive review of the literature in the areas of multiculturalism, DLRs, and SLIFE, as these were the themes that pertained to the problem and purpose of my study.

Chapter 2: Literature Review

The purpose of this quantitative correlational predictive study was to examine whether the high school language and content area teachers' self-reported multicultural teaching skills and multicultural teaching knowledge predict the choice of DLRs they use with ELLs who are SLIFE. The social problem that prompted me to search the literature was that the ELL environment in U.S. secondary schools is becoming increasingly complex due to the advancing numbers of SLIFE. These students typically do not respond to traditional ELL instruction and require culturally responsive approach (Custodio & O'Loughlin, 2020; DeCapua, 2016; DeCapua, A., & Marshall, H. W., 2010, 2011, 2015; DeCapua et al., 2020; DeCapua et al., 2007, 2009). Although the literature on ELLs is well established, research and research-based instructional recommendations are minimally available for SLIFE and their teachers, especially in the area of the best practices for the selection and use of DLRs (Altavila, 2020). This problem became especially evident with the increased use of distance learning technology during the COVID-19 pandemic. As schools continue integrating more technology and rely on remote use of digital resources beyond the COVID-19 pandemic, there is a need to understand the use of digital tools with SLIFE. In the technology-rich educational scenario, in addition to SLIFE cultural, linguistic, academic, socioeconomic, and socioemotional diversity barriers, the for many SLIFE typical lack of digital literacy skills (Drolia et al., 2020; Hsu, 2016; Smyser, 2019) can create an additional layer of barriers to successful technology integration and use (Andrei, 2017), and what is not known is whether teachers of SLIFE operationalize their multicultural teaching

competencies (skills and knowledge) when selecting DLRs that most appropriately fit SLIFE's culturally unique learning style. Therefore, considering the SLIFE educational challenges, the aim of my study was to gain insight into whether the high school teachers' multicultural teaching competencies can predict the choice of DLRs they use when teaching SLIFE.

Chapter 2 is organized as follows. I begin with the literature search strategy. I then outline the theoretical foundations related to my topic and explain the choice of the SCT as a theoretical framework most applicable to my study. In the literature review section, I first review widely used definitions of *multiculturalism* and *multicultural education* and outline how these terms are used in the area of education along with identifying the historical roots of multicultural education in the United States. I then introduce the cultural competency scales as measurements of teachers' multicultural attitudes and perceptions and justify the use of MTCS (see Spanierman et al., 2011) as to date the only multicultural competency scale developed to measure multicultural teaching knowledge and skills of general preservice and in-service elementary and secondary teachers (Sarraj et al., 2015), and in both primary and secondary environments (Spanierman et al., 2011). Additionally, I present the application of MTCS in recent quantitative studies with the results documenting the gap that exists between the multicultural teaching theory and practice. I also outline the foundations of culturally responsive approach to teaching and learning and through scholarly work I document the general teacher unpreparedness to effectively deliver culturally responsive teaching to diverse audiences. In the next section of my literature review, I discuss the classification

of DLRs, digital competence and its complexity, teachers' attitudes toward and perceptions of DLRs, and culturally responsive use of digital learning tools, as they pertain to my study. I present the upgraded TPACK (Mishra, 2019) technology integration model as a leading technology integration framework and include the scholarly argument that the multicultural teaching and learning *context* is a determining factor to consider when integrating digital resources in equitable and culturally responsive ways. Moreover, based on the existing research, I highlight *interactivity* as the leading feature that directly satisfies the fundamental constructs of the SCT and as a common denominator when using digital technologies in teaching and learning of SLIFE in a culturally responsive way. In my final section, I describe the social and cultural context of SLIFE and by delineating their collectivist orientation and informal, pragmatic ways of making meaning, I will highlight their unique language, literacy, academic, sociocultural, and socioemotional needs and explain how those affect the learning and teaching environment. Additionally, I discuss the challenges specific to secondary SLIFE in their language and literacy acquisition as well as their experiences with culturally responsive teaching and mutually adaptive learning paradigm (DeCapua, A. & Marshall, H.W., 2011, 2023) as the recommended approaches in teaching SLIFE. Finally, I identify the digital literacy as a critical barrier for effective use of digital tools with SLIFE. At the end of this section, I summarize the recommendations for effective technology integration in a culturally, linguistically, academically, socioeconomically, and socioemotionally diverse environment and conclude with a discussion related to the gap

in research about the use of digital technologies with SLIFE in general and with high school SLIFE more specifically, the gap that I intended to fill in my study.

Literature Search Strategy

I used the online library and multiple strategies to locate and review current, peer-reviewed literature on my topic. I first needed to clearly define the term SLIFE as it pertained to my study. Existing body of research identifies a number of various reasons for and causes of external as well as internal interrupted schooling from unstable home life, prolonged illness, incarceration, and newly COVID-19 (Chang-Bacon, 2021). However, in my study, the term SLIFE represented a specific subgroup of ELLs who are immigrant youth whose education was interrupted by either instability in their home country or by a process of migration (Freeman & Freeman, 2002). Further, SLIFE are defined as ELLs who have experienced various formal schooling interruptions or have had no formal schooling at all prior to their enrollment in U.S. schools (DeCapua, 2023; DeCapua & Marshall, 2010; DeCapua et al., 2007). After delimiting the boundaries of the term SLIFE as the study's phenomenon, I then accessed multiple available databases. Those included Education Source, ERIC, ERIC and Education Source Combined, Academic Search Complete, EBSCOhost, ProQuest Research Library, SAGE Journals, and Tylor and Francis Online. I accessed data related to education using NCES Publications and with a specific focus on SLIFE. I also searched the UNISEF and UNESCO Document Database as well as the United Nations Public Administration Network. I accessed SAGE Research Methods to identify methodology applicable to my study. I also utilized Library Search (formerly Thoreau) and Google Scholar to access

multiple open sources. I used Ulrich's Periodicals Directory to verify whether a journal is peer reviewed, and the journals I included in my search were both U.S.- and internationally based and oriented primarily toward research in education and educational technology. The initial search from the above sources revealed the three themes that I used as index terms for my literature review: *multiculturalism, digital learning resources,* and *students with limited or interrupted formal education*. I then developed these subject terms into three search strands: (a) *multicultural – multiculturalism – cultural diversity,* (b) *digital learning resources – educational technology,* and (c) *students with limited or interrupted formal education – refugees – asylum seekers – recently arrived English learners,* and because SLIFE represent a specific subgroup of English learners, I also expanded my search by the search strand *English language learners – Ell – ESL – English as a second language – second language learning.* Search of the aforementioned strands and their combinations yielded empirical research, seminal work, peer-reviewed journal articles, books, and reports pertaining to the topic, background, problem and purpose of my study, research questions, and theoretical framework. I printed, annotated, and filed these articles in binders while cataloguing them in a comprehensive notetaking spreadsheet. To ensure exhaustive search results, I used the reference lists of the applicable articles to identify seminal works and to access existing reviews of empirical work. After an expansive search of the individual themes, terms, and strands that yielded a multitude of literature related to multiculturalism, DLRs, and SLIFE in silos, I adjusted my strategy and combined the three terms into one stand *multiculturalism – DLRs – ELLs - SLIFE*. This strategy produced a very small number of studies, especially when adding

SLIFE, and therefore illuminated the gap in the literature about the use of DLRs with SLIFE in relation to their high school teachers' multicultural competencies (skills and knowledge), which is the gap in research that my study attempted to fill. To document this gap in a saturated way, I had to expand my searches back to a wider field to document what was missing rather than what existed in the empirical literature about secondary SLIFE and their teachers in a technology enriched educational environment.

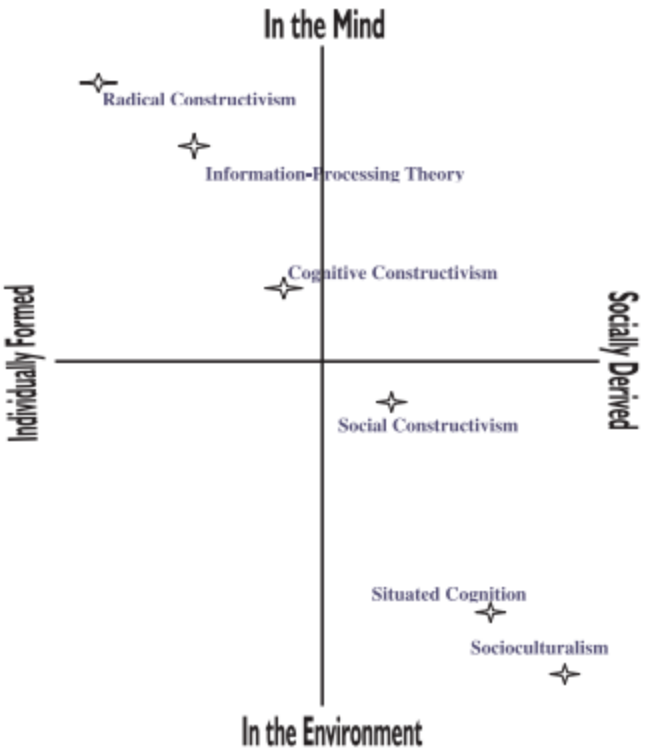
Theoretical Framework

Theoretical foundations that supported this study came from the theories of cognitive development, originating from the fields of psychology, sociology, and education. These theories, concerned with the process of learning, date as far back as the creation of the Socratic dialogical method, in which skills and knowledge are acquired by interpreting, testing, and examining the statements and knowledge of others and one's own knowledge and beliefs, and by learning from those who are wise (Benson, 2000). These theories are the SCT (Vygotsky, 1978), constructivist theory of knowing (Piaget, 1977), social cognitive theory (Bandura, 1986), situated cognition theory (Brown et al., 1993), social constructivism (Palincsar, 1998), cultural constructivism (Hutchison, 2006), and connectivism (Siemens, 2004) as a theory of learning in the digital age. Positioning these theories epistemologically (i.e., where knowledge comes from and where it resides), social constructivism theory, situated cognition theory, and SCT (Figure 1) all occupy the quadrant in which knowledge is constructed through social interaction within a context and culture and is inseparable from the environment in which it is acquired (Alexander, 2007, p. 68). From the above theories, Vygotsky's SCT stood out due to its

emphasis on the social and cultural influence on human development (see Murphy et al., 2012, p. 217); therefore, I identified SCT as the theory that guided my work.

Figure 1

The Epistemological Positioning of Learning Theories



Note. From "Bridging cognition and socioculturalism within conceptual change research: Unnecessary foray or unachievable feat?" by P. A. Alexander, 2007, *Educational Psychologist, 42(*1), pp. 67–73. (https://doi.org/10.1080/00461520709336919). Copyright 2007 by Taylor & Francis, http://www.tandf.co.uk/journals. Adapted with permission.

Propositions of the Sociocultural Theory

SCT presents the idea that individual cognitive development is determined by the participation in social interaction and in culturally organized activities and that culture

and language are essential aspects of human development (Scott & Palincsar, 2013). Vygotsky (1978) theorized that interacting with other people precedes individual learning and that the social and cultural context determines how and what information is internalized by an individual. The same social interaction is necessary during an individual's language acquisition process (Vygotsky, 1986). The three key tenets of SCT are (a) culture as a provider of the historical and social context for individual development; (b) language, symbols, and other tools of the culture as mediators of human development; and (c) genetic factor of human development represented by the idea that learners have varying capacities for learning and their full learning potential can be reached within the zone of proximal development. In contrast with other learning theories that are concerned with individual cognitive or behavioral development, SCT indicates that learning occurs in the transformation of socially shared activity into internalized processes (John-Steiner & Mahn, 1996). For the transformation to take place, the learning experience needs to occur within the zone of proximal development, which is the space between one's ability to problem solve independently and one's potential to problem solve under the adult guidance and in collaboration with more capable peer (Vygotsky, 1978). This supports the proposition of learning being largely a social process, extended by the concepts of more knowledgeable teacher, mentor, peer, or even technology, who can provide guidance when the learner can no longer problem solve at his or her independent level of knowledge.

Educational Implications of the Theory

SCT encompasses a broad scope of human mental functioning and is widely recognized in the field of educational psychology. Vygotsky's (1978) concept of the zone of proximal development allowed for further conceptualization of learning as distributed, interactive, contextual, and a result of the learners' participation in a community of practice (John-Steiner & Mahn, 1996). Rogoff (1990, p. vii) highlighted the social context of learning within the concept of guided participation and called the process *apprenticeship*. Brown (1992) and Brown et al. (1993) further developed the idea of the zone of proximal development by including artifacts, wall displays, scientific equipment, and computer environments as active agents and tools in the learning process. Freeman (2010) confirmed that SCT supports the development of learner-centered online environments, and Cicconi (2014) suggested that the internet can fill the role of the more knowledgeable other within the zone of proximal development. Similarly, Erbil, 2020 posits that SCT provides a base for a conceptual foundation of the flipped classroom student-centered blended approach, and Balbay (2018) explored Google Drive as a mediation tool in scaffolding students' learning within the zone of proximal development and documented that Google Drive tools supported the constructs of SCT. Therefore, the theoretical foundation laid out by SCT can help in understanding the use of online tools in teaching and learning activities (Balbay, p. 180). The premise that learning happens through interaction, negotiation, and collaboration within the zone of proximal development has been applied in the areas of teacher preparation and professional development (Shabani, 2016), frequently in second language acquisition (Balbay, 2018;

Lantolf & Beckett, 2009; Lantolf & Pavlenko, 1995, 2008), online learning designs (Hall, 2007), technology-enhanced learning (Sutherland et al., 2009), and flipped classroom approach (Erbil, 2020).

Rationale for Use of Theory

SCT relates to this study's inquiry about high school teachers' DLRs choices for SLIFE at cognitive and language acquisition levels as well as in recognizing the role cultural diversity as a learning context plays in learner's cognitive development. The majority of high school SLIFE are culturally diverse, arrive in U.S. schools with limited or interrupted prior educational backgrounds, and are learning many high school content area concepts for the first time, in addition to acquiring the language of these concepts (DeCapua, 2016, 2020). What exacerbated the need for theory and research-based pedagogies when working with SLIFE was the use of distance learning technology during the COVID-19 pandemic and further increase of remote use of digital resources beyond the COVID-19 pandemic years. SCT recognizes the broader social, cultural, and historical context of knowledge construction and is sensitive to individual differences within and between cultures; thus, acknowledges the cross-cultural diversity, and encourages learning in rich collaborative environments within a culture, in which learning is organized. What distinguishes SCT from other learning theories is the inseparability of the individual and society coined by Cooley (1902/1922, as cited in Murphy, 2012) who argued that knowledge is collective, which relates directly to the cultural mentality of the majority of SLIFE students. Finally, the fact that SCT is widely recognized in L2 (English as a second language/English as a foreign language) learning

and in the early 21st century educational technology research (Balbay, 2018; Erbil, 2020; Haque & Al Salem, 2019; Verenikina, 2010) further supported a good fit for its use in grounding my inquiry about the DLRs high school teachers use with SLIFE students.

SLIFE do not respond to traditional ELL instruction and require culturally responsive approach due to their prior limited or interrupted academic exposure (DeCapua, 2016). Entering at a secondary level, SLIFE are under pressure of developing academically and linguistically and at the same time assimilating into a new social and educational culture. Addressing these needs presents a very specific challenge high school teachers of SLIFE encounter daily. SCT with its main propositions of learning being a result of social interaction within a social, cultural, and historical context, language being a mediator for learning, and distributed, guided learning within the zone of proximal development being a requirement for the internalization of the learning and for the occurrence of individual cognitive development offers a comprehensive guidance to meet these challenges not only in the face-to-face interaction but also in the digital learning environments. In this quantitative study, I attempted to investigate whether there is a predictive relationship between the high school teachers' self-reported multicultural teaching competencies (skills and knowledge) and the DLR choices they make for SLIFE students. Considering that multicultural teaching competencies are a precondition for culturally responsive teaching (Spanierman et al., 2011; Walter, 2018) and that SLIFE's culturally unique learning style requires culturally responsive approach (DeCapua, 2016, 2020), SCT provided the lens under which the DLRs choices and use could be evaluated.

Multiculturalism

The term *multiculturalism* is currently used in scholarly as well as popular circles and disciplines such as sociology, anthropology, psychology, and social and political sciences and has varying definitions from merely acknowledging the presence and importance of several distinct cultural or ethnic groups in one location (Multicultural, 2014; Oxford Languages, 2023) to the way a given society supports cultural diversity (Longley, 2021). Melear (1995) defines multiculturalism as recognizing, understanding, and appreciating cultures that are different than one's own. In my study, I was particularly interested in multiculturalism in education.

Multiculturalism and Multicultural Education

In education, multiculturalism is an idea, educational reform movement, and a process aiming to change the structure of educational institutions (Banks, 1993, 1997, 2013, 2019) with the goal to remove barriers and ensure academic success for students from diverse cultural backgrounds (Multicultural, 2013). *Multicultural education* is any form of teaching that ensures social justice and educational equity for all students by placing their life histories and experiences at the center of the teaching and learning, by presenting material within a context that is familiar to students, and by incorporating multiple ways of thinking (NAME, 2021). The roots of multicultural education in the United States date back to the civil rights movement of the 1960's that resulted in the demands of late 1960's and 1970's for public schools to include cultural and ethnic content (Banks, 1989). The frameworks and foundations for multicultural education are used to illustrate that ethnic and racial content can be implemented into a school

curriculum through various approaches (Alismail, 2016). However, only the focus on the curriculum modifications and including multicultural materials has not proven sufficiently serving the students who find it difficult to cross cultural and language barriers of the new educational environment (Ogbu, 1994) and who require culturally responsive methods and multicultural teaching strategies. Therefore, my study was concerned with whether high school teachers operationalize their multicultural teaching competencies (skills and knowledge) as preconditions for culturally responsive teaching (Spanierman et al., 2011; Walter 2018) when choosing DLRs they use with SLIFE.

Teachers' Multicultural Attitudes and Perceptions

With the growing number of ethnically and linguistically diverse students, there is an increased need for a multicultural approach to curriculum, instruction, and assessment, which requires teachers to demonstrate a range of multicultural competencies. In this regard, Sue et al. (1992) identified three dimensions of cultural competency: (a) *awareness* of one's beliefs and attitudes, (b) *knowledge* of the beliefs and attitudes of one's culturally different clients, and (c) *skills* to effectively work with one's culturally different clients. Multiple scales have been developed using awareness, knowledge, and skills as the dimensions to measure teachers' multicultural competencies. For this study, I examined the relationship between high school teachers' self-reported multicultural competencies and the DLRs they use with the diverse SLIFE. To measure teachers' multicultural competencies, I used the Multicultural Teaching Competency Scale (MTCS) developed by Spanierman et al., (2011). MTCS is a 16-item, two-factor

instrument that measures (a) multicultural teaching skills and (b) multicultural teaching knowledge. Spanierman et al. (p.445) delineated the terms as follows.

- *multicultural teaching skill*: "teachers' ability to (a) actively select, develop, implement and evaluate strategies that facilitate the academic achievement and personal development of all students; (b) select and implement culturally sensitive behavioral management strategies and interventions; and (c) participate in ongoing review and evaluation of school policies, procedures, and practices with regard to cultural responsiveness"
- *multicultural teaching knowledge*: "teachers' knowledge of culturally responsive pedagogy and instructional strategies related to diverse populations, major sociohistorical and current sociopolitical realities, and cultural dynamics (e.g., ethnic identity, gender socialization, etc.) that may affect between- and within-group differences"

The following reasons justified the choice of MTCS as most appropriate for the problem and purpose of my study. First, the authors extended previous empirical literature and employed Sue et al. (1992) three dimensions of cultural competency model (multicultural awareness, knowledge, and skill) in designing a multicultural self-assessment measure specifically for *general* pre and in-service primary and secondary teachers (Saraj et al., 2015; Spanierman et al., 2011). Also, Spanierman et al. (2011) conducted the initial validation of the MTCS and ensured the technical adequacy of the measure by describing its fundamental psychometric properties. The exploratory and confirmatory factor analyses results supported two subscales (a) self-reported skills and (b) self-reported

knowledge but did not support the third dimension of multicultural awareness, as proposed by Sue et al. (1992). The two subscales are consistent with the multicultural education literature. Internal reliability coefficients of .83 (skills), .80 (knowledge), and .88 (competency overall) were relatively high and showing acceptable internal consistency, and the confirmatory factor analysis revealed a good fit and its superiority to other measures of multicultural competency (Spanierman et al., 2011). It is necessary to underscore that there is a large number of measures of multicultural competence for teachers and other educational professionals at all levels of education; however, many lack sufficient development, validation, and other psychometric and statistical properties (Brown, 2004; Dunn et al., 2006; Hamilton, 2016). Contrary to those, MTCS is documented to successfully measure the intended constructs of (a) "self-reported skills or behaviors in implementing culturally sensitive teaching practices" and (b) "self-reported knowledge of culturally responsive theories, resources, and classroom strategies" (Spanierman et al., 2011, p. 457) and is considered a sound and the only instrument to measure *general* pre and in-service teachers' multicultural teaching competencies (Sarraj et al., 2015). Additionally, MTCS consists of 16 items and is appropriate for an online survey format that is considerate of participants' time availability. Finally, MTCS has been applied in international contexts and has gained momentum recently among novice researchers who are interested in multicultural and culturally responsive education as well as other diversity-related concerns. In the United States, Harrison et al. (2010) utilized MTCS to examine physical education teachers' cultural competency and test a common assumption that Teachers of Color are more culturally competent. The

quantitative analysis of the collected data showed that the Teachers of Color scored significantly higher on both multicultural teaching skills and knowledge scales, and White teachers in urban school setting scored higher on the multicultural teaching knowledge scale than those from non-urban school settings. Kucuktas (2016) adapted MTCS to a four-year college-level setting where he examined 268 faculty members and quantitatively documented that faculty participation in certain types of multicultural activities as well as certain academic areas of teaching contributed to higher multicultural competency scores and concluded that multicultural teaching competence can be learned. In these studies, MTCS has been utilized to document that personal and in-person experiences with diversity and multicultural environments can positively influence overall multicultural competencies.

Although the concept of multicultural education has existed for nearly 50 years, researchers have documented multicultural teaching theory-practice gaps. While employing a descriptive survey model, Uzunboylu and Altay (2021) investigated the current state of research on multicultural education. The researchers documented that the majority of studies conducted between 2012 and 2017 focused on preservice teachers' studies of diversity; however, studies on the needs of in-service teachers when it comes to working in a multicultural environment and studies on the professional development and training of in-service teachers for multicultural education were scarce. A number of studies documented the teachers reporting a generally positive attitude toward multicultural education but needing professional development and training in instructional skills to be able to implement multicultural education effectively in the

classroom. Consequently, the scholars and researchers of multicultural education provided various recommendations to remedy this teacher-reported inadequacy of instructional skills from diversifying of the teaching staff to reflect the schools' student diversity (Gollnick & Chinn, 2013) and including multicultural education courses in preservice teacher education (Cochran-Smith, 2003) to enhancing in-service teachers' training programs with multicultural education awareness (Gay & Howard, 2000) and approaching the curriculum through the tenets of culturally responsive teaching (Gay 2002, 2004, 2018). The main goal of the above efforts was to ensure that preservice and in-service teachers have opportunities to learn and practice the *how* to teach the culturally diverse students. However, the gap remains, as is documented in Pourdavour and Yan's (2020) investigation of in-service teachers' perspectives on multiculturalism during a semester-long course on diversity. The authors concluded that the course resulted in a transformation of the teachers' perspectives; however, it did not provide sufficient time to follow up on how the teachers operationalized the newly gained insights in the classroom instruction. In my proposed study, I was working from a position that teaching about diversity by incorporating ethnically and racially diverse content is insufficient, and what is more important is the *how* of teaching. A teacher's approach to the learning experiences and teaching using the strengths of ethnically diverse students (Gay, 2000) is more important, especially when working with the students with limited or interrupted formal educational experience, such as SLIFE (DeCapua & Marshall, 2015; DeCapua, 2016).

Diversity in the Classroom and Culturally Responsive Education

As classrooms around the world are becoming more culturally diverse, the increased demand for culturally responsive approach to teaching and learning is evident. Similar to multiculturalism, there is not a unified definition of culture. Swidler (1986) defined *culture* as a toolkit of symbols of meanings, language, stories, habits, rituals, art, beliefs, and worldviews, which people may use in various combinations to solve different kinds of problems. Samovar and Porter (1994) extended the understanding of culture to the cumulative deposit of knowledge, experience, beliefs, values, attitudes, meanings, hierarchies, religions, notions of time, roles, spatial relations, concepts of universe, and material objects and possessions acquired by a group of people during generations through individual and group striving. Samovar et al. (2014) further stated a simplified definition of culture as the rules by which the society lives and functions. Applied to the educational setting, students from diverse cultures bring the rules unique to their culture into the classroom and require culturally responsive teaching. The foundation for culturally responsive approach to teaching and learning was laid by Geneva Gay (1975, 1980, 2000, 2002, 2010) in her work on *culturally responsive teaching* and by Gloria Ladson-Billings (1994, 1995a, 1995b, 2006, 2014) in her work on *culturally relevant pedagogy*. Gay (2010, p. 31) described culturally responsive teaching as "using the cultural knowledge, prior experiences, frames of reference, and performance styles of ethnically diverse students to make learning encounters more relevant to and effective for them." That requires teachers to develop knowledge about students' cultures, establish communication with and show caring for their students, include ethnically diverse

content in the curriculum, and respond to the ethnic diversity during the instructional delivery (Gay, 2002). While culturally responsive teaching focuses on the teacher's doing, culturally relevant pedagogy focuses on student learning, long-term academic achievement, and life-long empowerment (Ladson-Billings, 2006). Both Gay and Ladson-Billings centered their work on effectively teaching diverse students, and their approaches were inclusively labeled *culturally relevant education* (CRE; Dover, 2013). In the context of my study, I focused on the *how* marker of culturally responsive teaching and culturally responsive education related to the delivery of instruction, which is bridging students' cultural references and building on the knowledge and cultural assets students bring into the classroom (Aronson & Laughter, 2015; Dover 2013). In this approach, understanding why and how cultures are different is essential (Aronson & Laughter, 2015), and teaching through the ethnically diverse students' cultural and experiential filters results in the improvement of their academic achievement (Au & Kawakami, 1994; Foster, 1995; Gay, 2000, 2002; Hollins, 1996; Kleinfeld, 1975; Ladson-Billings, 1994, 1995).

Acquiring the attitudes, knowledge, and skills to teach in a multicultural classroom is not easy. In a reflective study of teaching an intensive university level English language course in a diverse classroom setting, Jabeen (2019) investigated the effects of individual cultures on students' academic life and documented the challenges the diverse environment presented to the teacher. The author concluded that managing the behavioral, environmental, and curriculum challenges in a diverse classroom is intense and complex (Jabeen, p. 131), and that teachers should be trained and skilled to

modify the curriculum and create instructional methodology to provide effective culturally responsive learning experience. Building on the previous research that documented teachers' unpreparedness to serve culturally and linguistically diverse students (Helfrich & Bean, 2011; Im & Martin, 2015; Santoro & Kennedy, 2016; Zhao et al., 2009), Hu et al. (2021) designed a methods course based on SCT (Vygotsky, 1978) and the three components of the culturally relevant teaching: beliefs and attitudes, knowledge, and skills. Their qualitative analysis of its implementation in the spring of 2018 in a southern university showed that meaningful, hands-on activities within the ELL environment not only positively influenced the pre-service teachers' beliefs, attitudes, and knowledge about teaching culturally and linguistically diverse students but also provided opportunities to gain the skills and therefore increased their overall culturally responsive competency. Overall, evidence in the research shows that both preservice and in-service teacher training is insufficient and results in the lack of teacher readiness to teach in diverse classrooms. All three components of the culturally responsive teaching work together and need to be learned together; therefore, the focus on the multicultural teaching attitudes, knowledge, and skills teachers need to successfully implement culturally responsive education in their classrooms is imperative.

Digital Learning Resources

The dynamic technology development in recent years resulted in the increased creation of new digital learning tools, and COVID-19 expanded and accelerated their use not only in the in-person technology-supported environments but also in various forms of remote learning (Francom et al., 2021). Technology-supported learning environments are

those that incorporate technology that can enhance knowledge, skills, and attitudes, as the students conduct learning activities with the help of teachers, peers, supporting tools, and technological resources (Chang et al., 2015; Wang & Hannafin, 2005; Wu et al., 2013). The use of technology in U.S. classrooms has become more prevalent, but scholars caution that not all educational technology supports all students in an equitable and culturally responsive way (Chisholm, 1998; Dolan, 2017; Greene-Clemons, 2016; Morgan, 2014), and teachers report lacking the knowledge and skills to use DLRs with their culturally diverse students (Chuang et al., 2020; Darling-Aduana & Heinrich, 2018). In the following section, I address the terminology and classification inconsistencies relating to educational technology tools and introduce the DLR classification applicable to my study. Further, I present scholarly work related to the use of DLRs with ELLs and conclude by highlighting the context of a multicultural teaching and learning environment and the need for applying effective multicultural teaching strategies (Chisholm, 1998) and culturally relevant pedagogy in order to ensure equitable and inclusive access to and use of DLRs with diverse populations.

Classification of Digital Learning Resources

The result of the rapid and dynamic development and implementation of new tools is terminology inconsistency and problems with the classification of such resources, and Balalaieva (2021) posits that the traditional, hierarchical methods of classification of e-learning resources were followed by current, faceted, more flexible terminology and classifications. The Office of Planning, Evaluation and Policy Development at the U.S. Department of Education and its team used the umbrella term *educational technology* and

with the focus on software, provided the definition as well as the categorization of these digital learning tools in the DLR Matrix (U.S. Department of Education, 2018b; Appendix A). According to this categorization, the DLRs are "digital resources such as applications (apps), software, programs, or websites that engage students in learning activities and support students' learning goals" (p. 22). These digital tools can be divided into three categories: digital academic content tools, digital productivity tools, and digital communication tools. Digital academic content tools are the resources that help learners learn academic content. Designed learning activities, reference materials, and language development supporting tools represent this category of digital resources. Digital productivity tools allow students to plan, document, analyze, process, and present information. Word processing, concept-mapping, and presentation tools are a few representatives of this category of digital tools. Digital communication tools are the tools that allow student-to-student and student-to-teacher networking, communication, collaboration, and facilitate any space where asynchronous and synchronous connections can occur (U.S. Department of Education, p. 5, 22). Additionally, some of the mentioned DLRs can be sold to school districts in an integrated form as complete pre-packaged programs.

In most previous studies, DLRs have been investigated in terms of their use in language learning and mostly at the elementary and higher education levels (Arce & Valdivia, 2020; Darling-Aduana & Heinrich, 2018; Mendoza, 2019; Prince, 2017), with a focus on specific devices and tools used individually or in online and distant learning environments (Kumi-Yeboah et al., 2020; Meina et al., 2021), and with ELLs in general.

At the elementary level, Darling-Aduana and Heinrich (2018) investigated the effects of an eReader Program accessed on tablets on increased math and reading scores for ELLs. In higher education ESL classroom setting, Mendoza (2019) identified the use of Blackboard discussion boards with emergent bilinguals as culturally responsive technological tools. Arce and Valdivia (2020) proposed that adding gamification to foreign language learning in general enhances motivation, which increases engagement and academic achievement. In a meta-analysis of empirical studies on the effectiveness of technology-integrated literacy instruction in the classroom context for ELLs in grades K-12 published between 1990 and 2018, Lee et al. (2022) identified 36 studies that confirmed a positive impact of technology-integrated instruction on higher-order literacy skills (reading comprehension, writing, and vocabulary) for ELLs although they observed that the effect was larger at the elementary level and with students who were learning English as a foreign language and not as a second language. However, only ten of those studies were conducted in the ELL context of learning English as a second language (ESL) in the student's new country while the others were the studies of EFL students (TESOL, 2024) who are learning English as a foreign language in their home countries (p. 1118 – 1120). Only four of those ten studies were conducted at the secondary level and with various focus: using WhatsApp instant messenger on Smart phone to communicate via Chat groups (Lai, 2016), employing game-based vocabulary learning on desktop (Mifsud et al.2013), formatting visual-syntactic text to English Language Arts textbook on laptop (Park & Warschauer, 2016), and providing multimedia learning activities for understanding meaning in context using desktop (Soruc & Tekin, 2017).

Although Lee et al. (2022) identified a positive, medium impact of technology-integrated instruction on the ELLs' literacy achievement, they cautioned about other factors (learning context, pedagogical use, teaching method, study duration and intensity) that may mediate the size of this effect, which explains the lack of consensus about the use of educational technology with ELLs at this time. What is currently known is that integrating the digital learning tools and technology-driven activities is among the best practices for teaching in a multicultural classroom with highly ethnically and linguistically diverse populations (Chuang et al., 2020; Darling-Aduana & Heinrich, 2018) and helps facilitate student-centered learning (Gomez et al., 2022). However, the research about which digital learning resources ensure the best educational experiences, engagement, and achievement of the linguistically and culturally diverse students is sparse, and a gap exists in research with a specific focus on SLIFE and especially those who are SLIFE at the secondary level.

Digital Competence and Teachers' Attitudes Toward and Perceptions of DLRs

Digital competence is the set of knowledge, skills, and attitudes that are required when using technology for work or leisure (Ferrari, 2012) and is relative to time and context (Štemberger & Konrad, 2021). The rapid transition from in-person to virtual and remote instruction, a result of COVID-19 school shutdowns, made the teaching and learning process extremely difficult and stressful for many teachers (Hodges et al., 2020; Marshall et al., 2020; Tate, 2020). While the use of the digital learning tools has been shown to be the best practice when teaching in a multicultural classroom (Darling-Aduana & Heinrich, 2018), teachers in general find themselves having various levels of

confidence in using and applying technology in their professional practice, and the use of technology varies (Sarker et al., 2019). Cheng et al. (2022) used an instrument developed by Chuang et al. (2020) to asses teachers' perceptions of culturally responsive teaching in technology-supported learning environments and concluded that the level of teacher's experience with technology is a positive and significant predictor on the teacher's perception of culturally responsive teaching with technology and underlined the essential role of technology-based professional development that provides K-12 teachers with technological knowledge needed for culturally responsive technology integration. Moreira-Fontán et al. (2019) considered digital self-efficacy for teaching one of the key factors in the teaching and learning progress, and similarly Gomez et al. (2022), in a study of urban K-12 teachers' technology use and integration concluded that teachers' self-efficacy is the decisive factor in teacher's use of technology and that a sustained, continuous professional development is necessary to advance the teachers' self-efficacy and *techno-pedagogical preparedness* (p. 166). Jackson et al. (2021) further observed that the opportunity for preservice teachers to engage in authentic, hands-on technology integration learning experiences with diverse learners equipped them with a more contextualized understanding of culturally responsive teaching in the diverse context. As documented in the scholarly work, developing teachers' digital competence is a complex task. Especially in a classroom with the culturally and linguistically diverse populations, the teachers find themselves lacking the knowledge and skills to use the digital tools in a culturally responsive way, and the research documents the need for more professional development and training in the knowledge about and the use of technology with the

diverse learners (Chuang et al., 2020; Darling-Aduana & Heinrich, 2018) and for ongoing opportunities to collaborate about meaningful culturally responsive technology use (Frederick & Schockley, 2008). In a multicultural classroom and especially when SLIFE are present, teachers' multicultural teaching skills and multicultural teaching knowledge add to the aforementioned predictors and conditions for effective use of technology and further influence the decisions teachers make when choosing the digital tools to most effectively serve the SLIFE unique needs. Therefore, by investigating the teachers' choices of DLRs for SLIFE, my study added to the scholarly conversation about what role the teachers' multicultural teaching competencies play in the choice of culturally responsive digital learning tools when serving high school SLIFE.

Culturally Responsive Use of Digital Learning Resources

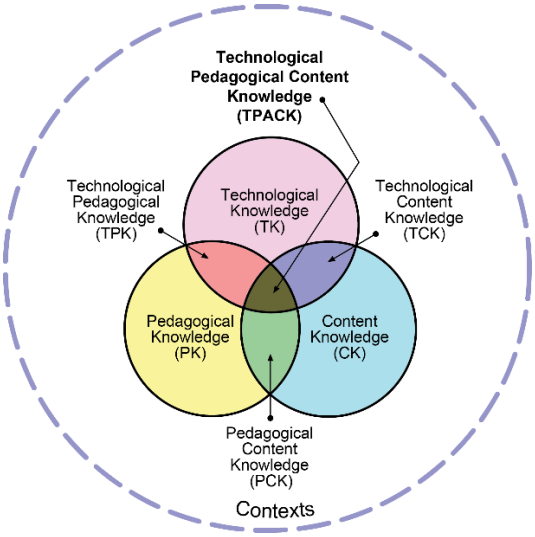
Culturally responsive teaching means connecting instruction with students' cultural experiences (Frederick & Shockley, 2008) by including students' personal, cultural, and community assets in the teaching and learning process (Jackson et al., 2021). However, adding technology to teaching and learning environments increases the complexity of the educational process (Frederick & Shockley, 2008; Nilsen et al., 2020), and it also further complicates the culturally responsive teaching (Frederick & Shockley, 2008). Consequently, when implementing digital learning tools, teachers of diverse students face a variety of instructional and pedagogical choices (Halvorsen, 2017). In a multicultural classroom, it is critical to consider and respond to students' needs when selecting and adapting of the digital learning tools; therefore, teachers need to have knowledge of and access to such resources (Darling-Aduana & Heinrich, 2018). Teachers

of all ELLs and especially those of SLIFE are met with additional layers of unique challenges to support their students in meeting their language proficiency and content knowledge development while using technology in a culturally responsive way. In considering the use of technology with SLIFE, it helps to examine existing frameworks, models, and standards for technology integration in general.

The leading effective technology integration framework is that of Mishra and Koehler (2006) who built on the pedagogical content knowledge (PCK) concept of Shulman (1986, 1987) and developed a framework that intersects the technological knowledge (TK; functions and use of technology itself) with its use in harmony with content knowledge (CK; comprehensive base in knowledge and understanding of the content) and pedagogical knowledge (PK; deep knowledge of methods of teaching and learning). The concept of PCK means knowing how to use the most powerful representations of one's subject area to make it more comprehensible to students (Shulman, 1986). According to the authors (Mishra & Koehler, 2006; Koehler & Mishra, 2009), TK is the knowledge of standard technologies, the skills to operate those technologies, and the ability to learn and adapt to new technologies. In the TPACK model (Figure 2), the technology lends its digital tools to enhance instructional methods and make content more comprehensible to the learner by representing it in new, innovative ways (Ronan, 2018).

Figure 2

The TPACK Framework and Its Knowledge Components



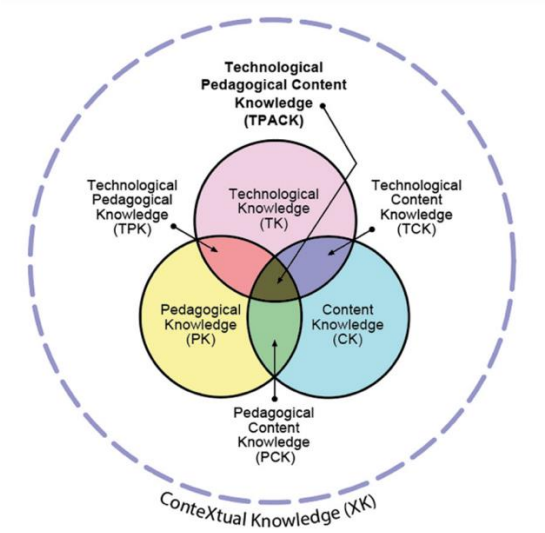
Note. From "Using the TPACK Image," by M. Koehler, 2011. http://tpack.org/. Reprinted by permission of the publisher, © 2012 by tpack.org.

While content, instruction, and technology are interconnected in teaching and learning practice (Lee et al., 2022), the context has not always been considered in the studies about TPACK (Rosenberg & Koehler, 2015). In a systematic research review about context and TPACK, Rosenberg and Koehler (2015) identified that only 36% of peer-reviewed publications considered the context and alerted that the representation of TPACK context in the scholarly literature was not consistent, systematic, nor comprehensive (p. 195). In their original TPACK model, Mishra and Koehler (2006) identified the following context factors: subject matter, grade level, student background, and types of available technology (p. 1032). Kelly (2007, 2008a) wrote about context extensively and argued that the context always changes, and how teachers adapt to it is

dependent of their knowledge of students. Angeli and Valanides (2009, 2013) concluded that the learners and context are the integral parts of the teachers' technological, pedagogical, and content knowledge. Advancing the discussion about context, Porras-Hernández and Salinas-Amescua (2013) proposed three levels of context (micro, meso, and macro) but emphasized that it is the complexity of the social interactions, resources, scaffolds, and supports that the teacher and student employ in the teaching and learning process that affect teaching with technology. As a culmination of this scholarly debate over the role of context in the TPACK model, Mishra (2019) updated the model by renaming the outer circle from "context" to "ConteXtual Knowledge (XK)" (Figure 3) and argued that the teacher's contextual knowledge can promote or hinder the technology integration effectiveness (p. 76-77). Moreover, Mishra (2019) recognized that the technological, pedagogical, and content knowledge are secondary to the teacher's knowledge of his or her organizational and situational constraints, and according to Zhang & Tang (2021), those are highly variable and always changing. With the rapidly changing demographics of schools, the context for teachers' work is increasingly diverse, and as the scholarship suggests, the student makeup of the classroom, i.e. the context, should be the springboard from which the technology integration and use are planned.

Figure 3

Revised Version of the TPACK Image



Note. From "Considering Contextual Knowledge: The TPACK Diagram Gets an Upgrade," by P. Mishra, 2019, *Journal of Digital Learning in Teacher Education, 35,* pp. 76-78. https://doi.org/10.1080/21532974.2019.1588611

Further expanding the scholarly conversation about the context in teaching with technology, Kelly (2007) emphasized cultural sensitivity when teaching and learning with technology in culturally diverse environments, and Kumi-Yeboah et al. (2020), citing constructivist learning theories and SCT (Vygotsky's, 1978)pointed out the importance of the consideration of the students' sociocultural context in creating online shared learning experiences and selecting materials and digital learning resources that help diverse learners to engage, participate, and contribute to knowledge creation online. Such marriage of culturally relevant pedagogy and consideration of digital learning tools

for the socio-culturally and linguistically diverse students applies especially to teachers of ELLs and SLIFE who need to consider not only their content, pedagogical, and technological competencies but also the context in which they teach that demands cultural competency and sensitivity when integrating the digital learning tools in their multicultural classroom instruction. Already in 1998 and further cited in the scholarly work on technology integration in multicultural environments (Dolan, 2017; Greene-Clemons, 2016; Morgan, 2014; Stafford-Levy & Wiburg, 2001), Chisholm (1998) postulated that not all educational technology supports the diverse learners in an equitable and culturally responsive way and that in order to ensure equitable access to technology, effective multicultural teaching strategies need to be implemented. Chisholm's six elements for technology integration in multicultural classrooms stem from effective teaching of diverse students and includes: "cultural awareness, cultural relevance, culturally supportive environment, equitable access, instructional flexibility, and instructional integration" (Chisholm, p. 251). Similarly, Chuang et al. (2020) identified cultural values, culturally relevant curricula, cultural scaffolding, multicultural collaboration, and integration of technology and multicultural perspectives as the five constructs related to culturally responsive teaching in technology-supported learning environments. Additionally, scholars argued that sociocultural approach to mobile learning is the way to bridge students' school and home experiences and ensure that students feel empowered and have equitable access to technology, their diversity is valued, their cultural and linguistic needs are met, and the learning is relevant and authentic (Prieto et al., 2016; Yuen et al., 2020).

In the study of diverse learners' perceptions of the use of technology in an online learning environment, Kumi-Yeboah et al. (2020) found that *interactivity* as a critical component in using digital technologies in teaching and learning of these students. The linguistically and culturally diverse learner participants in their study identified interactive digital technologies, such as video lectures, voice thread, blogs and blogging, wikis, Google Hangouts, multimedia presentation tool PowerPoint and Prezi, and social network tools as learning tools that helped them "to engage, participate, and contribute to knowledge creating in the online discussion forums" (Kumi-Yeboah, 2020, p.49) as part of their online educational process. The participants further reported the positive influence of the interactive digital tools on their "understanding of the course content, increased their participation in the educational process, and the opportunity for the collaborative online knowledge construction positively influenced their academic achievement" (Kumi-Yeboah, 2020, p. 55-56). Similarly, in higher education ESL classroom setting, Mendoza (2019) identified the interactive use of Blackboard discussion boards with emergent bilinguals as culturally responsive technological tools. The interactive ability of certain digital learning tools is the quality that directly satisfies the SCT's fundamental constructs (Balbay, 2018). The interactivity allows for a social interaction within the learning process during which the learners can employ their unique, culturally diverse tools to make meaning of the tasks and concepts. It provides space for scaffolding through the assistance of the more knowledgeable other (teacher or peers). It promotes the learner's inner speech (thinking about their metacognitive process) and therefore contributes to the learner's self-regulation. It employs dynamic assessment

within the zone of proximal development (Balbay, 2018). In this way, some digital technologies have the ability to act as a mediation tool to not only produce but also to construct knowledge (Morossan et al., 2017), and through technological tools, culturally relevant pedagogy could be incorporated to meet the needs of all students (Jackson et al., 2021). Numerous studies have identified the connection between the technology integration and culturally responsive instruction in the diverse educational settings. As Rosenberg and Koehler (2015) suggested, taking context seriously and spending time in the complex classroom settings will lead to understanding under which conditions "teaching with technology is most effective" (p. 196). SLIFE classrooms represent such complex context, but fewer studies examine how the educational practitioners engage technology in this unique teaching and learning context. The purpose of this quantitative study was to expand what is known about using educational technology with ELLs who are SLIFE and determine whether the teachers' self-reported multicultural competencies can predict the use of digital learning tools in instruction of these diverse learners.

Students with Limited or Interrupted Formal Education

The increased levels of immigration result in growing numbers of ELLs in U.S. classrooms and globally; however, these students vary greatly in their cultural, linguistic, socioeconomic, and prior academic backgrounds (DeCapua & Marshall, 2010, 2020, 2023). One of the growing subpopulations of ELLs are SLIFE who are ELLs without age-appropriate formal education and first language literacy (Custodio, 2011; DeCapua et al., 2007, 2009; WIDA, 2015). In the literature, these students are also identified as Students with Interrupted/Inconsistent Formal Education (SIFE), a label generally applied

to immigrant and refugee youth whose formal education was interrupted by the migration process from their previous country of residence to the United States (Freeman & Freeman, 2002). Some other labels applied to this student population are asylum seekers, refugees and multicultural adolescent refugees (secondary level), unaccompanied refugee minors, and newcomers (Amnesty International, n.d.). In this section, I identify the unique characteristics and challenges of SLIFE, especially when they enter or re-enter schooling at the secondary level and I discuss the existing recommendations in teaching SLIFE while identifying the gap in research about effective and culturally responsive integration of technology in high school language and content area SLIFE classrooms.

Social and Cultural Context

In the literature, SLIFE are defined by their common features, which are having a home language other than English, entered United States after the second grade, had (2 years) less schooling in their home country, and consequently are below grade level (at least 2 years) academically (Custodio, 2011; DeCapua et al., 2020; Potochnick, 2018; WIDA, 2015). Furthermore, many have low or no literacy and numeracy skills and are members of collectivist cultures (DeCapua & Marshall, 2015; Rothstein et al., 2009) As a result of the aforementioned factors, these students have significant gaps and need distinct pedagogical strategies (Custodio, 2011; DeCapua et al., 2009; Marshall, 2018; Potochnick, 2018). For these students, the linguistic barrier is only one of the barriers these learners experience. The interrupted schooling affects SLIFE's academic achievement, and scholars argue that it also affects student sense of belonging in schools and has a long-term impact on their well-being (Custodio & O'Loughlin, 2017;

Newcomer et al., 2021). The signs of SLIFE emotional difficulties and psychological distress due to relocation and flight-related trauma can manifest themselves in the signs of emotional withdrawal, anxiety, and depression (Namer et al., 2022) to which the most recent literature identifies recommendations to prioritize socioemotional support upon their school reentry (Hos, 2020; Newcomer et al., 2021; Suarez-Orozco et al., 2018). In summary, the growing numbers of SLIFE enrolling in US schools result in an increased cultural, linguistic, academic, socioeconomic, and even socioemotional diversity that translates to increased demands for culturally responsive instructional approach.

In the attempts to meet SLIFE's language, literacy, academic, and socioemotional needs while recognizing and including their cultural backgrounds, programs with a variety of specially tailored approaches have developed over time, and many have included *cultural content* as a culturally responsive approach to accommodate SLIFE's culturally different ways of learning. However, DeCapua and Marshall (2010) argued that more attention needs to be paid to *cultural factors* in learning and teaching, and as two major cultural factors they named the difference between *high-context* and *low-context* cultures and the difference between *pragmatic* and *academic* ways of conceptualizing information. Further, DeCapua and Marshall (2011) pointed out *orality-literacy* difference and *collectivism-individualism* orientation as additional challenges SLIFE have to overcome when entering the Western-style of schooling. The idea of high- and low-context culture is based on the work of Hall (1976) who identified high-low context as an important variable in distinguishing cultures. According to his work, cultures can be generally classified on the continuum from low-context to high-context. The low-context

cultures are usually individualistic while the high-context cultures are generally collectivist, value social relationships and interdependency within the extended network, and direct responsibilities, obligations, and accomplishments toward the common good. Although Hall's contexting continuum has been scrutinized for the author's research methodology inconsistencies, and no follow up studies have validated the contexting model (Cardon, 2008), the high-low continuum of classifying cultures is important to consider, as this can present itself as one of the factors influencing effective communication and relationships in a multiculturally diverse environment such as classroom, especially when Hall (1992) argued that "culture is communication, and no communication by humans can be divorced from culture" (p. 212). What is important to note in relation to SLIFE is the country classification attached to Hall's contextual model, although unsubstantiated and disputed, that positioned the countries in North America, Europe including Russia, and Australia to the "low-context end of continuum", and the countries in South America, Southern Europe, Africa, Arab countries, and the countries in Asia to the "high-context end of the context-model continuum" (Kittler et al., 2011, p. 69, 75). According to the most recent United Nations Refugee Agency's data, the top three areas of refugees coming to the US are Africa, Near East/South Asia, and Latin America/Caribbean (United Nations High Commissioner for Refugees [UNHCR], 2022); therefore, many newly coming SLIFE may be displaying the high-context characteristics, which clash with the U.S. schools' low-context academic environment.

Another factor to consider when working with SLIFE is their informal, pragmatic vs. formal, academic ways of making meaning. While the Western educational model is

based in abstract reasoning, print resources, standards-based curriculum, and formal assessments, SLIFE prefer oral transmission of information (DeCapua & Marshall, 2010, 2015), understand the world in pragmatic ways, and interpret the world through their *funds of knowledge* rooted in their life experiences (Gonzalez et al., 2006; Moll et al., 1992, 2006) as a foundation for interpreting new information (Cummins, 1996). With the growing global displacement of refugees who are SLIFE coming from high-context cultures, the U.S. classrooms are experiencing a high influx of students who have mismatched prior cultural and educational experiences and expectations and are experiencing *cultural dissonance*, a term coined by Ibarra (2001).

Secondary Level Language Acquisition and Cognitive Challenges

Pedagogical practices are culturally embedded (DeCapua & Marshall, 2011). The Western-style model of the U.S. schools is predicated on working with a learner who is a member of a low-context culture, learns in academic ways through literacy, and aims to achieve his or her individual success. On the contrary, students from high-context collectivist cultures with little or no literacy are more comfortable with oral modes of learning and require interconnectedness and immediate relevance as two important conditions for learning (DeCapua & Marshall, 2011). According to Potochnick (2018), 65% of SLIFE arrive in the U.S. schools at the adolescent age of 12 or older. Immediate relevance is especially important for these SLIFE adolescent newcomers, as they bring with rich life experiences and *funds of knowledge* from cultures in which they are viewed as adults. These students are generally highly motivated and with high aspirations for the future but not always prepared to reenter school and experience *cultural dissonance*

(DeCapua & Marshall, 2015; González et al., 2006; Ibarra, 2001; Hos, 2020; Moll et al., 1992).

The standardized educational system in the United States operates on the assumption that every student arrives at a grade level having mastered all the prior levels skills as prescribed by the state's educational standards. The realities of interrupted schooling proof otherwise and require curriculum that responds to SLIFE students' diverse academic and linguistic needs and considers their prior cultural backgrounds as well as their relocation and school reentry experiences. Although SLIFE students do not generally arrive in the U.S. classrooms with a common knowledge base, the literature suggests that they remain in their age-level cohorts (Drake, 2017), which, especially at the secondary level, exacerbates the barriers to learning and teaching. The major challenge for ELLs in general is the pressure to simultaneously master English and learn grade-level content in the new language (Potochnick, 2018). The general consensus among educators is that at the elementary level students learn to read while at the secondary level students read to learn. Therefore, while the elementary students are provided with more time and support in the mastery of language, the secondary teachers' curricula are built around the content area knowledge. Consequently, high school ELLs, other than in their language acquisition classes, are less likely provided with explicit language instruction in the various content areas (Janzen, 2008; Ruiz de Velasco & Fix, 2002). This presents a disharmony between the high school teachers' expectations and prerequisites and the ELLs' knowledge and abilities. According to Freeman and Freeman (2002), students' prior exposure to formal education and literacy is a key influencing

predictor of their academic success. Therefore, while ELL students may be learning a familiar academic content in a new language, SLIFE, especially at the secondary level, have limited time to overcome the challenge of learning the subject area academic content not only in a new language but for the first time while at the same time developing literacy skills and building English proficiency and all that in an unfamiliar formal classroom setting (DeCapua & Marshall, 2011, 2015; Hos, 2020; Potochnick, 2018).

While the teaching approach is important to consider with any student population, it is especially important with SLIFE, and Gay's (2000, 2010) culturally responsive teaching and DeCapua and Marshall's (2015, 2023) Mutually Adaptive Learning Paradigm (MALP) are so far the most recommended research-based approaches. Originally proposed by Gay (2000), culturally responsive teaching attempted to shift the idea that marginalized student populations are culturally deficient to an understanding that they are culturally different, and that the schools need to accommodate and incorporate these cultural factors into instruction. Cultural competence, culturally relevant curriculum, supportive learning community, cultural congruity, and effective instruction were laid out as the theory's basic tenets. DeCapua and Marshall (2015) built on the culturally responsive teaching tradition and created a MALP instructional model that with its three components: conditions, processes, and activities empowers both teachers and students mutually adapt to each other's paradigms and creates space for SLIFE to gradually acculturate and achieve success in the formal U.S. educational system. According to MALP, SLIFE *conditions* for learning (interconnectedness and

immediate relevance) are to be accepted as students bring them to class. *Processes* (the ways students interact with the material and demonstrate mastery) are to be built on the SLIFE oral skills to develop literacy skills and both shared responsibility and individual accountability occur. *Activities* begin teaching the academic task with familiar content and language to provide opportunities for SLIFE to acquire and practice new, academic ways of thinking, and teachers introduce new concept and language only after students learned to perform the given academic task (DeCapua & Marshall, p. 7-9). Rooted in the principles of culturally responsive teaching, MALP model was built specifically with SLIFE students in mind, as it validates SLIFE learning paradigm, ensures interconnectedness and immediate relevance, and provides opportunities in class to share responsibility, collaborate, and work together, and as such provides SLIFE a bridge to formal education (DeCapua, 2016; DeCapua & Marshall, 2015, 2023). When asked, secondary SLIFE themselves confirmed the application of culturally responsive teaching and MALP principles by overwhelmingly identifying the culturally responsive caring of their teachers and of having opportunities to practice and apply skills collaboratively as effective teaching strategies (Daniel, 2018; Daniel & Zybina, 2019). Because MALP empowers SLIFE to achieve academically and gradually adapt to the Western-style educational system, this approach has the potential to make a difference between secondary-level SLIFE achieving educational success or adding to a concerning number of ELL/SLIFE high school dropout, which, according to Fry (2005, as cited in Potochnick, 2018, p. 859), is seven times higher for SLIFE than those without interrupted schooling. This statistic is difficult to confirm through newer sources due to the

inconsistencies in tracking and identification of SLIFE (Browder, 2014; Morgan et al., 2023; Potochnick, 2018; Ruiz-de-Velasco & Fix, 2000). My best attempts to update the previously available and continuously frequently cited statistic (Fry, 2005) led me to Flueckiger's (2020) dissertation study findings specific to the Greater Boston Area urban high school, in which the author concluded that the 2020 SLIFE cohort graduation rate was 37.5%, which was 15.5% lower than their ELL peers, a statistic that should be considered alarming.

SLIFE and DLRs

The rapid educational technology adoption in schools prior to COVID-19, the upsurge of technology-driven out-of-classroom instruction during COVID-19, and the remaining post-COVID-19 increased volume of technology-based educational tasks presented to students in- and out-of-classroom preceded research about the best practices in the use of technology in general and with ELLs and SLIFE more specifically. In the enriched-with-technology educational scenario, in addition to SLIFE cultural, linguistic, academic, socioeconomic, and socioemotional diversity, the lack of digital literacy skills (Drolia et al., 2020; Hsu, 2016; Smyser, 2019) that is typical for many SLIFE needs to be considered as the students' computer skills can present a considerable barrier to successful technology integration and use (Andrei, 2017). Therefore, there is a need to understand what technology to use with SLIFE students - especially those reentering school at the secondary level – in a way that acknowledges their unique needs, increases their engagement, improves their academic achievement, and scaffolds instruction toward gradual assimilation into the formal schooling.

Much of the existing literature that focuses on the use of educational technology with the linguistically diverse student populations is related to integration with ELLs and not uniquely SLIFE. Additionally, the focus of the existing research is mainly on language learning and academic language learning in the content areas, and there exists a significant argument for the use of multimodal delivery of instruction at all K-12 levels when working with ELLs (Andrei, 2017; Love et al., 2017, Miller, 2018; Siefert et al., 2019). At the elementary level, Miller (2018) argued that the use of digital tools in language learning for elementary and early childhood learners validates the constructs of SCT (Vygotsky, 1978) by providing a social environment and that it supports the constructivist approach (Piaget, 1964, 2003) by facilitating a collaborative, hands-on, student centered engagement. At the middle and high school levels, due to the addition of content area learning, the focus shifts from strictly a language acquisition to language and literacy development for the purpose of mastering the content area material. In the study of middle school teacher perceptions and use of technology with ELLs across content areas, Siefert et al. (2019) applied the SAMR model of technology integration (Puentedura, 2013) and identified that while well-intended to use multimodal digital tools to integrate oral language into content-area assignments to support students' literacy and language development, teachers used technology mostly for substitution and enhancement purposes instead of using digital tools to facilitate meaningful, collaborative, authentic, student-centered learning experiences. However, all teachers under study recognized the important role of ELLs' *funds of knowledge* (Moll et al., 1992) and enabling students to incorporate their home languages into content area

learning while utilizing the ability to access dictionaries and translators (p. 116). Similarly, Andrei (2017) in the study of middle school English as a second language (ESL) teachers concluded that the teachers were not taking a full advantage of the multimodal and interactive capabilities of the technology available to them in their school and classrooms, and consequently, their students were not engaged through collaborative and hands-on activities. The author concluded that technology has potential to support English language and content area learning but identified teacher and environment-related barriers to its use. At the high school level, the use of e-books proved to be effective in providing students with opportunities for multiple exposures to content-specific academic vocabulary. Love et al. (2017) emphasized that limited academic vocabulary can hinder student's academic progress, especially at the high school level, and concluded that e-books provide flexible ways to preview and review vocabulary needed for deeper understanding and reaching academic success in a given content area. However, also in this scenario, technology was used as a mean to supplement direct instruction and assist the teacher in meeting the academic teaching goal rather than in meeting the learning needs of the linguistically diverse student.

According to the U.S. Department of Education (2016, 2017), in terms of the impact on student learning, the role of technology has changed from the focus on mainly improving productivity and lower-level drill-type practice to dynamically transforming learning. Technology has the potential to support culturally responsive classroom and help in the development of higher-level cognitive skills (Delgado et al., 2015), student-centered knowledge construction (Morossan, 2017), engaging all students in

collaborative learning while learning through culturally responsive teaching and simultaneously building digital literacy skills (Chuang, 2016), and meeting the needs of all students (Jackson et al., 2021). According to Chuang et al. (2020), technology integration also represents the best practice for teaching in a multicultural classroom, and a classroom with diverse ELLs and SLIFE classifies as such an environment.

What is currently known about technology use with ELLs is that the digital tools can advance the language acquisition development and content-area learning by facilitating learners' interactions and learner-centered engagement (Andrei, 2017; Carhill-Poza et al., 2020; Love et al., 2017; Miller, 2018). Technology also has the ability to provide rich and varied learning opportunities for ELLs and foster authentic and engaged learning experiences (Siefert et al., 2019). As such, technology has the ability to support the tenets of the SCT (Vygotsky, 1978) by facilitating a space for language and cognitive developments within social activities and meaningful human interactions (Lantolf, 2000; Miller, 2018).

In respect to SLIFE, research is scarce partly because SLIFE are somewhat complicated to identify and track due to the use of inconsistent indicators and out of date or limited data, especially at the national level (Arundel, 2022; Browder, 2014; Potochnick, 2018; Ruiz-de-Velasco & Fix, 2000). What has, however, the ability to inform the use of technology with SLIFE is research regarding the use of technology with refugee students. Refugee children and youth display all the SLIFE characteristics with their heterogenous aspects of origin, language acquisition, sociocultural and educational background, life experiences, place of residence, living conditions, health, and legal

status (Drolia et al., 2020). In order to reach these students, the use of mobile technologies has been investigated, and the results of multiple studies confirmed similar possibilities as well as barriers to using technology with these refugee SLIFE students. In terms of possibilities, the research review conducted by Drolia et al. (2020) team identified the conditions for effective mobile learning for the refugee SLIFE that is consistent with Vygotsky's (1978) SCT, the principles of culturally responsive teaching (Gay 2000, 2010) and MALP (DeCapua & Marshall, 2015, 2023). These conditions are "ensuring language accessibility, reducing cognitive overload by providing learning support in a way of content scaffolding, accommodating the need for socialization and collaboration, and ensuring relevance of the content to the students' daily lives" (Drolia et al., 2020, p. 8). The researchers also confirmed the barriers to effective technology integration with refugee SLIFE that are similar to those with ELLs. From the most frequent barriers previously highlighted in research with ELLs such as teacher attitudes, motivation, and beliefs toward technology, lack of training and professional development, time, adequate resources, and students' computer skills (Altavilla, 2020; Andrei, 2017; Hockly & Dudeney, 2018; Hsu, 2016), the *digital literacy* gap appears the most significant (Drolia et al., 2020). Digital literacy, as classified by Bussert-Webb and Henry (2016), exists at three level: basic digital literacy level (keyboard and apps/software navigation skills), intermediate skill level (conducting digital research), and advanced digital literacy level (evaluating digital information through a critical lens). Refugee children and women especially frequently lack even the basic digital literacy skills, which further complicates inclusion of technology in their education (AbuJarour,

2020; Smyser (2019). While mobile learning contributes to refugee education by providing access to and quality education, it is not a universal solution when working with such heterogenous groups of students and researchers caution about technology use limitations (Drolia et al., 2020).

The review of existing literature documents insufficient research about technology use with SLIFE, and the gap in the literature about technology use with secondary SLIFE specifically is evident. The one study conducted in a U.S. urban high school that implicitly addressed high school SLIFE in a technology-enhanced classroom is the study conducted by Carhill-Poza et al., (2020). The researchers employed SCT-based student-centered learning (Vygotsky, 1978), theory of multimodality as a central feature of technology-enhanced learning environment (Kress, 2003), and culturally responsive teaching strength-based teaching principle (Gay, 2000) in investigating how technology-enhanced environments affect adolescent English learners' learning. A comprehensive mixed method approach allowed the researchers to collect data about student growth in English proficiency, academic achievement and engagement, language and technology use outside of school, and student and teacher views of technology-enhanced practices. The data documented both student and classroom factors affecting growth in English proficiency and academic achievement and illuminated the effects of the diversity within the ELL student population on learning. While not explicitly naming SLIFE, the researchers identified that some ELL's prior educational experiences, socio-economic standing, student need to work outside of school, opportunities to use English with friends, and access to technology at home are the factors affecting student academic

growth. Because Carhill-Poza et al., (2020) emphasized a high variability among ELLs, the students affected by the aforementioned factors could fall within the SLIFE category. The notable finding of the study was that what best supports language and content area mastery include student-centered learning and strength-based teaching in a technologically enhanced classroom even though 19.1% of observed students were not convinced about whether the technology in their classroom "added any value to their learning" (Carhill-Poza et al., p.4).

In summary, what is currently known from the literature focused on serving ELLs in a technology-enhanced classroom is that technology integration needs to be purposeful and intentional (Altavilla, 2020; Miller, 2018; Siefert et al., 2019) and with a constructivist approach that is hands-on and student-centered (Andrei, 2017; Darling-Aduana & Heinrich, 2018; Miller, 2018). Access to hardware, software, and the internet alone does not guarantee student learning (Hockly & Dudeney, 2018; Prince, 2017). The students' learning needs and preferences need to be considered, and technology should match those needs and be used to enhance learning and not to replace other teaching methods (European Commission et al., 2017; Darling-Aduana & Heinrich, 2018; Miller, 2018; Prince, 2017). Technology should be used as a "tool for learning rather than a means to an end" (Siefert et al., 2019, p. 119) and as a tool to incorporate culturally responsive teaching (Jackson, 2021). Finally, and for SLIFE most importantly, effective technology-based instruction for ELLs is such that it allows not only interaction with the content but also frequent communication between the students and their peers and teachers (Miller, 2018).

While the body of literature focused on SLIFE has grown in recent years, there is little known about the use of educational technology with these students. With the exception of the work of Carhill-Poza et al. (2020) who indirectly recognized external influences on SLIFE learning, there is no study that clearly outlines specific uses of technology with SLIFE. My study added to the existing limited body of knowledge about the use of technology specifically with ELLs who are SLIFE and specifically at the high school level by examining the influence of teachers' self-reported multicultural teaching competencies (skills and knowledge) as a precondition of culturally responsive teaching (Spanierman et al., 2011; Walter, 2018) on the choices of DLRs when working with high school SLIFE in both language and content area classrooms.

Summary and Conclusion

Multiculturalism and multicultural education aim to ensure equitable educational opportunities and removing barriers to learning for students from diverse cultures by placing students' background, life experiences, and learning styles in the center of curriculum, instruction, and assessment planning and delivery (Alismail, 2016; Banks, 1993, 1997, 2013, 2019; Multicultural, 2013; NAME, 2021). Multiculturalism is a precondition to culturally responsive teaching (Spanierman et al., 2011; Walter, 2018), and teachers' multicultural competencies are associated with their ability to provide culturally responsive instruction (Abacioglu et al., 2020). Consequently, the need for training in how to operationalize teachers' multicultural attitudes, knowledge, and skills, especially in case of in-service teachers who work in the multicultural environments, has been documented in the scholarly literature (Gay & Howard, 2000; Doran, 2017;

Karacabey et al., 2019; Pourdavour & Yan, 2020; Uzunboylu & Altay, 2021). I centered my study around high school language and content area in-service teachers' experiences when working with SLIFE in a technology-supported classroom.

SLIFE require culturally responsive education (DeCapua & Marshall, 2015; DeCapua, 2016; Dover, 2013; Ladson-Billings, 1994, 1995, 2006, 2014, 2023). To meet their diverse needs, teachers need to consider the cultural, linguistic, socioeconomic, socioemotional, and relocation-and-school-reentry experiences and the significant academic gaps (Custodio, 2011; DeCapua et al., 2009; Herrera et al., 2022; Hoss, 2020; Marshall, 2018; Potochnick, 2018) that can have a lasting impact on SLIFE well-being (Custodio & O'Loughlin, 2017; Newcomer et al., 2021; Namer et al., 2022). Especially the high school SLIFE struggle with a school reentry in general after coming from cultures that considered them as adults and academically as they are mastering English and learning grade-level content in a new language and in a low context Western educational model (DeCapua & Marshall, 2011, 2015; Hos, 2020; Potochnick, 2018). However, in scholarly discussion, teachers' unpreparedness to serve culturally and linguistically diverse students has been a frequently reoccurring topic (Helfrich & Bean, 2011; Im & Martin, 2015; Santoro & Kennedy, 2016; Zhao et al., 2009).

Teaching in a diverse classroom is intense and complex (Jabeen, 2019), and adding technology increases the complexity of the educational process as well as further complicates the culturally responsive teaching (Frederick & Shockley, 2008; Nielsen et al., 2020). Teachers of diverse students have to make a variety of additional instructional and pedagogical choices (Halvorsen, 2017) when implementing technology and have

knowledge and access to various resources (Darling-Aduana & Heinrich, 2018). The demand to deliver culturally responsive instruction in technology-supported learning environments only adds an additional layer to the teachers' general unpreparedness to deliver culturally relevant instruction to multicultural audiences, and the scholars recommend that the attitudes, knowledge, and skills needed for both culturally responsive teaching and culturally responsive teaching with technology is best acquired through meaningful, hands-on activities within the English learner environment (Hu et al., 2021; Chuang et al., 2020; Darling-Aduana & Heinrich, 2018; Frederick & Schockley, 2008).

Current research documents that technology has the potential to meet the needs of all students and is the best practice for teaching in a multicultural classroom (Chuang et al., 2020; Jackson et al., 2021). It can advance the language and content-area knowledge acquisition, help develop higher-order cognitive skills, support student-centered engagement and knowledge construction, engage students in collaborative learning, foster authentic learning experiences, build digital literacy skills that SLIFE generally lack and that presents a considerable barrier to technology integration (Drolia et al., 2020; Hsu, 2016; Smyser, 2019) as well as overall support culturally responsive classroom (Andrei, 2017; Carhill-Poza et al., 2020; Chuang, 2016; Delgado et al., 2015; Love et al., 2017; Miller, 2018; Morossan, 2017; Siefert et al., 2019). Additionally, technology can facilitate social activities and students' interactions in which language and learning develop under the guidance of the more knowledgeable other (peer, teacher, technology) while recognizing students' culturally unique funds of knowledge, and therefore it has the ability to support the tenets of SCT (Vygotsky, 1978). The sociocultural approach to

learning with technology also provides a bridge between school and home experiences (Prieto et al., 2016; Yuen et al., 2020), and even the diverse learners' themselves identify that the *interactive* character of DLRs such as video lecture, voice thread, blogs and blogging, Google Hangouts, multimedia presentations, and social networks help them engage, participate, contribute, and learn (Kumi-Yeboah et al., 2020, Mendoza, 2019). The interactive character of some DLRs is where technology directly meets the tenets of SCT by allowing for a social interaction in the learning space while providing scaffolding within the zone of proximal development, and opportunity for students to use their own culturally unique tools to make meaning and internalize the newly constructed knowledge through their inner speech (Balbay, 2018; Vygotsky, 1978).

While a positive impact on technology-integrated instruction with linguistically diverse students is documented in the literature (Lee et al., 2022), most existing studies documented the use of DLRs with ELLs and not uniquely SLIFE and primarily in language learning and mostly at the elementary, middle, and higher levels of education and with focus on specific devices and tools (Arce & Valdivia, 2020; Darling-Aduana & Heinrich, 2018; Kumi-Yeboah at al., 2020; Lai, 2016; Meina et al., 2021; Mendoza, 2019; Mifsud et al., 2013; Park & Warschauer, 2016; Prince, 2017; Soruc & Tekin, 2017). With the global displacement of refugees, research begins to emerge about using technology with refugee students who have SLIFE characteristics, and the identified conditions for the use of technology with this population are consistent with the SCT, the principles of culturally responsive teaching, and MALP and are: ensuring language

accessibility, reducing cognitive overload by scaffolding, socialization and collaboration, and ensuring immediate relevance to students' living experiences (Drolia et al., 2020).

The general consensus is that integrating DLRs in a multicultural classroom is one of the best practices (Chuang et al., 2020; Darling-Aduana & Heinrich, 2018) and helps facilitate student-centered learning (Gomez et al., 2022). However, while that lack of digital literacy is one of the barriers to technology integration on the student side, there are also teacher barriers such as teacher attitudes, motivation, and beliefs toward technology, lack of training and professional development, time, and adequate resources (Altavilla, 2020; Andrei, 2017; Hockly & Dudeney, 2018; Hsu, 2016), Therefore, some researchers caution about the fact that due to the limitations, technology may not be a universal solution to add value to teaching diverse students (Drolia et al., 2020), to which even some students themselves attest (Carhill-Poza et al., 2020).

Factors such as learning context, pedagogical use of DLRs, and teaching method may mediate the effect of technology-integration with ELLs (Lee et al., 2022), which results in the lack of consensus about the use of educational technology with ELLs, and a gap exists in research about which DLRs ensure the best culturally responsive experience, engagement, and achievement of diverse students, specifically SLIFE, and especially SLIFE in a high school classroom. The goal is to meet students' needs, and the needs of SLIFE present a unique and highly variable context for culturally responsive technology integration. However, not all educational technology supports the diverse learners in an equitable and culturally responsive way (Chisholm, 1998; Dolan, 2017; Greene-Clemons, 2016; Morgan, 2014; Stafford-Levy & Wiburg, 2001). Therefore, the

scholars suggest considering the sociocultural context of the diverse students, and, grounded in the constructivist learning theories and Vygotsky's (1978) SCT, select the DLRs with cultural sensitivity (Kelly, 2007) and create online learning experiences that help the diverse learners to engage, participate, and contribute to knowledge creation and making meaning online (Kumi-Yeboah et al., 2020).

What is currently known is that technology integration with the linguistically diverse students must be purposeful and intentional (Altavilla, 2020; Miller, 2018; Siefert et al., 2019) and with a hands-on and student-centered constructivist approach (Andrei, 2017; Darling-Aduana & Heinrich, 2018; Miller, 2018).

Additionally, technology should match students' learning needs, preferences, cultural, and experiential filters, and enhance learning (European Commission et al., 2017; Darling-Aduana & Heinrich, 2018; Miller, 2018; Prince, 2017). It should be a tool for learning and incorporating culturally responsive teaching (Siefert et al., 2019; Jackson, 2021). Considering the sociocultural context of the diverse learners and constructivist and sociocultural theories of learning, DLRs should be selected with cultural sensitivity (Kelly, 2007), and, as SLIFE themselves highlight, technology should create collaborative online learning experiences that help them engage, participate, and contribute to knowledge creation and making meaning online (Daniel, 2018; Daniel & Zybina, 2019; Kumi-Yeboah et al., 2020).

What is not known is whether the theory meets the practice in such a unique and complex context as is a multicultural SLIFE classroom. My study attempted to contribute to the gap in the literature about SLIFE, as in Chapter 3, I explain how I employed

correlational predictive model to investigate whether the high school teachers of SLIFE apply their multicultural teaching competencies when choosing the DLRs in a way that would help deliver the content in a culturally responsive way and warrant SLIFE the opportunities to engage, participate, and contribute in a meaningful and productive way and support their academic achievement. By doing so, the results may assist high school teachers of SLIFE in the complex task of selecting the DLRs that align with SLIFE learning paradigm, which originates in their high context cultural background and pragmatic view of the world, that honor their funds of knowledge, and that ensure interconnectedness, immediate relevance, and collaboration (DeCapua, 2016; DeCapua & Marshall, 2015; Daniel, 2018; Daniel & Zybina (2019).

Chapter 3: Research Method

The purpose of this quantitative correlational predictive study was to examine whether the high school language and content area teachers' self-reported multicultural teaching competencies (skills and knowledge) predict the choice of DLRs they use with ELLs who are SLIFE. The definitions of the terms SLIFE and DLRs were clearly delineated in the survey. To accomplish the study's purpose, I collected survey data from currently active in-service high school English language (ESL, ENL) and content area (math, science, social studies, etc.) teachers who work with SLIFE. The type of teacher assignment (language vs. content area) was considered and statistically acknowledged as a covariate variable. Other demographic variables were also investigated for their potential effect on the dependent variable, and the presence or absence of a specialized EL/TOESL licensure/certification was also identified as appropriate to be included in the statistical model. From the data collected, I then analyzed the relationships between the major variables in this study.

In Chapter 3, I outline my research methodology for this study. I first describe my research design and rationale for applying this design. Then, I describe the target population, recruitment plan, and sampling strategy. Next, I discuss the instrument, data collection, and data analysis plan. I conclude the chapter with the discussion of threats to external and internal validity and ethical considerations I followed as I conducted my study.

Research Design and Rationale

In this quantitative correlational predictive research design, I examined whether the independent variables of high school language and content area teachers' self-reported multicultural teaching skills and multicultural teaching knowledge (jointly referred to as multicultural teaching competencies) predict the choice of the dependent variable of DLRs (digital academic content tools, digital productivity tools, and digital communication tools) when working with ELLs who are SLIFE. The questions that guided my study were as follows.

RQ1: Do high school language and content area teacher's self-reported (a) multicultural teaching skills and (b) multicultural teaching knowledge predict the utilization of *digital academic content tools* when working with SLIFE?

RQ2: Do high school language and content area teacher's self-reported (a) multicultural teaching skills and (b) multicultural teaching knowledge predict the utilization of *digital productivity tools* when working with SLIFE?

RQ3: Do high school language and content area teacher's self-reported (a) multicultural teaching skills and (b) multicultural teaching knowledge predict the utilization of *digital communication tools* when working with SLIFE?

The quantitative correlational predictive research design was applicable to my study and related to my RQs because in my study, I was attempting to identify the predictive capability of the independent variable on the dependent variable. The quantitative correlational predictive method allowed me to quantify the empirical relationship between the variables and describe the level of association between the

teachers' multicultural teaching competencies and their DLRs choice (see Babbie, 2017). Additionally, there was no control or treatment group and therefore no influence of the researcher on the process, and the data collected from a sampling of the population were statistically analyzed to see whether the variables were associated in a way consistent with the existing literature and with my expectations as a researcher.

In my study, I examined the association between high school language and content area teachers' multicultural teaching skills and multicultural teaching knowledge as my independent variables and their choice of DLRs (digital academic content tools, digital productivity tools, and digital communication tools) for SLIFE as the dependent variable, and the purpose of my investigation was to understand to what extent, if any at all, the independent variables predict the choice of the dependent variable. Therefore, the research design I selected for my study was correlational research design. This type of research design facilitates prediction and explanation of the relationships between variables (Seeram, 2019). Specifically, the quantitative correlational predictive research design was the most applicable to my investigation because I was attempting to quantify the predictive capability of my independent variables on the dependent variable.

The quantitative correlational predictive research design is a nonexperimental research design that does not involve any manipulated treatment variable; instead, the variables measured are believed to be meaningfully related (Warner, 2013). The rationale of using a correlational predictive research design was that it allowed me to identify the association between the variables and to what extent the variables might be correlated. The correlational statistical test helped me to describe the association in a quantitative,

objective way (see Seeram, 2019). Additionally, by using the survey data collection method, I was able to collect data from a large sample of high school teachers at one time (see Creswell & Guetterman, 2019), relatively quickly, and with a minimal research cost (see Kelley et al., 2003).

In correlational research, the other type of research method is correlational explanato*ry* research design. The correlational explanatory research design is used to explain why two or more things are related, and the researcher is concerned with determining the strength and direction of correlation (Seeram, 2019). In comparison, the correlational predictive design is concerned with whether the predictor variable has the capability to predict the criterion/outcome variable. This type of design was more applicable to the purpose of my study because there is little known in the literature about the influence of teachers' multicultural teaching competencies as preconditions of culturally responsive teaching (see Spanierman et al., 2011; Walter, 2018) on the choices of DLRs when working with secondary SLIFE in both language and content area classrooms.

Methodology

In this Chapter 3 methodology section, I include information about the population of my study. I describe the sampling and sampling procedures, including both inclusion and exclusion criteria as well as the recruitment strategy. I specify the instrument, data collection, operationalization of variables, and the data analysis plan. I conclude the methodology section of Chapter 3 by addressing the threats to external and internal validity and the ethical procedures I followed while conducting my research.

My role as researcher did not conflict with my present position as a secondary English Language Arts and ENL/ESL instructor in a small Midwestern urban school district because a nonexperimental research design did not involve any manipulation of variables by a researcher (see Warner, 2013). While collecting survey data, I was not directly collecting any information from the teachers in my district and/or in my school. Had these teachers gained access to the survey due to their associations with various educational organizations and/or social media, I was not able to identify their affiliation since the survey was anonymous.

Population

The target population for this study included high school English language (ENL/ESL) and high school content area teachers of SLIFE. For the teacher participant inclusion criteria purpose as well as for the overall purpose of this study, SLIFE definition was clearly identified. As defined from the literature in Chapter 2, SLIFE is one of the growing subpopulations of ELLs, and they vary greatly in their cultural, linguistic, socioeconomic, and prior academic backgrounds (DeCapua & Marshall, 2010; Pentón-Herrera, 2022). SLIFE are ELLs without age-appropriate formal education and first language literacy (Custodio, 2011a; DeCapua et al., 2007, 2009; Pentón-Herrera, 2022). The existing literature also identifies these students as students with interrupted/ inconsistent formal education (SIFE), a label generally applied to immigrant and refugee youth whose formal education was interrupted by the migration process from their previous country of residence to the United States (Custodio & O'Loughlin, 2017; Freeman & Freeman, 2002). Some other labels applied to this student population are

asylum seekers, refugees and multicultural adolescent refugees (secondary level), unaccompanied refugee minors, and newcomers (Amnesty International, n.d.). Their common features are having a home language other than English, entered United States after the second grade, had (2 years) less schooling in their home country, and consequently are below grade level (at least 2 years) academically with low or no literacy and numeracy skills (Custodio, 2011; DeCapua et al., 2009; DeCapua & Marshall, 2015a, 2015b; DeCapua et al., 2020; Potochnick, 2018; Pentón-Herrera, 2022).

Potochnick (2018) conducted the first and to date only national-level assessment of size and academic performance of immigrant students who are SLIFE. The author concluded that from the 11.4% of SLIFE in U.S. schools, 65% of them arrive at the secondary age and struggle acquiring the academic language needed to master the academic content in a short period of time, which complicates the teaching and learning process. Therefore, the target population of this study were the high school language and content area teachers of SLIFE. The target population size is, as literature on correlational research suggests, a minimum of 30 participants; however, in order to provide adequate statistical power, it was advisable to ensure the population size of at least $N = 100$ cases (see Warner, 2013). I further describe how I used the G Power calculator to calculate the target population size for my study.

Sampling and Sampling Procedures

I applied a purposive sampling technique to select potential participants for my study and include only high school teachers of SLIFE in the statistically analyzed sample. This was justified because purposive (or judgmental) sampling is used when it is

impossible to enumerate or make a list of all such participants, but the population characteristics specific for the purpose of the study can be defined (Babbie, 2017). As a nonprobability sampling strategy, purposive sampling can identify findings relevant for this subpopulation (Andrade, 2021). The procedures for how the sample was drawn included recruitment of the survey respondents via partner organizations, professional networks, and social media and additionally by utilization of snowball sampling. According to Babbie (2017), snowball sampling is a type of nonprobability sampling technique that results in the "growth of the surveyed sample from the initial selection", as the already identified members of the target population help identify other members of that population (p. 197). Although the nonprobability sampling techniques are typically used in qualitative studies, the purposive and snowball sampling were justified for the purpose of my study, as I intended to explore the variations within my observed population rather than the statistical profile of the whole population (Babbie, 2017). Therefore, in Chapter 5, I acknowledge and discuss the accuracy and representation of my studied sample as a limitation of this nonprobability sampling technique.

The procedure included both inclusion and exclusion criteria. To be included, participants (a) had to be a high school English language teacher (ENL/ESL) or high school content area teacher (math, science, social studies, etc.), (b) had to plan and deliver curricula to ELLs who are SLIFE either in SLIFE-specialized environments (ex. Newcomer sheltered instruction) or in general education classes, (c) and had to integrate DLRs as tools that SLIFE use to complete educational tasks. Participants could not be (a)

instructional and/or other support staff, (b) instructional coaches, or (c) school or district administrative staff.

Power analysis is the technique I used to determine sample size. Sample size estimation requires establishing research goals, writing null hypotheses, and choosing the appropriate statistical test (Kang, 2021). Because my variables were quantitative and initially considered ordinal, the statistical test I thought would be most appropriate to conduct my quantitative correlational predictive study was the ordinal logistic regression model (see Bevans, 2023; Laerd Statistics, n.d.a), and the power analysis was conducted as follows. There are several formulas noted in the literature in relation to a logistic regression test sample size estimation, and the recommendations span from no less than 100 to 500 subjects. Bujang et al. (2018) reexamined these formulas and recommended $N = 100 + 50(i)$, with i representing the number of independent variables, being a reliable rule of thumb for observational studies in large populations. Applying this rule to my study, I pre-estimated $N = 100 + 50(3) = 250$ with independent variables of multicultural teaching skills and multicultural teaching knowledge and one covariate of the teacher's classroom assignment type. In another calculation, I also included the overall multicultural teaching competency as an independent variable in addition to the multicultural teaching skills, knowledge, and classroom assignment covariate, and the pre-estimation resulted in $N = 100 + 50(4) = 300$ sample size. To further examine the sample size calculation, I conducted and a priori sample size analysis in order to control for Type I and II errors to prove the hypothesis (Kang, 2021). G Power (Erdfelder et al., 1996) and its major extension G*Power 3.1 (Faul et al., 2007, 2009) is a stand-alone

sample size and power analysis program for different statistical test families available free on the major web-based platforms. To estimate a priori sample size for my study, I engaged the G*Power 3.1 calculator and followed the process outlined by Uekawa (2019). In the input parameters area of G*Power, I entered the required variables of correlation and regression (type of test), a priori (the type of power analysis), *z* test (test family), logistic regression (statistical test), two-tail, and odds of successful outcome determined at 10% ratio. According to Uekawa (2019), when the real proportion is not known, this is the most conservative setting because the largest amount of error exists around 50%. Then I entered the assumption of recommended significance level $\alpha = .05$ and commonly used statistical power of .95 (Faul et al., 2007, 2009). The calculation of the a priori sample size resulted in $N = 347$ at 95% confidence level (Appendix B). Reexamining the same estimation at 80% confidence level resulted in $N = 213$ (Appendix C). Because my study was not experimental, and there was no treatment group, I did not manipulate any x parameters while conducting the G*Power calculations. Both G*Power sample size calculations fall within the ranges pre-estimated using the Bujang et al. (2018) rule. As a follow up, I conducted a post hoc sample power analysis after the data for the study were collected.

However, upon closer examination of the preliminary partial data sample, the measurement type of my dependent variables and its operationalization determined a re-evaluation of the use of the statistical test. In regard to the DLRs dependent variable, when creating the content, productivity, and communication outcomes in SPSS, it became clear that they were not ordinal and could not be operationalized that way.

Therefore, I investigated the use of an alternative test and concluded that the multiple regression test would appropriately answer the questions and hypotheses of my study. In accordance with using an alternative test, I also reevaluated a priori sample size requirement. I hypothesized a large effect in a priori fashion for the multiple regression model. Using a large effect size of f^2 = 0.35, and alpha value of 0.05, a beta value of 0.20 (1-beta = power; 80% power), and one primary independent and one covariate (total of two parameters) begin entered into the model, a total of N = 31 participants were needed to achieve adequate statistical power for the study (Faul et al., 2007, 2009). Chapter 4 presents the alternative test justification in more detail.

Procedures for Recruitment, Participation, and Data Collection

The recruitment process of currently active in-service high school language and content area teachers who work with SLIFE in public and private schools nationwide followed the steps outlined in Table 1. I first reached out to two professional organizations. Their only role was to distribute my invitation to a voluntary, low-risk, anonymous online survey. The identities of these organizations were protected by the way of masking/changing the names of the organizations on all materials and by generalizing their locations. The two professional organizations were the regional educational service center and Title III consortium whose membership comprised of educational professionals in 40 districts and 165 schools with 3,329 teachers in North Central United States. The teachers targeted this way were those within the consortium ELL network and those who attended the annual multilingual learner conference (2,023 conference registered, 385 participants). The second professional organization was a

state-wide network of teachers of English to speakers of other languages. At the time of recruitment, this network comprised of approximately 300 member educators.

Table 1

Professional Organizations and Social Media for Posting Study Invitation

Professional organization or social media space	Approximate number of members
Professional organization 1	165 schools/North Central Indiana
Professional organization 2	300 member educators
NNSTOY* network	1,155 members in 26 state chapters
Researcher's social media networks (LinkedIn, Facebook)	Direct access to the 2017-2024 State Teacher of the Year cohorts (each cohort: 50 states, District of Columbia, Department of Defense Education Association, and some U.S. Territories)

Note. NNSTOY is the abbreviation for National Network of State Teachers of the Year

To reach out to teachers nationwide, I used the National Network of State Teachers of the Year (NNSTOY) Facebook group that allowed access to the NNSTOY. At the time of recruitment, this network spanned across 26 states and registers 1,155 members. The access to professionals via researcher's LinkedIn network and postings on Facebook also assisted in widening the participant pool. I used these networks to directly reach out to the 2017 – 2024 cohorts of State Teachers of the Year in 50 states, District of Columbia, the Department of Defense Education Association, and some U.S. Territories. The permissions from the social media groups' moderators before posting the study to their space were secured. I established a weekly plan for the recruitment and engaged the four recruitment spaces (Table 2) in a sequenced order with 1 week separating the study

invitation postings while monitoring the number of collected responses in each space weekly.

Table 2

Sequence for Posting Study Invitation

Week Number	Sequence for posting study invitation
Week 1	Professional organization 1
Week 2	Professional organization 2
Week 3	NNSTOY network
Week 4	Social media platforms (LinkedIn, Facebook)

Once I received both proposal approval and the IRB confirmation of ethics approval number 04-01-24-0971786, I executed the following data collection steps. First, I created an online survey for anonymous data collection using Qualtrics online survey tool. The first page of the survey was the preapproved anonymous survey consent form. In order to remain anonymous, the participants were not asked to share names or contact information. Another way to ensure anonymity was by creating a single universal survey link rather than using individual participant emails. The final assurance of anonymity was that the participants were not asked to sign the consent forms. Their consent was implied, and those who chose to participate were able to complete the survey after they read the informed letter of consent. The survey should not have taken more than 10 minutes to complete and included an introductory and demographic sections, MTCS questionnaire, and DLRs questionnaire. The introductory section provided a brief introduction of the study with the definitions of SLIFE and DLRs, anonymous consent form, and inclusion criteria questions. In case that any of the inclusion criteria were not satisfied, the

participant was not able to continue, and the survey closed. If the inclusion criteria were satisfied, the participant answered the teacher's classroom assignment type (language or content area) and continued to the demographic section. The demographic section included questions about gender, ethnic origin, age, level of education, years of teaching, and presence or absence of a specialized EL/TESOL licensure/certification. All demographic categories were investigated during the data analysis process for a potential effect on the dependent variable. In the next section, the MTCS questionnaire collected answers regarding teachers' self-reported multicultural teaching competencies (skills and knowledge). In the final section, the participants answered questions about the frequency with which SLIFE students in their classroom used the DLRs (digital academic content, digital productivity, and digital communication tools) to complete education tasks.

Then I followed the sequence of posting study invitations (Table 2). Public invitations included a link to the voluntary, low-risk, anonymous online survey and maintained a professional and low-pressure tone. The survey link was shared using email and social media invitation templates. The survey was available via the Internet for a minimum of 8 weeks during Spring 2024 and for additional 8 weeks during Fall 2024. Weekly reminders were sent out to restate the study's purpose, reinforce the sense of urgency in contributing to its findings, and express appreciation to those who had already completed the questionnaire. A minimum of three reminders in each space (Table 1) were anticipated as necessary to saturate the sample size. I kept a detailed record of all the postings and re-postings in all four spaces and monitored the number of completed

surveys. There was no identifying information gathered during the data collection process.

Instrumentation and Operationalization of Constructs

To measure the independent variable, the teachers' self-reported multicultural teaching competencies (skills and knowledge), I used the Multicultural Teaching Competency Scale (MTCS) developed by Spanierman et al., (2011). MTCS is a 16-item, two-factor instrument that measures (a) multicultural teaching skills – integrations of multicultural teaching knowledge into the instruction and (b) multicultural teaching knowledge – i.e. cultural dynamics, instructional strategies in a multicultural classroom (see Appendix E). The complete definitions of the above multicultural teaching competencies are included in Chapter 2. The two subscales are consistent with the multicultural education literature. Internal reliability coefficients of .83 (skills), .80 (knowledge), and .88 (overall) are relatively high and show acceptable internal consistency, and the confirmatory factor analysis revealed a good fit and its superiority to other measures of multicultural competency (see Spanierman et al., 2011). There exists a large number of measures of multicultural competence for teachers at all levels of education; however, many lack sufficient development, validation, and other psychometric and statistical properties (Brown, 2004; Dunn et al., 2006; Hamilton, 2016). Contrary to those, MTCS is documented to successfully measure the intended constructs of (a) "self-reported skills or behaviors in implementing culturally sensitive teaching practices" and (b) "self-reported knowledge of culturally responsive theories, resources, and classroom strategies" (Spanierman et al., 2011, p. 457) and is considered a sound and

the only instrument to measure *general* pre and in-service teachers' multicultural knowledge and skills (Sarraj et al., 2015). How the independent variable was operationalized is detailed in the next section.

To measure the dependent variable, the use of DLRs, the DLR classification Matrix (Appendix A) was used to clarify the types of DLRs in the survey (Zehler, 2019). The use of DLRs in terms of frequency was measured using the NSELD Teacher Survey, Question #23 modified with permission (Zehler et al., 2019, p. 85). How the dependent variable was operationalized is detailed in the next section.

Operationalization of Variables

Operationalization of variables in social research means deciding and specifying how the variables under study will be measured and collected (see Babbie, 2017). In my study, the independent variables were the teacher's self-reported multicultural teaching knowledge and multicultural teaching skills (also referred to as multicultural teaching competencies) as measured by the MTCS (Spanierman et al., 2011). MTCS is a 16-item, two-factor instrument that measures (a) multicultural teaching skills: items 1, 3, 5, 6, 8, 10, 12, 13, 15, and 16) and (b) multicultural teaching knowledge: items 2, 4, 7, 9, 11, and 14). The items are scored on a 6-point Likert scale: 1 = Strongly Disagree, 2 = Moderately Disagree, 3 = Slightly Disagree, 4 = Slightly Agree, 5 = Moderately Agree, and 6 = Strongly Agree. Higher scores indicate higher levels of multicultural teaching competency. Item #12 (bolded in the instrument) is scored in a reverse order: 6 = 1, 5 = 2, 4 = 3, 3 = 4, 2 = 5, and 1 = 6. Each response answers one of the two factors. Each factor is calculated as a sum of the points of all questions associated with that factor. Therefore,

the maximum possible points for the multicultural teaching knowledge factor is 36, and the maximum possible points for the multicultural teaching skills factor is 60. A total (overall) multicultural teaching competency score was also obtained, and its maximum value is 96 (36 for knowledge plus 60 for skills).

The dependent variables included the DLRs as classified by the U.S. Department of Education DLR Matrix (Appendix A; Zehler et al., 2019). The use of the DLR tools was measured using the NSELD Teacher Survey question # 23 that was modified with permission to achieve the purpose of this study (Zehler et al., 2019, p. 85). While the original wording of the question focused on ELs (Appendix F), the modification specified the question to the use of DLRs with SLIFE and the wording was: *How often do your students who are SLIFE use the following DLRs when completing educational tasks in your class?* There are three categories of DLRs, each with a number of subset questions: Digital Academic Content Tools (11 subset questions), Digital Productivity Tools (3 subset questions), and Digital Communication Tools (3 subset questions). The DLRs subset answers measure frequency of DLR use (Not at all – Less than monthly – Monthly – Weekly – Daily), which was operationalized on a 1-5 scale with the highest score 5 representing the highest frequency of use.

There were some relevant demographic variables investigated for potentially having an influence on the dependent variable. The first was the teacher's classroom assignment type (language or content area). This variable was operationalized as dichotomous categorical variable (1) high school language teacher (ENL, ESL) and (0) high school content area teacher (math, science, social studies, etc.) and included in the

regression model as a covariate/moderator variable. Additionally, the demographic variables of age, gender, race/ethnicity, years of teaching experience, and the presence or absence of EL/TESOL licensure/certification were examined and treated accordingly for the level of their potential influence on the dependent variable. Especially the presence or absence of EL/TESOL licensure/certification was presumed by the researcher to have a potential impact on teacher's DLR choices and was found appropriate to be included in the statistical model as a covariate/moderator variable. This variable was also operationalized as dichotomous categorical variable (1) presence and (0) absence of specialized EL/TESOL licensure/certification.

Data Analysis Plan

For the purpose of answering the primary RQs of this quantitative correlational predictive study, I rejected the initially selected multivariate ordinal logistic regression model and conducted a multiple linear regression analysis to determine whether the high school teacher's self-reported multicultural teaching competencies (knowledge and skills) can predict the DLRs they use with SLIFE. The choice if fully justified in Chapter 4. Prior to engaging the IBM SPSS Statistics software, I screened the data to ensure that only survey data from qualified participants were entered. Qualified participants had to meet all inclusion criteria. Additionally, only the surveys with all three fully completed sections (demographics, MTCS, DLRs) were included in the statistical analysis processes.

To address the problem and purpose of this study, the following research questions (RQs) and hypotheses were used to guide my study.

RQ1: Do high school language and content area teacher's self-reported multicultural teaching skills and multicultural teaching knowledge (measured by MTCS; Spanierman et al., 2011; Appendix E) predict the utilization of *digital academic content tools* (measured by NSELD; Zehler et al., 2019; Appendix F) when working with SLIFE?

H_o1: There is no statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital academic content tools when working with SLIFE.

$H_1 1$: There is a statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital academic content tools when working with SLIFE.

RQ2: Do high school language and content area teacher's self-reported multicultural teaching skills and multicultural teaching knowledge (measured by MTCS; Spanierman et al., 2011; Appendix E) predict the utilization of *digital productivity tools* (measured by NSELD; Zehler et al., 2019; Appendix F) when working with SLIFE?

H_o2: There is no statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital productivity tools when working with SLIFE.

$H_1 2$: There is a statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital productivity tools when working with SLIFE.

RQ3: Do high school language and content area teacher's self-reported multicultural teaching skills and multicultural teaching knowledge (measured by MTCS;

Spanierman et al., 2011; Appendix E) predict the utilization of *digital communication tools* (measured by NSELD; Zehler et al., 2019; Appendix F) when working with SLIFE?

H_o3: There is no statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital communication tools when working with SLIFE.

$H_1 3$: There is a statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital communication tools when working with SLIFE.

The data analysis plan included several steps. First, I conducted reliability analyses for the overall 16-item MTCS scale as well as for both multicultural teaching skills and multicultural teaching knowledge subscales. Cronbach's alpha was calculated to determine the instrument's internal consistency reliability. Then I applied a multiple linear regression analysis to determine whether there exists a statistically significant effect of the independent variables (teacher's self-reported multicultural teaching skills and multicultural teaching knowledge) on the dependent variable (DLRs). The initial rationale for the utilization of the ordinal logistic regression was rooted in the type of measurements. According to Laerd Statistics (n.d.a), in order to meet the measurement-related assumptions of the test, the following conditions must exist: (1) one dependent variable is measured at the ordinal level and (2) one or more independent variable is continuous, ordinal or categorical (including dichotomous variables). The dependent variable (DLR) is measured on a 5-point Likert scale in terms of frequency of DLR use (not at all – less than monthly - monthly – weekly – daily), which satisfies the first

assumption. The independent variable (teacher's multicultural teaching competencies) satisfies the second assumption in that although measured on a 6-point Likert scale at an ordinal level, it will be treated as continuous with the higher score indicating greater levels of multicultural teaching competency (Spanierman et al. 2011). The third assumption of this statistical model is that there should be no multicollinearity. To ensure that this assumption is met, meaning that the independent variables of teacher's multicultural teaching skills and multicultural teaching knowledge do not display collinearity, the chi-square of independence (Pearson's chi-square test) needs to be performed to identify if the relationship between the independent variables exists (Laerd Statistics, n.d.b).

However, due to further investigation of the measurement type of dependent variable during the initial partial data sample examination in SPSS, an alternative test had to be utilized, and the complete justification of this change is provided in Chapter 4.

Additionally, there existed a reasonable rationale for investigating the teacher classroom assignment type (language or content area) in a role of a control variable. The control variable isolates the effect of the independent variable on the dependent variable (Githaiga, 2021). The high school ELL/SLIFE language teachers by default have more opportunities to participate in professional training and development in the areas of multicultural and culturally responsive instruction than the high school content area teachers. Therefore, the type of classroom assignment can be considered an obvious determinant of the dependent variable. This covariate was operationalized as a dichotomous categorical variable (1) high school language teacher (ENL, ESL) and (0)

high school content area teacher (math, science, social studies, etc.). The suggested assessment method is to first check for the effect of the control variable and then add the control variable/s in the same regression model as predictors (Iyisoy, 2017; Githaiga, 2021). The other demographic variables were also investigated for the level of their potential influence on the dependent variable, and the presence of EL/TESOL licensure/certification was also operationalized as a dichotomous categorical predictor variable (1) presence of licensure and (0) absence of licensure and included in the statistical model as such.

The main purpose of this study was to examine whether the high school teachers' self-reported multicultural teaching skills and multicultural teaching knowledge are predictive of the choice of DLRs they use with SLIFE after accounting for the impact of the covariates teacher's classroom assignment type and presence of specialized EL/TOESL licensure/certification. I first tested the correlation among the variables. Next, I conducted a multiple linear regression analysis to determine whether the independent variables of secondary teachers' self-reported multicultural teaching skills and multicultural teaching knowledge significantly predict the choice of the dependent variable of choice of DLRs when working with SLIFE.

Threats to Validity

Addressing validity means evaluating whether the instrumentation measures what it purports to measure, and whether the results can be generalized to a larger population (Kelley, 1927; Warner, 2013). According to Onwuegbuzie (2000), every study in the educational field faces threats to both external and internal validity. The more controlled

research yields higher external and internal validity (Babbie, 2017). Due to the nonexperimental nature of my study, threats to both external and internal validity were addressed. Additionally, the trustworthiness as a methodological (research design, data gathering, data analysis) accuracy (soundness) and adequacy of the research inquiry (Holloway & Wheeler, 2002) were evaluated, and the provision of reliability, objectivity, and validity of this quantitative inquiry were described.

External Validity

External validity is the degree to which research can be generalized to other participants, settings, and materials, and in nonexperimental study can be high if it examines naturally occurring behaviors (Warner, 2013). The type of research design and potential threats to external validity can affect the level to which the conclusion of the study can be generalized (Laerd Statistics, n.d.c); therefore, several external validity issues need to be discussed in relation to my study.

Population selection and sampling always present a threat to external validity in educational studies (Onwuegbuzie, 2000). For the purpose of my study, I utilized a purposive sampling method that targeted only secondary teachers with specific characteristics (work with SLIFE in language and content areas). The representativeness of this sample depended on how large of a sample I was able to collect for my inquiry and on the distribution of the various characteristics of the sampled participants (i.e., type of classroom assignment, presence/absence of EL licensure). The limitations of the sample representativeness is detailed in the limitations section of Chapter 5.

Construct validity is another threat to external validity and to the researcher's ability to generalize the results of the study. Onwuegbuzie (2000) names the specificity of variables as the considerable threat, as any investigation is conducted under specific conditions of individuals, time, location, circumstances, independent and dependent variables, and with specific instruments, and the more unique these conditions are, the more caution needs to be applied when generalizing the study's findings. Because the population of my study was limited to a specific subset of teachers in terms of location (high school teachers of SLIFE), I operationalized this variable as a dichotomous covariate variable, and I statistically identified the potential effect of the teacher classroom assignment type on the dependent variable. I took caution when interpreting the results and making recommendations for further scholarly inquiry.

Internal Validity

There are also issues of internal validity. The nature of this study was nonexperimental, and nonexperimental studies usually have weak internal validity, as the research design does not involve any manipulation of the independent variables (Warner, 2013). The potential threats to internal validity can be associated with participants, instrumentation, and testing. In this study, the internal validity was not threatened due to its participants (maturity, selection-maturation, interaction) because the participants volunteered to complete a one-time, low-risk, anonymous, survey. However, the threats associated with instrumentation and testing were considered as follows.

To ensure that survey data collected by the MTCS instrument were reliable, the internal consistency coefficient Cronbach's alpha was calculated and compared to the

initial factor analysis of the MTCS instrument. Spanierman et al. (2011) determined that the internal consistency reliabilities were $\alpha = .88$ (for the total MTCS scale), $\alpha = .80$ (for multicultural teaching knowledge scale), and $\alpha = .83$ (for multicultural teaching skills scale). However, even with the validity and reliability of the MTCS instrument being supported, the limitation of the, by default, self-reported perceptions of participants' multicultural teaching knowledge and multicultural teaching skills needed to be addressed and reported.

Another threat to internal validity to consider is the threat to the validity of statistical data analysis and conclusion. This correlational predictive study design employed the multiple linear regression data analysis method for the purpose of exploring the relationship between the two independent variables (multicultural teaching knowledge and multicultural teaching skill) on the dependent variable, in which case the possibility of multicollinearity needed to be examined. Multicollinearity is the degree of potential intercorrelation among predictor variables (Warner, 2013) and leads to inflated or unstable statistical coefficients (Onwuegbuzie, 2000). To identify whether multicollinearity existed, scatterplot as a visual examination and correlation as an objective measure of the potential relationship was applied in order to prevent redundancy when further applying the regression model (Foltz, 2014) and to identify potential difficulty distinguishing the unique contributions of each predictor (Warner, 2013). Additionally, I investigated the possibility of the presence of confounding variable/s. This was justified because there were more than 3 variables present in my study. A confounding variable is any variable that has the ability to provide an alternative

explanation for the relationships between variables, exists in studies with more than 3 variables, and systematically changes with at least one other variable the study is measuring (Laerd Statistics, n.d.d). In my study, there was a logical reason for the assumption that the presence or absence of EL licensure might have an effect on the dependent variable; therefore, my decision was to investigate the existence and/or strength of its impact within my research design.

The final threat to internal validity that related to my study stemmed from the testing. For the purpose of this quantitative correlational predictive study, I utilized the online survey data collection method. To satisfy all IRB pre-approved procedures for low-risk anonymous surveys, I followed the IRB-approved data collection steps. One concern with this method of data collecting is the representativeness and consequently the ability to generalize the results of the study to the wider population (Warner, 2013). One way I planned to increase the representativeness of the surveyed sample was to ensure the minimum required response rate as calculated by the way of power analysis and the minimum sample size were met and/or exceeded.

Ethical Procedures

For this study, I followed ethical procedures by submitting application to the IRB at Walden University and by obtaining the IRB approval number. There was no conflict of interest due to the quantitative nature of the study and the voluntary, low-risk, anonymous survey method of data collection.

The first ethical procedures I had in place were related to the treatment of human participants. This included the informed consent process and protection of the

professional organizations and participant confidentiality and privacy as well as the voluntary, low-risk, anonymous data collection process. I complied with the partner organization's policies and requirements. The participants were informed about the voluntary nature of their participation and ensured that their identity would not be revealed at any point in the survey completion process. The participants who declined participation were able to exit the survey, and no information from or about them was gathered in the survey software.

Other ethical procedures I had in place were related to the treatment of data. The data collected during the study were confidential and were stored securely on a password protected device. I maintain sole control of and access to the research data and keep the raw data for a minimum of five years. After the five-year hold period, the data in all forms will be permanently destroyed.

Summary

In Chapter 3, I outlined the research methodology for this study with the aim of describing the research process in a transparent manner so that the readers can understand how the study was conducted. I began by describing my research design and providing rationale for applying the quantitative correlational predictive design to accomplish the purpose of my study. Then, I detailed the target population, outlined the recruitment plan, included a priori power analysis calculation, and justified the utilization of nonprobability purposive sampling strategy while outlining both inclusion and exclusion criteria. I also explained my role as a researcher in this nonexperimental study. Next, I discussed the instruments and how the variables will be operationalized. Further, I included the data

collection schedule and outlined the data analysis plan. I concluded the chapter with the discussion of threats to external and internal validity and ethical considerations I followed as I conducted my study.

Chapter 4: Results

The purpose of this quantitative correlational predictive study was to examine whether the high school language and content area teachers' self-reported multicultural teaching competencies (skills and knowledge) predict the choice of DLRs they use with ELLs who are SLIFE. To accomplish this purpose, I examined the relationship between two independent and three dependent variables. The independent variables were the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge as measured by the MTCS (Spanierman et al., 2011). Because the MTCS instrument also provided the overall multicultural teaching competency score, its potential predictive ability was also investigated and enriched the results of the study with relevant data. The dependent variables were the DLRs (digital academic content tools, digital productivity tools, and digital communication tools) as measured by NSELD (Zehler et al., 2019; Appendix F). In addition, I investigated the potential effect of teacher's classroom assignment (language vs. content area) on the dependent variable. The type of teacher assignment (language vs. content area) was statistically acknowledged as a covariate variable. The presence or absence of EL/TOESL certification was also a priori identified for its potential influence on the dependent variable and was included in the statistical model as another covariate variable. Other demographic variables provided the information needed to describe the collected sample. The quantitative methodology with a predictive correlational design was the most appropriate choice for addressing the research questions within this study because determining a statistically significant relationship was desired (Nooriaie et al., 2020).

To address the problem and purpose of this study, the following research questions (RQs) and hypotheses were used to guide my study.

RQ1: Do high school language and content area teacher's self-reported multicultural teaching skills and multicultural teaching knowledge predict the utilization of digital academic content tools when working with SLIFE?

$H_0$1: There is no statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital academic content tools when working with SLIFE.

$H_1$1: There is a statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital academic content tools when working with SLIFE.

RQ2: Do high school language and content area teacher's self-reported multicultural teaching skills and multicultural teaching knowledge predict the utilization of digital productivity tools when working with SLIFE?

$H_0$2: There is no statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital productivity tools when working with SLIFE.

$H_1$2: There is a statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching

knowledge and the utilization of digital productivity tools when working with SLIFE.

RQ3: Do high school language and content area teacher's self-reported multicultural teaching skills and multicultural teaching knowledge predict the utilization of digital communication tools when working with SLIFE?

$H_0$3: There is no statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital communication tools when working with SLIFE.

$H_1$3: There is a statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital communication tools when working with SLIFE.

In this chapter, I report on the results of this quantitative correlational predictive study. The chapter includes data collection time frame, recruitment, and response rates as well as any discrepancies in data collection from the plan presented in Chapter 3. Further I provide baseline descriptive and demographic characteristics of the sample and describe how representative the sample is of the population of interest. Based on the demographic characteristics of the sample and the results of basic univariate analyses, I justify inclusion of covariates in the statistical model. Finally, in the results section I evaluate statistical assumptions as appropriate to this study and discuss the results of the statistical analysis as they relate to each study hypothesis.

Data Collection

Participant recruitment was executed during two terms – spring and fall 2024. The spring term data collection began on April 2nd and ended on May 26th. The initial steps (Table 1) and the survey invitation posting sequence (Table 2) of the recruitment process of currently active in-service high school language and content area teachers who work with SLIFE in public and private schools nationwide, as outlined in Chapter 3, encountered time-related modifications and discrepancies and could not be completed during the spring 2024 term. All discrepancies were solely related to the delays in terms of the timing of survey invitation postings. For example, Professional Organization 1 (PO 1) posted the invitation in Week 1; however, the link to the survey was missing, and the survey needed to be reposted correctly in Week 2. Similarly, Professional Organization 2 (PO 2) did not post the survey as planned in Week 2 but instead in Week 3. Another example of survey posting delay was due to a personnel change withing PO 1 where the transfer of responsibility for the posting caused a 3-week delay between the second and third survey re-posting. Similarly, the webmaster changes within the NNSTOY organization resulted in delays in the initial and consecutive postings. Finally, while managing the first three recruitment spaces (PO 1, PO 2, NNSTOY network) and carefully monitoring the data collection resulting from these spaces, the fourth recruitment space represented by using my professional network was not engaged until Weeks 7 and 8 of the spring 2024 data collection process. Therefore, upon receiving the approved change of procedure from the university IRB office, the survey was reopened on September 9th and closed on December 1st spanning over 11 weeks during the fall

2024 term. The change of procedure included adding a new partner organization, using the snowball sampling technique (SST) within my professional network, and using the IRB office recommended QR code mode of survey distribution. The newly engaged partner organization was the state's Department of Education (PO 3), and my professional network engagement consisted of the Indiana Teacher of the Year cohorts of professionals and the connections established during the multilingual teachers and teachers of English as a second language conferences. All added strategies to reach respondents yielded additional survey response rates and resulted in reaching and exceeding the predetermined sample size ($N = 31$). During both spring and fall terms, the data collection was monitored on a weekly basis, and the complete record of survey postings and the number of responses collected is recorded in Table 3.

Table 3

Sequence for Posting Study Invitation and Sum of Responses after Each Posting

Weekly posting schedule	Sequence for posting study invitation	Sum of responses after each posting
Spring 2024		
Week 1	PO 1	0 (missing survey link)
Week 2	PO 1	3
Week 3	PO 2	14
Week 4	PO 1 and PO 2 and NNSTOY network	24
Week 5	PO 2	27
Week 6	NNSTOY network	30
Week 7	PO 1 and social media platforms (LinkedIn, Facebook)	42
Week 8	None	45
Fall 2024		
Week 1	PO 3	48
Week 2	social media platforms (LinkedIn, Facebook)	49
Week 3	SST	54
Week 4	SST	56
Week 5	SST	56
Week 6	SST	58
Week 7	SST	58
Week 8	SST	63
Week 9	SST	68
Week 10	SST	70
Week 11	SST	71

Note. SST (Snowball Sampling Technique)

The target population for this study included high school English language (ENL/ESL) and high school content area teachers of SLIFE. For the purpose of this study, SLIFE definition was clearly identified. As Potochnick (2018) documented in a to-date only national-level study of immigrant students who are SLIFE, higher percentage of SLIFE (65%) arriving in the United States enroll at the secondary age. Therefore, this study targeted SLIFE teachers at the high school level of education. According to G*Power a priori sample size estimation, the minimum sample size needed to power this study was 31. The anonymous data collection using Qualtrics online survey tool yielded a total of 71 responses. From these responses, 34 participants did not satisfy the

predetermined inclusion criteria when answering the inclusion questions of the survey. Qualtrics online survey tool ended the survey when there was a NO-answer to any of the exclusionary questions: (1) *Are you a high school (9-12) language (ENL/ESL) or content area (math, science, social studies, etc.) teacher of SLIFE? ("No" also applies to instructional assistants and/or coaches, administrators, and any non-high school staff),* (2) *Do you plan and deliver instruction to SLIFE whether in a specialized/sheltered or in a general education classroom?* and (3) *Do your SLIFE students use educational technology (DLRs) as tools to complete learning tasks?* By design, any negative response to any of these questions blocked the participant from continuing the survey completion. Only 37 responses satisfied the participant inclusion criteria. There were $N = 36$ complete responses for the models with the dependent variable digital academic content tools and $N = 37$ complete responses for the models with the dependent variables of digital productivity and digital communication tools. Only the complete responses ($N = 36/37$) were included in the respective statistical analysis. The complete overview of the demographic characteristics of the data set is presented in Table 4. The distinctive features of the data set are that most respondents were female (87%; $n = 32$), most were White/non-Hispanic (81%; $n = 30$), and a majority were in the age category 40-59 (67%; $n = 25$). Additionally, most held a Master or higher level of education (70%; $n = 26$), and 43% ($n = 16$) reported having between 11 and 20 years of teaching experience. Because 73% ($n = 27$) were teachers of English (ENL/ESL) and 65% ($n = 24$) of the teachers held a licensure specific to teaching English learners/SLIFE, and it was hypothesized that these teachers would have had more experience and/or training specific to teaching these

students, the teacher's classroom assignment type and the presence of the specialized licensure qualified to be included in the statistical model as covariates.

Table 4

Sample Demographics

Variable	Description	*N*	%
Gender	Male	5	13.5
	Female	32	86.5
	Total	37	100
Ethnicity	White/non-Hispanic	30	81.1
	Hispanic/Latino	6	16.2
	Black/African American	0	0.0
	Other	1	2.7
	Total	37	100
Age	18 – 29	2	5.4
	30 – 39	6	16.2
	40 – 49	12	32.4
	50 – 59	13	35.1
	60 or older	4	10.9
	Total	37	100
Highest level of education	Associate's degree	0	0.0
	Bachelor's degree	11	29.8
	Master's or Higher	26	70.3
	Total	37	100
Years of teaching	0 – 10	9	24.4
	11 – 20	16	43.2
	21 or more	12	32.4
	Total	37	100
Classroom assignment	English (ENL/ESL)	27	73
	Content – Math	2	5.4
	Content – Science	1	2.7
	Content – Social Studies	1	2.7
	Content – Art	1	2.7
	Other – World Language	2	5.4
	Other – Career Technical	3	8.1
	Total	37	100
Licensure (EL/TOESL)	Present	24	65
	Absent	13	35
	Total	37	100

The sample for this study was drawn using purposive sampling technique. I used a purposive sampling technique to select potential participants for this study because it was impossible to enumerate all teachers of SLIFE, but the population characteristics specific for the purpose of my study could be defined (see Babbie, 2017) and because the purposive sampling could identify findings relevant for the subpopulation of high school SLIFE teachers (see Andrade, 2021). The respondents were recruited through their affiliation with the partner organizations, professional networks, social media, and additionally by using snowball sampling as a technique that results in the growth of the surveyed sample from the initial selection (see Babbie, 2017). For generalizability, to be included, participants (a) had to be a high school English language teacher (ENL/ESL) to high school content area teacher (math, science, social studies, etc.), (b) had to plan and deliver curricula to ELLs who are SLIFE either in SLIFE-specialized environments (e.g., newcomer sheltered instruction) or in general education classes, (c) and had to integrate DLRs as tools that SLIFE use to complete educational tasks. The three exclusion criteria were: the participants could not be (a) instructional and/or other support staff, (b) instructional coaches, or (c) school or district administrative staff.

Before the statistical analysis could be performed, I conducted the following steps to ensure data accuracy. First, the survey was administered using Qualtrics online survey tool where the raw data were collected. After providing an implied consent and satisfying the inclusion criteria, the participants completed the demographic section, MTCS questionnaire, and DLRs questionnaire. I downloaded the raw data to an Excel file before

importing them into SPSS where only the completed surveys (N = 36/37) were considered for the statistical analysis.

Results

In Chapter 3, I identified the ordinal logistic regression as the statistical test appropriate for my study. Ordinal logistic regression is used to predict an ordinal dependent variable given one or more independent variables and allows in determining which of the independent variables have a statistically significant effect on the dependent variable and how well the model predicts the dependent variable (Laerd Statistics, 2015). The rationale for the use of the ordinal logistic regression was rooted in the type of measurement of variables. The initial specific decisive factor was the 5-point Likert scale measurement of the dependent variables because the type and data collected from a Likert scale is typically considered ordinal data (Bishop & Herron, 2015). A priori sample size for the study was estimated as N = 347 at 95% confidence level (Faul et al., 2007, 2009).

During the preliminary data analysis, I challenged my initial thoughts about the measurement type of my dependent variables. According to the DLRs Matrix (Zehler et al., 2019), digital learning tools are categorized based on the outcome: academic content learning, production, and communication. However, when creating the content, productivity, and communication outcomes in SPSS, it became clear that they were not ordinal and could not be operationalized that way. The survey question *How often do your students who are SLIFE use the following DLRs when completing educational tasks in your class?* investigated the frequency of DLR use (Not at all – Less than monthly -

Monthly – Weekly – Daily) on a 1-5 scale with the highest score 5 representing the highest frequency of use. The numbers were added together to yield a score, which was considered a continuous/numerical outcome. When Likert scales have individual rating items with numerical response formats that contain at least five categories, Harpe (2015) recommended that Likert scales should be treated as continuous rather than ordinal data.

My initial thought of the DLRs as categories of digital learning tools on the continuum from the least culturally responsive (digital academic content) to the most culturally responsive (communication) and investigating the DLRs in such way would have been changing the subscales in an arbitrary fashion that did not have empirical backing. Therefore, I investigated the use of an alternative test and concluded that the multiple linear regression test would appropriately answer the questions and hypotheses of my study.

According to Laerd Statistics (2015), multiple linear regression analysis requires eight assumptions. The first two assumptions (a) a continuous dependent variable and (b) two or more independent variables either continuous (i.e., an interval or ratio) or categorical (i.e., ordinal or nominal) relate to the study design. The other six assumptions relate to the nature of the data, and those assumptions are: (c) independence of observations, (d) linearity, (e) homoscedasticity of residuals, (f) no display of multicollinearity, (g) no significant outliers, and (h) normally distributed residuals. I discuss how I tested for the assumptions further in this chapter. In accordance with using an alternative test, I also re-evaluated a priori sample size requirement. I hypothesized a large effect in a priori fashion for the multiple linear regression model. Using a large

effect size of f^2 = 0.35, an alpha value of 0.05, a beta value of 0.20 (1-beta = power; 80% power), and one primary independent and one covariate (total of two parameters) being entered into the model (Appendix D), a total of *N* = 31 participants were needed to achieve adequate statistical power for the study (Faul et al., 2007, 2009). The survey yielded *N* = 36 viable responses for the models with the dependent variable digital academic content tools and *N* = 37 viable responses for the models with the dependent variables of digital productivity and digital communication tools, *N* = 36/37 which satisfied a priori sample size calculation.

Multiple linear regression analysis was used to test the three hypotheses in the study. For the hypotheses, multicultural teaching skills and multicultural teaching knowledge were analyzed separately as well as together as the overall multicultural teaching competency factor. The teacher's classroom assignment type was included in the model as a covariate and operationalized as dichotomous categorical variable (1) high school language teacher (ENL, ESL) and (0) high school content area teacher (math, science, social studies, etc.). The presence or absence of EL/TESOL licensure/certification was also included in the model as a covariate and operationalized as a dichotomous categorical variable (1) licensure present and (0) licensure absent. Both covariates were a priori hypothesized to have an effect on the dependent variables but were investigated separately. One independent variable and one covariate went into each statistical model. The total of 18 regression models produced statistical results to answer whether there is a predictive relationship between the independent variables and the

utilization of the DLRs (digital academic content tools, digital productivity tools, and digital communication tools) while controlling for the influence of the covariates.

A reliability analysis of the MTCS (Spanierman et al., 2011) compared the reliability concerns of the instrument as used in my study. Spanierman et al. (2011) conducted the initial validation of the MTCS and ensured the technical adequacy of the measure by describing its fundamental psychometric properties. The exploratory and confirmatory factor analyses results supported two subscales (a) self-reported skills and (b) self-reported knowledge. The two subscales were consistent with the multicultural education literature. Internal reliability coefficients of .83 (multicultural teaching skills), .80 (multicultural teaching knowledge), and .88 (multicultural teaching competency overall) were relatively high and showing acceptable internal consistency, and the confirmatory factor analysis revealed a good fit and its superiority to other measures of multicultural competency (Spanierman et al., 2011). Instrument reliability for my sample is represented by Cronbach's alpha coefficients in Table 5. Computing reliability of the MTCS (Spanierman et al., 2011) instrument supported Cronbach's alpha values at .89 (multicultural teaching skills), .87 (multicultural teaching knowledge), and .94 (multicultural teaching competency overall). Not only did the values exceeded the recommended reliability at or above .60 (Taherdoost, 2016), but they also exceeded the values originally documented by the authors of the instrument (Spanierman et al., 2011).

Table 5

Reliability Coefficients

Variable	*N* of items	Cronbach's alpha	Interpretation
MTS	10	0.894	High reliability
MTK	6	0.871	High reliability
MTC	16	0.936	High reliability

Note. MTS (multicultural teaching skills), MTK (multicultural teaching knowledge), MTC (multicultural teaching competency overall).

To evaluate the strength of the relationship between the quantitative variables in this study, I conducted the correlational analyses. High intercorrelation represents a strong relationship between two or more variables (Franzese & Iuliano, 2018). There was a significant positive relationship between MTS and Content, $r(24) = .697$, $p < .001$, two-tailed. There was a significant positive relationship between MTS and Productivity, $r(35) = .511$, $p = .001$, two-tailed. There was a significant positive relationship between MTS and Communication, $r(35) = .470$, $p = .003$, two-tailed. There was a significant positive relationship between MTK and Content, $r(24) = .713$, $p < .001$, two-tailed. There was a significant positive relationship between MTK and Productivity, $r(35) = .473$, $p = .003$, two-tailed. There was a non-significant positive relationship between MTK and Communication, $r(35) = .295$, $p = .076$, two-tailed. There was a significant positive relationship between MTC and Content, $r(24) = .721$, $p < .001$, two-tailed. There was a significant positive relationship between MTC and Productivity, $r(35) = .512$, $p = .001$, two-tailed. There was a significant positive relationship between MTC and Communication, $r(35) = .419$, $p = .010$, two-tailed. The correlation results are summarized in Table 6.

Table 6

Correlation Table

Variable	Pearson correlation	Content	Productivity	Communication
MTS	Pearson correlation	0.697	0.511	0.470
	Sig. (2-tailed)	<0.001	0.001	0.003
	N	36	37	37
MTK	Pearson correlation	0.713	0.473	0.295
	Sig. (2-tailed)	<0.001	0.003	0.076
	N	36	37	37
MTC	Pearson correlation	0.721	0.512	0.419
	Sig. (2-tailed)	<0.001	0.001	0.010
	N	36	37	37

Note. MTS (multicultural teaching skills), MTK (multicultural teaching knowledge), MTC (multicultural teaching competency overall). Correlation nonsignificant for MTK – Communication.

There were a number of statistical assumptions appropriate for this study. The first assumption of the multiple linear regression is the presence of a continuous dependent variable. In this study, there were three dependent variables that were investigated individually. Those variables were classified by the U.S. Department of Education DLR Matrix (Appendix A: Zehler, 2019). The use of the DLR tools was measured using the NSELD Teacher Survey Question #23 that was modified with permission to achieve the purpose of this study (Zehler et al., 2019, p. 85). The modified wording was: *How often do your students who are SLIFE use the following DLRs when completing educational tasks in your class?* Each of the three dependent variables had subset questions: Digital Academic Content Tools (11 subset questions), Digital Productivity Tools (3 subset questions), and Digital Communication Tools (3 subset questions). The subset answers measured frequency of DLR use (Not at all – Less than

monthly – Monthly – Weekly – Daily), which was operationalized on a 1-5 Likert scale with the highest score representing the highest frequency of use. The type and level of data collected from a Likert scale can be considered an ordinal or interval scale (Slater & Hanson, 2024). To be able to perform descriptive statistics, correlational analysis, and multiple regression analysis, and to be able to answer the hypotheses of this study, the dependent variable scale was operationalized as a continuous variable. Therefore, the assumption of a continuous dependent variable was met.

The second assumption of two or more independent variables either continuous (i.e., an interval or ratio) or categorical (i.e., ordinal or nominal) was also satisfied. The independent variable, the teachers' self-reported multicultural teaching skills and multicultural teaching knowledge and additionally the overall multicultural teaching competency were measured by MTCS (Spanierman et al., 2011). MTCS is a 16-item instrument. The items were scored on a 6-point Likert scale from 1 = Strongly Disagree to 6 = Strongly Agree with item #12 scored in a reverse order. Each response answered one of the two factors, and each factor was calculated as a sum of the points of all questions associated with that factor. Higher scores indicated higher levels of competency. An overall multicultural teaching competency score was also obtained and investigated on its predictive ability on the dependent variable. All independent variables were operationalized as continuous variables.

The third assumption of the multiple linear regression requires the independence of observations. The assumption focuses on testing for the correlation of adjacent observations and independence of their errors (residuals). A residual is the difference

between an observed value and a predicted value of the dependent variable. In SPSS Statistics, independence of observations was tested using Durbin-Watson statistics, which was run as part of the multiple regression procedure. The Durbin-Watson test outcome can range from 0 to 4. A value of approximately 2 indicates that there is no correlation between errors, and if the value is close to 2, it can be accepted that there is independence of errors (Laerd Statistics, 2015). The results of the Durbin-Watson test, as shown in Table 7, document no correlation between errors (residuals); therefore, the assumption of independence of observations was met.

Table 7

Durbin-Watson Test of Independence of Observations

Independent	Dependent	Covariate	Durbin-Watson
MTS	Content	Classroom assignment	1.694
MTK	Content	Classroom assignment	1.805
MTC	Content	Classroom assignment	1.733
MTS	Productivity	Classroom assignment	1.572
MTK	Productivity	Classroom assignment	1.518
MTC	Productivity	Classroom assignment	1.545
MTS	Communication	Classroom assignment	1.697
MTK	Communication	Classroom assignment	1.687
MTC	Communication	Classroom assignment	1.669
MTS	Content	Licensure	1.812
MTK	Content	Licensure	2.017
MTC	Content	Licensure	1.879
MTS	Productivity	Licensure	1.441
MTK	Productivity	Licensure	1.381
MTC	Productivity	Licensure	1.408
MTS	Communication	Licensure	1.536
MTK	Communication	Licensure	1.591
MTC	Communication	Licensure	1.530

Note. MTS (multicultural teaching skills); MTK (multicultural teaching knowledge); MTC (multicultural teaching competency overall). Content (digital academic content tools); Productivity (digital productivity tools); Communication (digital communication tools). Classroom Assignment (ENL/ESL language = 1; content area = 0); Licensure EL/TESOL (presence = 1; absence = 0).

The sixth assumption relates to multicollinearity. Multicollinearity occurs when two or more independent variables are highly correlated with each other. If the Tolerance value is less than 0.1 or its reciprocal variance inflation factor (VIF) is greater than 10, there might be a collinearity problem (Laerd Statistics, 2015). I used SPSS statistics to inspect the Tolerance and VIF values between all variables included in the regression model. All tolerance values fell well above 0.1 and well below VIF 10, which provided confidence in that there were no problems with collinearity in this data set. Consequently, there were no problems with understanding which independent variable contributed to the variance explained in the dependent variable (Laerd Statistics, 2015). Tolerance and VIF values are presented in Table 8.

Table 8

Tolerance and VIF Values

Independent Variable	Dependent Variable	Covariate	Tolerance	VIF
MTS	Content	Classroom Assignment	0.995	1.005
MTK	Content	Classroom Assignment	1.000	1.000
MTC	Content	Classroom Assignment	0.997	1.003
MTS	Productivity	Classroom Assignment	0.965	1.036
MTK	Productivity	Classroom Assignment	0.993	1.007
MTC	Productivity	Classroom Assignment	0.976	1.025
MTS	Communication	Classroom Assignment	0.965	1.036
MTK	Communication	Classroom Assignment	0.993	1.007
MTC	Communication	Classroom Assignment	0.976	1.025
MTS	Content	Licensure	0.820	1.219
MTK	Content	Licensure	0.870	1.150
MTC	Content	Licensure	0.831	1.203
MTS	Productivity	Licensure	0.778	1.285
MTK	Productivity	Licensure	0.843	1.186
MTC	Productivity	Licensure	0.791	1.264
MTS	Communication	Licensure	0.778	1.285
MTK	Communication	Licensure	0.843	1.186
MTC	Communication	Licensure	0.791	1.264

Note. MTS (multicultural teaching skills); MTK (multicultural teaching knowledge); MTC (multicultural teaching competency overall). Content (digital academic content

tools); Productivity (digital productivity tools); Communication (digital communication tools). Classroom Assignment (ENL/ESL language = 1; content area = 0); Licensure EL/TESOL (presence = 1; absence = 0).

The assumptions 4 (linearity), 5 (homoscedasticity of residuals), 7 (no significant outliers), and 8 (normally distributed residuals) were tested for all 18 regression models utilizing the SPSS chart feature (Appendix G). The P-P Plots, scatterplots, and histograms visually supported that all these data assumptions were met.

The assumption of linearity was established by generating partial regression plots between each independent and dependent variable (Laerd Statistics, 2015). The normal Predicted Probability plots (P-P plots) were produced as part of the multiple regression procedure and documented that the data followed the normality line in all regression models (Appendix G). There was a linear relationship between the independent variables (multicultural teaching skills, multicultural teaching knowledge, multicultural teaching competency overall) and the dependent variables DLRs (digital academic content tools, digital productivity tools, digital communication tools). Therefore, the assumption of linearity was met.

Additionally, the P-P plots and the histograms of residuals showed that the residuals were evenly distributed (Appendix G). Residuals are the differences between the observed and predicted values of the dependent variable and have to align closely with the plot's diagonal line. The P-P plots did not display any significant irregularities. Therefore, the multiple regression models could be considered fairly robust against

deviation from normality (Laerd Statistics, 2015), and the assumption of normality was met.

The assumption of homoscedasticity of residuals was visually inspected by plotting the studentized residuals against the unstandardized predicted values. In order to satisfy the assumption of homoscedasticity, the points of the plot need to exhibit no pattern and need to be approximately constantly spread, which means that the values of the independent variables have constant variance of errors (residuals). The scatterplot of studentized residuals versus unstandardized predicted values (Appendix G) was assessed for each regression model, and the visual inspection supported the conclusion that the assumption of homoscedasticity (homogeneity of variance) was met (Laerd Statistics, 2015).

Finally, there were no significant outliers. According to Laerd Statistics (2015), and outlier is an observation that does not follow the usual pattern of points and can be screened by using Casewise diagnostics in SPSS. Any cases where the standardized residual is greater than ±3 standard deviation define whether a particular residual is a representative of an outlier. A Casewise Diagnostic table in SPSS is not produced if all cases in the data set have standardized residuals less than ±3. The Residual Statistics tables are included in Appendix G, and the values of the standardized residuals are summarized in Table 9.

Table 9

Residual Statistics

Variable	Minimum	Maximum	Mean	*SD*	*N*
MTS*Classroom*Content	-2.24	2.27	0.00	0.97	36
MTK*Classroom*Content	-2.03	2.27	0.00	0.97	36
MTC*Classroom*Content	-2.23	2.35	0.00	0.97	36
MTS*Classroom*Productivity	-1.92	2.40	0.00	0.97	37
MTK*Classroom*Productivity	-1.81	2.34	0.00	0.97	37
MTC*Classroom*Productivity	-1.88	2.42	0.00	0.97	37
MTS*Classroom*Communication	-1.71	2.38	0.00	0.97	37
MTK*Classroom*Communication	-1.81	2.46	0.00	0.97	37
MTC*Classroom*Communication	-1.78	2.44	0.00	0.97	37
MTS*Licensure*Content	-2.37	2.10	0.00	0.97	36
MTK*Licensure*Content	-2.22	2.07	0.00	0.97	36
MTC*Licensure*Content	-2.37	2.19	0.00	0.97	36
MTS*Licensure*Productivity	-.200	2.30	0.00	0.97	37
MTK*Licensure*Productivity	-1.96	2.23	0.00	0.97	37
MTC*Licensure*Productivity	-2.02	2.31	0.00	0.97	37
MTS*Licensure*Communication	-1.72	2.31	0.00	0.97	37
MTK*Licensure*Communication	-1.79	2.29	0.00	0.97	37
MTC*Licensure*Communication	-1.77	2.33	0.00	0.97	37

Note. MTS (multicultural teaching skills); MTK (multicultural teaching knowledge); MTC (multicultural teaching competency overall). Content (digital academic content tools); Productivity (digital productivity tools); Communication (digital communication tools). Classroom Assignment (ENL/ESL language = 1; content area = 0); Licensure EL/TESOL (presence = 1; absence = 0).

The standardized residuals for the dependent variable *digital academic content tools* ranged from -2.24 to 2.35 when the type of classroom assignment was held constant and from -2.37 to 2.19 when the presence of EL/TOESL licensure was held constant. The standardized residuals for the dependent variable *digital productivity tools* ranged from -1.92 to 2.42 when the type of classroom assignment was held constant and from -2.02 to 2.31 when the presence of EL/TOESL licensure was held constant. The standardized

residuals for the dependent variable *digital communication tools* ranged from -1.81 to 2.46 when the type of classroom assignment was held constant and from -1.79 to 2.33 when the presence of EL/TOESL licensure was held constant. All standardized residuals were within the normal limits, not greater or equaling to 3. Therefore, the seventh assumption of the multiple linear regression was met.

To address the research questions and hypotheses, I conducted multiple linear regression analysis. Using multiple independent variables, a multiple linear regression is used to predict a continuous dependent variable and explain the relative contribution of each of the independent variables to the total variance of the dependent variable (Laerd Statistics, 2015). Because two of the demographic variables (type of teacher's classroom assignment and presence of ESL/TOESL licensure) were a-priori identified as having potential influence on the dependent variables, both were included but investigated separately in the regression models.

Research Question 1

RQ1 "Do high school language and content area teachers' self-reported multicultural teaching skills and multicultural teaching knowledge predict the utilization of *digital academic content tools* when working with SLIFE" was investigated using six regression models: MTS*classroom – Content, MTK*classroom – Content, MTC*classroom – Content, MTS*licensure – Content, MTK*licensure – Content, and MTC*licensure – Content (Table 10).

Table 10

ANOVA Summary Table for Regression Models for Research Question 1

Independent Variables	Model	Sum of Square	*df*	Mean Square	*F*	*p*
MTS*classroom	Regression	1279.897	2	639.948	15.748	<0.001
	Residual	1340.992	33	40.636		
	Total	2620.889	35			
MTK*classroom	Regression	1331.361	2	665.681	17.035	<0.001
	Residual	1289.527	33	39.077		
	Total	2620.889	35			
MTC*classroom	Regression	1367.959	2	683.979	18.015	<0.001
	Residual	1252.930	33	37.968		
	Total	2620.889	35			
MTS*licensure	Regression	1298.342	2	649.171	16.198	<0.001
	Residual	1322.546	33	40.077		
	Total	2620.889	35			
MTK*licensure	Regression	1379.755	2	689.877	18.343	<0.001
	Residual	1241.134	33	37.610		
	Total	2620.889	35			
MTC*licensure	Regression	1388.436	2	694.218	18.588	<0.001
	Residual	1232.453	33	37.347		
	Total	2620.889	35			

Note. MTS (multicultural teaching skills); MTK (multicultural teaching knowledge); MTC (multicultural teaching competency overall). Classroom Assignment (ENL/ESL language = 1; content area = 0); Licensure EL/TESOL (presence = 1; absence = 0). Dependent Variable: Digital Academic Content Tools.

The ANOVA for the model MTS*classroom – Content was statistically significant, F (2, 33) = 15.748, $p < .001$, $R^2 = .488$. This result means that MTS significantly predicts the frequency of use of digital academic content tools while controlling for the teacher's type of classroom assignment. It also means that 48.8% of the variance in the frequency of use of digital academic content tools can be explained by this model. The ANOVA for the model MTK*classroom – Content was statistically significant, F (2, 33) = 17.037, $p < .001$, $R^2 = .508$. This result means that MTK significantly predicts the frequency of use of digital academic content tools while controlling for the teacher's type of classroom assignment. It also means that 50.8% of the variance in the frequency of use of digital academic content tools can be explained by this model. The ANOVA for the model MTC*classroom – Content was statistically significant, F (2, 33) = 18.015, $p < .001$, $R^2 = 0.522$. This result means that MTC significantly predicts the frequency of use of digital academic content tools while controlling for the teacher's type of classroom assignment. It also means that 52.5% of the variance in the frequency of use of digital academic content tools can be explained by this model. The ANOVA for the model MTS*licensure – Content was statistically significant, F (2, 33) = 16.198, $p < .001$, $R^2 = .495$. This result means that MTS significantly predicts the frequency of use of digital academic content tools while controlling for the presence of specialized licensure. It also means that 49.5% of the variance in the frequency of use of digital academic content tools can be explained by this model. The ANOVA for the model MTK*licensure – Content was statistically significant, F (2, 33) = 18.343, $p < .001$, $R^2 = .526$. This result means that MTK

significantly predicts the frequency of use of digital academic content tools while controlling for the presence of specialized licensure. It also means that 52.6% of the variance in the frequency of use of digital academic content tools can be explained by this model. The ANOVA for the model MTC*licensure – Content was statistically significant, F (2, 33) = 18.588, $p < .001$, $R^2 = .530$. This result means that MTC significantly predicts the frequency of use of digital academic content tools while controlling for the presence of specialized licensure. It also means that 53% of the variance in the frequency of use of digital academic content tools can be explained by this model.

*H*o1 stated that there is no statistically significant predictive relationship between the teachers' self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital academic content tools when working with SLIFE. Data related to this hypothesis documented statistical significance for all models that investigated RQ1. Therefore, the null hypothesis was rejected. There is a statistically significant predictive relationship between the teachers' self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital academic content tools when working with SLIFE.

Research Question 2

RQ2 "Do high school language and content area teachers' self-reported multicultural teaching skills and multicultural teaching knowledge predict the utilization of *digital productivity tools* when working with SLIFE" was investigated using six regression models: MTS*classroom – Productivity, MTK*classroom – Productivity,

MTC*classroom – Productivity, MTS*licensure – Productivity, MTK*licensure – Productivity, and MTC*licensure – Productivity (Table 11).

Table 11

ANOVA Summary Table for Regression Models for Research Question 2

Independent Variables	Model	Sum of Square	*df*	Mean Square	*F*	*p*
MTS*classroom	Regression	92.625	2	46.313	7.716	0.002
	Residual	204.077	34	6.002		
	Total	296.703	36			
MTK*classroom	Regression	89.327	2	44.664	7.323	0.002
	Residual	207.375	34	6.099		
	Total	296.703	36			
MTC*classroom	Regression	94.897	2	47.448	7.994	0.001
	Residual	201.806	34	5.935		
	Total	296.703	36			
MTS*licensure	Regression	92.367	2	46.183	7.685	0.002
	Residual	204.336	34	6.010		
	Total	296.703	36			
MTK*licensure	Regression	88.467	2	44.234	7.222	0.002
	Residual	208.236	34	6.125		
	Total	296.703	36			
MTC*licensure	Regression	93.315	2	46.658	7.800	0.002
	Residual	203.387	34	5.982		
	Total	296.703	36			

Note. MTS (multicultural teaching skills); MTK (multicultural teaching knowledge); MTC (multicultural teaching competency overall). Classroom Assignment (ENL/ESL language = 1; content area = 0); Licensure EL/TESOL (presence = 1; absence = 0). Dependent Variable: Digital Productivity Tools.

The ANOVA for the model MTS*classroom – Productivity was statistically significant, F (2, 34) = 7.716, p = .002, R^2 = .312. This result means that MTS significantly predicts the frequency of use of digital productivity tools while controlling for the teacher's type of classroom assignment. It also means that 31.2% of the variance

in the frequency of use of digital productivity tools can be explained by this model. The ANOVA for the model MTK*classroom – Productivity was statistically significant, F (2, 34) = 7.323, p = .002, R^2 = .301. This result means that MTK significantly predicts the frequency of use of digital productivity tools while controlling for the teacher's type of classroom assignment. It also means that 30.1% of the variance in the frequency of use of digital productivity tools can be explained by this model. The ANOVA for the model MTC*classroom – Productivity was statistically significant, F (2, 34) = 7.994, p = .001, R^2 = .0.320. This result means that MTC significantly predicts the frequency of use of digital productivity tools while controlling for the teacher's type of classroom assignment. It also means that 32% of the variance in the frequency of use of digital productivity tools can be explained by this model. The ANOVA for the model MTS*licensure – Productivity was statistically significant, F (2, 34) = 7.685, p = .002, R^2 = .311. This result means that MTS significantly predicts the frequency of use of digital productivity tools while controlling for the presence of specialized licensure. It also means that 31.1% of the variance in the frequency of use of digital productivity tools can be explained by this model. The ANOVA for the model MTK*licensure – Productivity was statistically significant, F (2, 34) = 7.222, p = .002, R^2 = .298. This result means that MTK significantly predicts the frequency of use of digital productivity tools while controlling for the presence of specialized licensure. It also means that 29.8% of the variance in the frequency of use of digital productivity tools can be explained by this model. The ANOVA for the model MTC*licensure – Productivity was statistically significant, F (2, 34) = 7.800, p = .002, R^2 = .320. This result means that MTC

significantly predicts the frequency of use of digital productivity tools while controlling for the presence of specialized licensure. It also means that 32% of the variance in the frequency of use of digital productivity tools can be explained by this model.

*H*o2 stated that there is no statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital productivity tools when working with SLIFE. Data related to this hypothesis documented statistical significance for all models that investigated RQ2. Therefore, the null hypothesis was rejected. There is a statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital productivity tools when working with SLIFE.

Research Question 3

RQ3 "Do high school language and content area teachers' self-reported multicultural teaching skills and multicultural teaching knowledge predict the utilization of *digital communication tools* when working with SLIFE" was investigated using six regression models: MTS*classroom – Communication, MTK*classroom – Communication, MTC*classroom – Communication, MTS*licensure – Communication, MTK*licensure – Communication, and MTC*licensure – Communication (Table 12).

Table 12

ANOVA Summary Table for Regression Models for Research Question 3

Independent Variables	Model	Sum of Square	*df*	Mean Square	*F*	*p*
MTS*classroom	Regression	84.759	2	42.380	9.170	<0.001
	Residual	157.133	34	4.622		
	Total	241.892	36			
MTK*classroom	Regression	63.231	2	31.616	6.017	0.006
	Residual	178.660	34	5.255		
	Total	241.892	36			
MTC*classroom	Regression	77.606	2	38.803	8.031	0.001
	Residual	164.286	34	4.832		
	Total	241.892	36			
MTS*licensure	Regression	78.082	2	39.041	8.103	0.001
	Residual	163.810	34	4.818		
	Total	241.892	36			
MTK*licensure	Regression	63.746	2	31.873	6.083	0.006
	Residual	178.145	34	5.240		
	Total	241.892	36			
MTC*licensure	Regression	72.117	2	36.059	7.221	0.002
	Residual	169.775	34	4.993		
	Total	241.892	36			

Note. MTS (multicultural teaching skills); MTK (multicultural teaching knowledge); MTC (multicultural teaching competency overall). Classroom Assignment (ENL/ESL language = 1; content area = 0); Licensure EL/TESOL (presence = 1; absence = 0). Dependent Variable: Digital Communication Tools.

The ANOVA for the model MTS*classroom – Communication was statistically significant, F (2,34) = 9.170, p < 0.001, R^2 = .350. This result means that MTS significantly predicts the frequency of use of digital communication tools while controlling for the teacher's type of classroom assignment. It also means that 35% of the variance in the frequency of use of digital communication tools can be explained by this model. The ANOVA for the model MTK*classroom – Communication was statistically significant, F (2, 34) = 6.017, p = .006, R^2 = .261. This result means that MTK significantly predicts the frequency of use of digital communication tools while controlling for the teacher's type of classroom assignment. It also means that 26.1% of the variance in the frequency of use of digital communication tools can be explained by this model. The ANOVA for the model MTC*classroom – Communication was statistically significant, F (2, 34) = 8.031, p = .001, R^2 = .321. This result means that MTC significantly predicts the frequency of use of digital communication tools while controlling for the teacher's type of classroom assignment. It also means that 32.1% of the variance in the frequency of use of digital communication tools can be explained by this model. The ANOVA for the model MTS*licensure – Communication was statistically significant, F (2, 34) = 8.103, p = .001, R^2 = .323. This result means that MTS significantly predicts the frequency of use of digital communication tools while controlling for the presence of specialized licensure. It also means that 32.3% of the variance in the frequency of use of digital communication tools can be explained by this model. The ANOVA for the model MTK*licensure – Communication was statistically significant, F (2, 34) = 6.083, p = .006, R^2 = .264. This result means that MTK

significantly predicts the frequency of use of digital communication tools while controlling for the presence of specialized licensure. It also means that 26.4% of the variance in the frequency of use of digital communication tools can be explained by this model. The ANOVA for the model MTC*licensure – Communication was statistically significant, F (2, 34) = 7.221, p = .002, R^2 = .298. This result means that MTC significantly predicts the frequency of use of digital communication tools while controlling for the presence of specialized licensure. It also means that 29.8% of the variance in the frequency of use of digital communication tools can be explained by this model.

*H*o3 stated that there is no statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital communication tools when working with SLIFE. Data related to this hypothesis documented statistical significance for all models that investigated RQ3. Therefore, the null hypothesis was rejected. There is a statistically significant predictive relationship between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital communication tools when working with SLIFE.

Summary

The objective of this study was to examine the predictive relationship between the teachers' self-reported multicultural competencies and the use of digital learning tools in instruction of ELLs who are SLIFE. I used a quantitative predictive correlational design and applied multiple linear regression analyses to address the study's objective. I used

Qualtrics online survey tool to collect the data from 71 teachers of SLIFE of which 36/37 complete answers were included in the statistical model.

The key findings of this study showed that there exists a statistically significant predictive relationship between teachers' self-reported multicultural teaching skills, multicultural teaching knowledge, and overall multicultural teaching competencies (skills and knowledge combined) while controlling for the type of teacher's classroom assignment (language/content) as applied to high school teachers of SLIFE. There also exists a statistically significant predictive relationship between teachers' self-reported multicultural teaching skills, multicultural teaching knowledge, and overall multicultural teaching competencies (skills and knowledge combined) while controlling for the presence of specialized EL/TOESL licensure as applied to the high school teachers of SLIFE. While all three null hypotheses were rejected due to the statistically significant findings, the degree to which the multicultural teaching competencies predicted the frequency of use of the DLRs (academic content, productivity, communication) varied.

In Chapter 5, I summarize this study and synthesize the results with the previous scholarly literature. I present the findings and conclusions and describe the study limitations and implications. I also present recommendations for practitioners and future research.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this quantitative correlational predictive study was to examine whether the high school language and content area teachers' self-reported multicultural teaching competencies (skills and knowledge) predict the choice of DLRs they use with ELLs who are SLIFE. This study was important because the fast-growing numbers of SLIFE in U.S. schools require a culturally responsive approach in all areas of curriculum, instruction, and assessment. It is not known whether the teachers are able to operationalize their knowledge of multicultural and culturally responsive teaching in their practice (Pourdavour & Yan, 2020) when integrating technology into the teaching and learning process, which further complicates the culturally responsive teaching (Frederick & Shockley, 2008; Nielsen et al., 2020) and presents to the teachers of diverse students the need to make additional instructional and pedagogical choices. Therefore, in this quantitative predictive correlational study I examined whether there is a statistically significant relationship between the independent variables (multicultural teaching skills and multicultural teaching knowledge) and the dependent variables DLRs (digital academic content tools, academic productivity tools, and academic communication tools) and consequently whether the teacher's multicultural teaching competencies can be applied as a predictive component when making technology integration choices especially in the context of high school language and content area teachers of SLIFE.

In the nonexperimental design, the data were collected from high school language and content area teachers of SLIFE using a voluntary, low-risk, anonymous online survey, and multiple linear regression analyses were applied to determine the predictive

ability of the independent variable on the dependent variable. Teacher's classroom assignment type (language or content area) and presence of specialized EL/TOESL licensure/certification were held constant in all statistical models. The results indicated a statistically significant predictive relationship between teachers' self-reported multicultural teaching skills, multicultural teaching knowledge, and the overall multicultural teaching competencies (skills and knowledge combined) while separately controlling for the type of teacher's classroom assignment (language/content) and for the presence of specialized EL/TOESL licensure as applied to the high school teachers of SLIFE. While all three null hypotheses were rejected due to the statistically significant findings, the degree to which the multicultural teaching competencies predicted the frequency of use of the DLRs (academic content, productivity, communication) varied.

Interpretation of the Findings

This study of the predictive ability of the teachers' self-reported multicultural teaching competencies (skills and knowledge) on the DLR choices they make when working with high school SLIFE was grounded in the tenets of SCT of learning and cognitive development (Vygotsky, 1978, 1986). Additionally, culturally responsive teaching (Gay, 2000) and MALP (DeCapua & Marshall, 2015, 2023), the most recommended research-based instructional models to teaching SLIFE students, and the updated TPACK model of technology integration (Mishra, 2019), supported the foundational assumptions of the study, as they highlighted the context of learning and the importance of attending to SLIFE unique cultural, linguistic, academic, socioeconomic, and socioemotional needs through culturally responsive teaching.

Sociocultural Theory of Cognitive Development

SCT (Vygotsky, 1978) grounded my study and offered a lens through which I could examine the use of DLRs in a comprehensive way. SCT recognizes the complexity of the cultural and historical context and the necessity of social interactions with the more knowledgeable others within the zone of proximal development as necessities for the internalization of knowledge by an individual. According to DeCapua (2016), SCT best corresponds with SLIFE unique learning style that is rooted in collaborative, apprenticeship models of communal learning.

SCT has been cited in the literature on teaching diverse learners in technology-supported learning environments. Kumi et al. (2020) cited constructivist learning theories and SCT to emphasize the importance of the consideration of the sociocultural context when creating learning experiences online and selecting DLRs that help diverse learners to engage, participate, and contribute to knowledge creating in the online spaces. When investigating diverse learners' perceptions of the use of technology and online learning, Kumi-Yeboah et al. (2020) identified interactivity as being a critical component of online interaction and having positive influence on constructing knowledge and increasing participation and academic achievement. Balbay (2018) proponed that the interactive ability of certain DLRs also directly satisfies the fundamental tenets of SCT because students can use their culturally specific language and tools to make meaning of learning tasks in an environment that is scaffolded through the assistance of peers, teachers, and technology and self-regulate their learning through the dynamic assessment within the zone of proximal development. In this way, some DLRs can act as a mediation tool for

scaffolding learning (Morossan et al., 2017) and through technological tools, the needs of all students can be ensured in culturally responsive ways (Jackson et al., 2021). According to Chuang et al. (2020), technology integration represents the best practice for teaching in a multicultural classroom, and a classroom with diverse ELLs and SLIFE classifies as such an environment. This study extends the existing knowledge by incorporating the DLR Matrix, recognizing the difference in using the DLRs for various purposes – academic content learning, task production, and communication – and underscoring the interactive digital tools as those that best satisfy the tenets of culturally responsive teaching when working with SLIFE. Further, in the context of my study, a clear intersection was identified between the tenets of SCT, MALP instructional model, and the updated TPACK framework as applied to the high school teachers of ELLs who are SLIFE.

Mutually Adaptive Learning Paradigm

MALP (DeCapua & Marshall, 2010, 2015, 2023) is the most recommended approach in serving SLIFE as a subgroup of ELLs. MALP is rooted in research on culturally responsive teaching (Gay, 2000) and was developed specifically with SLIFE students in mind and confirmed by secondary SLIFE themselves as an effective teaching strategy (Daniel & Zybina, 2018; Daniel & Zybina, 2019). MALP validates SLIFE unique learning paradigm, as it ensures relevance, relationships, oral transmission of information before written practice, and group before individual responsibility (DeCapua & Marshall, 2010), and as such acts as a bridge to formal education (DeCapua, 2016; DeCapua & Marshall, 2015). MALP recognizes interconnectedness and immediate

relevance as the primary learning conditions of SLIFE and empowers SLIFE to achieve academically and gradually adapt to the Western-style educational system. What this may mean in the context of my study is that applying MALP model to the DLR integration in the context of the high school teachers of SLIFE can ensure that the technology choices satisfy both the principles of culturally responsive teaching and the specific needs of this unique subgroup of ELLs.

Updated TPACK Technology Integration Model

TPACK technology integration framework identifies the types of knowledge needed for successful educational technology integration (Koehler & Mishra, 2009; Mishra & Koehler, 2006). Angeli and Valanides (2009, 2013) challenged the initial TPACK model and advanced the discussion about technology integration by proposing that learner and context are integral parts of the teacher's technological, pedagogical, and content knowledge. Consequently, Mishra (2019) updated the model with the term ConteXtual Knowledge and recognized that the teacher's contextual knowledge is primary, as it represents the teacher's organizational and situational constraints. As Zhang and Tang (2021) noted, with the rapidly changing demographics of schools, those constraints are highly variable and always changing and warrantied at all levels of education. In the context of implementing DLRs in a multicultural classroom, Kelly (2007) highlighted cultural sensitivity, Chuang et al. (2020) underlined constructs of culturally responsive teaching in the technology-supported environments, and Kumi et al., (2020) cited constructivist learning theories and SCT (Vygotsky, 1978). Combined, the above recommendations emphasize the importance of the consideration of the

sociocultural context when creating learning experiences online and selecting DLRs that help diverse learners to engage, participate, and contribute to knowledge creating in the online spaces.

The documented intersection of SCT, MALP, and TPACK warranted the investigation into whether the teacher's self-reported multicultural teaching competencies as a precondition of culturally responsive teaching (Spanierman et al., 2011; Walter, 2018) can predict the choices of DLRs when working with high school SLIFE in both language and content area classrooms. My study extends the existing literature by exploring this phenomenon through the lens of teachers' multicultural acumen using quantitative methods and by filling the gap that exists in the research regarding the culturally responsive utilization of DLRs with high school SLIFE. The teachers' multicultural acumen represented the independent variable and was investigated using the MTCS (Spanierman et al., 2011). The dependent variables were the DLRs in the categories of digital academic content tools, digital productivity tools, and digital communication tools. I interpreted the results in relations to the research questions that guided my study and to the independent and dependent variables as quantified by their respective measurements.

Research Questions

To address the problem and purpose of this study, the following research questions (RQs) were used to guide my study.

RQ1: Do high school language and content area teacher's self-reported multicultural teaching skills and multicultural teaching knowledge predict the utilization of digital academic content tools when working with SLIFE?

RQ2: Do high school language and content area areas teacher's self-reported multicultural teaching skills and multicultural teaching knowledge predict the utilization of digital productivity tools when working with SLIFE?

RQ3: Do high school language and content area teacher's self-reported multicultural teaching skills and multicultural teaching knowledge predict the utilization of digital communication tools when working with SLIFE?

The assumptions of the null hypotheses as related to my research questions were that there were no statistically significant predictive relationships between the teacher's self-reported multicultural teaching skills and multicultural teaching knowledge and the utilization of digital academic content, digital productivity, and digital communication tools respectively when working with SLIFE. Based on the results of the study, I rejected all null hypotheses and concluded that there is a statistically significant relationship between all variables in this study. While all three null hypotheses were rejected due to the statistically significant findings, the degree to which the multicultural teaching competencies predicted the frequency of use of the DLRs (academic content, productivity, communication) varied.

Multicultural Teaching Competency

In the context of this study, the MTCS instrument measured (a) "self-reported skills or behaviors in implementing culturally sensitive teaching practices" and (b) "self-

reported knowledge of culturally responsive theories, resources, and classroom strategies" (Spanierman et al., 2011, p. 457); therefore, the language of the instrument established a link between teachers' multicultural teaching competencies (skills and knowledge) and the ability to create culturally responsive environments. The findings of the study revealed a strong significant positive correlation between multicultural teaching skills, knowledge, and overall competency and digital academic content tools (r = .697, r = .713, r = .721 respectively). However, the correlation between multicultural teaching skills, knowledge, and overall competency and digital productivity tools was moderate (r = .511, r = .473, r = .512 respectively), and the correlation between multicultural teaching skills and overall multicultural teaching competency and digital communication tools was even smaller (r = .470, r = .419 respectively). Additionally, there was a nonsignificant positive correlation between multicultural teaching knowledge and digital communication tools (r = .295). Between multicultural teaching skills and multicultural teaching knowledge, the knowledge is the stronger predictor in the utilization of the digital academic content tools, but the skills have a stronger predictive ability in the utilization of the digital productivity and digital communication tools. The weakest predictive relationship is between knowledge and the utilization of digital communication tools. If the academic content tools help learners acquire academic content, productivity tools allow students to plan, document, analyze, process, and present information, and communication tools facilitate student-to-student and student-to-teacher networking, communication, collaboration (U. S. Department of Education, 2018b) and interactivity and collaboration have been identified by scholars and diverse learners as critical

components of culturally responsive SLIFE online experience (Balbay, 2018; Jackson et al., 2021; Kumi-Yeboah et al., 2020; Morossan et al., 2017), then the digital communication tools can be elevated as the most effective DLR tools for these students, and a high frequency of their use can be desired. The results of my study, however, documented the opposite trend (see Table 5). Teachers who participated in my study reported significantly higher frequencies of use of academic content tools in comparison to the productivity and communication tools with the lowest use of communication tools in correlation with their multicultural teaching knowledge. These findings extend the existing scholarly work by documenting that the extent of teacher's ability to operationalize their multicultural teaching acumen in the highly contextualized SLIFE context may be limited.

Digital Learning Resources

DLRs are academic content tools, digital productivity tools, and digital communication tools that engage students in learning activities and support students' learning goals (U. S. Department of Education, 2018b, p. 22). For the purpose of this study, the DLR Matrix (Appendix A; Zehler et al., 2019) was used to characterize the three groups of the DLRs. The Digital Academic Content Tools are "Software, applications (apps), programs, or websites that offer academic content resources and/or engage students in activities to learn academic content or skills, including, but not limited to, language and literacy content or skills" (Zehler et al., p. 75). This DLR group includes tutorials, modeling, virtual worlds, dictionaries, e-books, and translation and articulation tools that help with language production. The Digital Productivity Tools are "Software,

applications (apps), programs, or websites that students use to plan, document, organize, and analyze content. They do not contain academic content" (Zehler et al., p. 75). This DLR group includes presentation and publication tools, word processing tools, and information analysis and organization tools such as spreadsheets, concept-mapping tools, and story templates. The Digital Communication Tools are "Software, applications (apps), programs, or websites that students use to communicate, collaborate, network or present information. They do not contain academic content" (Zehler et al., p. 75). This DLR group includes asynchronous and synchronous text communication (discussion boards, emails, text messaging, chats), reflection tools (blogs or student journals), videoconferencing and meeting tools, and project collaboration and sharing tools.

In the review of literature, interactivity was identified by the researchers and by the SLIFE students themselves as a critical component in online interactions because it has positive influence on constructing knowledge and increasing participation and academic achievement (Kumi-Yeboah et al., 2020). It directly satisfies the fundamental construct of SCT (Balbay, 2018) with the assistance of peers, teachers, and technology can act as a mediation tool for scaffolding learning within the zone of proximal development (Morossan et al., 2017) and ensures meeting the needs of all students in culturally responsive ways (Jackson et al., 2021). Specifically, Kumi-Yeboah et al. (2020) found the linguistically and culturally diverse learner participants identified interactive digital technologies, such as video lectures, voice thread, blogs and blogging, wikis, Google Hangouts, multimedia presentation tool PowerPoint and Prezi, and social network tools as learning tools that helped them "to engage, participate, and contribute to

knowledge creating in the online discussion forums" (p. 49) as part of their online educational process. The ELL participants in the study further reported that the interactive digital tools had a positive influence on their understanding of the course content and increased their participation in the educational process, and that the opportunity for collaborative online knowledge construction positively influenced their academic achievement. Applying the interactivity lens onto the DLRs choices for SLIFE illuminates the difference between the three DLR categories and elevates the Digital Communication Tools as the most satisfactory to the constructs of SCT, MALP, and TPACK in the context of high school teachers of ELLs who are SLIFE. This means that this study contributes to the gap in the understanding that the DLRs that include the interactive, collaborative, and communicative component are better positioned to serve SLIFE in a way that acknowledges their unique characteristics and needs and provides a more equitable and inclusive technology-supported online learning experience. These findings also contribute to the gap that exists in knowledge about whether the teachers are able to operationalize what they know and/or learn about multicultural and culturally responsive teaching and how/whether they are able to apply this knowledge in their practice (see Pourdavour & Yan, 2020), especially when working with high school ELLs who are SLIFE.

Limitations of the Study

The limitations of this study were related to methodology. More specifically, the boundaries, delimitations, and limitations to the participant pool, and the instrument itself limited the generalizability of this study. First, a clear understanding of the term SLIFE as

it pertained to the scope of my study was imperative. In my study, SLIFE were defined by the seminal scholars of this phenomenon as a specific subgroup of ELLs who are immigrant youth whose education was interrupted by either instability in their home country or by a process of migration (Freeman & Freeman, 2002) and who have experienced interrupted education due to war, civil unrest, migration, or other factors, who have never had the opportunity to participate in any type of schooling before entering school in the United States, or who have experienced limited education in their home countries due to lack of resources or trained teachers, the type of schooling they participated in, or other circumstances (DeCapua, 2023; DeCapua & Marshall, 2010; WIDA, 2015). However, due to the inconsistencies in tracking SLIFE across the nation (Arundel, 2022; Browder, 2014; Morgan et al., 2023; Potochnick, 2018; Ruiz-de-Velasco & Fix, 2000; WIDA, 2015), identifying SLIFE is complicated. Consequently, some high school teachers may not be aware of serving SLIFE, especially in the content area courses. This misunderstanding of the term likely limited the number of participants who volunteered for the study and might explain the imbalance between language (73%) and content area (27%) teacher respondents. Additionally, the participant inclusion and exclusion criteria bounded the participants to being high school teachers who plan and deliver curricula to ELLs who are SLIFE and integrate DLRs as tools that SLIFE use to complete educational tasks. Instructional and other support staff, instructional coaches, or administrative staff were excluded. The final exclusion criteria was that the teacher responses had to be grounded in the ELL/SLIFE and not in the EFL teaching experience. The limitations related to the participant pool was mitigated by enriching the purposive

sampling technique by utilizing snowball nonprobability sampling strategy to help saturate the sample size (see Babbie, 2017). Further, and as recommended by Samsa (2013), including the teacher assignment type (language or content area) as a covariate mitigated this limitation and increased precision as well as reduced bias when interpreting the results of my study.

There were also limitations related to the MTCS instrument (Spanierman et al., 2011). As a self-report method to investigate how teachers perceive their multicultural teaching competencies, the answers may not reflect the teacher's real ability to create culturally responsive environments and implement culturally responsive teaching. This limitation is balanced within the instrument itself by not including the teacher's self-reported multicultural awareness/attitude, which could disadvantage the teachers with a less developed multicultural training background. The more critical limitation to the MTCS instrument stems from its initial development during which the authors did not consider the potentially different cultural lens of the respondents (Chang & Cochran-Smith, 2022). Therefore, the instrument itself may not have reflected fully the culturally unique living experiences of the participants with diverse ethnic backgrounds. What this means for my study, in which 81.1% of respondents were White/non-Hispanic, 16.2% were Hispanic/Latino, and 2.7% claimed other ethnicity, is that the results could not be fully generalized across my entire population due to its ethnic diversity. However, even considering the instrument's limitations, MTCS is to date the only instrument intended to measure multicultural teaching skills and knowledge of general preservice and in-service teachers (as compared to special education teachers, school professionals, etc.), as

documented in Sarraj et al., (2015), and in both primary and secondary environments (see Spanierman et al., 2011) and therefore was the most applicable instrument to measure the teachers' multicultural teaching acumen in my study.

Considering the methodology-related limitations of this study, the overall degree of generalizability and transferability was further supported by the utilization of a nonexperimental research design, which did not involve any manipulations of variables, by the employment of a voluntary, low-risk, anonymous online survey tool, which minimized the issues of participant selection bias, and by ensuring the geographical location freedom of respondents, which aided in saturating a priori sample size requirements. Finally, my role as researcher did not conflict with my present position as a secondary English Language Arts and ENL/ESL instructor in a small Midwestern urban school district because while collecting survey data, I was not directly collecting any information from the teachers in my district and/or in my school. Had these teachers gained access to the survey due to their associations with various educational organizations and/or social media, I was not able to identify their affiliation because the survey collected the data anonymously.

The final limitation and concern related to my study that can be raised by experts is related to the sample power calculation. For the multiple regression model, I hypothesized a medium effect size of $f^2 = 0.35$, an alpha value of 0.05, a beta value of 0.20 (1-beta = power; 80% power), and one primary independent and one covariate (total of two parameters) being entered into each model (Appendix D), a total of $N = 31$ participants were needed to achieve adequate statistical power for the study (Faul et al.,

2007, 2009). Hypothesizing the medium effect size of .35 rather than the more commonly used small effect size of .15 resulted in a smaller sample estimate, and according to Cohen (1992), my study was underpowered. In statistical hypothesis testing, sample size is a common factor affecting the margin of error. A smaller sample size generally increases the exposure to Type I error, which occurs when the null hypotheses is rejected based on the sample data. While Cohen's (1992) method establishes a required $N = 67$ at power = .80 for $\alpha = .05$ for a two-parameter multiple correlation statistical test, it also operationally defines the effect (ES) index (i.e., "the degree to which the null hypothesis is believed to be false") at small ES = .02, medium ES = .15, and large ES = .35 levels (Cohen, p. 157). To support the degree of certainty in my findings, I computed the ES statistics (Cohen's *f*) based on the R squared in all 16 statistical models (Table 13, Appendix H). All findings yielded large ES's between the smallest ES = 0.594 and the largest ES = 1.062 values. These findings minimize the risk of committing the Type I error and further substantiate that the findings of my study are meaningful.

Recommendations

Recommendations for further research are based on study results and limitations of the study. The first recommendation is related to the findings that there is a statistically significant relationship between the teachers' multicultural acumen and the choices of DLRs when working with high school SLIFE. Therefore, more research needs to be done to understand what determines the specific DLR choices the teachers make in their educational practice and whether the DLR choices are motivated by the level of teacher's multicultural teaching competencies or by other organizational and situational factors.

The second recommendation is related to the MTCS instrument (Spanierman et al., 2011). Although the language of the instrument established a link between teachers' multicultural teaching competencies (skills and knowledge) and the ability to create culturally responsive environments, the self-reporting nature of the instrument could result in self-reporting bias. There are cultural, societal, gender, age, and other reasons for individuals to overestimate their knowledge and abilities (Walkowiak et al., 2023), and even when using a reliable and valid measurement instrument, the self-reported and actual knowledge may not always correspond. As related to the topic of my study, Mohammadpour and Maroofi (2025) documented a significant disparity between performance-based and self-reported measures of teachers' TPACK knowledge and skills. Therefore, qualitative or mixed-methods methodology could produce more precise results and richer data by utilizing interviews, classroom observations, or performance-based evaluations.

The last recommendation is related to the limitations of this study. This study collected a total of 71 responses of which $N = 36$ were included in the multiple regression statistical models with the dependent variable digital academic content tools and $N = 37$ were included in the statistical models with the dependent variables digital productivity and digital communication tools. Therefore, this study could be replicated with a more robust sample in order to increase the generalizability of the study. As well, this study included high school teachers, and mirroring the same approach with elementary, middle, or higher education professionals could enrich the results and inform a wider spectrum of teachers of SLIFE. In addition, a comparative approach could be applied to investigate

separately the differences between various demographic teacher groups. In my study, 86% of teacher respondents were females, 81.1% were White/non-Hispanic, 67.5% were between ages 40 and 59, 43.2% had between 11 and 20 years of teaching experience, 70.3% had Master's or higher level of education, 73% were ENL/ESL language teachers, and 65% held the specialized EL/TOESL licensure. For instance, in a study of mainstream elementary and high school teachers, Pasquarella et al. (2024) documented that years of experience as an educator were in their teacher sample not statistically correlated with teacher's confidence and self-efficacy when serving multilingual learners (new term for ELLs). Therefore, a specific teacher demographic could be investigated separately and in more depth to extend the understanding of the phenomenon of my study.

The demographic characteristics of the collected sample also confirmed the continuous mismatch between students' and teachers' race and ethnicities (Tanase, 2022). While the average ethnically diverse student levels have reached 50% across the country, 79% of the elementary and secondary teachers were non-Hispanic white in 2017-2018 school year according to the most recently available reports by NCES (2020). In my sample, the majority of the participating teachers (81.1%) were not from diverse backgrounds. Therefore, especially a study inquiry into the difference between the diverse and non-diverse teachers could expand the utilization of the MTCS instrument, which in its initial development did not account for the experiences and knowledge of culturally diverse participants and stakeholders (Chang & Cochran-Smith, 2022).

One final consideration to expand upon the findings of this study is that this study could serve as a springboard for further investigations into professional development and training that could help teachers understand the connection between the principles of culturally responsive teaching and the specific types of technology that serves SLIFE in a culturally responsive way. The results of my study documented a statistically significant higher utilization of the digital academic content tools as compared to the digital communication tools as well as a nonsignificant predictive ability of teacher's knowledge on the use of the digital communication tools, which according to SCT tenets and MALP principles rank as the most culturally appropriate for SLIFE. In Chapter 3, I positioned the *what* and *how* of teaching in the context of Pourdavour and Yan's (2020) study, in which the authors concluded that a semester-long course of diversity transformed the teachers' perspectives on multiculturalism but did not follow up investigating how the teachers operationalized the newly acquired knowledge in their practice. Similarly, Li and Peters (2020) documented that traditional professional development that incorporated research about teaching ELLs and its application while simultaneously serving ELLs was more effective. Therefore, my proposition about the insufficiency of teaching *about* diversity and the necessity of acquiring the *how* to teach the diverse students holds its merit, and my recommendation for professional development is while providing the knowledge to also provide ample opportunities for practicing the skills of incorporating culturally responsive technology into the culturally responsive curriculum.

Implications

This study may contribute to positive social change in several ways. First, at the theoretical level, the study illuminated the intersection of SCT (Vygotsky, 1978) as a learning theory frequently cited in the second language acquisition and educational technology research, MALP as the SLIFE-specific leading culturally responsive teaching model, and the ConteXtual Knowledge of TPACK model of technology integration. Applying these principles and using the DLRs Matrix could assist teachers at the individual level in narrowing the wide range of DLR choices when planning, delivering, and assessing their integration into the curriculum.

There is also potential for change at the organizational level. School leaders and program directors could evaluate current use of educational technology in the classrooms with diverse student populations and plan to support their teachers of diverse students with culturally responsive resources and professional development. What is known is that teachers' digital competence, digital self-efficacy, and techno-pedagogical preparedness are among the most frequently stated barriers to the use of DLRs in the classroom (Gomez, 2022; Moreira-Fontán et al., 2019), but the teachers of diverse students have to make additional instructional and pedagogical choices (Halvorsen, 2017). They also need to have knowledge of and access to a variety of these digital learning tools (Darling-Aduana & Heinrich, 2018) as well as opportunities to engage in culturally responsive technology integration professional development (Cheng et al., 2022). Therefore, professional development could be better organized around the practical skills of application of various DLRs into language and content area teaching of SLIFE so that the

opportunity to engage in authentic, hands-on technology integration learning experiences with diverse learners equip teachers with a more contextualized understanding of culturally responsive teaching in the diverse context as was observed by Jackson et al. (2021) and empower teachers with technological skills. I ground this recommendation in the results of my study that highlighted that the multicultural teaching skills have a stronger predictive ability in the utilization of the digital productivity and digital communication tools, and that the multicultural teaching knowledge had the smallest ability to predict the utilization of the digital communication tools as the most culturally responsive DLRs in the context of teaching SLIFE.

Further the study may have implications for future educational technology development. Various DLRs have been investigated with ELLs (Arce & Valdivia, 2020; Darling-Aduana & Heinrich, 2018; Mendoza, 2019; Prince, 2017), and there is a lack of consensus about the use of educational technology with ELLs in general (Lee et al., 2022) and with SLIFE more specifically. Additionally, multiple scholars cautioned that not all educational technology supports the diverse learners in an equitable and culturally responsive way (Chisholm, 1998; Dolan, 2017; Greene-Clemons, 2016); Morgan, 2014) and that programs designed for English speakers can be biased against ELLs in general and SLIFE more specifically (Altavilla, 2020). SLIFE are a non-monolithic group of ELLs with very unique needs that are a result of their diverse lived experiences (Rowland, 2020). Understanding that both teaching and technology are culturally embedded, and that culture provides the context for teaching and learning (Byrd, 2016), the findings of this study have a potential to direct future technology creation to

considering the wide range of cultural, linguistic, academic, socioeconomic, and socioemotional diversity of our learners.

Finally, this study can also advance positive social change for SLIFE. Although the interest in studies involving SLIFE has grown recently in the doctoral candidate community, published scholarly literature continues to be sparse. However, although limited, the existing studies documented that the SLIFE unique needs and additional barriers, such as lack of digital literacy skills, further complicate successful technology integration (AbuJarour, 2020; Andrei, 2017; Carhill-Poza et al., 2020; Drolia et al., 2020; Hsu, 2016; Smyser, 2019). What is known is that technology integration with the linguistically diverse students must be purposeful and intentional (Altavilla, 2020; Miller, 2018; Siefert et al., 2019), have to provide opportunities for hands-on, students-centered knowledge construction (Andrei, 2017; Darling-Aduana & Heinrich, 2018; Miller, 2018), should match students' learning needs and preferences, and enhance learning (European Commission et al., 2017; Darlin-Aduana & Heinrich, 2018; Miller, 2018; Prince, 2017). It should be used as a tool for learning (Siefert et al., 2019) and as a tool to incorporate culturally responsive teaching (Jackson, 2021). Yet, the use of digital learning tools has been shown to be the best practice when teaching in a multicultural classroom (Darling-Aduana & Henrich, 2018). Therefore, the findings of my study enrich the existing knowledge about teachers' multicultural teaching competencies as predictors of the utilization of DLRs in a multicultural, technology-supported learning environment and as such can contribute to an improved professional practice concerning SLIFE.

Conclusion

The purpose of this quantitative correlational predictive study was to examine the predictive ability of the high school teachers' multicultural acumen on the choices of DLRs they make when teaching SLIFE. The results documented a positive predictive relationship between the variables with the varied levels of degree to which the multicultural teaching competencies predicted the frequency of use of the DLRs, specifically underscoring the difference between how teachers operationalized their multicultural teaching competencies (skills and knowledge) in relation to the choice of the DLRs (academic content, productivity, communication tools). The study also illuminated the complexity of the decisions teachers of SLIFE make and advanced the understanding of the importance of multicultural teaching competencies when working with diverse, multilingual students. Additionally, establishing the intersection of SCT learning theory, MALP principles, and TPACK technology integration model in the context of SLIFE highlighted the interactive ability of the digital communication tools as the tools that best satisfy the principles of culturally responsive teaching.

The rapid increase in the numbers of ELLs in U.S. schools from 9 and 14 percent in 1980 and 1990 respectively to 22 percent in 2021, not reflecting the most recent border crisis (Camarote et al., 2023) resulted in the surge in SLIFE representation nationwide and created an increased cultural, linguistic, academic, socioeconomic, and even socioemotional classroom diversity that demands a culturally responsive instructional approach for, in some school, up to 50% of diverse students. However, there is a critical shortage of mainstream educators equipped with pedagogical knowledge and practical

skills to support these students (NCES 2024; USED 2023), and especially in technology-supported in-person and remote learning environments teachers report various levels of confidence in integrating technology and consequently various levels of the use of technology in their practice (Sarker et al., 2019) and need opportunities to engage in culturally responsive technology integration professional development (Cheng et al., 2022). Therefore, this study has far-reaching implications on positive social change for teachers, administration and support staff, technology developers, and SLIFE, and offers opportunities for further, so much needed inquiry into the best teaching practices for this unique student population.

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Appendix A: Digital Learning Resources (DLR) Matrix

Definitions: Digital Learning Resources

Digital Learning Resources (DLRs) refers to digital resources such as applications, software, programs, or websites that engage students in learning activities and support students' learning goals. There are three categories of DLRs: digital academic content tools, digital productivity tools, and digital communication tools. DLRs as defined here do not include the hardware or infrastructure needed to use the digital resources.

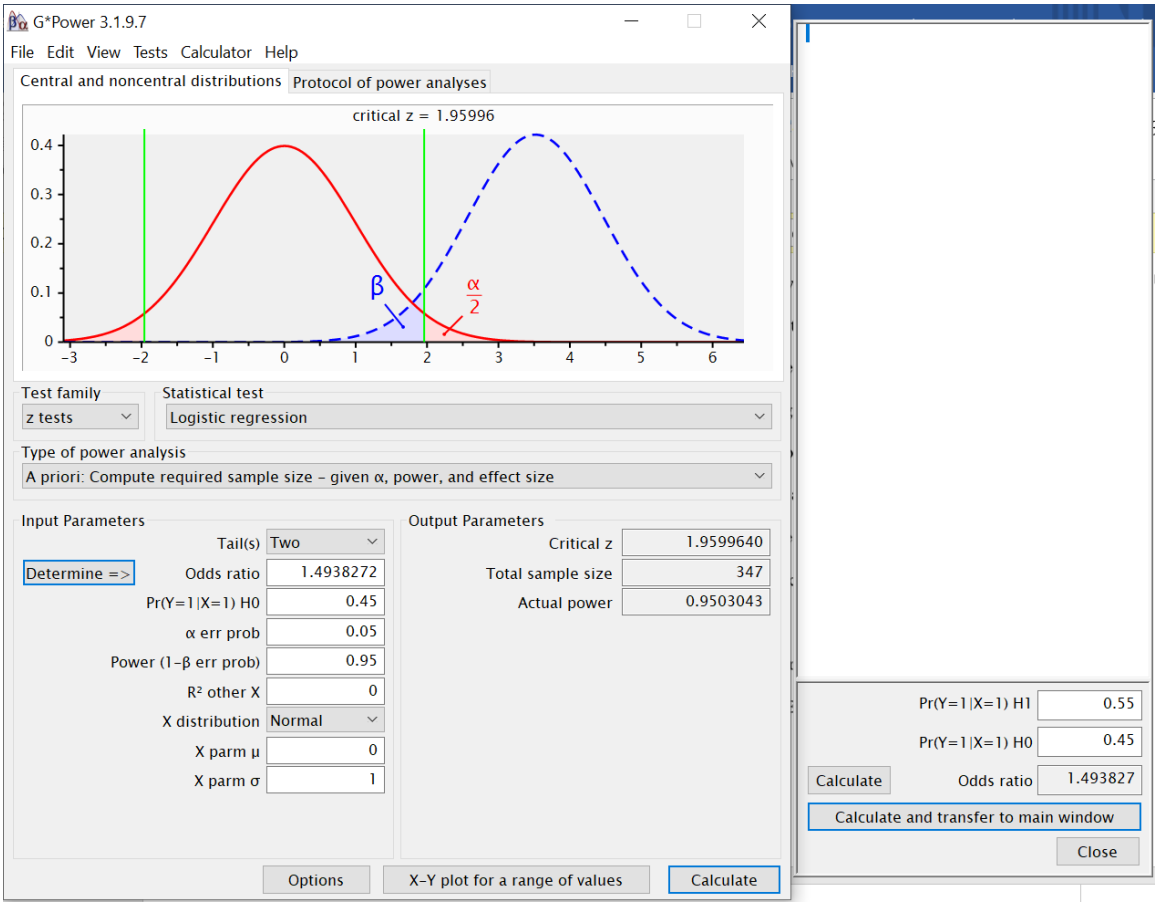
DLR Category	*Definition*	*Category*	*Types and Examples*
Digital Academic Content Tools	Software, applications, programs, or websites that offer academic content resources and/or engage students in activities to learn academic content or skills, including but not limited to language and literacy content or skills.	**Designed Learning Activities**	• ***Interactive tutorials or lessons (adaptive and other)*** such as an interactive lesson on life cycle of a butterfly or a math tutorial on fractions.
			• ***Practice and assessment tools*** such as a math program that provides multiple opportunities to practice addition skills.
			• ***Dynamic modeling or simulation tools*** such as a physics simulation that lets students manipulate virtual equipment, change parameters, and see the results.
			• ***Virtual worlds*** that immerse a student in a fully interactive environment such as one that allows a student to roam in a period of past history or explore a desert environment.
		References/ Resources	• ***Dictionaries, encyclopedias, e-books, topic blogs, and/or topic-focused websites*** that serve as information resources, such as an online encyclopedia that offers students pictures, facts, and videos about mammals or a digital dictionary.
			• ***Visual and auditory topic-related resources*** such as a *YouTube video* on earthquakes and plate tectonics.
		Language Resource Tools	• ***Translation tools*** that assist students by providing a translation to another language; and • ***Language articulation tools*** that assist a student to accurate production of a language such as by showing images of how a sound should be produced and/or by letting a student record and listen to his/her own voice to compare with the model.
Digital Productivity Tools	Software or online programs or websites that students use to plan, document, organize, and analyze content. They do not contain academic content.	**Presentation Tools**	• ***Presentation/Publication Tools*** such as slide presentation software that allows students to create a series of slides to communicate what they have learned about a topic; or to publish a digital story about a memorable day. Both may include music, images, and/or video.
		Word Processing Tools	• ***Word Processing*** *software* that allows students to write text to support their learning activities in a variety of ways.
		Information Organization Tools	• ***Spreadsheet tools*** that allow students to organize and track information, such as entering and tracking local rainfall over time; • ***Data analysis and representation tools*** that allow students to analyze and represent information such as using a tool to analyze and summarize the characteristics of selected Native American groups or tribes in the Southwest; • ***Concept-mapping tools*** that let students visually represent relationships among sets of information, such as to create a mindmap of the American Revolution or create a concept map for the causes of the Civil War; and/or • ***Story-templates*** that assist students to communicate a narrative using text and/or images, as in retelling a story they have heard.
Digital Communication Tools	Software or online programs or websites that students use to communicate, collaborate, network, or present information. They do not contain academic content.	**Asynchronous/ Synchronous Text Communications**	• ***Discussion boards or forums*** where individuals can post reactions and/or comments to provide feedback and/or share perspectives, such as where students write in-depth analysis of the novel they are reading and give feedback to their peers' analyses; and • ***Emails, text messaging, chats***, for example, used as means of providing feedback to support student learning.
		Reflection Tools	• ***Blogs or student journals*** allow students opportunities to share and/or reflect on their learning experiences, such as a student who uses a journal entry to reflect on her understanding of particular math concepts.
		Videoconferencing/ Meeting Tools	• ***Videoconferencing or meeting tools*** provide a remote means of seeing and speaking with others in real time, as where a science class sees and talks with NASA experts, or students in a Spanish dual language class see and share a geography game with Spanish-speaking peers in Mexico.
		Project Collaboration Tools	• ***Document-sharing tools*** or other tools that provide an online platform where students can work on products together, as in cases where students have access to and jointly edit a shared book report.

Multiple individual DLRs can be combined in an Integrated DLR Set

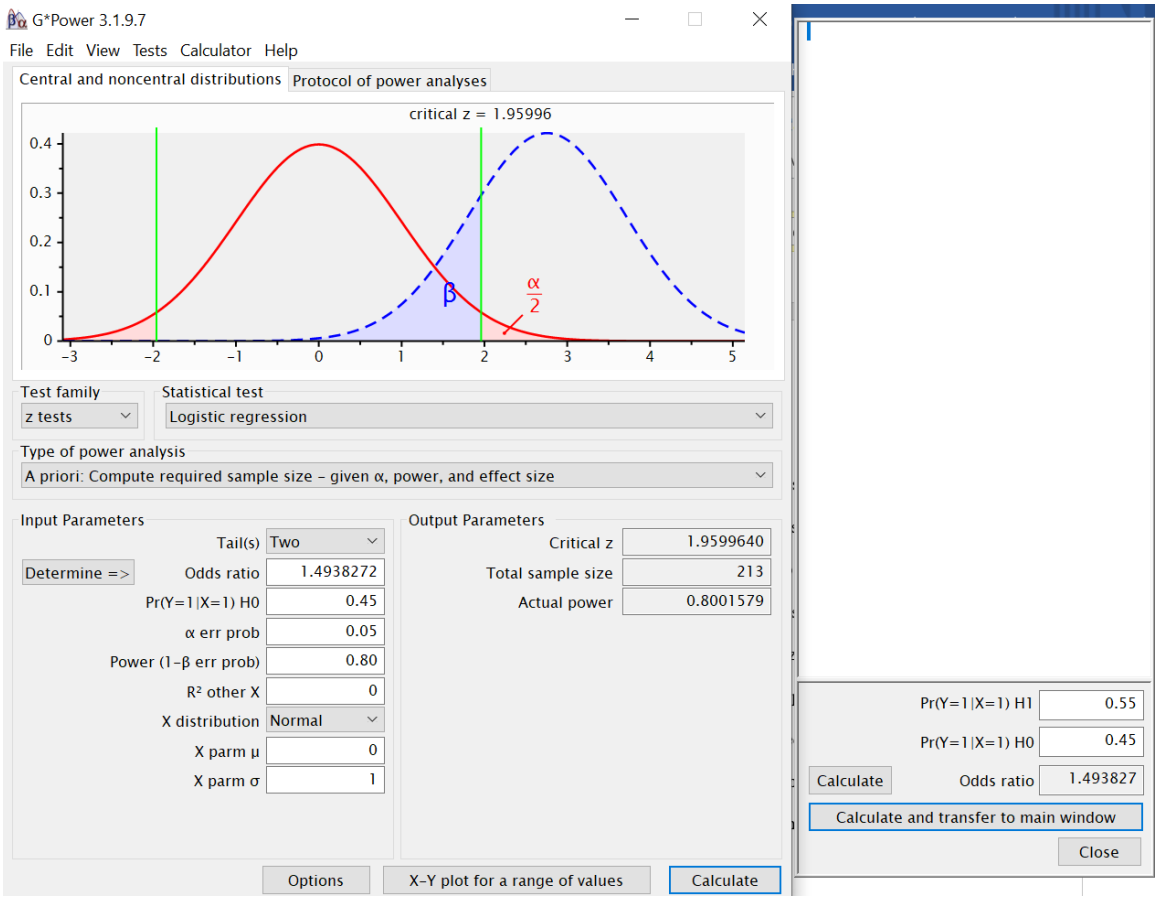
Integrated DLR Sets	A structured **combination of individual DLRs to** provide a complete core or supplemental curriculum. Often, DLR sets are licensed as a package by a school district.	***Core Curriculum Integrated DLR Set***	A math program for grades 6–8 that combines visual lessons with embedded assessments, productivity tools, and flexible class management tools into one package.
		Supplemental Integrated DLR Set	A math intervention for at-risk students in grades 6–12 that provides tutorials, practice activities, and progress monitoring tools to inform instruction.

National Study of English Learners and Digital Learning Resources (NSELD) 2018.

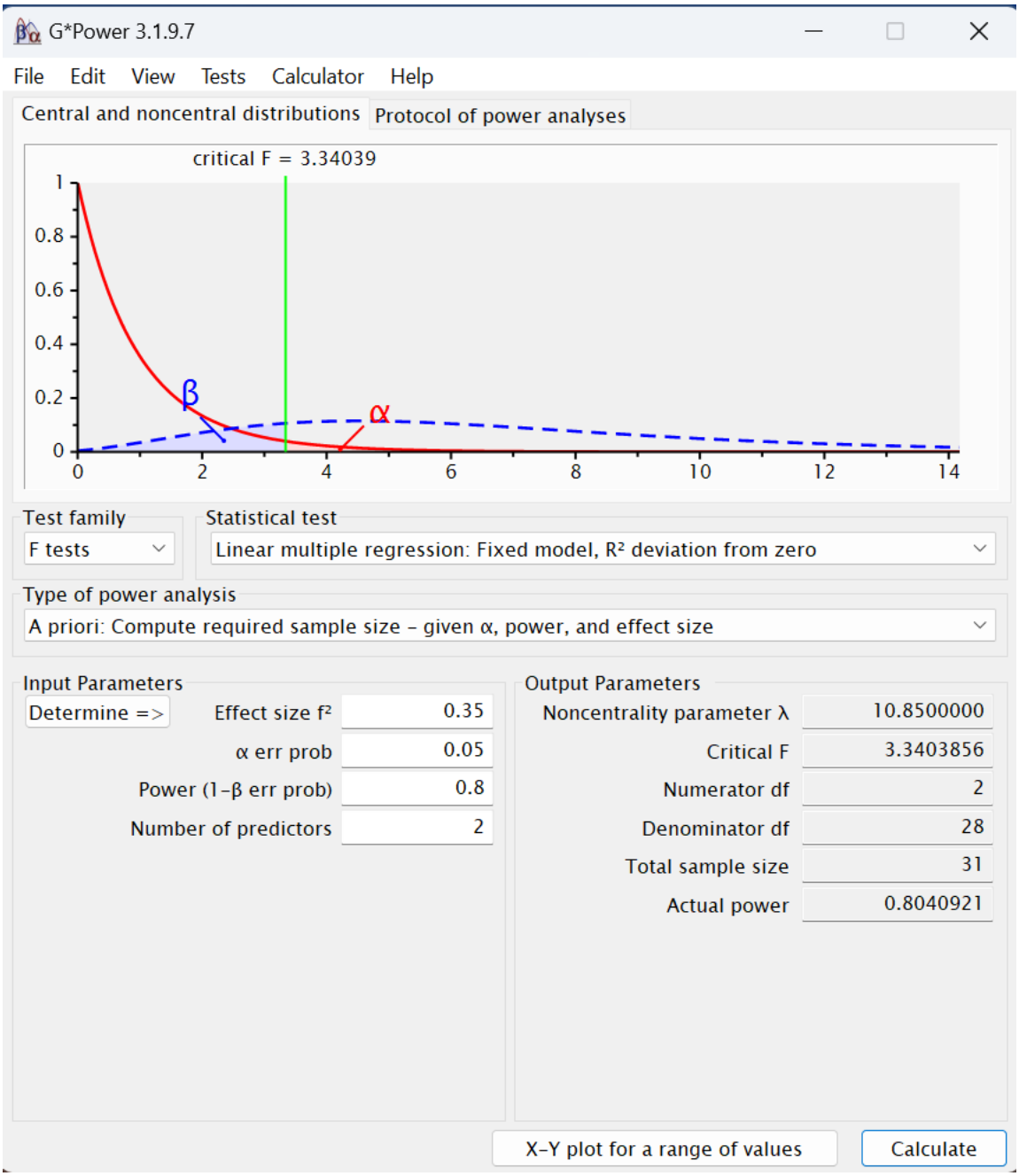
Appendix B: G*Power Sample Size: Confidence Level 95%: Initial Statistical Test: Multiple Ordinal Logistic Regression



Appendix C: G*Power Sample Size: Confidence Level 80%: Initial Statistical Test: Multiple Ordinal Logistic Regression



Appendix D: G*Power Sample Size: Confidence Level 80%: Updated Statistical Test: Multiple Linear Regression



Appendix E: Multicultural Teaching Competency Scale (MTCS)

TEACHER BELIEFS INVENTORY SCORING PROCEDURE

Spanierman, L. B., Oh, E., Heppner, P. P., Neville, H. A., Mobley, M., Wright, C. V., Dillon, F. R., & Navarro, R. (2011). The Multicultural Teaching Competencies Scale (MTCS): Development and initial validation. *Urban Education, 46,* 440-464.

1=Strongly Disagree
2=Moderately Disagree
3=Slightly Disagree
4=Slightly Agree
5=Moderately Agree
6=Strongly Agree

1. ____ I plan many activities to celebrate diverse cultural practices in my classroom.
2. ____ I understand the various communication styles among different racial and ethnic minority students in my classroom.
3. ____ I consult regularly with other teachers or administrators to help me understand multicultural issues related to instruction.
4. ____ I have a clear understanding of culturally responsive pedagogy.
5. ____ I often include examples of the experiences and perspectives of racial and ethnic groups during my classroom lessons.
6. ____ I plan school events to increase students' knowledge about cultural experiences of various racial and ethnic groups.
7. ____ I am knowledgeable about racial and ethnic identity theories.
8. ____ My curricula integrate topics and events from racial and ethnic minority populations.
9. ____ I am knowledgeable of how historical experiences of various racial and ethnic minority groups may affect students' learning.
10. ____ I make changes within the general school environment so racial and ethnic minority students will have an equal opportunity for success.
11. ____ I am knowledgeable about the particular teaching strategies that affirm the racial and ethnic identities of all students.
12. ____ **I rarely examine the instructional materials I use in the classroom for racial and ethnic bias.**
13. ____ I integrate the cultural values and lifestyles of racial and ethnic minority groups into my teaching.
14. ____ I am knowledgeable about the various community resources within the city that I teach.
15. ____ I often promote diversity by the behaviors I exhibit.
16. ____ I establish strong, supportive relationships with racial and ethnic minority parents.

Item #12, which is bolded above, is reverse scored such that 6 = 1, 5 = 2, 4 = 3, 3 = 4, 2 = 5, 1 = 6. Higher scores indicate greater levels of multicultural teaching competency.

Factor 1: Multicultural Teaching Skill consists of the following 10 items: 1, 3, 5, 6, 8, 10, **12**, 13, 15, 16

Factor 2: Multicultural Teaching Knowledge consists of the following 6 items: 2, 4, 7, 9, 11, and 14

For more information please contact Lisa Spanierman
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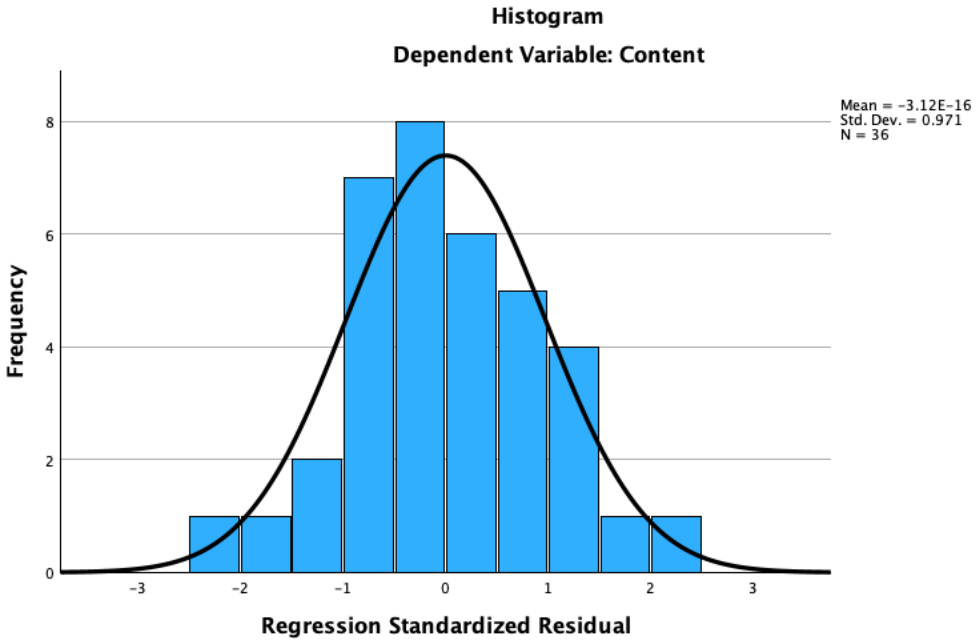
Appendix F: National Study of English Learners and Digital Learning Resources (NSELD): Question #23

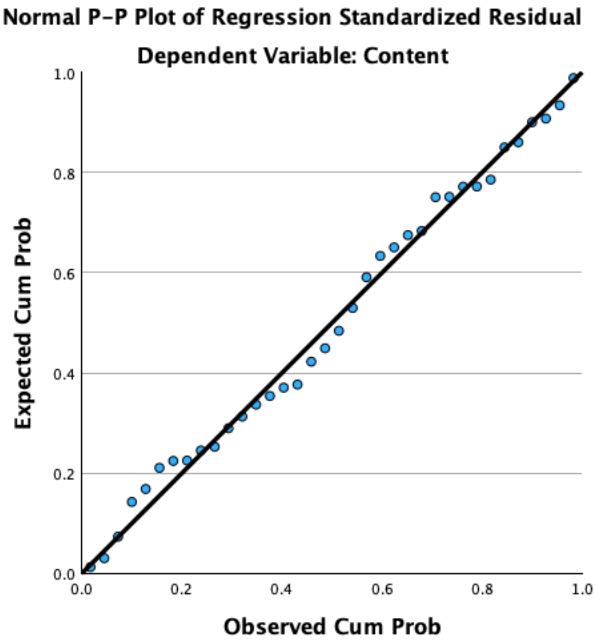
23. What DLRs do you use in instructing your ***English learner (EL) student(s)*** and how frequently do you use these? Include general education instruction you may provide to a whole class that includes ELs). (*Check one in each row.*)

Type and/or content of DLRs	Frequency of DLR use in instructing ELs				
	Not at all	Less than monthly	Monthly	Weekly	Daily
DIGITAL ACADEMIC CONTENT TOOLS					
a. Tutorials or lessons on basic English vocabulary and language skills	☐	☐	☐	☐	☐
b. Tutorials or lessons on language and/or literacy	☐	☐	☐	☐	☐
c. Tutorials or lessons on math, science, or other academic content areas	☐	☐	☐	☐	☐
d. Practice and assessment tools for language and/or literacy	☐	☐	☐	☐	☐
e. Practice and assessment tools for math, science, or other academic content areas	☐	☐	☐	☐	☐
f. Simulations or dynamic modeling tools	☐	☐	☐	☐	☐
g. Virtual worlds to build academic skills or content knowledge	☐	☐	☐	☐	☐
h. References and other resources provided specifically as K–12 learning resources (*such as online dictionaries, topic websites, e-books, images, or videos*)	☐	☐	☐	☐	☐
i. Commercial and non-commercial websites or resources that were not designed as content for K–12 learning activities (*such as travel sites, online store product display sites, videos, or other*)	☐	☐	☐	☐	☐
j. Language translation tools	☐	☐	☐	☐	☐
k. Language articulation tools	☐	☐	☐	☐	☐
DIGITAL PRODUCTIVITY TOOLS					
l. Presentation tools	☐	☐	☐	☐	☐
m. Spreadsheets or data analysis tools	☐	☐	☐	☐	☐
n. Information organization tools (*such as concept maps and storytelling templates*)	☐	☐	☐	☐	☐
DIGITAL COMMUNICATION TOOLS					
o. Discussion boards, blogs, chats, journals	☐	☐	☐	☐	☐
p. Video-conferencing or meeting tools	☐	☐	☐	☐	☐
q. Project collaboration tools	☐	☐	☐	☐	☐

Appendix G1: Multiple Linear Regression: Tests of Assumptions:

MTS*Classroom*Content





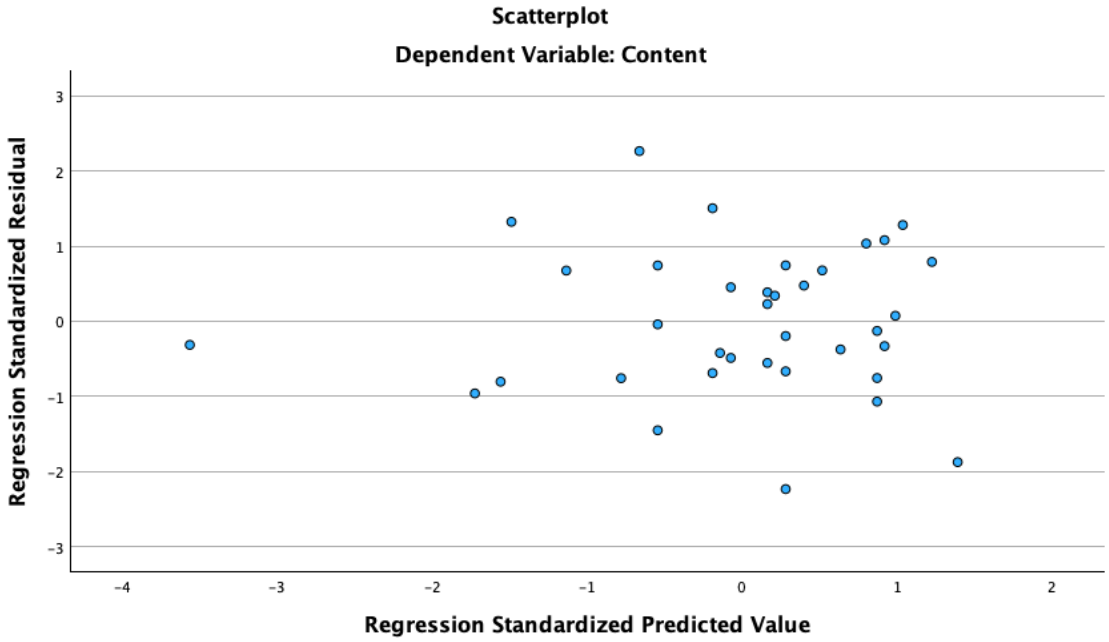


Table G1

*Multiple Linear Regression: Test of Assumptions" MTS*Classroom*Content: Residual Statistics*

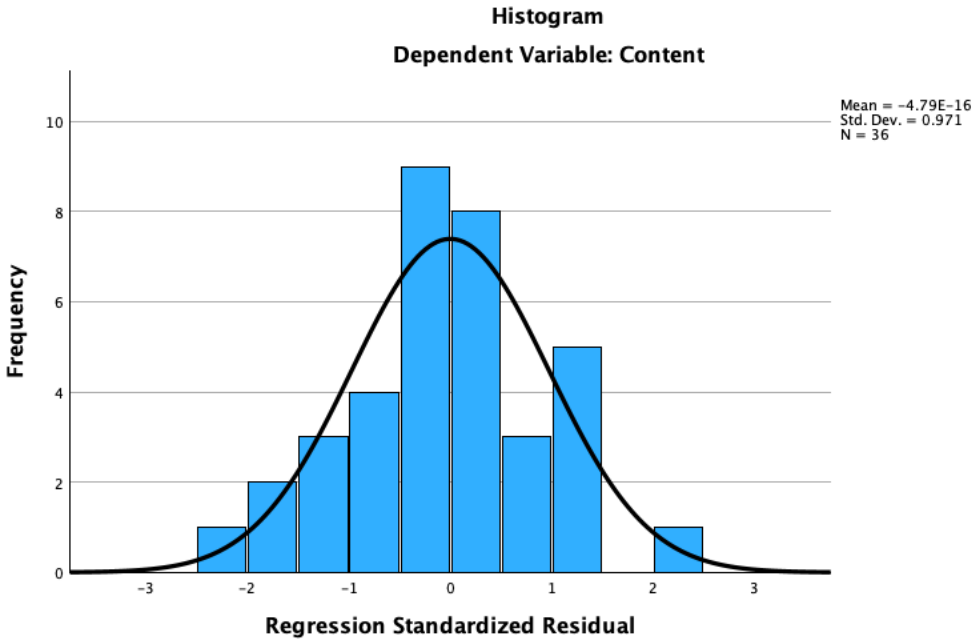
Residuals Statistics[a]

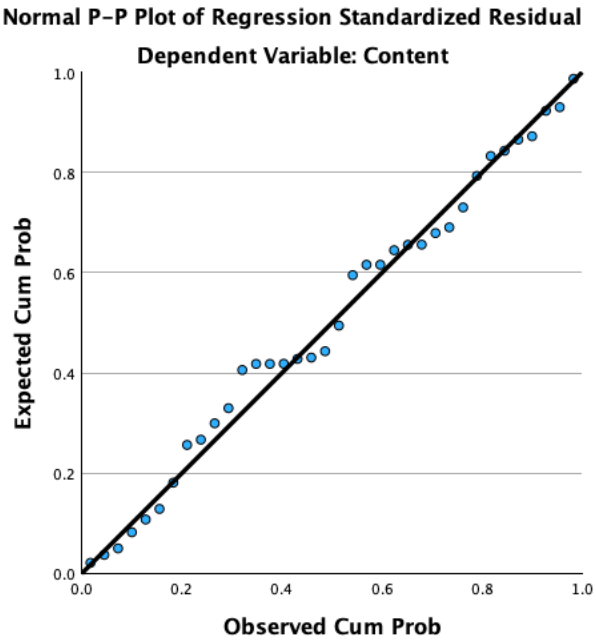
	Minimum	Maximum	Mean	Std. deviation	*N*
Predicted value	17.9994	47.9561	39.5556	6.04719	36
Residual	-14.24623	14.45981	0.00000	6.18984	36
Std. predicted value	-3.565	1.389	0.000	1.000	36
Std. residual	-2.235	2.268	0.000	0.971	36

a. Dependent Variable: Content

Appendix G2: Multiple Linear Regression: Tests of Assumptions:

MTK*Classroom*Content





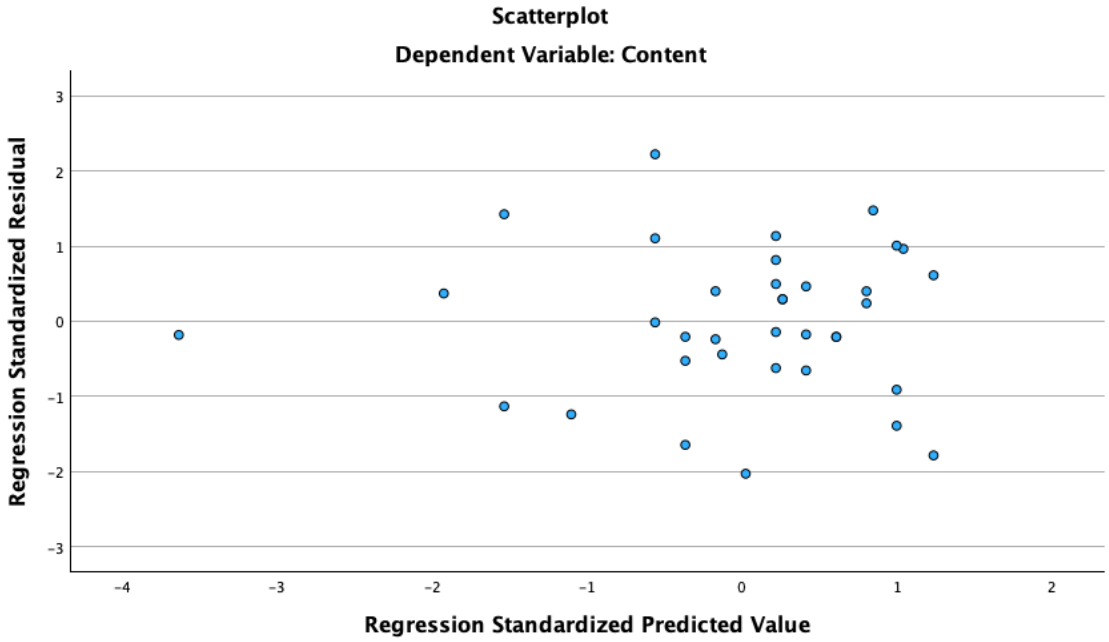


Table G2

*Multiple Linear Regression: Test of Assumptions" MTK*Classroom*Content: Residual Statistics*

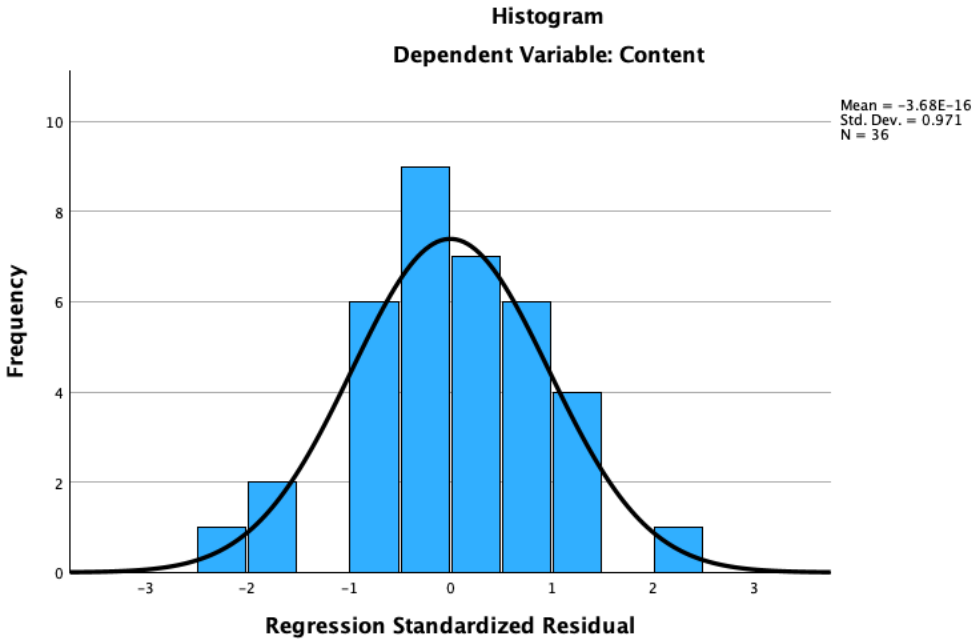
Residuals Statistics[a]

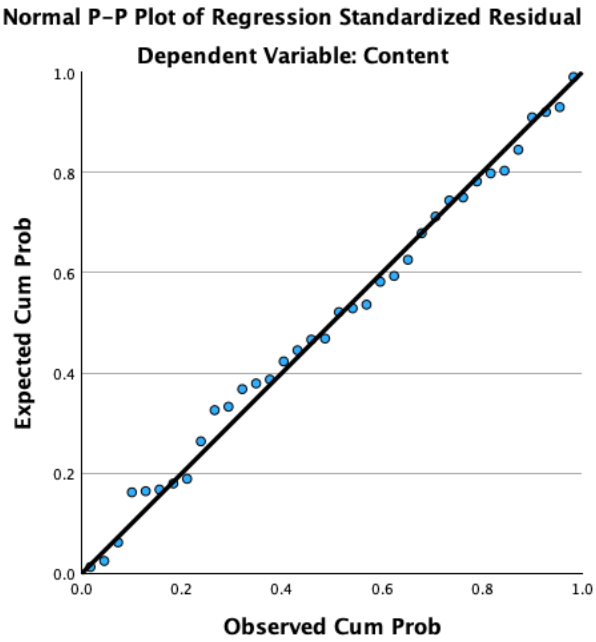
	Minimum	Maximum	Mean	Std. deviation	*N*
Predicted value	17.1326	47.1633	39.5556	6.16757	36
Residual	-12.68902	13.91466	0.00000	6.06990	36
Std. predicted value	-3.636	1.234	0.000	1.000	36
Std. residual	-2.030	2.226	0.000	0.971	36

a. Dependent Variable: Content

Appendix G3: Multiple Linear Regression: Tests of Assumptions:

MTC*Classroom*Content





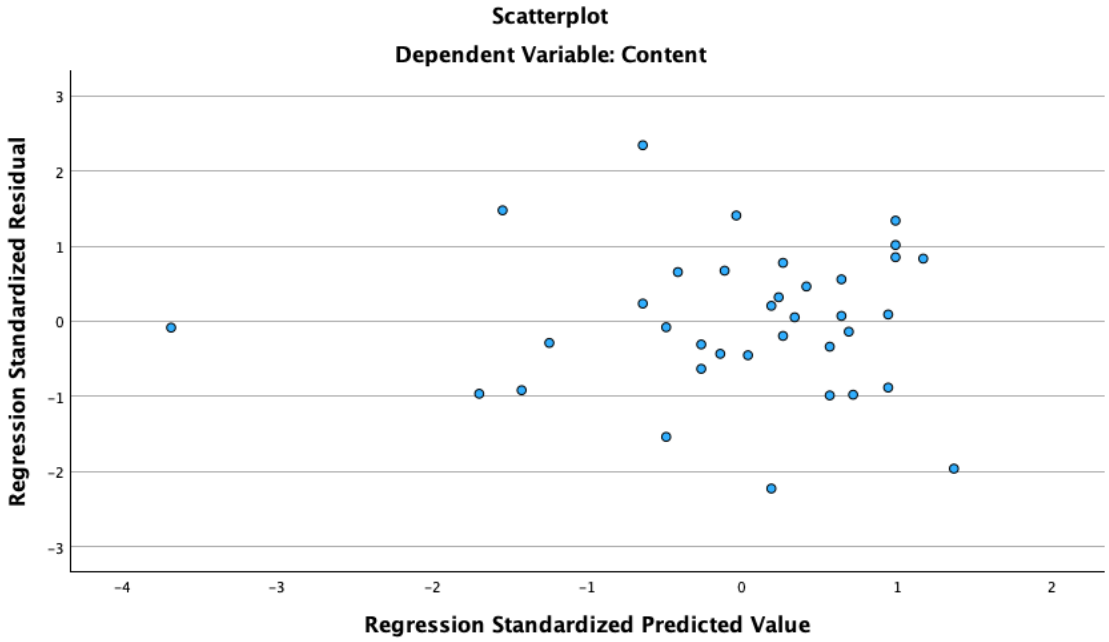


Table G3

*Multiple Linear Regression: Test of Assumptions" MTC*Classroom*Content: Residual Statistics*

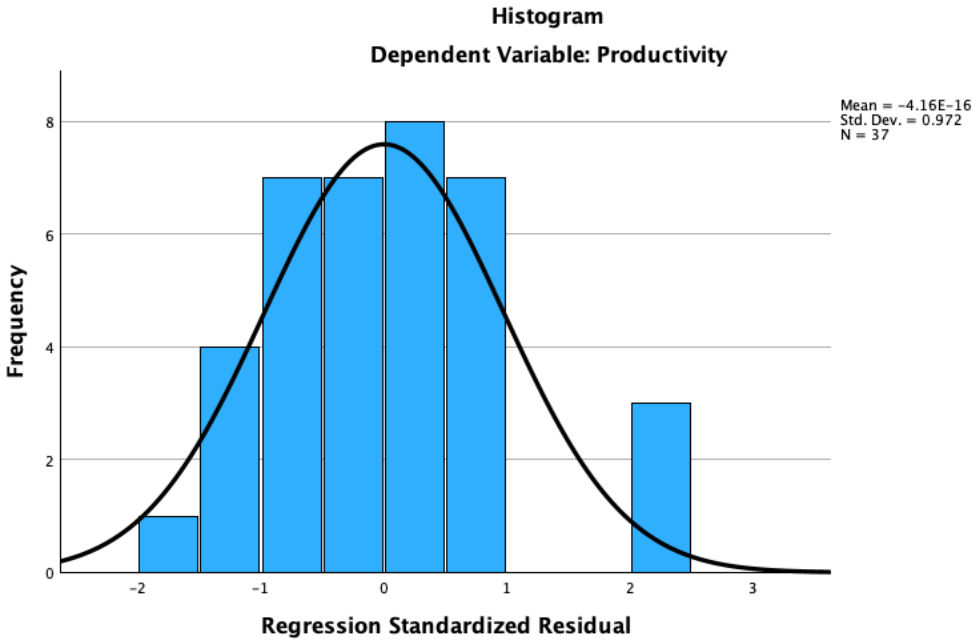
Residuals Statistics[a]

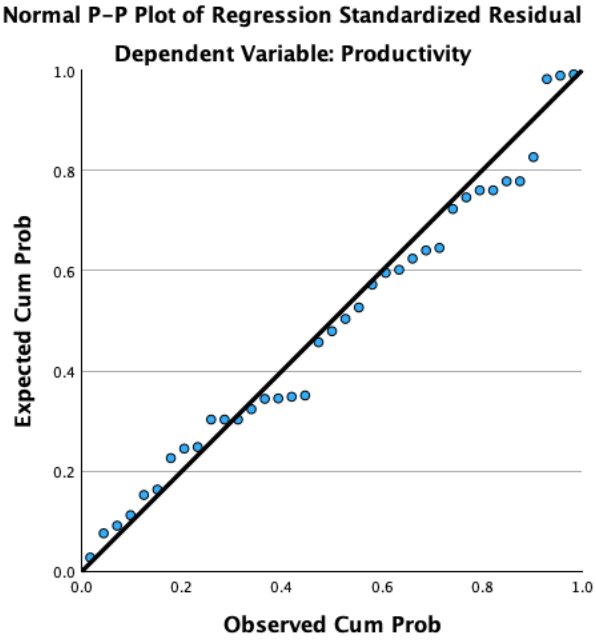
	Minimum	Maximum	Mean	Std. deviation	*N*
Predicted value	16.5163	48.0906	39.5556	6.25176	36
Residual	-13.72497	14.45887	0.00000	5.98314	36
Std. predicted Value	-3.685	1.365	0.000	1.000	36
Std. residual	-2.227	2.347	0.000	0.971	36

a. Dependent Variable: Content

Appendix G4: Multiple Linear Regression: Tests of Assumptions:

MTS*Classroom*Productivity





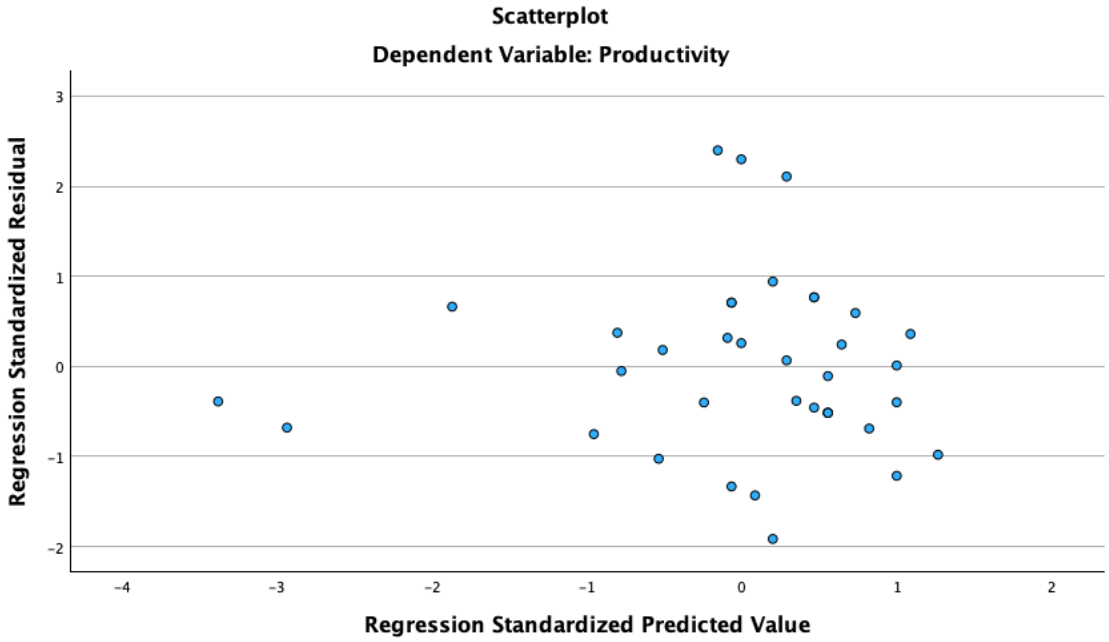


Table G4

*Multiple Linear Regression: Test of Assumptions" MTS*Classroom*Productivity: Residual Statistics*

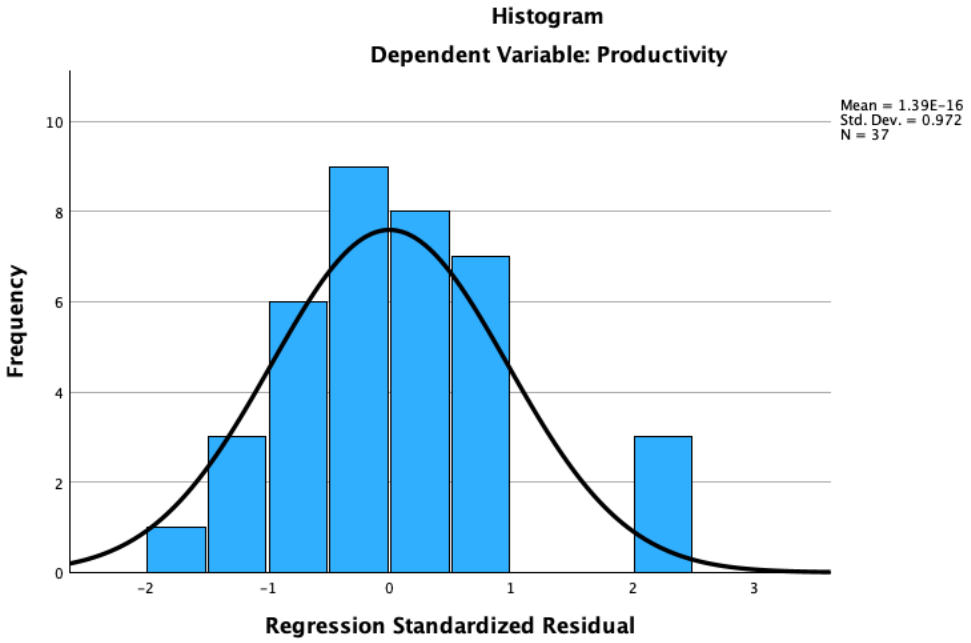
Residuals Statistics[a]

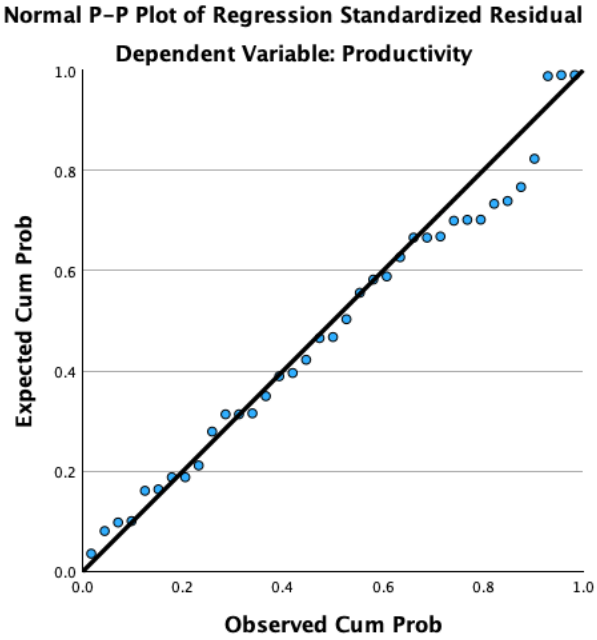
	Minimum	Maximum	Mean	Std. deviation	*N*
Predicted value	3.9540	11.4032	9.3784	1.60404	37
Residual	-4.69378	5.87605	0.00000	2.38093	37
Std. predicted Value	-3.382	1.262	0.000	1.000	37
Std. residual	-1.916	2.398	0.000	0.972	37

a. Dependent Variable: Productivity

Appendix G5: Multiple Linear Regression: Tests of Assumptions:

MTK*Classroom*Productivity





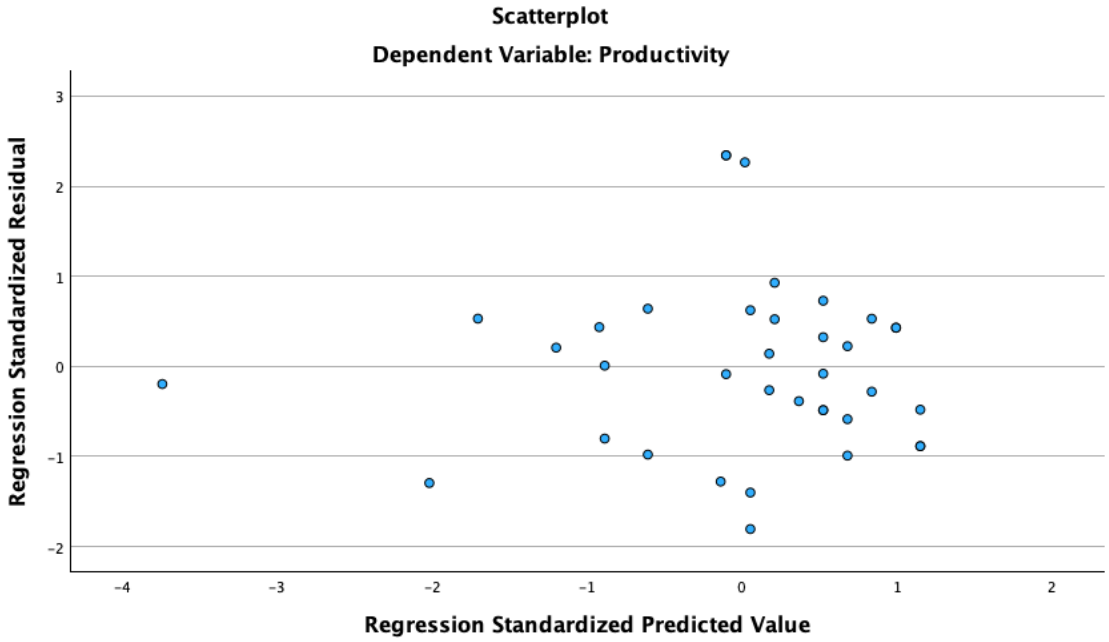


Table G5

*Multiple Linear Regression: Test of Assumptions" MTK*Classroom*Productivity: Residual Statistics*

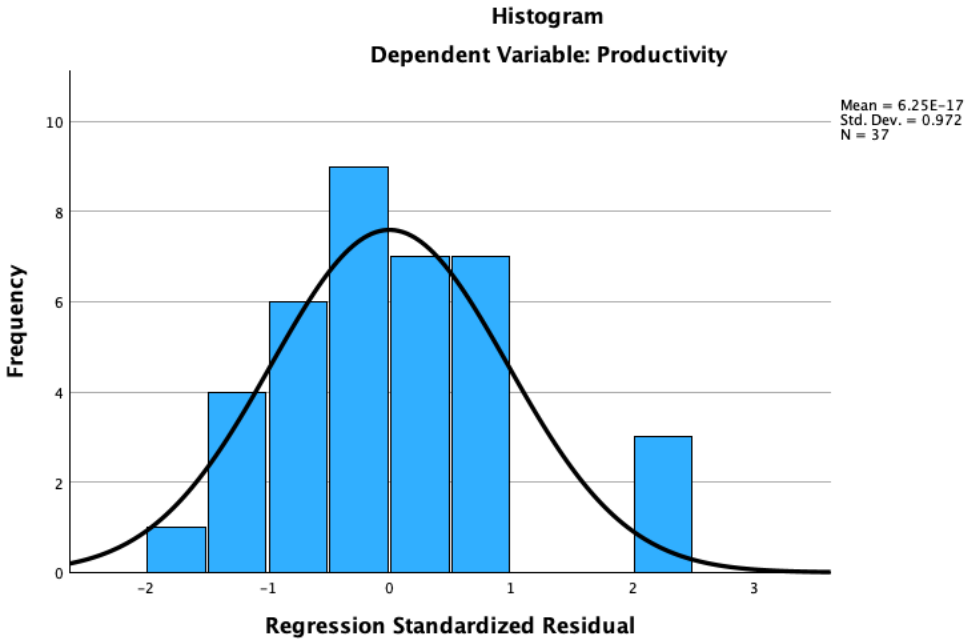
Residuals Statistics[a]

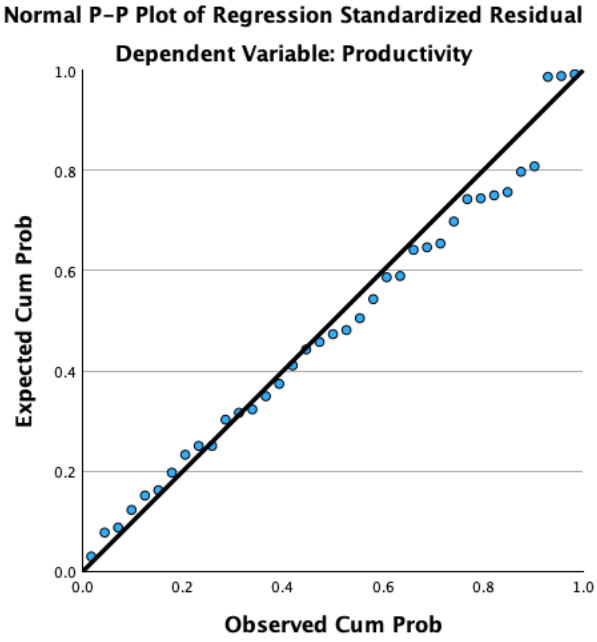
	Minimum	Maximum	Mean	Std. deviation	*N*
Predicted value	3.4840	11.1869	9.3784	1.57522	37
Residual	-4.45993	5.78678	0.00000	2.40009	37
Std. predicted value	-3.742	1.148	0.000	1.000	37
Std. residual	-1.806	2.343	0.000	0.972	37

a. Dependent Variable: Productivity

Appendix G6: Multiple Linear Regression: Tests of Assumptions:

MTC*Classroom*Productivity





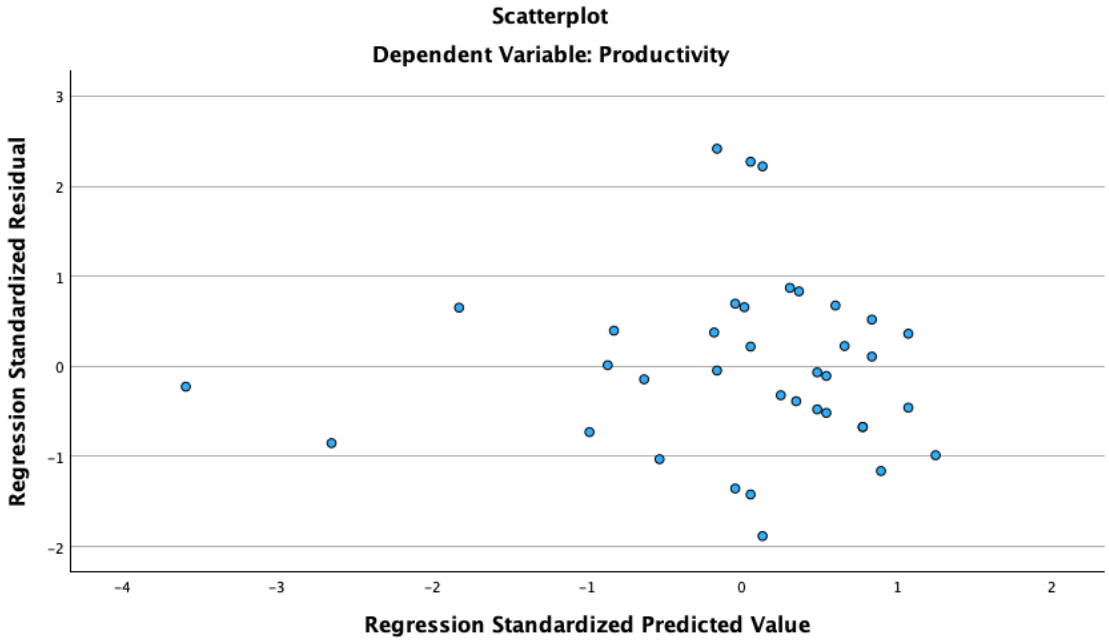


Table G6

*Multiple Linear Regression: Test of Assumptions" MTC*Classroom*Productivity: Residual Statistics*

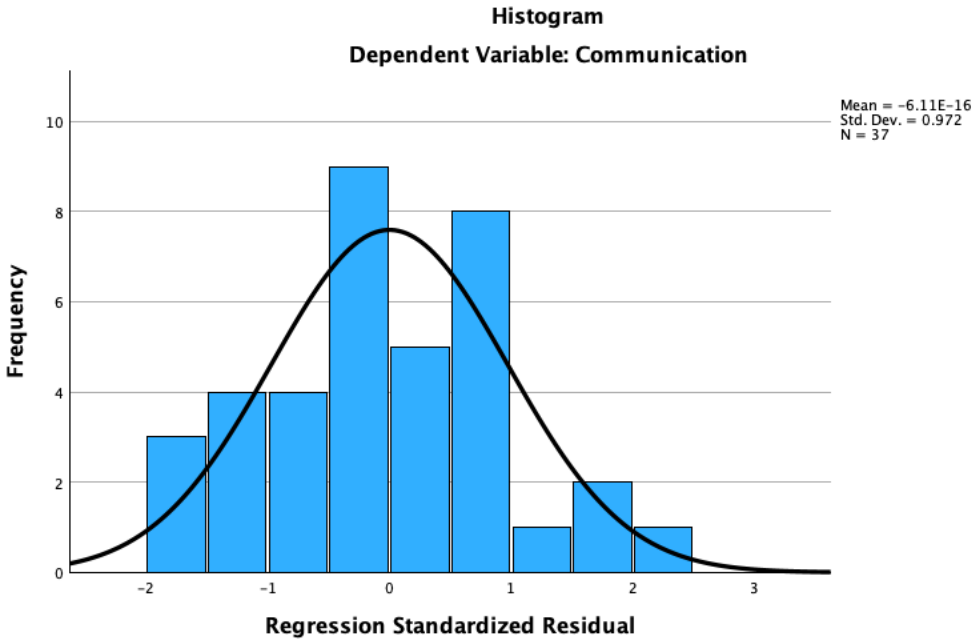
Residuals Statistics[a]

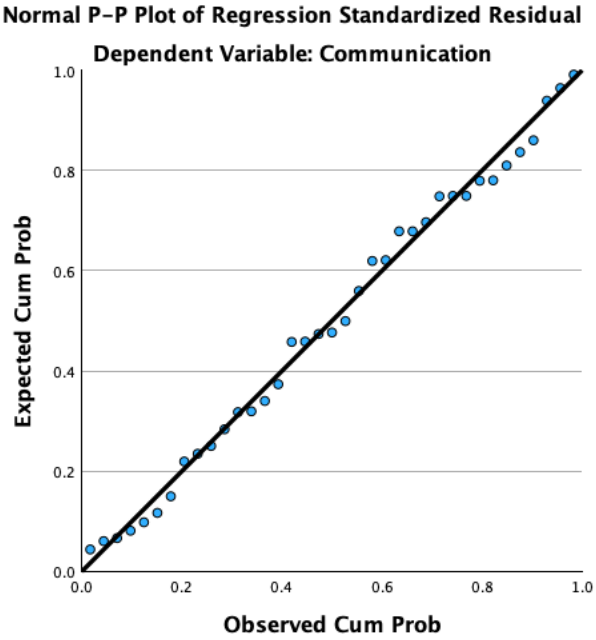
	Minimum	Maximum	Mean	Std. deviation	*N*
Predicted value	3.5489	11.4032	9.3784	1.62358	37
Residual	-4.59019	5.88690	0.00000	2.36764	37
Std. predicted value	-3.591	1.247	0.000	1.000	37
Std. residual	-1.884	2.416	0.000	0.972	37

a. Dependent Variable: Productivity

Appendix G7: Multiple Linear Regression: Tests of Assumptions:

MTS*Classroom*Communication





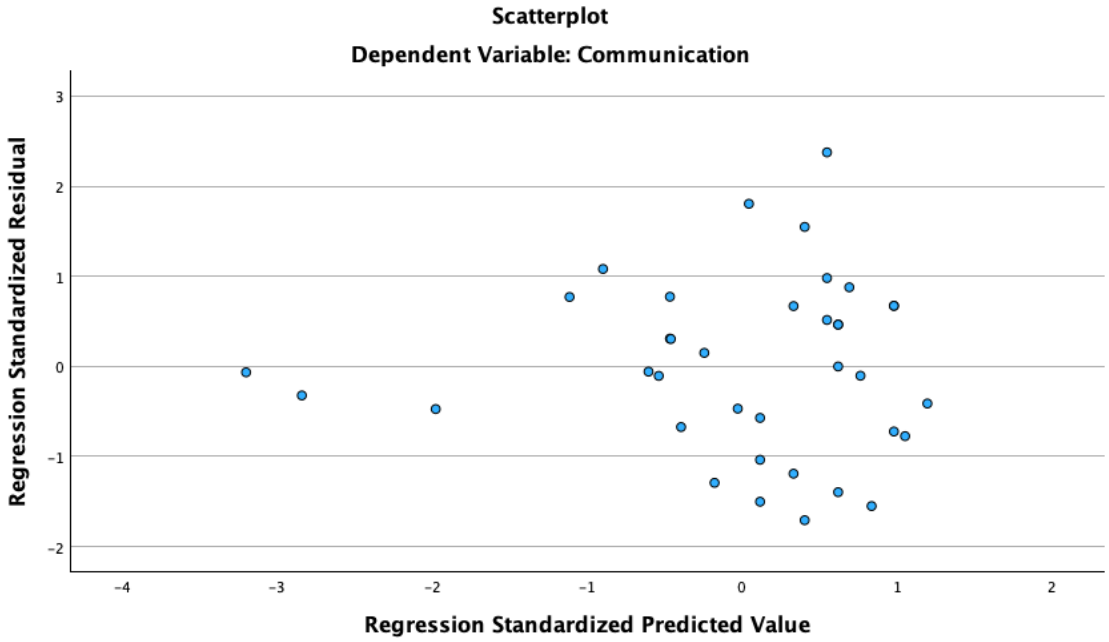


Table G7

*Multiple Linear Regression: Test of Assumptions" MTS*Classroom*Communication: Residual Statistics*

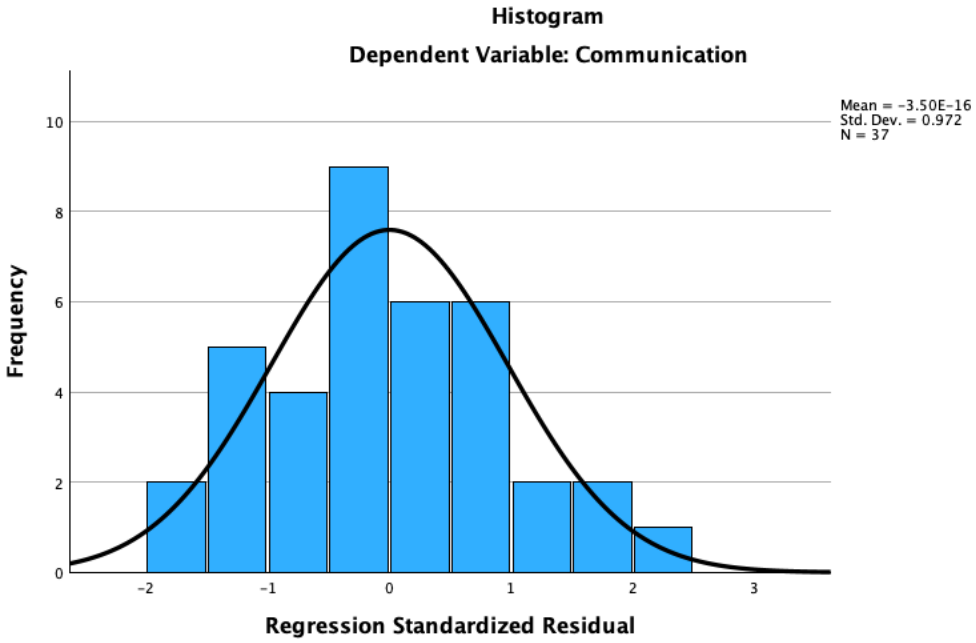
Residuals Statistics[a]

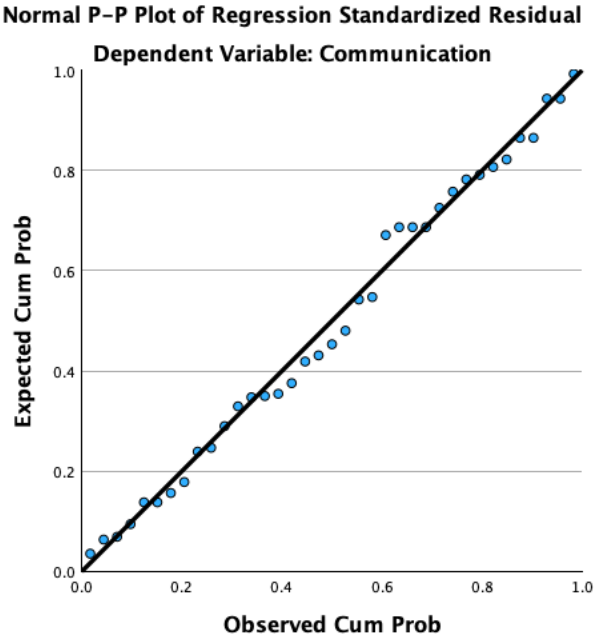
	Minimum	Maximum	Mean	Std. deviation	*N*
Predicted value	3.1415	9.8858	8.0541	1.53441	37
Residual	-3.67122	5.10795	0.00000	2.08921	37
Std. predicted value	-3.202	1.194	0.000	1.000	37
Std. residual	-1.708	2.376	0.000	0.972	37

a. Dependent Variable: Communication

Appendix G8: Multiple Linear Regression: Tests of Assumptions:

MTK*Classroom*Communication





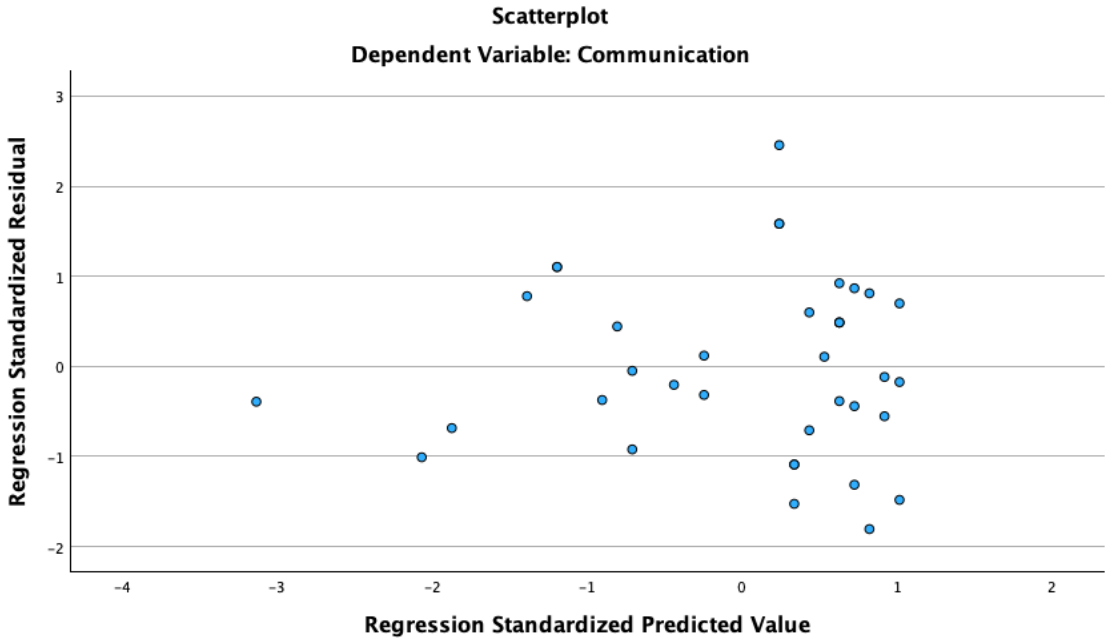


Table G8

*Multiple Linear Regression: Test of Assumptions" MTK*Classroom*Communication: Residual Statistics*

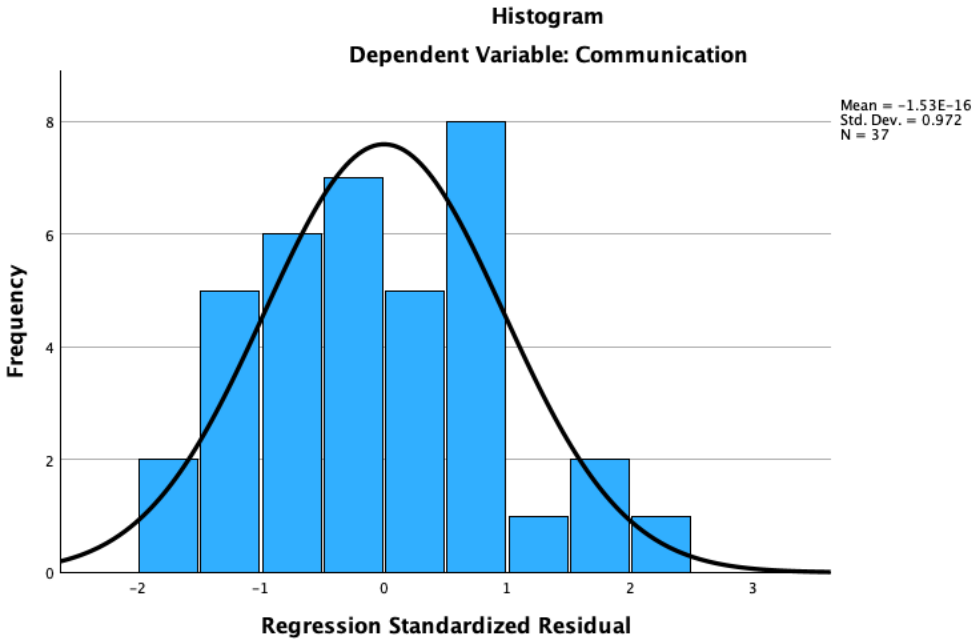
Residuals Statistics[a]

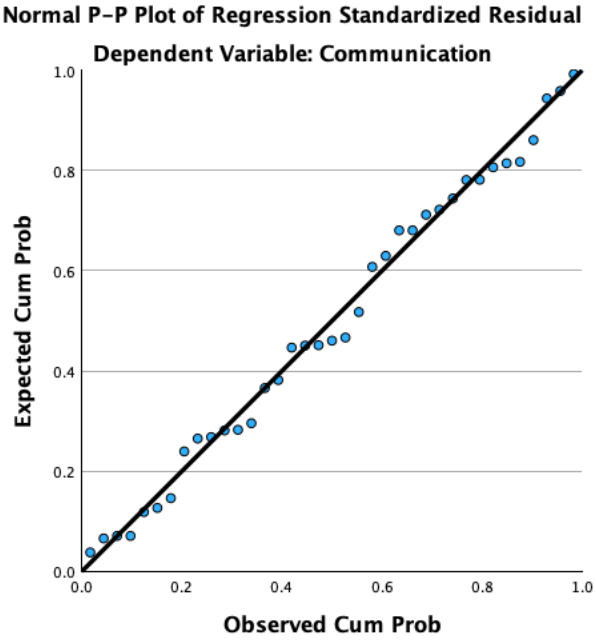
	Minimum	Maximum	Mean	Std. deviation	*N*
Predicted value	3.8987	9.3978	8.0541	1.32530	37
Residual	-4.14072	5.63066	0.00000	2.22773	37
Std. predicted value	-3.135	1.014	0.000	1.000	37
Std. residual	-1.806	2.456	0.000	0.972	37

a. Dependent Variable: Communication

Appendix G9: Multiple Linear Regression: Tests of Assumptions:

MTC*Classroom*Communication





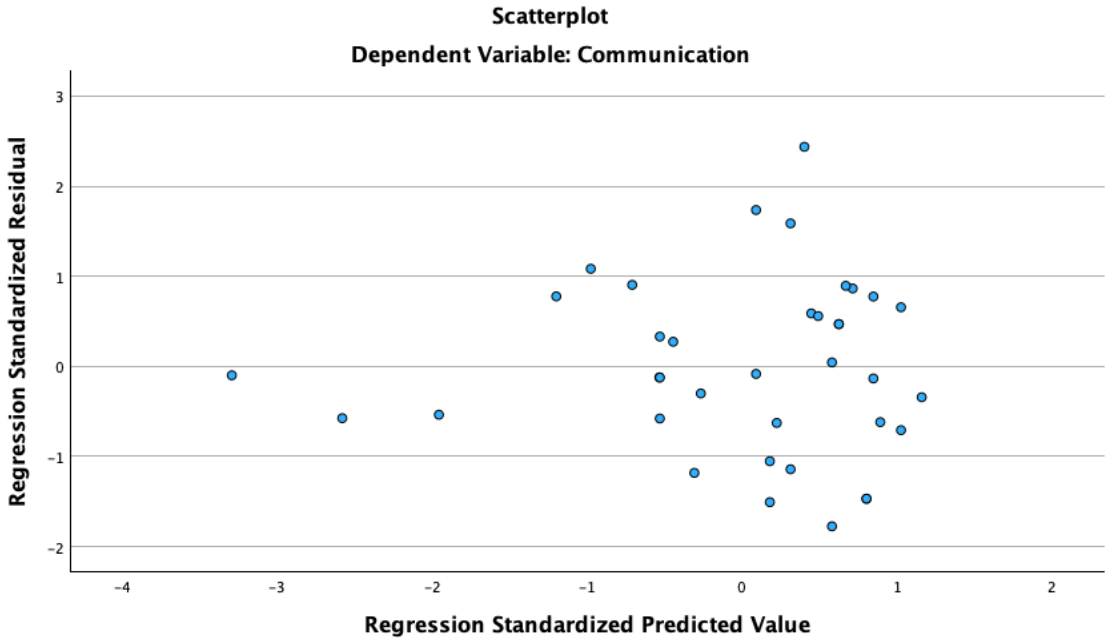


Table G9

*Multiple Linear Regression: Test of Assumptions" MTC*Classroom*Communication: Residual Statistics*

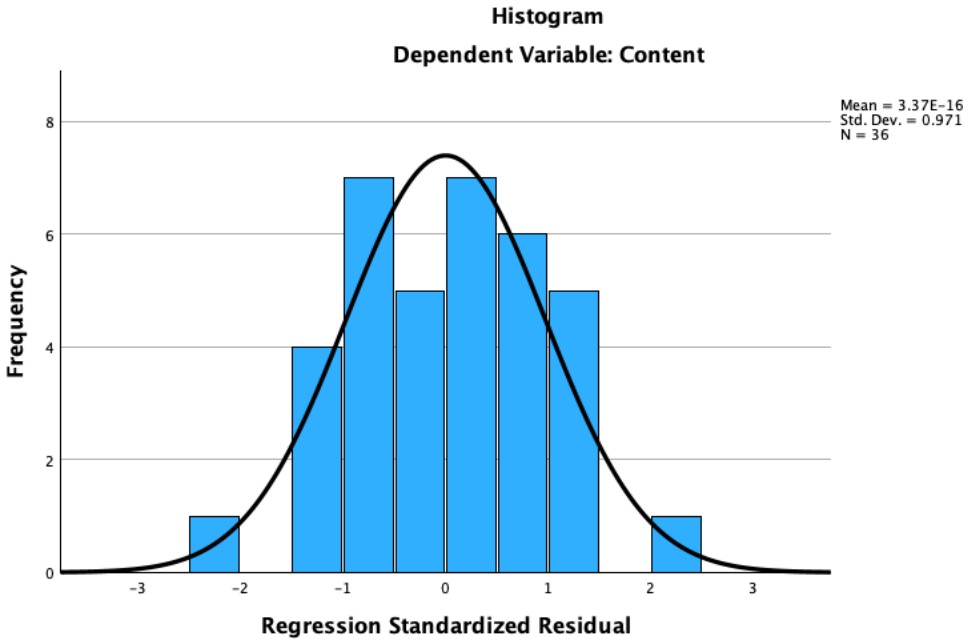
Residuals Statistics[a]

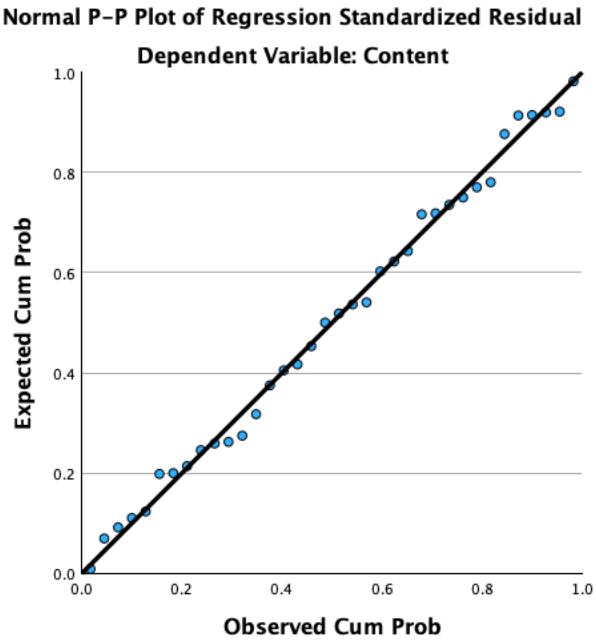
	Minimum	Maximum	Mean	Std. deviation	*N*
Predicted value	3.2183	9.7531	8.0541	1.46824	37
Residual	-3.90300	5.35855	0.00000	2.13623	37
Std. predicted value	-3.294	1.157	0.000	1.000	37
Std. residual	-1.776	2.438	0.000	0.972	37

a. Dependent Variable: Communication

Appendix G10: Multiple Linear Regression: Tests of Assumptions:

MTS*Licensure*Content





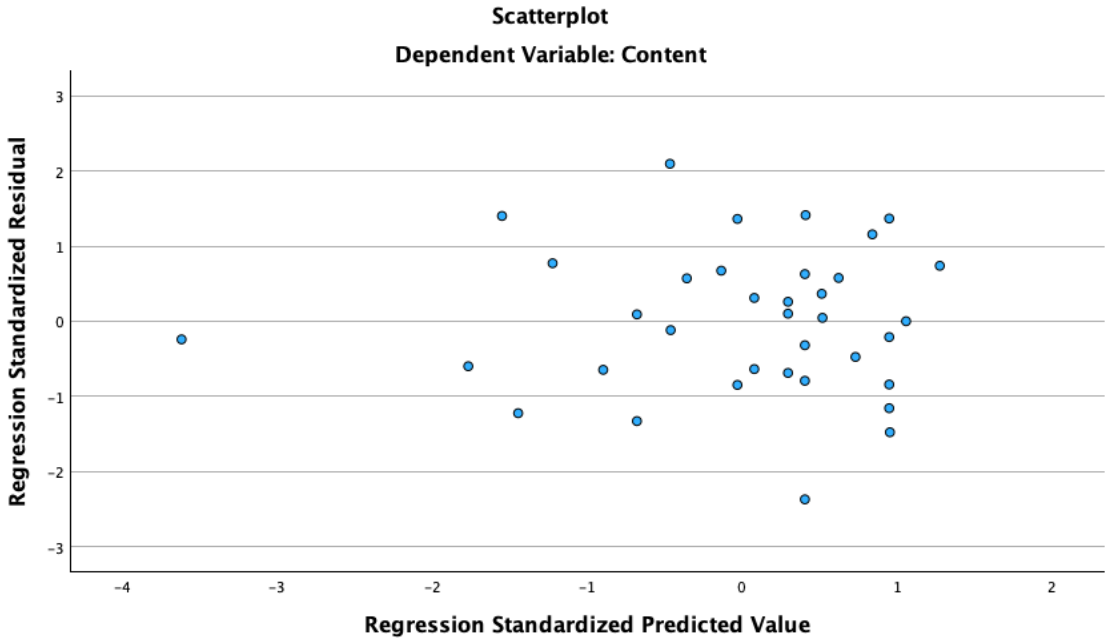


Table G10

*Multiple Linear Regression: Test of Assumptions" MTS*Licensure*Content: Residual Statistics*

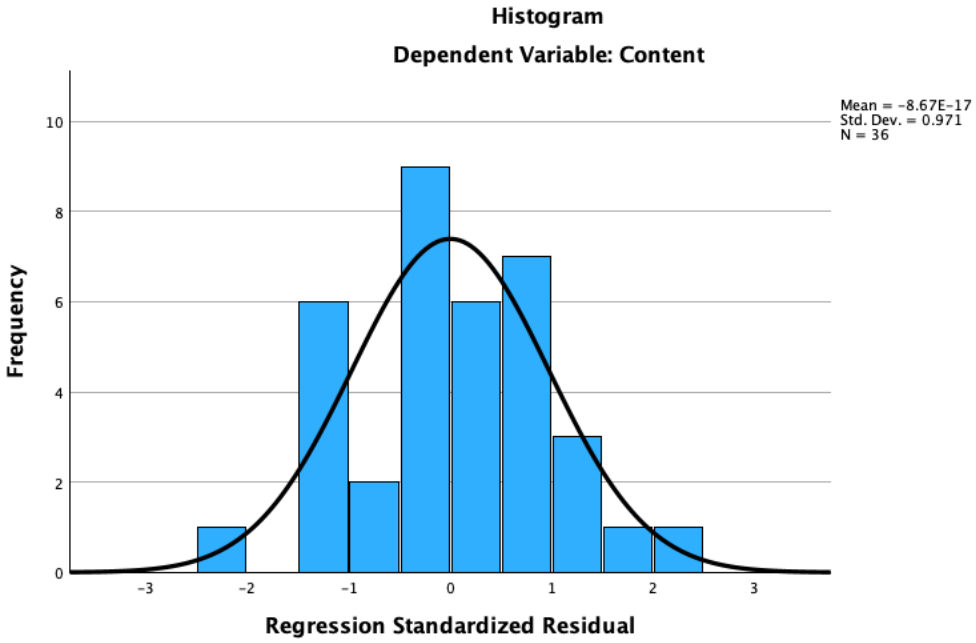
Residuals Statistics[a]

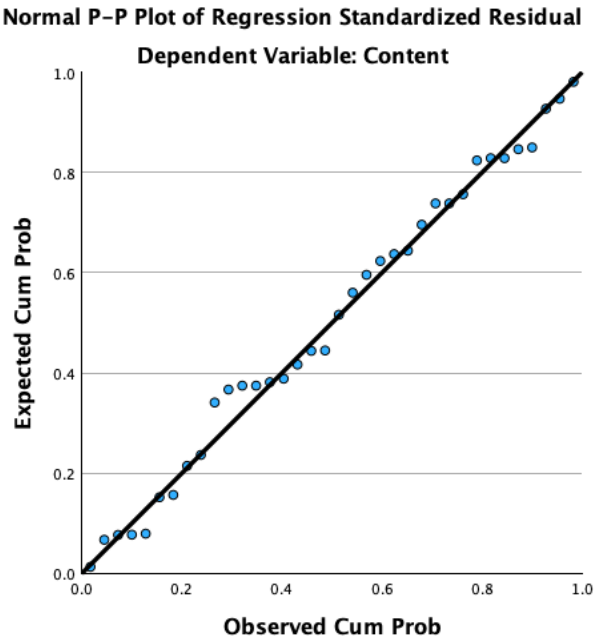
	Minimum	Maximum	Mean	Std. deviation	*N*
Predicted value	17.5202	47.3148	39.5556	6.09061	36
Residual	-15.01307	13.28871	0.00000	6.14712	36
Std. predicted value	-3.618	1.274	0.000	1.000	36
Std. residual	-2.371	2.099	0.000	0.971	36

a. Dependent Variable: Content

Appendix G11: Multiple Linear Regression: Tests of Assumptions:

MTK*Licensure*Content





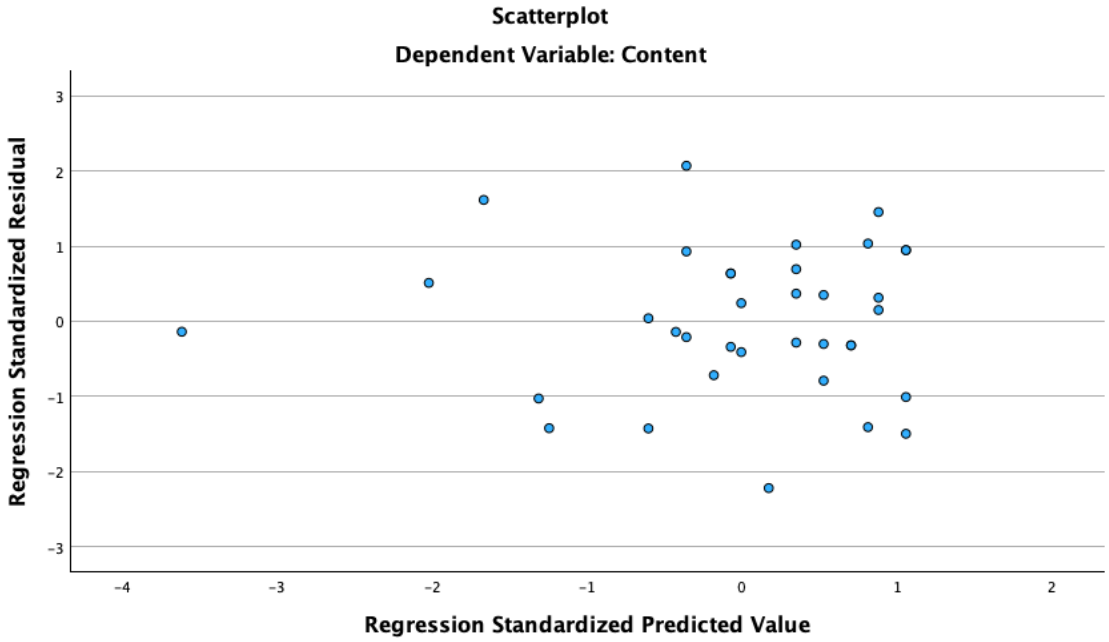


Table G11

*Multiple Linear Regression: Test of Assumptions" MTK*Licensure*Content: Residual Statistics*

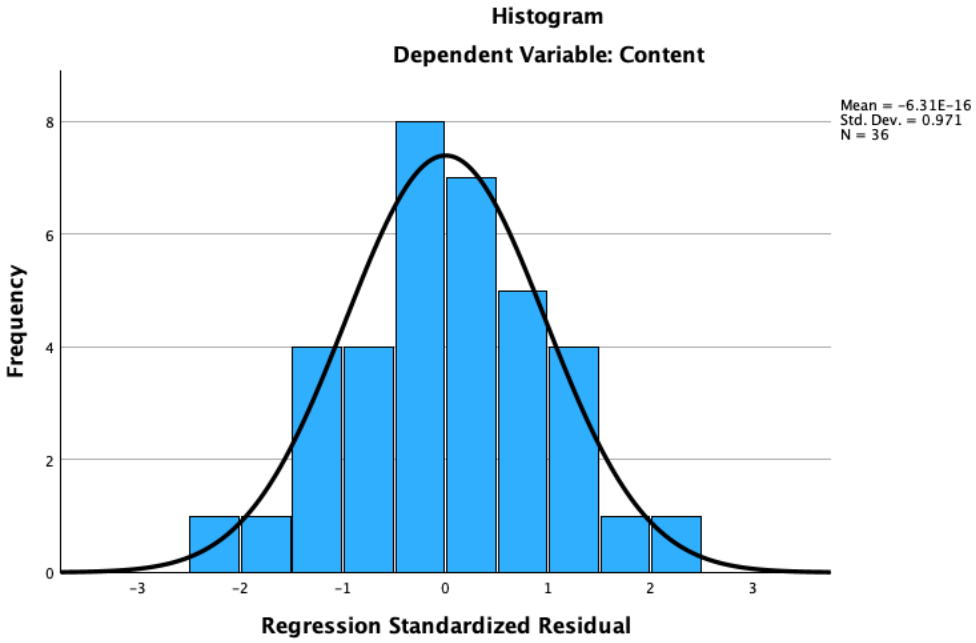
Residuals Statistics[a]

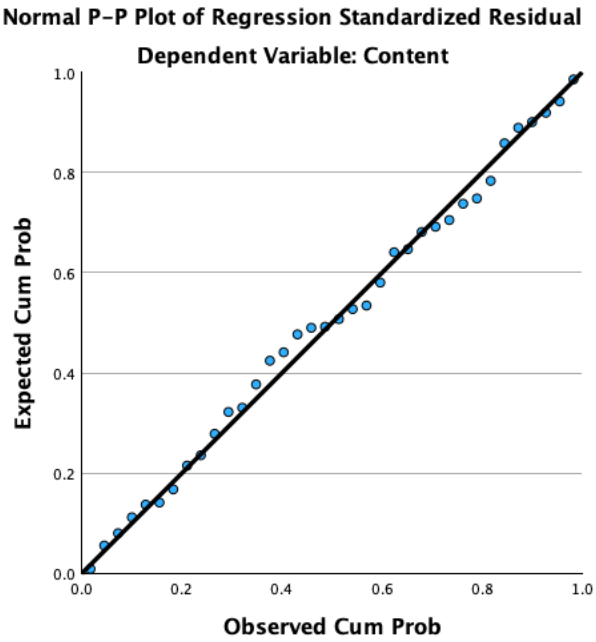
	Minimum	Maximum	Mean	Std. deviation	*N*
Predicted value	16.8501	46.1832	39.5556	6.27866	36
Residual	-13.62424	12.71112	0.00000	5.95491	36
Std. predicted value	-3.616	1.056	0.000	1.000	36
Std. residual	-2.222	2.073	0.000	0.971	36

a. Dependent Variable: Content

Appendix G12: Multiple Linear Regression: Tests of Assumptions:

MTC*Licensure*Content





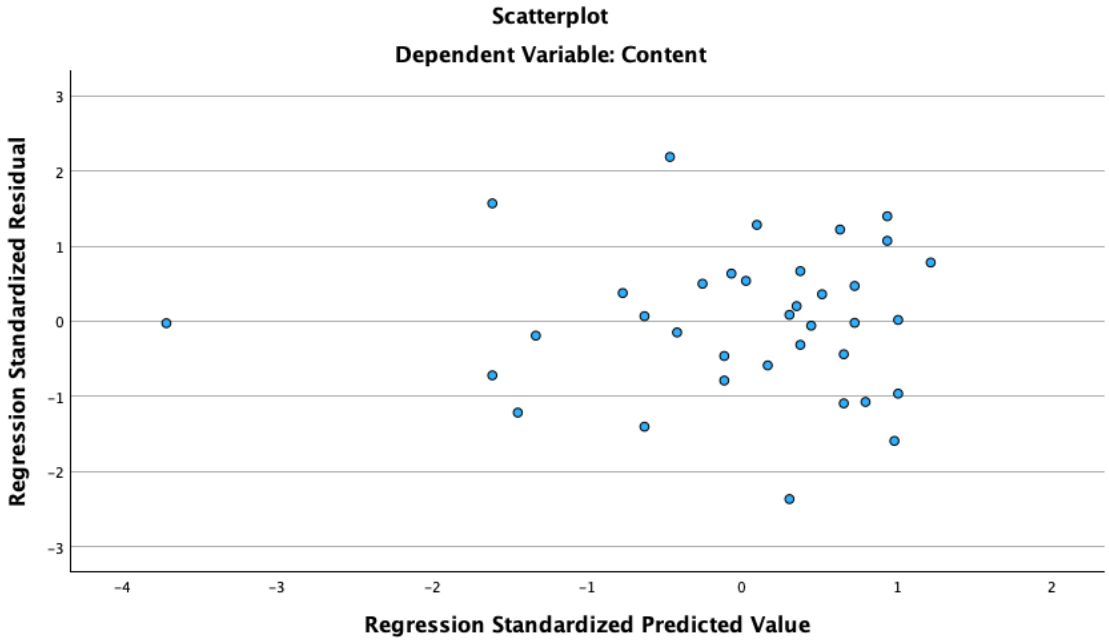


Table G12

*Multiple Linear Regression: Test of Assumptions" MTC*Licensure*Content: Residual Statistics*

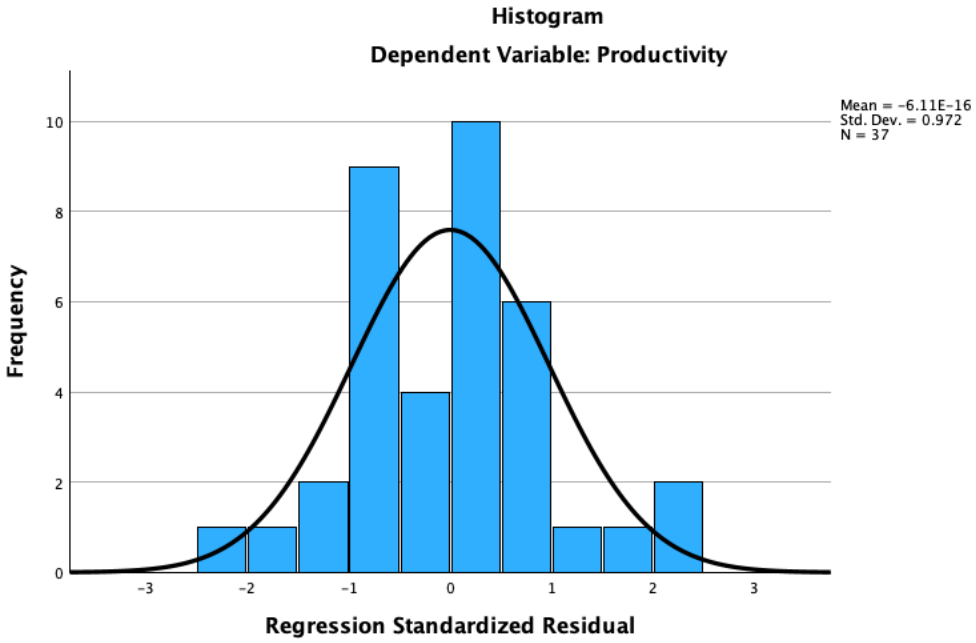
Residuals Statistics[a]

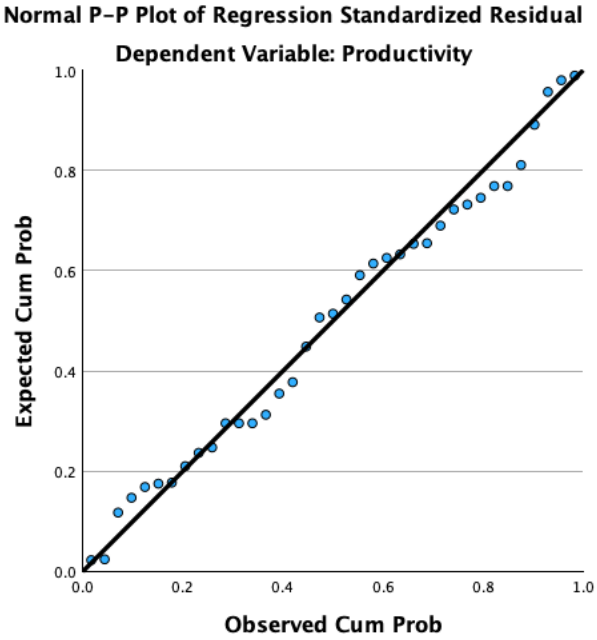
	Minimum	Maximum	Mean	Std. deviation	*N*
Predicted value	16.1511	47.2103	39.5556	6.29838	36
Residual	-14.47025	13.38672	0.00000	5.93405	36
Std. predicted value	-3.716	1.215	0.000	1.000	36
Std. residual	-2.368	2.191	0.000	0.971	36

a. Dependent Variable: Content

Appendix G13: Multiple Linear Regression: Tests of Assumptions:

MTS*Licensure*Productivity





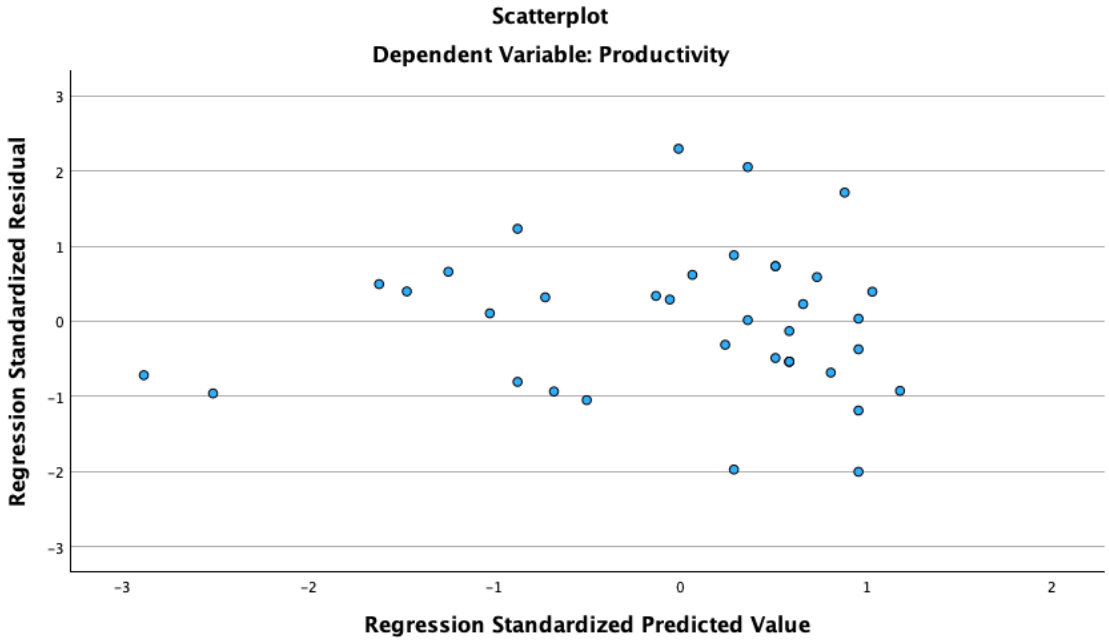


Table G13

*Multiple Linear Regression: Test of Assumptions" MTS*Licensure*Productivity: Residual Statistics*

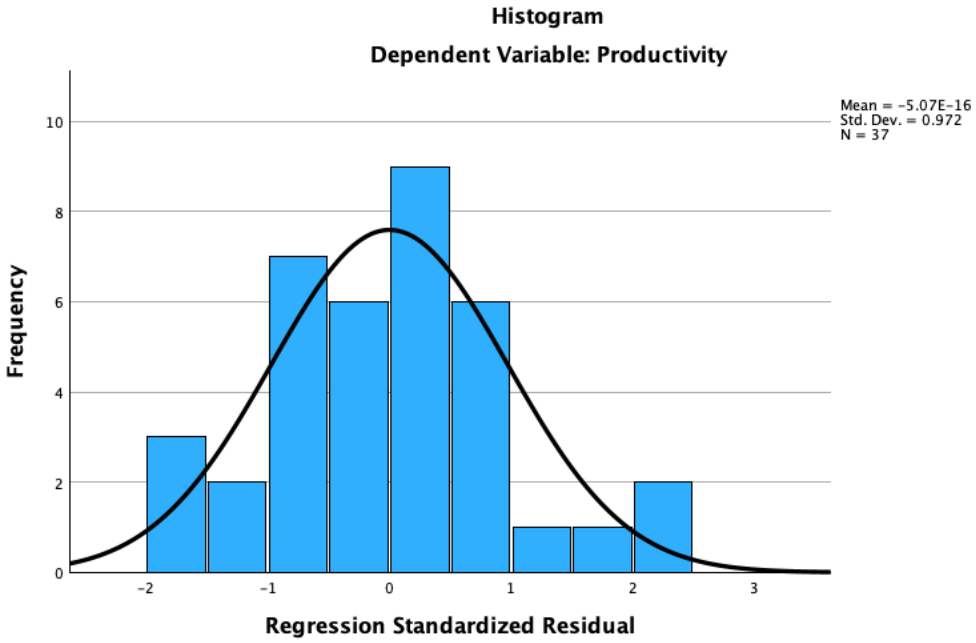
Residuals Statistics[a]

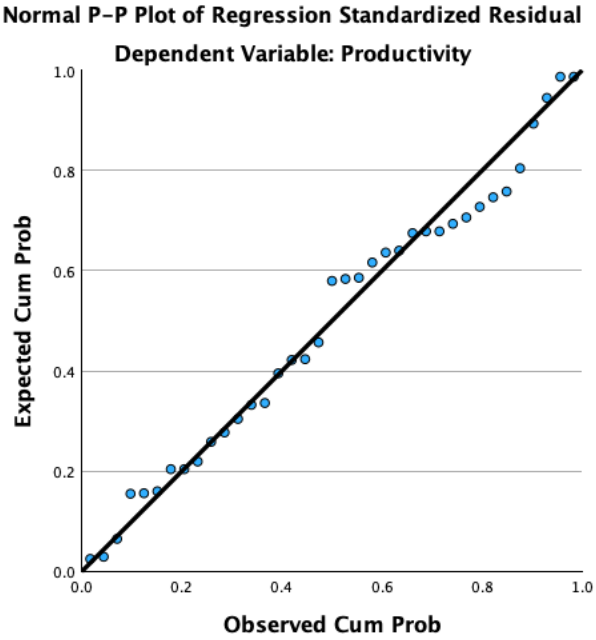
	Minimum	Maximum	Mean	Std. deviation	*N*
Predicted value	4.7583	11.2701	9.3784	1.60179	37
Residual	-4.91248	5.63706	0.00000	2.38244	37
Std. predicted value	-2.884	1.181	0.000	1.000	37
Std. residual	-2.004	2.299	0.000	0.972	37

a. Dependent Variable: Productivity

Appendix G14: Multiple Linear Regression: Tests of Assumptions:

MTK*Licensure*Productivity





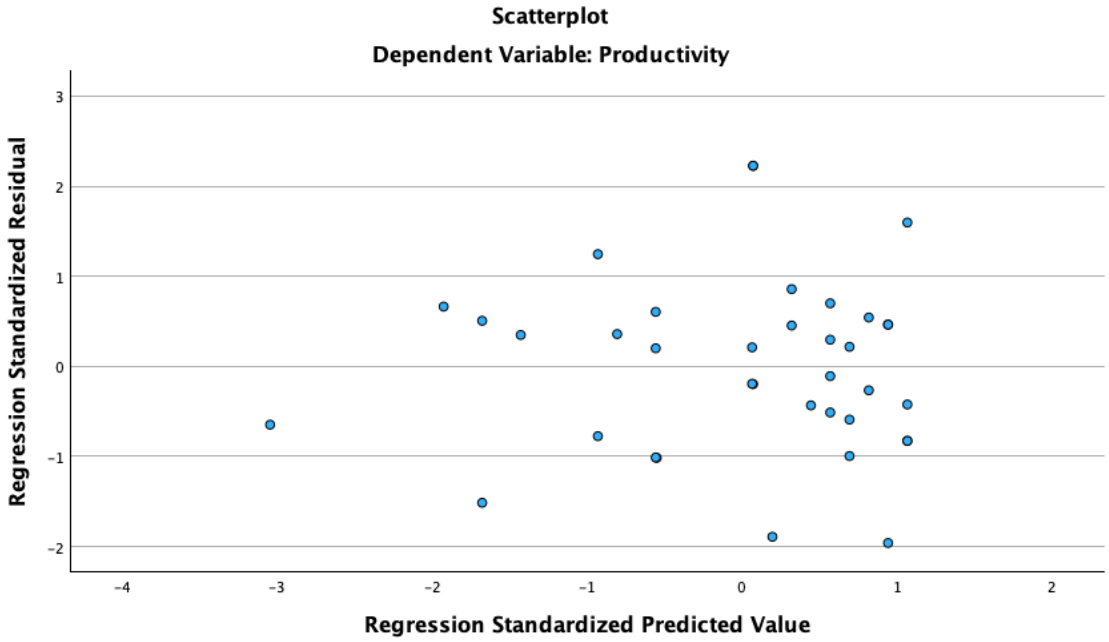


Table G14

*Multiple Linear Regression: Test of Assumptions" MTK*Licensure*Productivity: Residual Statistics*

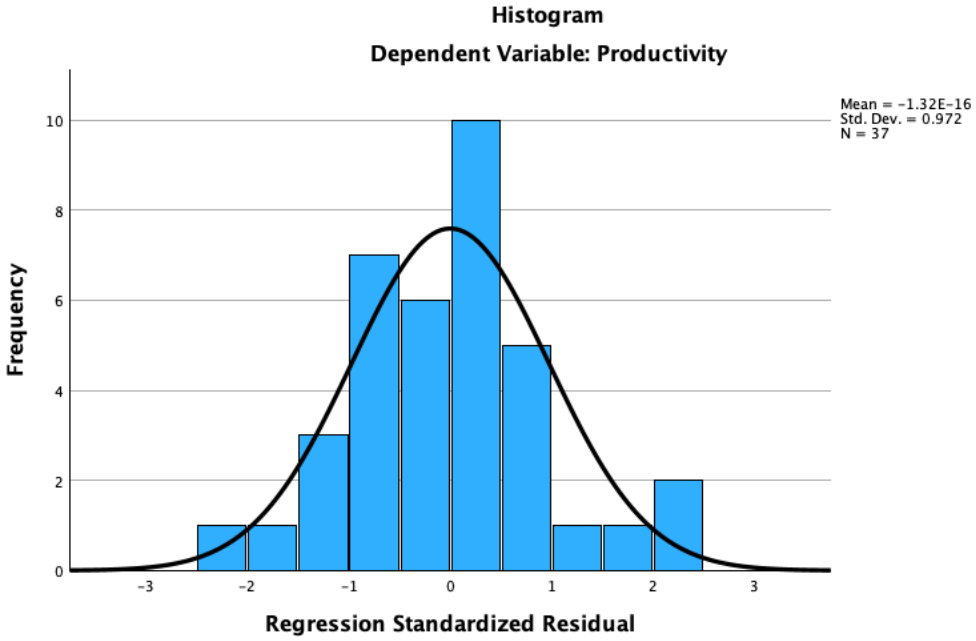
Residuals Statistics[a]

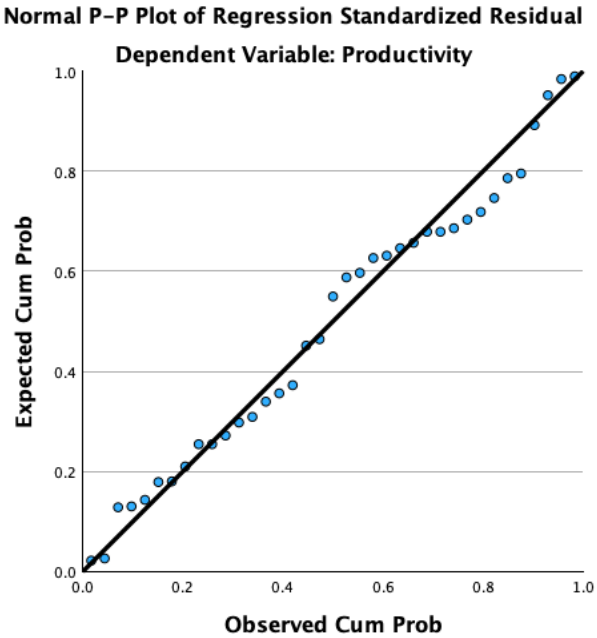
	Minimum	Maximum	Mean	Std. deviation	*N*
Predicted value	4.6025	11.0472	9.3784	1.56762	37
Residual	-4.85225	5.51265	0.00000	2.40506	37
Std. predicted value	-3.047	1.065	0.000	1.000	37
Std. residual	-1.961	2.228	0.000	0.972	37

a. Dependent Variable: Productivity

Appendix G15: Multiple Linear Regression: Tests of Assumptions:

MTC*Licensure*Productivity





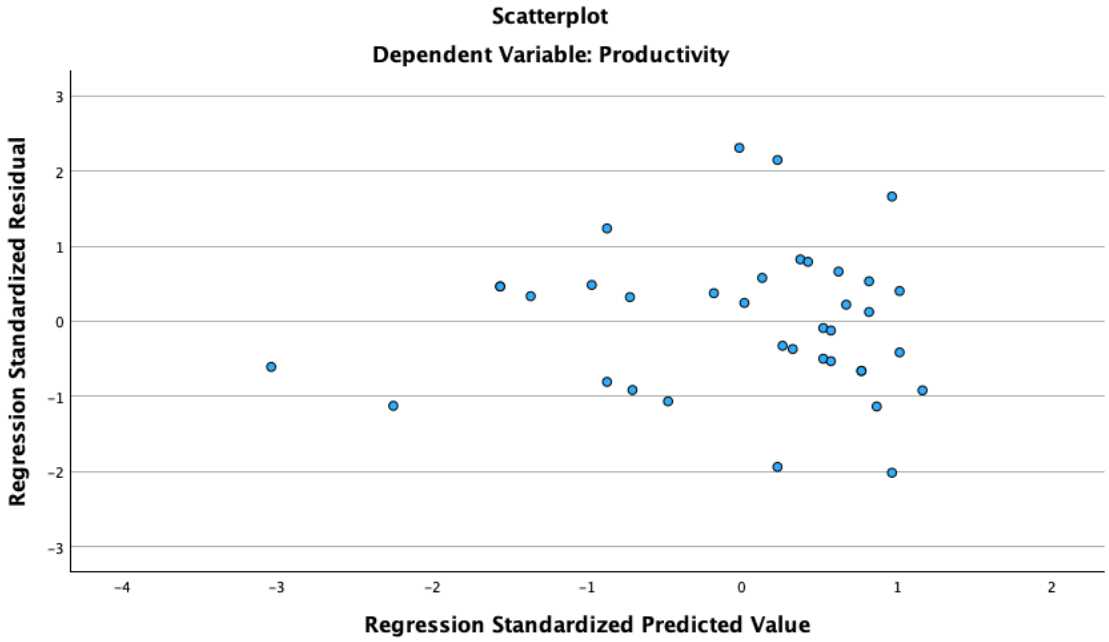


Table G15

*Multiple Linear Regression: Test of Assumptions" MTC*Licensure*Productivity: Residual Statistics*

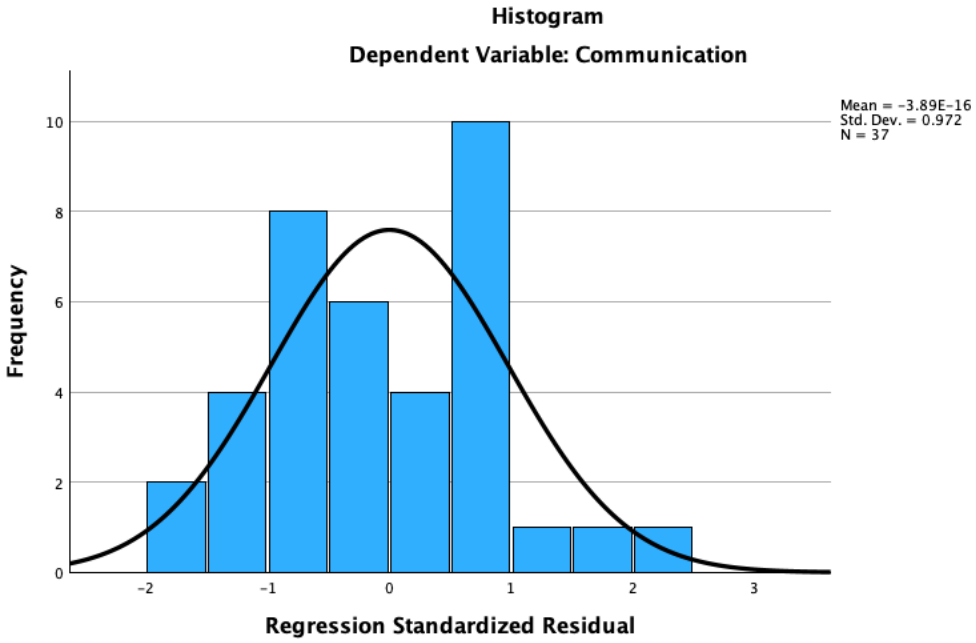
Residuals Statistics[a]

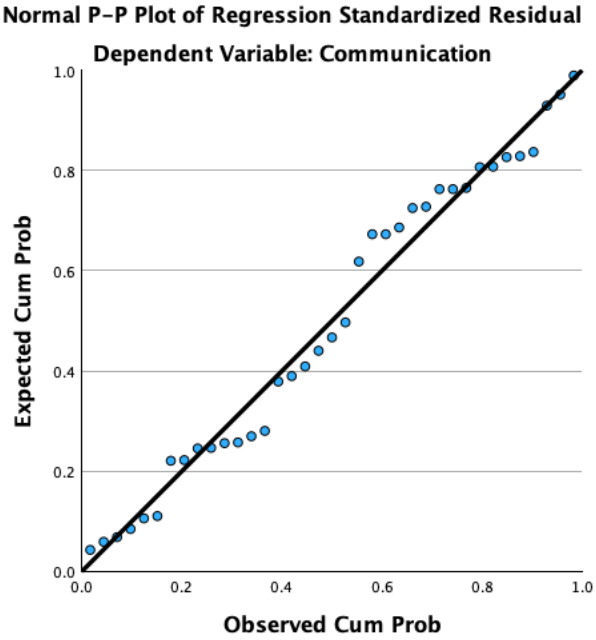
	Minimum	Maximum	Mean	Std. deviation	*N*
Predicted value	4.4849	11.2495	9.3784	1.61000	37
Residual	-4.93244	5.65298	0.00000	2.37690	37
Std. predicted value	-3.039	1.162	0.000	1.000	37
Std. residual	-2.017	2.311	0.000	0.972	37

a. Dependent Variable: Productivity

Appendix G16: Multiple Linear Regression: Tests of Assumptions:

MTS*Licensure*Communication





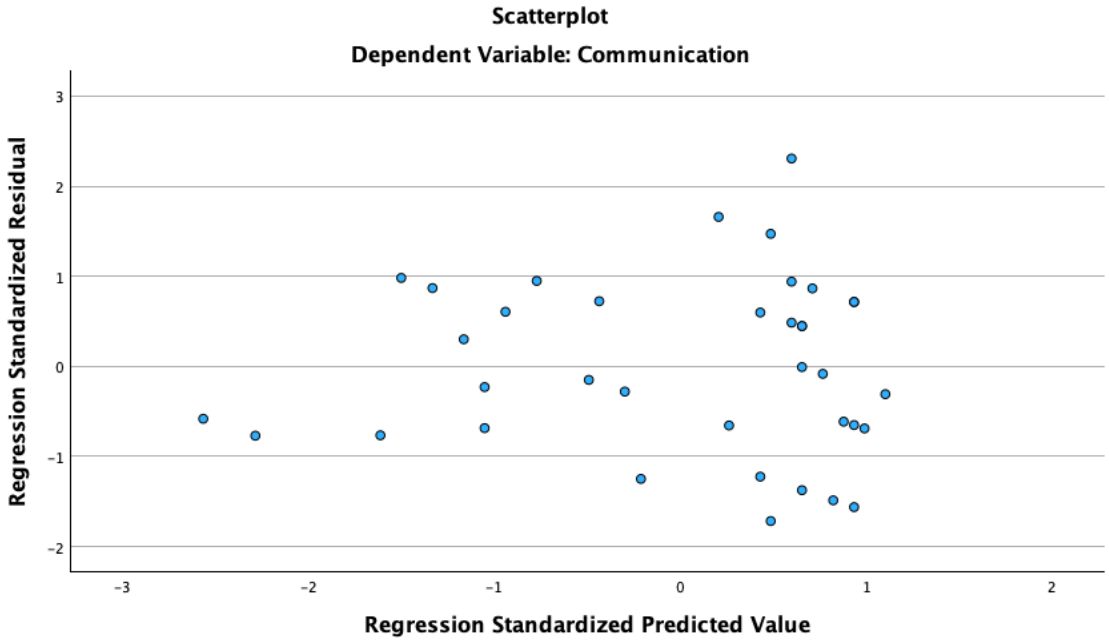


Table G16

*Multiple Linear Regression: Test of Assumptions" MTS*Licensure*Communication: Residual Statistics*

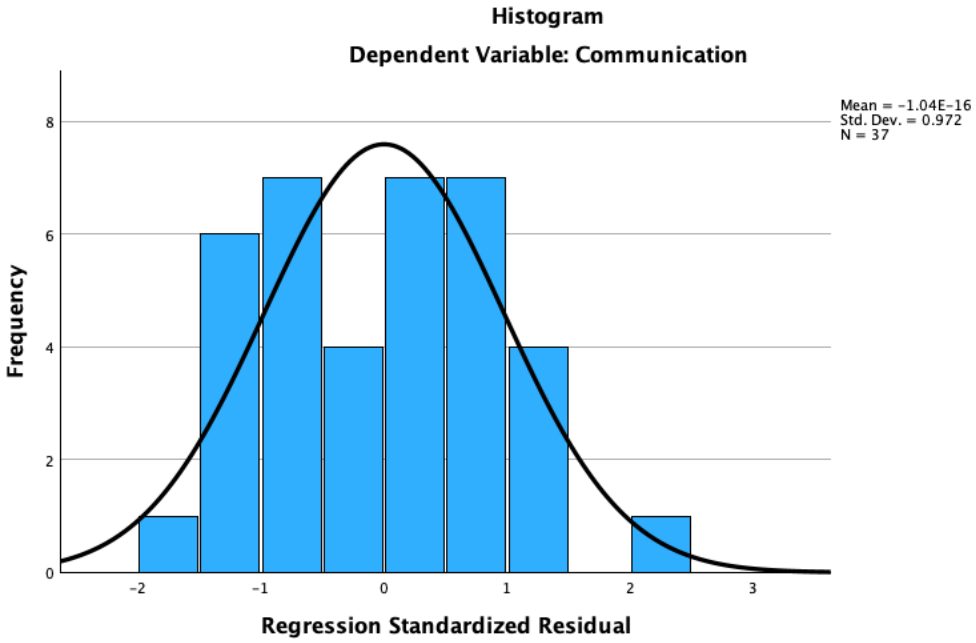
Residuals Statistics[a]

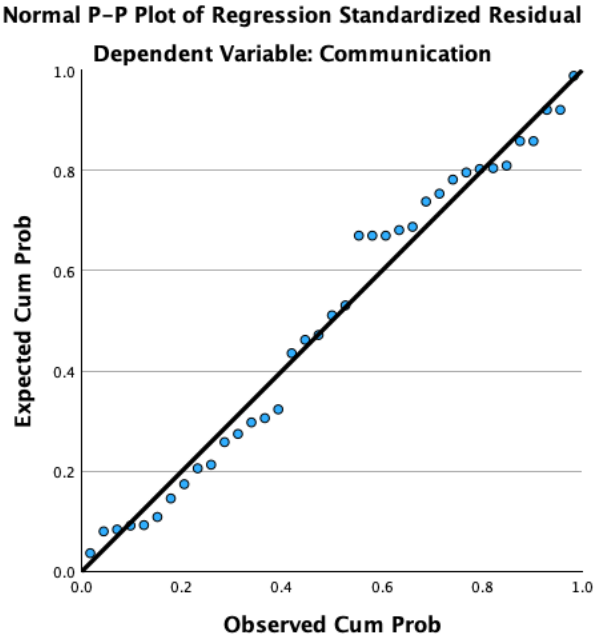
	Minimum	Maximum	Mean	Std. deviation	*N*
Predicted value	4.2766	9.6773	8.0541	1.47273	37
Residual	-3.76966	5.06532	0.00000	2.13314	37
Std. predicted value	-2.565	1.102	0.000	1.000	37
Std. residual	-1.717	2.308	0.000	0.972	37

a. Dependent Variable: Communication

Appendix G17: Multiple Linear Regression: Tests of Assumptions:

MTK*Licensure*Communication





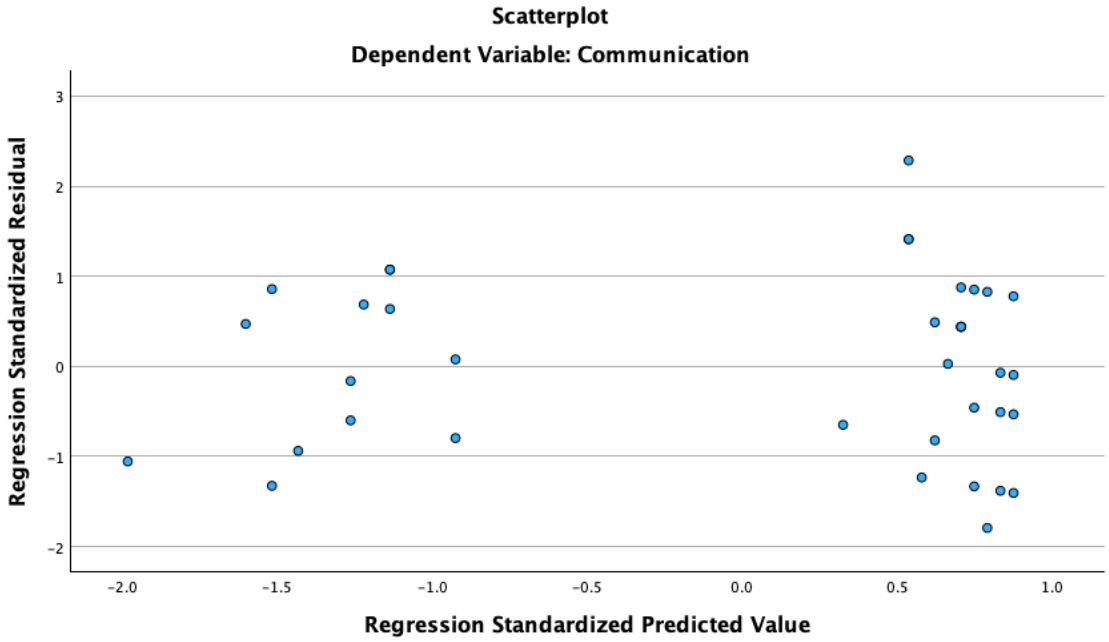


Table G17

*Multiple Linear Regression: Test of Assumptions" MTK*Licensure*Communication: Residual Statistics*

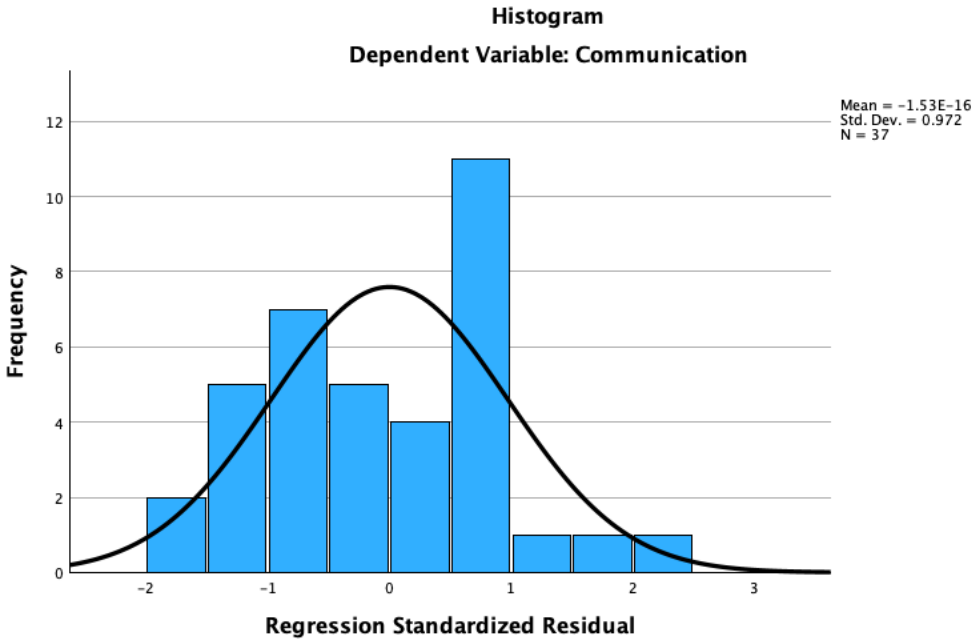
Residuals Statistics[a]

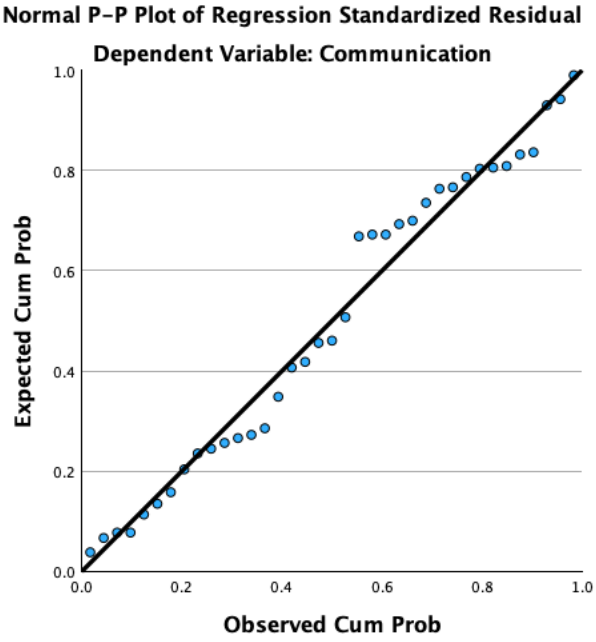
	Minimum	Maximum	Mean	Std. deviation	*N*
Predicted value	5.4159	9.2181	8.0541	1.33069	37
Residual	-4.10552	5.23214	0.00000	2.22452	37
Std. predicted value	-1.983	0.875	0.000	1.000	37
Std. residual	-1.794	2.286	0.000	0.972	37

a. Dependent Variable: Communication

Appendix G18: Multiple Linear Regression: Tests of Assumptions:

MTC*Licensure*Communication





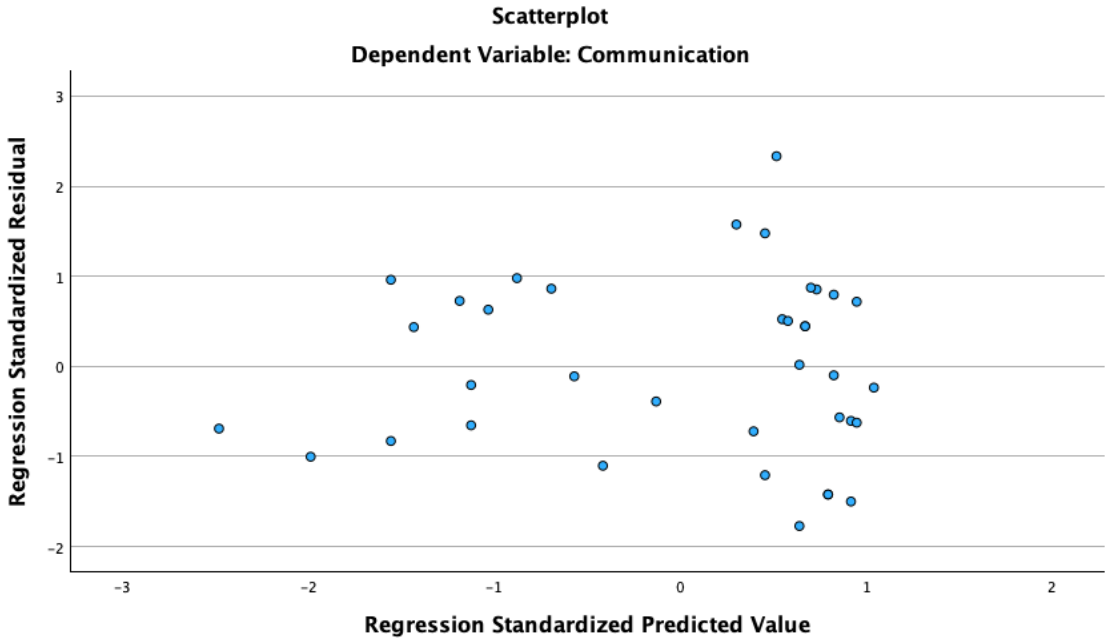


Table G18

*Multiple Linear Regression: Test of Assumptions" MTC*Licensure*Communication: Residual Statistics*

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. deviation	*N*
Predicted value	4.5435	9.5269	8.0541	1.41536	37
Residual	-3.96003	5.21438	0.00000	2.17163	37
Std. predicted value	-2.480	1.041	0.000	1.000	37
Std. residual	-1.772	2.333	0.000	0.972	37

a. Dependent Variable: Communication

Appendix H: Effect Size Statistics (Cohen's *f*)

Table H1

Effect Size Statistics (Cohen's f)

Variable	R^2	1 - R^2	Cohen's f	Effect Size
MTS*Classroom*Content	0.488	0.512	0.976	large
MTK*Classroom*Content	0.508	0.492	1.016	large
MTC*Classroom*Content	0.522	0.478	1.045	large
MTS*Classroom*Productivity	0.312	0.688	0.673	large
MTK*Classroom*Productivity	0.301	0.699	0.656	large
MTC*Classroom*Productivity	0.320	0.680	0.686	large
MTS*Classroom*Communication	0.350	0.650	0.734	large
MTK*Classroom*Communication	0.261	0.739	0.594	large
MTC*Classroom*Communication	0.321	0.679	0.688	large
MTS*Licensure*Content	0.495	0.505	0.990	large
MTK*Licensure*Content	0.526	0.474	1.053	large
MTC*Licensure*Content	0.530	0.470	1.062	large
MTS*Licensure*Productivity	0.311	0.689	0.672	large
MTK*Licensure*Productivity	0.298	0.702	0.652	large
MTC*Licensure*Productivity	0.315	0.685	0.678	large
MTS*Licensure*Communication	0.323	0.677	0.691	large
MTK*Licensure*Communication	0.264	0.736	0.599	large
MTC*Licensure*Communication	0.298	0.702	0.652	large

Note. MTS (multicultural teaching skills); MTK (multicultural teaching knowledge); MTC (multicultural teaching competency overall). Content (digital academic content tools); Productivity (digital productivity tools); Communication (digital communication tools). Classroom Assignment (ENL/ESL language = 1; content area = 0); Licensure EL/TESOL (presence = 1; absence = 0).

Cohen's f = $\sqrt{\frac{R^2}{(1-R^2)}}$ (.01 but less than .25 = small effect size; .25 but less than .40 = medium effect size; .40 or greater = large effect size)