

ABSTRACT

Pandemic Teaching: Application of Universal Design for Learning in Eighth-Grade English Language Arts and Reading

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The COVID-19 pandemic changed the landscape of education globally, requiring educators to teach online and in-building with social distancing protocols. In this context, U.S. school districts were tasked with addressing learner variability in new ways. The purpose of this multiple case study was to understand the application of universal design for learning (UDL) strategies used by eighth-grade English language arts and reading educators in the Texas Independent School District, a one-to-one public school district. The study contributes to the literature on the effectiveness of UDL-based practices by addressing how course design is essential to meeting students' diverse learning needs in synchronous remote learning or socially distanced in-building learning during an emergency. The researcher captured the application of UDL during course design, combined with district-approved digital tools and teaching strategies, to understand how this practice affected course delivery in the synchronous remote and socially distanced, in-building learning environments. A literature review, review of district structures and systems, and qualitative case study of a three member, eighth-grade professional learning community were used to study the application of UDL during the pandemic. The

researcher coded and analyzed the data obtained to reveal three themes with six subthemes. The first theme, change in purpose, contained one subtheme: ready-to-learn based upon life situations created a need-to-know and apply for survival. The second theme, change in course materials and content delivery, included three subthemes: (a) the validity of the content, (b) how the content was structured, and (c) the importance of clarity concerning how information was being delivered to their students. The last theme, change in teaching perspectives, was associated with the following subthemes: (a) modifying teaching strategies as the awareness of learner variability increased and (b) innovations supporting nontraditional teaching methods as the participants recognized varying student learning needs in their synchronous remote or in-building instructional settings. Findings revealed the need to develop a comprehensive, district-wide approach to addressing learner variability through professional development and the professional learning community model.

Keywords: pandemic teaching; universal design for learning; learner accessibility; synchronous teaching; asynchronous teaching

Pandemic Teaching: Application of Universal Design for Learning in Eighth-Grade
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by

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DEDICATION

To my husband, Gerry.

Your subtle, humbling encouragement and belief in me is something I am incredibly thankful for and blessed to have in my life. This season was not possible without you, a lot of prayer, and God's grace and affirmation. This journey has grown us closer, even during a pandemic. I cannot thank God enough for giving me your support and love in this journey and what's yet to come. Here's to *Always and Forever*.

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CHAPTER ONE

Introduction

Introduction to the Problem of Practice

The landscape of how modern society delivers and receives an education changed entirely with the onset of the COVID-19 pandemic. The global school shutdown happened on an unprecedented scale, with no historical comparison. As Shenanhan (2020) explained, "There is no research on education and pandemics" (para. 2). However, there is research capturing how students and communities respond in disasters like Hurricane Katrina (Pane et al., 2008; Paxson & Rouse, 2008; Perry et al., 2015; Van Fleet & Winthrop, 2016 and the Ebola outbreak (World Bank, 2015). In truth, over the last 20 years, emergency education has coalesced as a field of research and practice led by practitioners working in humanitarian aid and global development who can offer much insight (Winthrop, 2020). Winthrop (2020) explained, "Education in emergencies refers broadly to ensuring people affected by emergencies and crises—no matter the type of source of the crisis—have access to safe, relevant, and quality education" (Winthrop, 2020, para.7). Though research into education in emergencies offered some insight into how school systems respond to crisis, collective research did not quite address the sweeping challenges of the COVID-19 pandemic.

The United Nations Educational, Scientific, and Cultural Organization is tracking the impact of the pandemic on education. According to Winthrop (2020), the organization estimated that 87% of the world's students have been affected by school closures, with the bulk being in the primary and secondary schools. In the United States, 50 states and

territories closed their schools in some capacity. As noted earlier, previous educational emergencies disrupted schooling in portions of the United States and other countries, but even compared to school closures during the global crisis posed by the 1918 Spanish flu, the magnitude of the COVID-19 disruption to education has been much higher (Winthrop, 2020). Winthrop (2020) noted, "Today, 90 percent of the world's young people are enrolled in primary school now compared to 40 percent in 1920," (para. 5), which highlights the level of impact of the COVID-19 pandemic.

The question of what education might look like in the future has become a concern for all stakeholders because the pandemic had not ended at the time of this research. The United Nations Children's Fund (1999) noted that school systems must devise immediate response activities that lay the foundation for reaching long-term goals instead of serving as short-term measures amid a crisis. Capturing any aspect of this moment in time is vital for asynchronous and synchronous remote and socially distanced in-building instructional best practices at the local, state, and national levels because it will take time and study before the unintended consequences of the school shutdown can be known. Thus, school leaders can use this event to think through ways to mitigate the possible societal risks and opportunities for improvement during a crisis.

There is a range of possible ways school systems could become more robust in the COVID-19 pandemic. Winthrop (2020) and Gonser (2020) noted a potential area of improvement may be integrating technology into education that allows students to be academically engaged and emotionally connected to their school communities through a variety of asynchronous and synchronous remote and socially distanced in-building instruction. This multicase study provides insight on the application of UDL in these

contexts and was intended to fill the research gap regarding how UDL strategies, when integrated into initial course design and used in conjunction with digital tools can help educators meet the diverse needs of students and grow teachers' instructional practices and efficacy amid a pandemic. In the next section, the school district's instructional technology vision, supports, and history are discussed to show why and how the district responded to the COVID-19 pandemic crisis and provide the study background in the local context. The participants in this study were adults implementing and applying their learning, so Knowles's (1975) theory of andragogy, an adult learning theory, is discussed later in the chapter.

Background of the Study

To have a clear understanding of a school district is to know its mission and systems as well as the people who are in place to achieve that mission. For the purposes of confidentiality, the school district will remain confidential. The mission of the Texas Independent School District (ISD) under study was to be vitally committed to educational excellence that prepares and inspires all students for life-long success by engaging each student in rigorous academic experiences and enriching opportunities. Several administrative and cultural aspects of the district were aimed at fulfilling this mission. Like most educational school systems, the Texas ISD culture was rooted in its community's historical context. At the time of this study, the 31.2 square mile school district served approximately 8,064 students in six K–5 elementary schools, two Grade 6–8 middle schools, and one Grade 9–12 high school. The 2018–2019 student enrollment report from the Texas Education Agency (TEA) showed the Texas ISD student population was 70.7% white, 12.8% Hispanic, 11.1% Asian, 4.3% two or more races, and

0.9% African American. The district's student population was 2.7% economically disadvantaged, 2.2% English language learners, and 7.4% special education.

Texas ISD was a high performing school district. According to the district's website, Texas ISD earned an A designation on the state accountability rating system. In 2019, the average SAT score in Texas ISD was 1300 compared to the state's score of 1022, and the global score of 1059. The average Texas ISD ACT score was 27.7 compared to the state and global scores of 20.5 and 20.7 respectively. Ninety-nine percent of the 2018–2019 Texas ISD seniors received letters of acceptance to attend college. Of that group, 83% attended a 4-year institution, 12% visited a 2-year institution or technical school, and 5% joined the military, went to work, or took a gap year to perform volunteer service.

Texas ISD has a highly qualified and supported instructional staff to serve their student population. According to the district's website, the average teacher in Texas ISD had 13 years of experience, with 53% of educators having 11 or more years of experience. Forty-two percent of teachers had advanced degrees. To ensure smaller class sizes and fulfill the community's quality of education, the Texas Education Foundation funded 51 teacher and staff positions to support the gap between adequate and excellent instruction. Since its launch in 2004, the Texas Education Foundation has granted over \$19 million to fund more than 370 teachers. This was the only organization in the district that could support additional teacher and staff positions. This organization worked alongside the district's booster clubs and parent and teacher organizations that fund essential supplies and programs for teachers at each campus community. These entities all partnered to meet the needs of staff and campuses, creating partnerships that were

believed to be the district's backbone of success, which explained the district's deep community roots.

In this study, the Texas ISD maintained a K–12, one-to-one initiative, meaning every student throughout the district received a school-issued mobile device. The Texas ISD defined a mobile device to include tablets, laptops, wearables, e-readers, and emerging technologies per the student handbook. The Texas ISD provided an iPad to every K–12 student, and the district was one of the first in the nation to implement this learning model. In the 2019–2020 school year, Texas ISD evaluated, revisited, and reimaged the kindergarten through 12 grade one-to-one school-issued mobile device initiative. Keeping in mind Sheninger's (2019) digital leadership point that

It's not what the adult does with technology that ultimately matters, but instead what the learners are doing with it. . . . Understanding how they are impacting teaching and learning will help guide your consideration of which tools are useful and how to best implement them. (p. 88)

Texas ISD worked to ensure educators were intentional with technology implementation and communication to optimize relevance, value, and authenticity a suggested in Novak & Rodriguez (2016).

To be strategic and maintain the district's values and expectations, all aspects of its technology vision were tied to its mission statement, instructional practices, and stated beliefs. The school district's mission statement described a district vitally committed to educational excellence that prepares and inspires all students for life-long success by engaging each student in rigorous academic experiences and enriching opportunities. This mission tied to the professional practices of educators and the readiness of learners in the district. The school district's educator profile and graduate profile, as shown in Figure 1.1, were vital components of the vision statement because each provides learning

expectations and outcomes for educators and students. These expectations were imposed to drive equitable instructional technology implementation throughout the district by enhancing the district's approaches to best instructional practices models, the guaranteed viable curriculum, and access to high-quality assessments.

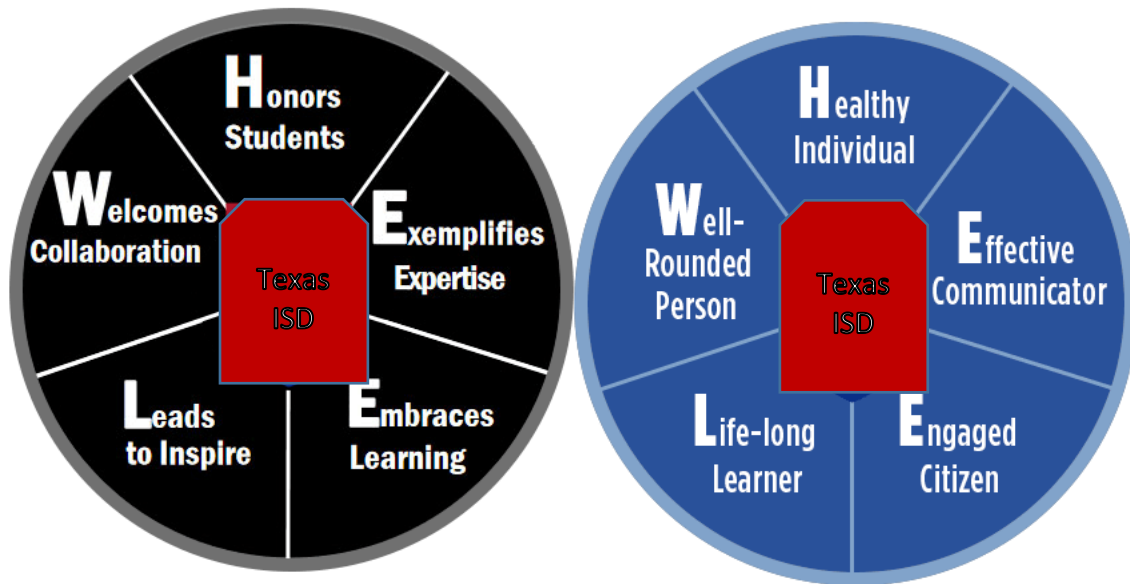


Figure 1.1. Educator and Graduate Profiles in Texas Independent School District

The role of technology intertwines with each of the five skills laid out in the profiles, which is why Texas ISD embraced the effective use of technology through the district's vision for best instructional practices and beliefs about technology integration outlined in Figure 1.1. The chart aligned with the vision that technology should be used for the intentional, purposeful integration of developmentally appropriate digital tools to enhance all student engagement and learning. This included the belief that technology enhances opportunities for differentiation, creation, collaboration, critical thinking, and digital citizenship. The district also expressed a belief that thoughtful use of technology

begins with lesson design, and the district aligned the curriculum with its instructional and technological standards.

Fullan (2012) said, “Don’t focus on technology—focus on its use” (p. 11), and to responsibly implement the one-to-one program with thoughtful use of instruction, leaders at Texas ISD aimed to infuse instruction with the state technology standards. The Texas Essential Knowledge and Skills (TEKS; TEA, 2020) based on the International Society for Technology in Education standards, outlined technology application expectations and skills for students in grades K–12 that can integrate with other subjects. The standards allowed school districts to view technology as an instructional tool in the classroom that provides access to information anytime and anywhere. As teachers designed lessons with the standards in their content area, they used the Texas ISD planning framework in Figure 1.2 to ensure technology integration was purposeful, enhanced the learning experience, and aligned with the TEKS.

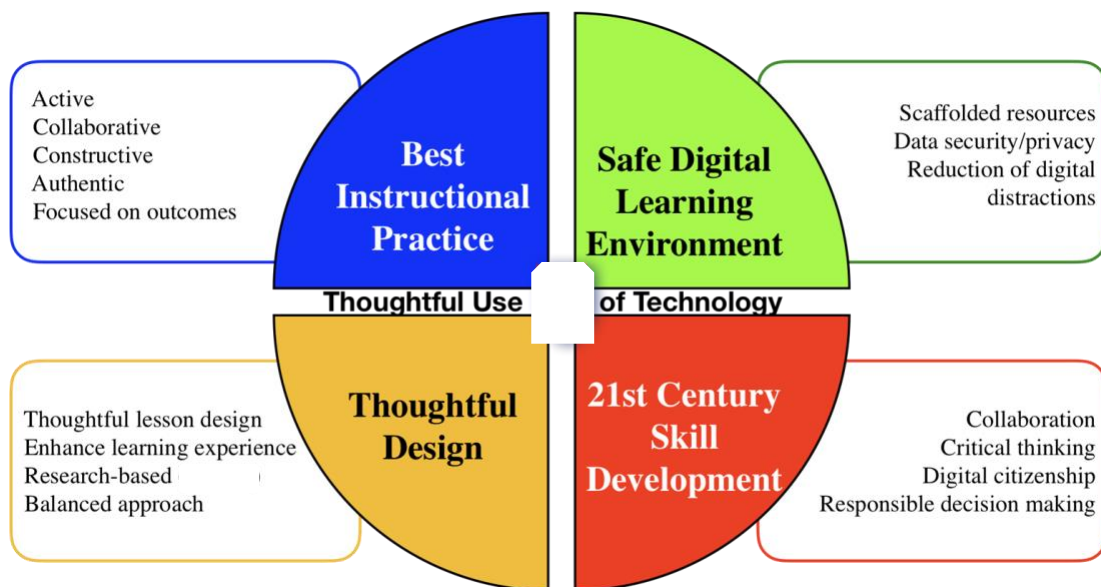


Figure 1.2. Texas Independent School District Planning Framework

As Figure 1.2 shows, thoughtful use of technology was designated for every aspect of curriculum, instruction, and assessment. District leaders viewed the iPad as their vehicle for instruction, and staff utilized the digital tools available to students to enhance the learning environment.

Over the past 10 years in the one-to-one district-issued device learning environment, several systems were revisited with district leadership and community stakeholders to ensure a safe online learning environment. For example, Texas ISD selected a digital curriculum delivery model for instruction that included various curriculum resources, including online interactive textbooks, leveled reading books and resources, skill-based intervention and challenging applications, formative and summative assessments, and student productivity tools. With this delivery model, teachers can create balanced learning experiences that enable students to collaborate and create products in analog and digital formats. Students have access to assistive technology, electronic devices, and district-approved applications to provide accessibility tools beneficial to all students.

Over the 2019–2020 school year, the school district vetted applications and digital tools that help students safely access grade-level standards, explore content and concepts beyond their grade level, and have access to differentiated resources. To do this, the Texas ISD Technology Advisory Committee was formed in the fall of 2019 to engage in providing input, guidance, and support for district technology initiatives. The committee was composed of Texas ISD community members, educators, high school students, and administrators and aimed to offer a diverse perspective on technology integration, data privacy, and instructional expectations for a K–12 education. The district also convened

an elementary and middle school focus group composed of educators to serve as an advisory group to identify, reflect on, and discuss multiple topics focused on thoughtful use of technology to make recommendations in these areas as district leaders considered best instructional practices in the classroom. Through these committees, Texas ISD solidified learning management systems (LMS) for K–12 and applications in alignment with the district's data privacy agreement. It also provided feedback on needs concerning professional development and improved systems of communication to the community about the educators' thoughtful use of instructional technology. Additionally, with the groups' collaborative research and discussion, the board approved the purchase of iPads and digital resources and tools so the district could continue using that mobile device as a vehicle for instruction.

Considering this history, Texas ISD was well-positioned in the digital learning environment when the COVID-19 pandemic began. Lack of access to devices and the internet was not a barrier when transitioning to synchronous remote and socially distanced in-building learning during the pandemic. Educators and students were already accustomed to utilizing an LMS, digital instructional resources, and digital tools for creativity, collaboration, and critical thinking. However, as the district reopened schools in the 2020–2021 school year, instructional planning and practices required better lesson design support within the new synchronous instructional context. In the fall of 2020, district leader's questions about preparing for adaptable and accessible instruction and assessment during synchronous remote and socially distanced in-building learning and about how that information would support all students' diverse learning needs were at the forefront of district leaders' minds. Specifically, community members and district leaders

wondered how educators would prepare for the new school year amid a pandemic so that emergency education was not continuously at play in the learning environment. This study captured this unique moment in education by combining crisis or emergency schooling research and emerging pandemic research. Gathering data about how educators crafted accessible online content during the pandemic using the UDL framework could provide a way of providing students with meaningful instruction and access to content instead of merely giving them a device and an internet connection. These findings provide a glimpse into how state and national practices can be implemented to prepare educators to design synchronous remote and socially distanced in-building learning during an emergency or reimagining schooling practices.

Statement of the Problem

Research indicated schools do not adequately meet the needs of diverse learners in the K–12 online instructional setting, (Allen & Seaman, 2009; Hutchins, 2003; Izzo et al., 2008; Muilenburg & Berge, 2005; Roh & So, 2005; Shattuck, 2015a; Sims, 2009; Sprenger, 2008). These impacts on general online learning environments are just beginning to receive research attention (Watson et al., 2011). The problem was exacerbated within the transition to synchronous remote and socially distanced in-building learning imposed by COVID-19 local and state health guidelines. With the pandemic and recent rise of online education, many districts provided a choice for parents: in-building learning with social distancing measures in place or remote learning. There was no option in some communities due to the number of COVID-19 cases or lack of access to resources like the internet or devices. Either way, there was an increase in the number of K–12 school districts offering some if not all students an option to learn

remotely. Therefore, a more diverse learning population was taking advantage of virtual learning. Santovec (2005) explained that diverse learners include everyone: individuals with disabilities, nontraditional students, older or returning students, and international students. Richardson (2009) postulated that in normal circumstances, more learning opportunities can occur when taking a course online in the convenience of home. However, district leaders wondered if they were reaching all students, meeting their needs, and retaining them. Specifically, Texas ISD students had access to the classroom in-building or virtually with adequate devices and internet connectivity, yet the ability of teachers to provide an accessible viable curriculum using synchronous online and face-to-face instructional techniques was in question.

UDL is a well-known approach in higher education contexts (Adelstein & Barbour, 2016; Ortiz, 2014; Shattuck, 2015b) but not in a secondary online setting. In this study, UDL was introduced and applied districtwide by Texas ISD staff. This question preceded the introduction and application of UDL: Could the needs of diverse learners be met in synchronous remote and socially distanced in-building learning by using the principles of UDL? Applying the principles of UDL may address the needs of all learners in any instructional setting; however, the concept of UDL is still relatively new to many educators, and there was limited research as to its use online to inform best practices during an emergency. This multicase study provides insight on the application of UDL and was an attempt to fill the research gap regarding how UDL strategies, when integrated into initial course design and used in conjunction with digital tools, can help educators meet the diverse needs of students and grow teachers' instructional practices and efficacy amid a pandemic.

Purpose of the Study

The COVID-19 pandemic changed the global education landscape, requiring educators to teach online and in-building with social distancing protocols. This study was designed to explore how a course's design was essential to meeting students' diverse learning needs in synchronous remote and socially distanced in-building learning during an emergency. Utilizing Knowles's (1975) theory of andragogy and the guidelines supported in UDL may allow educators to provide equitable access to instructional material online and in-building with adherence to COVID-19 protocols. There was an insufficient understanding of how educators learn and apply UDL in a synchronous remote and socially distanced in-building instructional setting. The purpose of this multicase study was to gain insight into the application of UDL strategies used by eighth-grade English language arts and reading (ELAR) educators within a one-to-one public school district amid a pandemic to contribute to the literature on the effectiveness of UDL-based practices.

Though research should be an ongoing effort, identifying current contributions in the area of accessibility in a synchronous remote and socially distanced in-building learning environment amid a pandemic was the ultimate goal. The belief was findings could be used to inform local, state, and federal agencies on best instructional design and professional learning for synchronous remote and socially distanced in-building schooling. The application of UDL was captured at the onset of course design when it was combined with district-approved digital tools and teaching strategies to understand how this practice would affect course delivery in the synchronous remote and socially distanced in-building learning environment.

Research Questions

The teaching and learning practices were explored of three eighth-grade ELAR teachers who provided synchronous remote and socially distanced in-building instruction in the Texas ISD. Three questions drove this research.

1. What practices, if any, of the UDL framework with district-approved digital tools, do three eighth-grade ELAR teachers already employ during the pandemic, and what is their comfort level within the synchronous remote and socially distanced in-building learning environment?
2. How does the district's UDL implementation impact three eighth-grade ELAR teachers' UDL application of instructional practices using district-approved digital tools in a synchronous remote and socially distanced in-building learning environment?
3. How are teachers' perceptions regarding the application of UDL shaping synchronous remote and socially distanced in-building learning practices?

Significance of the Study

The lesson design phase of course development in the Texas ISD typically focuses on content aligned with the TEKS. Grade 6–12 educators in the Texas ISD utilized Google Classroom as the LMS and had a list of district-approved applications at their disposal for use in delivering innovative and safe instruction. The educators aimed to create a learning atmosphere where thoughtful and intentional technology planning would give all students access to the curriculum. This consideration was intended to increase student interaction and engagement and reduce barriers. By applying UDL, educators hoped they may have a higher chance of meeting their students' needs while

reducing challenges when delivering a course remotely or in-building. However, to apply a concept or strategy, it is necessary to understand how it operates, what results may occur, and the practice of benefiting from such results (Ortiz, 2014).

An insufficient understanding existed of how educators apply UDL in a synchronous remote and socially distanced in-building environment. This study provides insight into the application of UDL in a pandemic. It was an attempt to fill in the research gap by improving understanding of how UDL strategies, when integrated into initial course design and used in conjunction with digital tools, can help educators to meet the diverse needs of students in emergency, remote, and traditional settings. This study's results could affect course material delivery in a synchronous remote and socially distanced in-building learning environment.

Research Design and Methodology

District and campus leadership at Texas ISD who have UDL framework training created the course content for their K–12 educators to participate in a synchronous remote and socially distanced in-building learning environment at the onset of the school year. Web-conferencing sessions were held over the application Zoom, which provided a meeting space for learning. Figure 1.3 shows the flow of the study. It also shows that the researcher identified the comfort level and frequency-of-use of district-approved digital tools and UDL strategies after the professional learning session. These elements were identified using an individual online survey and one-on-one interviews, which were conducted over Zoom. One focus group interview was also conducted over Zoom to further discuss the educators' application of what they had learned from the UDL professional development session and gauge change. Artifacts like unit plans,

professional learning community (PLC) meeting agendas, notes, Google Classroom posts, and other district-approved digital tools like Nearpod and Flipgrid were reviewed throughout the unit and discussed in the focus group interview. All interviews were recorded through Zoom, transcribed, and coded to understand how the application of UDL enhanced teaching and learning throughout the unit of instruction and how teachers' instructional practices and efficacy changed.

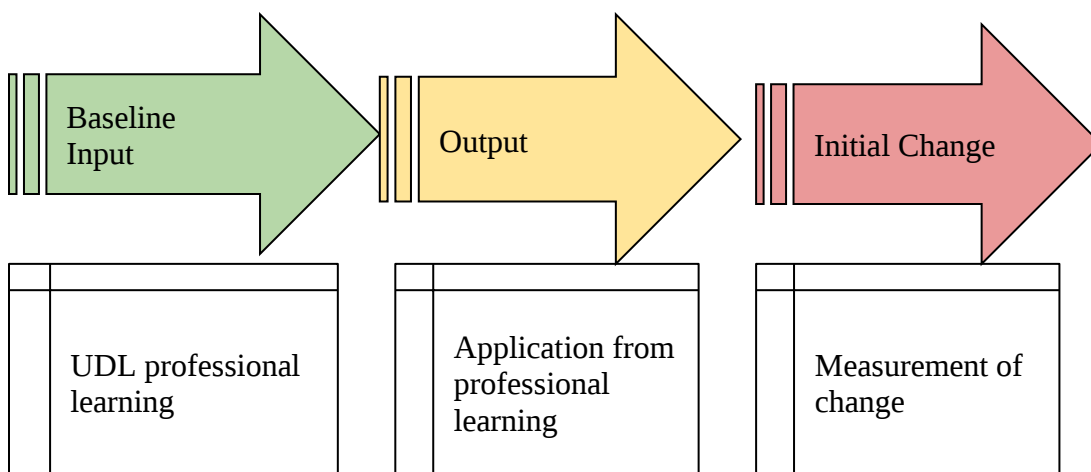


Figure 1.3. Baseline Input, Output, and Initial Change. UDL = universal design for learning. Adapted from Accessibility in Distance Education: Implements of Universal Design for Learning [Doctoral dissertation, University of Hawai'i at Mānoa], by T. Ortiz, 2014, ProQuest Dissertations Publishing. <http://search.proquest.com/docview/1611919767/>

Knowles's (1975) adult learning theory provided the conceptual framework for this study. In this theory, Knowles described how adults learn, using the term *andragogy* to refer to an approach that is learner-focused and self-directed (Ortiz, 2014). In contrast, *pedagogy* refers to a teacher-focused and teacher-directed approach to instruction; therefore, andragogy provides a set of assumptions for designing instruction with a more self-directed learner (Birzer, 2004; Conner, 2004; Taylor & Kroth, 2009; Ortiz, 2014). Table 1.1 provides Knowles's (1975) six key assumptions where self-concept,

experience, readiness to learn, orientation to learn, motivation to learn, and need-to-know set the foundation for how adult learning occurs. This theory guided the research questions to show how educators experience learning and apply UDL principles.

Table 1.1

Knowles's Six Key Assumptions

Assumption	Explanation
Self-concept	As an individual matures, their self-concept moves from a dependent personality towards a self-directing personality. This idea includes how learning may begin to occur.
Experience	An adult accumulates many experiences that they can account for and use as resources for further learning.
Readiness to learn	The readiness of an adult to learn is related to the developmental tasks of their locus of control (e.g., work, friends, family).
Orientation to learn	Time and perspectives change as people mature, resulting in the immediate application and implementation of things learned instead of waiting until needed.
Motivation to learn	Adults are motivated to learn by internal rather than external factors. Curiosity may be a motivator for learning.
Need-to-know	Adults tend to learn when there is an immediate need to implement the information either for themselves or another individual.

Note. Information from *Self-Directed Learning: A Guide for Learners and Teachers*, by M. S. Knowles, 1975, Cambridge.

A multicasestudy design was used in this study (Creswell, 2014; Merriam, 1998; Ortiz, 2014; Stake, 2006; Yin, 2014), and a 2-phase data collection process was conducted. Phase 1 involved the initial Google Form survey to ensure participants' criteria were met and to gain insight into the participants' instructional expertise and

lesson design, use of district-approved digital tools, and perceptions of synchronous remote and socially distanced in-building instruction. Three eighth-grade ELAR educators were recruited with varying levels of teaching experience. All three participants were in the same PLC in the same middle school and school district. All had received the same amount of UDL training and had experienced the one-to-one environment from its inception in the 2011–2012 school year. All three teachers were delivering remote synchronous instruction at the end of the 2019–2020 school year and at the start of the 2020–2021 school year. They all later provided instruction in the synchronous remote and socially distanced in-building instructional environment that the school district called blended learning.

Phase 2 consisted of other qualitative methods for collecting data including viewing artifacts and conducting an initial 30–45 min individual virtual interview, one virtual 45–60 min focus group session, and one 15–30 min virtual individual exit interview to learn about the way teachers applied the framework with district-approved digital tools in the synchronous remote and socially distanced in-building learning environment. The aim was to gain insight into the level of change in the participants' instructional practices and perceptions. A multiple-case analysis was adopted along with an iterative and step-by-step process of coding, categorizing, and creating themes to generate findings with data (Merriam, 1998; Ortiz, 2014; Saldaña, 2009; Stake, 2006). The multicase study was bound by time according to the district's board-approved school district calendar.

Limitations

The study promised significant findings concerning shifts in mindset and instructional change because synchronous remote and socially distanced in-building learning occurred in response to a pandemic. The overarching goal was to provide insight into how local, state, and national education practices could be used to prepare educators to design this kind of blended instruction during an emergency or during traditional schooling. It is true that many school districts would need to begin this process by addressing the problem of access to devices and the internet, but this study instead focused on course design because that barrier did not exist in the district being studied. However, this study took place during a pandemic, so it was essential to ensure that pupils' health in the case study was not threatened. The TEA acknowledged two collective challenges of the 2020–2021 school year: (a) keeping students safe throughout COVID-19 and (b) redesigning the school experience so students could still reach high academic goals. Data was collected with those limitations in mind. Therefore, data stemmed from recorded web-conferences with individuals and a focus group. A set of electronic artifacts and documentation was also collected. Other limitations are addressed in Chapter 3.

Definition of Terms

The following are important terms used in this study.

- *Andragogy* "is defined as the art and science of helping adults learn" (Knowles, 1975, p. 19).

- *Asynchronous* is defined as a curricular experience where students engage in the learning materials on their own time, interacting intermittently with the teacher via the computer, other electronic devices, or over the phone (TEA, 2020).
- *Blended learning* is a term adopted by the school district to explain an instructional context where an educator is synchronously teaching remotely and in a socially distanced in-building setting.
- *COVID-19* is an illness caused by a virus that can spread from person to person (Center for Disease Control and Prevention, 2020).
- *Diverse learners* include individuals with disabilities, second language learners, and traditional and nontraditional students (Santovec, 2005).
- *Learning management system (LMS)* refers to online learning technologies for creating, managing, and delivering course material (Sabharwal et al., 2018; Turnbull et al., 2019).
- *Pandemic* refers to an epidemic that has spread over several countries or continents, usually affecting a large number of people (Richards, 2012).
- *Pandemic teaching* refers to the synchronous and asynchronous in-person or remote instruction and instructional practices occurring during a pandemic to reach students.
- *Remote online learning environment* is any form of instruction delivered to students not confined to a traditional brick and mortar classroom environment.
- *Remote synchronous instruction* is two-way, real-time (i.e., live) virtual instruction between teachers and students when students are not on campus. In this method, the required amount of instructional time is scheduled each day, and

- funding is generated when attendance is recorded daily at a locally selected snapshot in time. Synchronous instruction is provided through a computer or other electronic device or over the phone. The instructional method must address the required curriculum, per Texas Education Code, Section 28.002 (TEA, 2020).
- *Remote asynchronous instruction* is instruction that does not require the instructor and student to engage simultaneously. In this method, students learn from instruction that is not necessarily being delivered in-building or in real time. This type of instruction may include various forms of digital and online learning, such as prerecorded video lessons or game-based learning tasks that students complete on their own. It may also include preassigned work and formative assessments made available to students on paper. The instructional method must address the required curriculum, per Texas Education Code, Section 28.002 (TEA, 2020).
 - *Synchronous instruction* is defined as two-way, real-time (i.e., live) instruction between teachers and students through the computer or other electronic devices or over the phone (TEA, 2020).
 - *Universal design for learning (UDL)* is a teaching concept that provides a blueprint in which teaching strategies like flexible goals, methods, materials, and assessments are implemented to meet all learners' needs (Center for Applied Special Technology, 2009).

Summary and Organization of the Dissertation

As school districts look to create teaching and learning plans during a pandemic, educators in Texas have been charged to keep in mind that, "We cannot allow this public health crisis to become a generational education crisis" (TEA, 2020, p. 4). Ortiz (2014)

noted that distance education has allowed many diverse populations to receive an education using an online platform. Now more than ever, the delivery of such instruction must allow for educators to reach all students. In this chapter, the researcher addressed the unexpected course design problems educators and students may encounter during emergency or pandemic teaching and how one school district approached those barriers. Therefore, this study aimed to explore how the design of a course contributed to the teacher's ability to meet the diverse learning needs of their students during a pandemic. Utilizing Knowles's (1975) theory of andragogy and the guidelines of UDL may allow educators to effectively deliver content without isolating a population or group with accommodations. In Chapter 2, the literature concerning ways the progression of educational law supports the need for reaching all students is explored. Next, the definition, empirical research, and theoretical framework of UDL is detailed including its influence on students and laws regarding how courses are created in an online setting. Andragogy closes the discussion in Chapter 3 with an explanation of the researcher's methods and data analysis. Chapter 4 showcases participant information and the role the discovered themes played in the study. Chapter 4 also provides results and a discussion of themes found in the data collection and analysis processes from Phase 1. Chapter 4 also includes the explication of themes that emerged through the coding analysis of the data from Phase 2. Chapter 5 provides a discussion of the results, limitations, further implications of the study, and recommendations for further research.

CHAPTER TWO

Literature Review

Introduction of Literature

This chapter includes a thorough review of the relevant research for the support of a multiple case study to examine how the application of the UDL framework impacted the instructional strategies and the perceptions of three eighth-grade ELAR educators in a synchronous remote and socially distanced in-building learning environment amid a pandemic. First addressed is the historical context of critical public school reform in the United States, including the role of technology and the integration of technology in 21st-century teaching and learning environments. This section provides a discussion of the various forms of technology integration in face-to-face and online learning and of the rate at which online learning has grown due to the COVID-19 pandemic. Instructional strategies in online environments, particularly those in asynchronous and synchronous settings, continue to evolve as this relatively new mode of instruction matures. The studies reviewed included more postsecondary settings than K–12; however, lessons learned from research in postsecondary settings may provide a preliminary framework for critically examining online interface considerations and instructional designs at the K–12 level.

Connecting learner variability and accessibility in both learning environments is a summary of learning theory, instructional design theory, and online instructional design processes. Reviewed next is the 21st-century teaching and learning environment to establish a background of previous research on integrating technology into instructional

practices and on the professional development provided to educators. The UDL framework is expanded upon to establish an understanding of the framework of this study, and lastly, the learning theory of the study, andragogy, is expounded upon to frame the efforts of this study. Each section provides a summary and justification of the educational literature relevant to the research topic. This chapter lays a foundation for examining the skills and knowledge needed for educators to design accessible courses in the remote or socially distanced, in-building learning environment.

The sources for the literature review were acquired by searching scholarly journals, peer-reviewed articles, and dissertations on UDL, educational technology, integration of instructional technology, professional development, distance learning, online learning, and virtual learning. The following are keywords the researcher used for an electronic literature search in the library database provided by Baylor University: *universal design for learning, universal design for learning and technology, universal design for learning implementation, instructional technology instructional models, implementation and deployment of technology, professional development for universal design for learning, professional learning communities and universal design for learning, online and distance learning implementation, online learning technology, and virtual schools and schooling*. The resulting research was quantitative and qualitative in design. Most of the references reviewed were published in the last 10 years. Earlier research was included to provide historical context regarding the evolution of teaching and learning practices through policy and legislation. Historical knowledge is critical to the use of technology in instructional practices; therefore, literature was included that addressed instructional technology policy, practices, pedagogy, and professional development.

Generally, the research demonstrated that UDL is underutilized in K–12, particularly so with the use of instructional technology because it is typically a model associated with assistive technology (Blackhurst, 2005; Cortiella, 2008; Hitchcock & Stahl, 2003; Messinger-Willman & Marino, 2010; Pisha & Coyne, 2001; Rose, Hasselburg, et al., 2005; Samuels, 2009; Wehmeyer et al., 2002). UDL is often improperly implemented due to a lack of fidelity in implementation and instructional support from leadership, trust in the policy or legislation, and educator efficacy (Berquist, 2017; Spooner et al., 2007; Werts et al., 2014;). Thus, the literature's significant gap was how the UDL framework has impacted the 21st-century teaching and learning environment in online and traditional classroom settings. Specifically, the types of UDL professional development, implementation, and support for educators were in question because its use may impact educators' self-efficacy in pandemic teaching and learning environments.

Accessibility in Instructional Design

Laws, Guidelines, and Expectations in the United States

In the United States, a significant change has occurred in education laws and systems for learners with varying abilities and needs. When responding to the legal and ethical requirements of providing a free and appropriate public education for all students, special education law has historically and intrinsically been a foundational driver for personalized instruction and technology, focusing on specialized learning options and assistive technology (Evergreen Education Group, 2014). Before 1975, little effort was made to meet the needs of learners with disabilities within general education, and most

programs followed a separate but equal model (Dalton & Brand, 2012). In 1983, the U.S. Department of Education (ED) National Commission of Excellence in Education published the report *A Nation at Risk: The Imperative for Educational Reform*. The report detailed the American educational system's need to require improvement in four areas: curriculum, expectations, time, and teaching (Topps, 2008). The ED (1983) defined excellence around interrelated concepts and called for educational reform because members identified education indicators that threatened America's global competition. In response to the report, President Bill Clinton signed the Goals 2000: Educate America Act of 1994 to improve teaching and learning practices through national education reform (ED, 1994). Goals 2000 represented an effort to restore the American public school system to its standing as an excellent world model by creating a fundamental teaching and learning goal of enabling educators to use technology as an instructional tool to enhance the learning environment (ED, 1994).

Opening the door to increased information accessibility and developments in technology played a significant role in increasing learners' access to the general curriculum. During the era of *A Nation at Risk*, microcomputers were introduced to classrooms, and standards for teaching and learning for technology developed with an aim of preparing globally competitive students (Alessi & Trollip, 2000). Apple Classrooms of Tomorrow partnered with universities and public schools to help educators integrate technology into teaching and learning (Baker et al., 1990). Wyer (1994) noted that educators were optimistic that technology would support educational systems reform in the United States. Nevertheless, advancements and partnerships in education with

technology was not the only hopeful solution, and the desire to further provide access to the general education curriculum for students with disabilities grew.

The U.S. Congress reauthorized the Individuals with Disabilities Education Act (IDEA) in 1997, citing, "Over 20 years of research and experience has demonstrated that the education of students with disabilities can be made more effective by having high expectations for such children and ensuring their access in the general curriculum" (IDEA, 2004, Section 1400). Passage of the IDEA served as a significant moment in education for students with disabilities, special education services, stakeholders, and service providers for their success in the public education system because of specific provisions such as eligibility for services, the individualized education program, free and appropriate public education, procedural safeguards, and the least restrictive environment. Though many states responded to the report with legislation and methods of accountability, Topps (2008) noted it may have been the foundational work for the No Child Left Behind Act (NCLB).

In 2001, Congress passed NCLB, which required all children to attain proficiency on state achievement standards and assessments. NCLB reinforced state efforts to impose accountability for educational achievement to improve educational services (Karger, 2005). Common teaching and learning practices were not sufficient for many students who became a primary focus of school improvement efforts because such legislative and policy efforts increasingly required teachers to make the curriculum accessible and monitor students' progress (Hitchcock et al., 2002; Karger, 2005). These legislative changes contributed to a fundamental shift in making education accessible to all learners; however, providing students with disabilities access to general education programs does

not ensure complete success or guarantee comparable outcomes (Artiles, 2003). Seitz (2007) described the NCLB reforms as centered on high stakes testing as an indicator of improvement. Many educators felt ill-equipped to appropriately address all students' needs to prepare them for higher standards and expectations laid out by the state and nation (Schumm & Vaughn, 1995). High stakes testing and educational standards made it more difficult for students with special needs to function adequately within general education settings.

IDEA (2004) extended the concepts of the least restrictive environment and the individualized education plan by explicitly stating that to the "maximum extent appropriate, children with disabilities, including children in public or private institutions or care facilities, are educated with children who are nondisabled" (Section 300.114). With the reauthorization of the IDEA, the focus and intent shifted to requiring schools to achieve yearly progress by focusing on under-achieving students' improved achievement. The expected impact of NCLB and the lack of technology application in K–12 schools necessitated the development of The National Education Technology Plan by the ED (2004, 2010, 2016, 2017). The lack of technology integration was not due to insufficient funding but to a lack of adequate training and understanding of how technology can enrich the teaching and learning process (ED, 2004). In its National Education Technology Plan, the ED (2004) outlined seven significant action steps and recommendations focused on leadership, budgets, teacher training, e-learning, broadband access, digital content, and integrated data systems. The first and most crucial was to strengthen leadership. The ED specifically recommended the following five concepts:

1. Invest in leadership development programs to create a new generation of tech-savvy leaders at every level.
2. Retool administrator education programs to provide training in technology decision making and organizational change.
3. Develop partnerships between schools, higher education, and the community.
4. Encourage creative technology partnerships with the business community.
5. Empower students to participate in the planning process (p. 39).

These concepts aligned with the earlier reports proposing the whole school system must be involved in innovation to do well in the 21st century. In sum, the NCLB Act and the IDEA showcased a need for a research-based practice with the curriculum's fundamental components, and The ED (2010) provided a possible method to a solution. Learning models existed in which all learners' needs were addressed through innovative, appropriate instructional design of the general education curriculum as cited in Coyne et al. (2004) and Edyburn (2010). Nevertheless, education reform for the future of learning remained stagnant.

The Higher Education Opportunity Act of 2008 included the first definition of the UDL framework; to make curricula more inclusive and provide instructional goals, methods, materials, and assessments that work for everyone. This first statutory definition promoted the development, selection, and evaluation of instructional materials and resources for accessibility and equity of the learning experience using the UDL framework as a guide. The framework was also promoted as guidance to vendors and third-party technology developers in interactions with the state, district, and higher education institutions about accessibility decisions made to support all students. Most

recently, the Every Student Succeeds Act (ESSA) urged states to adopt UDL in several areas. Specifically, as it pertains to this study, ESSA required schools to use technology consistent with the principles of UDL to support all students' learning needs (ESSA, 2015, Section 4104). The Higher Education Opportunity Act and ESSA allowed educators to intentionally connect technology with instructional design in their face-to-face and online distance learning environments to ensure accessibility.

Challenges and Opportunities for Accessibility

In general terms, accessibility involves an individual's ability to obtain and use something. Seale (2006) described accessibility as determined by the flexibility of the learning environment to adjust to the needs of all learners with flexibility related to presentation, control methods, access modality, learner support, and the availability of alternative but equivalent content and activities (p. 19). Seale's (2006) social model applied to this research because it is not the learner who needs to adjust for access to face-to-face or distance instruction to occur. Rather, the learning environment should be transformed to meet learner variability with the creation and maintenance of the accessible face-to-face and online learning environments that are vital for students to succeed in the 21st century.

In its National Education Technology Plan, the ED (2010, 2016, 2017) strongly endorsed UDL, and CAST (2018) created a UDL exemplar of the National Educational Technology Plan (2010) to demonstrate the power of UDL principles applied in a digital format. The National Education Technology Plan, ESSA (2015), and the Higher Education Opportunity Act (2008) mandated accessibility to course materials, regardless

of delivery mode. As Edyburn (2010) explained, accessibility within a learning environment creates equality for all learners.

Additionally, some researchers have argued that providing an accessible learning environment is the ethical thing to do (Edyburn, 2010; Lin, 2007; Moore & Kearsley, 2005). Moore and Kearsley (2005) and Lin (2007) argued that making learning environments accessible is ethically and socially sound. Furthermore, Lin (2007) used empirical data regarding ethical issues to emphasize the importance of accessibility, pointing out that the overarching idea was that providing access to education is the moral and lawful thing to do, not just for those with disabilities, but for society as a whole. As more learning opportunities move online because of COVID-19, a lack of accessibility can and will impact student learning opportunities and become a societal issue. As schools aim to provide equitable and accessible online schooling, UDL could provide ways of approaching challenging questions concerning accessibility.

The concept of UDL involves the educators' efforts to incorporate accessibility within their instructional pacing of a course so that all students benefit. Understanding and implementing UDL can and should be part of the professional development available to educators, administrators, and education support professionals in all instructional contexts. UDL offers a curriculum planning framework that supports inclusivity and addresses all learners' needs in any instructional setting, including face-to-face and online learning environments. Before detailing more about the UDL framework, it is essential to review the learning and instructional design theory that led to this model outside of legislation.

K–12 Distance Schooling in the United States

Brief History

Advancements in technology have provided new methods for engaging online learners. In the mid-19th century, distance learning took a recognizable form where learning materials, assignments, and feedback were transmitted via the U.S. postal system (Holmberg, 2005; Keegan, 1996). As the world wide web and web-based LMSs became interactive in the 1990s and early 2000s, technology use began to show potential for high-quality content and interaction aligned with Moore's (1989) recommendations. Moore (1989) postulated that distance is a matter of psychology, and although the physical range increases in distance learning, its effect can be decreased. Moore (1989) explained the interchange within a distance learning context has three characteristics from three learner interactions: learner-to-content (i.e., course material and delivery mode of learning objectives and students), learner-to-instructor (i.e., types of communication, feedback, access, and support), and learner-to-learner (i.e., types of communication, feedback, support systems, and procedures for discussion). As the government, educational researchers, and society-at-large began to see the potential of greater access and opportunity for learners, the development of models of distance education that primarily relied on web-based online learning gained traction in education (Fouts, 2000; Kerrey & Isakson, 2000; Kozma et al., 1998). Specifically, the ED (2017) noted that schools in the United States must use technology to develop and implement learning resources that allow students full access to learning materials anytime and anywhere. As a result of this policy and market demands, many schools and districts have emphasized various ways of incorporating online learning to educate K–12 students with options like

an LMS or a web conferencing platform. With the COVID-19 pandemic, K–12 school districts deployed online learning models with this technology evolution in mind.

There are two primary modes of K–12 distance and online course delivery: synchronous and asynchronous. Synchronous instruction provides educators the opportunity to interact in real time, and asynchronous instruction allows educators to reach students during a predetermined period (Archambault & Crippen, 2009). For example, in asynchronous learning, educators present students with an online lesson where students must complete and post responses on a virtual platform over a designated period of time. Hybrid models of asynchronous and synchronous learning with face-to-face interaction among educators and students are also an option for distance and online learning; however, asynchronous courses are the most prevalent method for delivering online instruction (Seltzer & Lewis, 2005). Therefore, during the pandemic, the educational community was required to provide a high-quality education that addressed all students' needs in the asynchronous or synchronous online learning environment. As school districts looked to mainstream asynchronous or synchronous remote learning plans, many considered which online programs and schooling were already in place in other areas of the country to inform the next steps.

Synchronous Versus Asynchronous Learning Environments

Online tools used to create a face-to-face experience in virtual space are what schools turned to amid the COVID-19 pandemic for communication and instruction (Baily, 2020; Lieberman, 2020; World Bank, 2020). The communication tools provided choices for learners and educators to make during class. These choices determined the value of the learning experience and, in many cases, the success of students' learning

outcomes. The two communication models in online schools during the COVID-19 pandemic were synchronous and asynchronous learning. In other words, the options involved real-time access to instruction or access apart from a designated time and place.

According to the research, asynchronous discussion allowed for more task-oriented outcomes, and synchronous instruction allowed for more social outcomes (Borup et al., 2012; Cook et al., 2011; Hou & Wu, 2011; Im & Lee, 2003). For example, Im and Lee (2003) and Borup et al. (2011) conducted postsecondary studies demonstrating how synchronous discussions could promote social interactions among students, helping them to establish a social presence. Researchers in both studies concluded that asynchronous discussion allowed for more task-oriented outcomes. While Hou and Wu (2011) and Cook et al. (2011) found participants in synchronous instruction with text chats and small groups created social interactions, and students perceived these interactions as more interactive and supportive than those in asynchronous learning environments. Furthermore, Hwang and Yang (2008) conducted a study examining synchronous discussion among sixth-grade students and analyzed a mechanism that allowed educators to provide instant feedback. The results demonstrated that teachers could positively affect student responses in both the affective and cognitive domains using online chat discussions. This difference in findings was essential because Texas ISD followed a synchronous online and in-building schedule to deliver instruction.

Overall, the advancement of technological devices and the internet and the use of learning management systems have together allowed distance education to evolve into a viable option for instruction in two different types of environments: synchronous and asynchronous. Research has shown synchronous communications have spontaneity and

social presence, whereas asynchronous communications require more time and less social interaction, which suggested deeper interactions with the subject matter (Borup et al., 2011; Cook et al., 2011; Hou & Wu, 2011; Im & Lee, 2003). As schools chose between the asynchronous or synchronous delivery of online instruction, these two modes of delivery were discussed at length with district leadership to ensure a robust learning opportunity. For this study, Texas ISD chose to conduct remote synchronous learning for the first 3 weeks of instruction and later transition to synchronous remote and socially distanced in-building instruction, called blended learning, as their primary K–12 instructional model.

Contextualizing Online Learning Environments for K–12 Students

From 2000 to 2010, K–12 researchers sought to understand the comparative effectiveness of online and face-to-face learning methods (Cavanaugh, 2001; Cavanaugh et al., 2004; Means et al., 2010). Cavanaugh’s (2001) investigation of 19 studies from 1986–1997 found a small positive effect in favor of distance education (0.147). This significant finding meant interactive online learning techniques were not more effective than traditional approaches and that educators could expect results comparable to conventional instruction (Cavanaugh, 2001). Cavanaugh et al. (2004) also found online education did not outperform or underperform in-person instruction and that some factors, such as the mode of the distance program or instructional variables, did not generate a statistically significant impact on learning (pp. 19–20). To support the narrative and findings on the ongoing discussion of learning environments, Rice (2006) conducted one of the first comprehensive literature reviews to summarize the evidence on instructional and environmental considerations in creating effective K–12 online learning

experiences. The researcher identified three significant areas as significant in the existing research: the affective domains, learner supports, and learner characteristics.

Affective learning domains involved the students' sense of connectedness through interaction and engagement in learning. Learner supports included instructional and technical support, a sense of community, the design of the learning environment, and learner characteristics, including understanding and addressing learning styles, self-esteem, beliefs, and demographics. While the category of learner characteristics is problematic for its inclusion of learning styles (Willingham et al., 2015), Roblyer et al. (2008) identified similar areas of focus and suggested the overarching categories of learner characteristics and studies of the features of learning environments. Learning environments included teacher–student and student–student interactions in the learning experience design, and the characteristics are markers for current K–12 online learning research (Pourreau, 2015). These takeaways were essential because these characteristics are associated with the types of learning that occur online and should be considered when designing instruction for any environment.

The K–12 teaching objectives guiding instruction in any learning environment include academic and social outcomes. These objectives reflect the TEA standards. The standards, better known as the TEKS, stipulated all learning environments should allow students to master the academic standards. Students should also be able to comprehend and critique evidence, use technology and digital media, and come to understand other perspectives and cultures (TEA, 2017). With the demands of the TEKS in mind, students in rural areas, families who travel for work or military obligations, families with ethnic or religious practices that interfere with the typical school day, and students who have failed

in traditional schools make choices to use online schools (Watson et al., 2011). The ED's meta-analytic Evaluation of Evidence-Based Practices in Online Learning (Means et al., 2010) suggested better outcomes for online and blended approaches over face-to-face approaches. However, Means et al. (2010) cautioned about interpreting these results to preference online over blended or vice versa. As more families choose online delivery of instruction during the pandemic and beyond, it is essential researchers determine the effectiveness of the online instructional practices currently used to deliver online education and support for success at home.

Current research indicated factors that determine high school students' success in online schools include motivation, technology proficiency, and the home study environment, and student interest in technology predicts success in an online learning environment (Barbour, Siko, et al., 2012; Robinson & Sebba, 2010). Robinson and Sebba (2010) conducted case studies of 10 personalized learning situations in primary to postsecondary schools using technology. The researchers determined that access and decisions to introduce technology that supported learning was essential to online learning growth and found that personalized learning using digital technologies was rare if a standard structure did not exist. The teachers in the study possessed high-quality technology skills and allowed students to be actively involved in deciding what and how to learn. Therefore, student interest in technology predicted online success.

Additionally, when teachers allow students to be actively involved in learning decisions, younger students experience increased success. Therefore, online learning environments link positive outcomes and experiences with student self-regulatory behaviors because more responsibility is placed on the students to organize and direct

their learning (Kirby et al., 2012; Regan et al., 2012). Online learning environments link positive outcomes and experiences with student self-regulatory behaviors because more responsibility is placed on the students to organize and direct their learning (Kirby et al., 2012; Regan et al., 2012). However, Coy et al. (2013) warned these conclusions warrant additional study.

In sum, consistent findings identified in this section, combined with the UDL framework, supported the notion that online learning environments should be included in future research on how to best address learner variability. This section identified potentially effective educational practices and digital tools that could be utilized using synchronous and asynchronous delivery methods in supported online educational settings. These areas should provide a foundation for future research in online learning classrooms for students with and without special education needs. Online lesson investigations should be contextualized in authentic instructional frameworks.

Anastasiades et al. (2010) noted that synchronous learning could support collaborative learning activities and strengthen social relationships among participating students. Teachers creating and delivering synchronous lessons should consider incorporating evidence-based instructional practices adapted from brick-and-mortar environments. This point contradicted the notion that online learning environments are a completely new educational space, and instructional design should be different from traditional settings. However, several researchers (e.g., Bower & Hedbert, 2010; Hwang & Yang, 2008) noted that student interaction and collaboration could occur effectively online. These potential benefits could extend to all students learning outside of the traditional school who may be more geographically isolated due to COVID-19. All of the

options mentioned for online learning were considered at Texas ISD, and yet, there were some unknown challenges and benefits leading into their first year of pandemic teaching and learning.

Challenges and Benefits of Online Learning

Online learning provides benefits and opportunities to K–12 school districts, teachers, and students (Barbour, McLaren, et al., 2012; Kim et al., 2012; McQuiggan, 2012; Rice, 2006). Research supported that online learning can benefit teaching and learning and may positively influence the development of information and communication technologies in the physical classroom and expand 21st-century skills (McQuiggan, 2012; Rice, 2012). McQuiggan (2012) found that when teachers transition to online teaching, their perspectives evolve from teacher-centered practices to student-centered practices and that teachers rely less on lecture-focused lessons and increase their use of student interaction and differentiation. McQuiggan (2012) concluded that virtual education requires online teachers to transform their teaching practices and challenges educators to view education from a new perspective. Rice (2012) noted the online K–12 educator also evolves to establish clear expectations for ongoing parent contact, protocols for communication and feedback, and clear expectations for the online course's accessibility, pace, and integrity.

Before the pandemic, research showed that virtual schools are appealing as they provide students with flexibility, time, and personal space while they complete coursework and earn high school credits (Kim et al., 2012). They also provide students with opportunities to access curricula and courses that may not be available at their home campuses or districts. However, not all students come prepared for the online learning

environment. Kim et al. (2012) surveyed newly enrolled students in an online public charter school. The authors examined why students chose an online charter school as well as their perceptions of online discussions. They found nearly half of students surveyed did not find online discussions beneficial and that students who were successful within an online environment were highly motivated, goal oriented, and enjoyed interacting with groups in an online forum. Kim et al. (2012) concluded that students' success in online programs might be partly dependent on their disposition toward self-regulation. The need for self-regulation was also evident in a secondary study by Barbour, McLaren, et al. (2012) of student perceptions regarding learning support within an online environment. The researchers found that students enjoyed the autonomy and ownership of the online learning environment. The students in the study also indicated they enjoyed synchronous classes because they allowed interactions with students in their local communities.

In contrast, Barbour, McLaren et al. (2012) found that students reported engaging in off-task behaviors within asynchronous classes, including emailing, playing games, or texting. While this reflected a lack of self-regulation, similar to the study by Kim et al. (2012), the authors concluded that students engaged in these behaviors because the course content lacked the engaging qualities needed to keep students on task. Thus, student engagement and self-regulation is a consistent barrier in the online learning environment.

One of the biggest challenges to successful online learning is equitable access to technology and the internet. When states mandate online courses for K–12 students, as many states did for the 2019–2020 school year because of COVID-19, provisions for computers, internet access, and supervision fall on schools. By requiring an online

learning environment, the school or district must provide the means to meet this requirement for students who do not have the resources, such as a computer or internet access, outside of school. A reduction in funding, however, has impacted the ability to monitor and supervise online programs. Students with limited access to computers and internet outside of school may not have the same literacy skills with information and communication technologies as their advantaged peers who utilize and explore technology in and outside of school (Angus et al., 2004; Lindsey & Poindexter, 2003; National Education Association, 2003). There was debate over whether online instruction is fulfilling its potential in providing the benefits for school districts and online learners; however, the Texas ISD in this study did not have this barrier because the school district already maintained a one-to-one technology environment.

In sum, if students have access to technology and other resources needed to participate in an online learning environment, research has found that online learning can increase access to equitable learning. However, virtual education may also create barriers and challenges for traditional schools and students. Despite the groundwork in framing research areas, relatively little research has been conducted on the factors that affect K–12 learning success online (Barbour, 2015). Referencing the comments made by Rice (2006) on this topic, Barbour (2017) expressed the current state of the field by saying, "A full decade later . . . practice continues to outpace the availability of useful research" (p. 2). However, a consensus has emerged around its effectiveness regarding online learning's comparative effectiveness (Means et al., 2010). Therefore, questions centered around which learning conditions best met the needs of increasingly diverse online learning populations, and during pandemic teaching, this is pivotal for understanding how

students access a robust online schooling structure so that learner variability does not impede education.

Learning Theory

The study of how people learn began over 2 centuries ago, and the pursuit of this knowledge continues today. According to Driscoll (2005), the study of learning was considered a justifiable area of psychology by the late 1800s. Since then, many researchers have provided theories about how learning occurs. As Burgstahler (2011) explained, learner diversity comprises physical, visual, hearing, sensory, attention, and communication impairments. Therefore, direct teaching based on a one-size-fits-all approach cannot successfully accommodate all learners, and two theories in this section showcase this train of thought. In one, Gardner (1993) postulated that individuals have their preferred style of learning or strengths in particular types of intelligence. In the other, Kirschner (2002) outlined cognitive load theory, which involves the limitations of working memory capacity and the measures taken to promote learning through the construction of schemata to impose only manageable levels of cognitive load.

Learning Styles Theory

Multiple learning styles theory is one example of the learning theories that have evolved over time in education. In learning styles theory, it is suggested that learning content and pathways should be tailored to learner preferences. This theory has attracted educational psychologists and instructional designers in the field of education such as Akbulut and Cardak (2012), Al-Azawei, Serenelli et al. (2016), and Truong (2015). Learning styles theory has been integrated into adaptive educational hypermedia systems

to respond to student learning styles in the classroom setting (Akbulut & Cardak, 2012; Truong, 2015). Some researchers have pointed out that the pedagogical implications of these frameworks are not accepted universally (Akbulut & Cardak, 2012; Al-Azawei, Al-Bermani, et al., 2016; Mayer, 2011). Several concerns emerged from the critique of learning styles theory. Graf (2013) noted there is no clear definition of the different styles among psychologists and educationalists, and according to Felder (1996), the idea of learning styles suggests there are characteristic strengths and preferences in the way learners take in and process information. This thought interlocks the concepts of cognitive styles and learning approaches (Al-Azawei & Badii, 2014; Al-Azawei, Serenelli et al., 2016; Graf, 2013).

Presenting instructional materials according to learner preferences is not necessarily the best instructional choice. For example, presenting only written or audio materials for verbal learners has been shown to reduce content effectiveness due to the relationship between instructional materials and the presented instructional content's nature. Other debates existed concerning the absence of accurate measurement to identify a person's learning style, and the lack of empirical research confirms the significance of this implication (Al-Azawei & Lundqvist, 2014; Mayer, 2011; Pashler et al., 2009). Considering these shortcomings, Pashler et al. (2009) concluded there is no adequate evidence base to incorporate learning style assessments into educational practices. In summary, these studies showed contradictory findings regarding the implications of learning styles on different learning aspects such as achievement, satisfaction, engagement, and learning time.

Cognitive Load Theory

Paas et al. (2003) explained that cognitive load theory provides an investigative framework into cognitive processes and instructional design. Cognitive load theory (see Figure 2.1) is critical for online learning environments because it combines multimedia elements that make the learning process less efficient and less effective. Cognitive load theorists stress the importance of assessing each of three cognitive load factors as a part of the design process: intrinsic or content, extraneous or presentation, and germane or relevant (Paas et al., 2003).

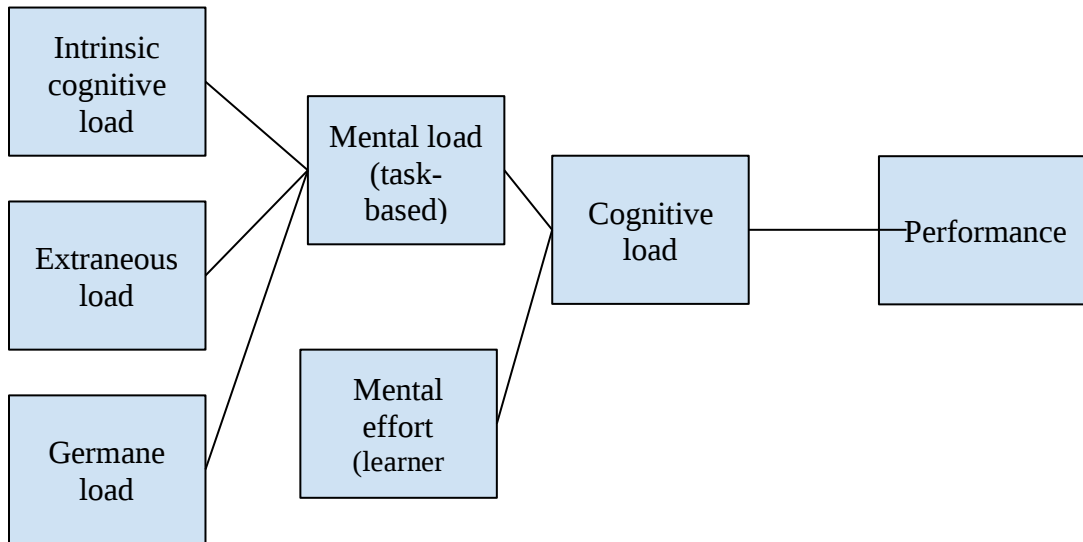


Figure 2.1. Graphic Description of Cognitive Load Theory. Adapted from *Principles of Universal Design for Learning: What is the Value of UDL Training On Accessible Technology?* [Doctoral dissertation, Cappella University], by C. Poore-Pariseau, 2011. ResearchGate.

As shown in Figure 2.1, the three cognitive load factors are additive and equal in total cognitive load, and this process can affect performance in online learning environments. All of the components highlighted in Figure 2.1 explained the impact on performance. Claxton and Murrell (1988) noted that possessing a working knowledge of

learning theory is essential for those involved in online course design because information about learning styles can help educators become more sensitive to the diversity students bring to the learning environment. Claxton and Murrell (1988) further explained that such understanding can serve as a guide in designing learning experiences that match or mismatch students' styles, and some studies show that identifying a student's style and then providing instruction consistent with that style contributes to more effective learning. Consideration of cognitive load in the instructional design process results in a course design that is different from one designed initially. Therefore, the schema is first established and then built upon, making the learning process more efficient, regardless of the learner's abilities, learning style, or particular areas of primary intelligence.

People learn in a variety of ways, have preferred learning styles and strengths in certain areas of intelligence, utilize brain networks in different ways, and operate within the bounds of cognitive load limitations. Consequently, those charged with designing effective instruction are challenged to meet the needs of all learners (Claxton & Murrell, 1988; Paas et al., 2003; Poore-Pariseau, 2011). With this in mind, the Texas ISD believed the UDL framework could support the challenge of meeting students' needs in designing learning experiences.

Instructional Design Theory

Knowledge of learning theory is not enough to design an accessible online course because not all aspects of the brain are engaged, represented, and expressed (CAST, 2009). A teacher-centered model of direct instruction focuses on a one-way flow of information and outcomes and behaviors that result from such instruction, and at the

time, this was acceptable (Driscoll, 2005). This teacher-centered model prepared students to succeed in areas requiring limited critical thinking skills that became less effective in the 21st century's highly complex world.

Reigeluth (2005) explained that instructional theory has changed dramatically in response to awareness of different learning needs in education and training environments and advances in knowledge about the human brain and learning theory. Educational philosophies, beliefs, and advances in information technologies have made new instruction methods possible and necessary. For example, in a study conducted by Cleveland-Innes et al. (2007) about the adjustments students make when shifting from the traditional setting to online learning, the researchers noted changes were not a matter of learners feeling comfortable in the new environment. Online learning has significant learning implications that require educators to extend beyond the subject area to understand how to use technology effectively. Students no longer have a passive role in learning and must receive guidance from their instructors regarding how to make this adjustment so they can stay motivated and continue to learn (Yang & Cornelious, 2005).

The U.S. educational landscape has become more diverse, so educators can no longer assume they will be teaching homogenous groups of students from similar social backgrounds. Instructional design theories that do not account for the growing heterogeneous nature of student bodies may result in instructional design processes that fall short of adequately addressing students with varying backgrounds, learning styles, learning needs, and preferences (Driscoll, 2005; Reigeluth, 2005; Sims, 2008; Yang & Cornelious, 2005). These are all concerns that must be taken into account when

considering instructional design theories and processes in the remote and traditional instructional settings.

Instructional Design Process

Muilenburg and Berge (2005) conducted an exploratory factor analysis study to learn about student barriers to online learning. They found eight factors to be significant: (a) administrative issues, (b) social interaction, (c) academic skills, d) technical skills, (e) learner motivation, (f) time and support for studies, (g) cost and access to the internet, and (h) technical problems (p. 29). Each of these factors may be exacerbated by the presence of an impairment that influences learning, so educators who design instruction must be aware of their impact on accessibility and be prepared to work through the issues to provide students with positive and effective online learning experiences. The instructional design process involves questions about how instruction should be implemented (Morrison et al., 2007). The intentional development of instruction begins with identifying whether or not the instruction is the most appropriate solution to a given problem and includes consideration of instruction from the learner's perspective (Morrison et al., 2007). To support the process, Morrison et al. (2007) suggested that educators consider the following questions at the outset of instructions design:

1. What level of readiness do individual students need to accomplish the objectives?
2. What are instructional strategies most appropriate in terms of objectives and learner characteristics?
3. What technology or other resources are most suitable?
4. What is the necessary support for successful learning?

5. How is the achievement of the objectives measured?
6. What revisions are necessary if a trial run of the program does not match expectations (p. 6)?

These questions are essential for an educator to consider, regardless of the instructional setting. If teachers accept students who have strengths, weaknesses, or intelligence in different areas, instruction addressing this range can be designed (Poore-Pariseau, 2011). In particular, for this study, a design that accounted for the need to create accessible online courses that addressed learner variability was explored.

Designing Effective Online Instruction

Without a strong research base on the effectiveness of online environments and instructional practices, providers of online education have often turned to the National Standards for Quality in Online Courses developed by the International Association of Online Learning to guide course and program development (Barbour et al., 2014). The National Standards for Quality in Online Courses developed by the International Association for K–12 Online Learning (2011) identified five key design areas:

1. Content. The course provides online learners with multiple ways of engaging with learning experiences that promote their mastery of content and are aligned with state or national content standards.
2. Instructional design. The course is run using learning activities that engage students in active learning and provide students with multiple learning paths to master; the content is based on student needs and provides ample opportunities for interaction and communication (i.e., student-to-student, student-to-instructor, and instructor-to-student).

3. Student assessment. The course uses multiple strategies and activities to assess student readiness for and progress in course content and provides opportunities for students to receive feedback on their progress.
4. Technology. The course takes full advantage of various technological tools, has a user-friendly interface, and meets accessibility standards for interoperability and access for learners with special needs.
5. Course evaluation and support. The course is evaluated regularly for effectiveness using various assessment strategies, and the findings are used as a basis for improvement. The course is kept up to date, both in content and in applying new research on course design and technologies (International Association of K–12 Online Learning, 2011, pp. 8–18).

However, the content validity for numerous elements in the National Standards rubric may be questionable because the literature supporting the K–12 rubrics is limited.

Adelstein and Barbour (2016) revealed the lack of K–12 online course design research, and this required the authors to supplement the K–12 literature with studies that included participants in higher education. Shattuck (2015b) also noted that as the field continues to develop, efforts to bridge the gap between using and understanding adult learning models to address a population with different learning needs. However, additional research on designing effective K–12 online programs remained unclear as best practices were informed by higher education research. Overall, Adelstein and Barbour (2016) and Shattuck (2015b) showed that designing online learning courses takes different skills from those necessary for designing in-building courses. For example, traditional face-to-face education is a teacher-centered design model, whereas

the format for online learning is student centered (Yang & Cornelious, 2005). Yang and Cornelius (2005) observed that faculty members are often lecturers who disseminate information for students to reflect upon. In contrast, online instruction often involves allowing students to become a community of learners who collaborate to develop a personal understanding of course content. To support this level of engagement, educators must know how to set up their courses to effectively encourage collaboration among a diverse group of students.

Additional challenges faced when designing online instruction are understanding how to effectively implement appropriate technology and guiding students to utilize the technology in a way that promotes learning. Changing from synchronous to asynchronous classroom discussions is one significant difference between online and face-to-face learning. The Wu and Hiltz (2004) study of 116 students enrolled in hybrid courses found online discussions improved perceived student learning outcomes. However, facilitating discussion in face-to-face classrooms is different from doing so in an online learning environment (Yang & Cornelius, 2005). Online environments allow all students to participate in discussions; however, an abundance of information and the change of format from synchronous to asynchronous may lead to information overload.

Students may also need assistance from teachers while discovering how to move an asynchronous discussion forward in a scholarly fashion and overall assistance concerning how to adjust to the technology and a new mode of learning. In a study conducted by Cleveland-Innes et al. (2007) on the adjustments learners must make when moving from the traditional on-ground classroom to an online environment, the researchers noted adjustments were not merely a matter of students feeling comfortable in

the new environment. Students no longer have a passive role in learning and must receive guidance from their instructors regarding how to adjustment, move their learning processes forward, and stay motivated (Yang & Cornelius, 2005). Additional barriers were revealed in research in the online environment. For example, Novak and Thibodeau (2016) adapted the findings of Irvin et al. (2010) and Bork and Rucks-Ahidiana (2013) to explain other types of barriers that exist in an online learning environment:

1. Academic barriers, such as lack of student time, lack of executive function, lack of content preparation.
2. Cultural barriers such as lack of understanding about the value of distance education and faculty's lack of readiness to communicate cultural sensitivity.
3. Financial barriers such as inadequate internet access and availability of computers and necessary programs.
4. Technology barriers such as infrastructure, equipment problems and maintenance, and student computer skills.
5. Instructional barriers such as faculty training, readiness to meet the needs of all learners, time, technical expertise, and design of course.
6. Institutional barriers such as availability of courses and student support services (p. 7).

With the move to online environments, teachers must master, design, and deliver strategies and methods for teaching online courses (Yang & Cornelius, 2005). These barriers present hurdles educators must be aware of to ensure accessibility of the curriculum, and they must be prepared to work through the issues to provide students with positive and productive online learning experiences.

For educators teaching online, the type of pedagogy used can differ from face-to-face classes, and the growth of the online platform for classes and programs has increased the need for educators to become comfortable with online teaching platforms and gain the necessary skills to make online teaching a successful practice. Educators who teach in K–12 educational settings have a foundation of knowledge within their discipline, and yet they often do not have an adequate level of knowledge to draw on regarding online course design (Chodock & Dolinger, 2009). A lack of knowledge concerning instructional design can be exacerbated by a lack of understanding of online pedagogy, creating a need for support in gaining knowledge in this area (Sims, 2008). This support and training must include elements necessary to design pedagogically sound instruction plans that increase accessibility and enhance students' learning experiences because of the increasingly diverse makeup of online students.

One place to begin this type of training is by assessing the tools and knowledge teachers possess and need. Izzo et al. (2008) studied 271 college-level faculty members and teaching assistants and found educators wanted more professional development on UDL. They also wanted access to training on an as-needed basis to offer necessary guidance when a student disclosed a disability. This study signaled awareness among faculty members that they lacked some tools and skills needed to design comprehensive and accessible courses. Izzo et al. (2008) also found that teachers who received on-demand, multimodal professional development in UDL practices and assessment reported they were better able to support the learning needs of their students. This was significant because it showed that educators desired more training to grow teaching expertise and not merely to grow technological skills.

Research regarding professional development in the intersection of online learning and accessibility has focused on the course development process and technological aspects, rather than on learning (Hutchins, 2003). In considering how to design instruction in a way that accounts for factors such as accessibility, educators can look to Sims's (2009) proactive design for learning and Sprenger's (2008) discussion about student choice and UDL. Each model portrays instruction from the standpoint that students are a heterogeneous group with individual learning needs, and instruction cannot follow a one-size-fits-all model. Thus, educators who are teaching and designing online instruction should master their subject matter, but they also must understand the legal and technical issues involved in designing accessible courses.

In sum, to design effective, accessible online instruction, teachers must discover students' learning preferences, integrate technology tools, apply appropriate instructional techniques, put them all into practice, and generate the most suitable method of learning (Yang & Cornelius, 2005, p. 6). This was one proposed approach to addressing the challenges of implementing UDL (CAST, 2015), and the study in this dissertation was aimed at adding to the narrative of its use.

UDL Theoretical Framework

Origins

Universal design originated out of the work of architects, engineers, and environmental design researchers who sought to design "products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design" (Center for Universal Design, 2008, p. 2). It has since extended the

design of educational experiences in order to maximize the impact of instruction (Burgstahler, 2011), instructional design (Scott et al., 2003), and learning (Rose & Meyer, 2002). Universally designed educational frameworks vary in degrees in the research of the learning and pedagogical sciences, neuroscience, and cognitive psychology. For example, the National Center on UDL takes the neuropsychological knowledge that our learning brains are composed of recognition networks, strategic networks, and affective networks and maps these to learning principles (National Center on UDL, 2012). CAST (2018) defined UDL as "a framework to improve and optimize teaching and learning for all people based on scientific insights into how humans learn" (p. 2). Essentially, CAST (2015) explained that practitioners of UDL accomplish their aim of universality by building flexibility into learning experiences so that everyone benefits from available options. UDL provides educators with specific principles, guidelines, and checkpoints that support finding learning solutions, which can lead to significant opportunities for students to succeed in any learning environment.

Principles, Guidelines, and Application

Following the principles of its architectural origin and the contributions of Ron Mace concerning UDL, CAST (2008) defined UDL as an instructional concept that allows for the implementation of teaching strategies to meet all learners. As online remote learning options grow due to COVID-19 (TEA, 2020), so does student variability (Archambault, 2011). Novak and Thibodeau (2016) explained that use of UDL will address this concern in any learning environment because "By employing UDL principles and guidelines, we can better reach online learners" (p. 11). The UDL framework is built

upon three principles that lead to a list of strategies or guidelines that help make learning accessible for all learners (CAST, 2018).

UDL offers three primary principles based on neuroscience research to address learner variability, multiple means of representation, multiple means of expression, and multiple means of engagement (Rose, Meyer, et al., 2005).

Novak and Thibodeau (2016) explained:

- Multiple means of engagement provide different ways to engage learners' interests to activate the brain.
- Multiple means of representation provide different ways of presenting materials to activate the brain.
- Multiple means of expression include options for learners to express what they have learned and know to activate the brain (pp. 23–25).

These UDL principles explain how content and information exchange occurs in neuroscience. However, researchers have warned only knowing and examining the UDL principles will not result in a universally designed experience for learners (Edyburn, 2010; Novak & Thibodeau, 2016). Implementing the principles by following UDL guidelines is critical for the learning experience to be successful. To implement the UDL guidelines, the framework provides distinct checkpoints for each principle's guidelines (Novak & Thibodeau, 2016). This creates opportunities for educators to involve students who may not have otherwise participated or put forth their best efforts. Educators have attempted to implement UDL in face-to-face classrooms, and recognized benefits occurred when incorporated at the onset of course design instead of creating ways to accommodate individual learning needs later in a course. However, research involving

UDL in online education was limited. The most recent literature focused more on face-to-face applications of UDL as opposed to online (Coy, 2013; Edyburn, 2010; Xu & Jagers, 2014) though some studies of online applications was present (Anastasiades et al., 2010; Coy, 2013; Ortiz, 2014; Pace & Schwartz, 2008).

To understand UDL in online course design, Finn (2005) measured the effectiveness of an online UDL staff development module and integration with 75 community college online teachers. Finn found that 93% of staff included materials to integrate UDL in their courses after professional learning, and 96% of staff claimed they developed new ideas for lesson design. Finn showed that a change of instruction is possible with the application of UDL online. The Coy (2013) online synchronous environment study demonstrated the capacity to align the UDL framework with content. This finding was consistent with previous research indicating that synchronous learning supports collaborative learning activities (Anastasiades et al., 2010). Coy's (2013) study revealed that teachers were more likely to provide multiple means of representation than the other UDL guidelines and that teacher alignment with the UDL framework varied during individual lessons. Additionally, Ortiz (2014) found that although there was a positive shift in attitudes towards creating accessible online materials using the UDL framework, the content and resources that make up a course were more challenging to implement concerning accessibility. Therefore, comprehensive, accessible online courses continue to lack in some accessibility areas; however, efforts to close the gap have increased (Ortiz, 2014). Though there was little research available on the application of the UDL framework in online learning environments, what was noted was compelling and impactful enough to warrant further exploration given the current pandemic and the

resulting need to implement asynchronous and synchronous online learning environments.

Benefits of UDL in Distance Learning

Online schools and distance learning environments are steeped in technology to allow a symbiotic relationship between the content and UDL features that can address the needs of diverse learners (Anastasiades et al., 2010; Basham et al., 2010; Coy, 2013; Finn, 2005; Ortiz, 2014; Novak & Thibodeau, 2016). Anastasiades et al. (2010) and Coy (2013) noted that synchronous learning could support collaborative learning activities and strengthen social relationships among participating students. Teachers creating and delivering synchronous lessons should consider incorporating evidence-based instructional practices adapted from brick-and-mortar environments. The online synchronous and asynchronous environments examined in these studies demonstrated the capacity to align lessons with the UDL framework.

A UDL-inspired course design positively affects user perceptions and academic performance (Coyne et al., 2004; Kennedy et al., 2014; King-Sears et al., 2015). Coyne et al. (2004) illustrated that successful implementation of UDL can promote the reading comprehension of learners with significant intellectual disabilities. As indicated by Kennedy et al. (2014), UDL adoption is useful for student performance with particular disabilities. King-Sears et al. (2015) did not find a significant difference in academic achievement between control and experimental groups, but results did support the positive influence of UDL on learner perceptions. Similarly, a curriculum-based UDL integration promoted learner engagement, satisfaction, and self-efficacy (King-Sears et al., 2015). Utilizing UDL through online courses can decrease learner concerns and

anxiety and promote perceived satisfaction, and designing courses with UDL principles can positively affect learning flexibility and success, reduce learning stress, and enhance learners' social presence (Kumar & Wideman, 2014). Furthermore, the specialized programs on UDL instructional design techniques helped educators adapt their teaching strategies to fit all learners, practice their individual teaching experience in diverse ways, and transform their teaching styles for a broad mix of students.

Courey et al. (2012) highlighted how teachers greatly benefited from UDL-based training programs to design and improve instructional content accessibility. Some research supported the positive effect of UDL implementation on both educators and students (Hall et al., 2015; Kumar & Wideman, 2014). Kumar and Wideman's (2014) study highlighted how UDL-based course design could promote educator engagement and reduce workload because UDL can lead students to practice a learner-centered approach rather than relying solely on the traditional teacher-centered method. The researchers found that for educators to better understand how technology improves content accessibility in online education can be evident when using UDL in course design because its use creates awareness of what UDL is and how it can benefit all learners (Kumar & Wideman, 2014).

Introduced in this study are fundamental concepts of UDL through an online UDL professional learning experience where participants agree to use at least one application of UDL while simultaneously receiving supplemental support with UDL course design through PLCs. Xu and Jaggars (2014) and Novak and Thibodeau (2016) noted that faculty need ongoing support in designing courses for online delivery. Novak and Thibodeau (2016) continued by explaining that all educational institutions should provide

proper support in course design, and many do not. They argued: "This creates a barrier for the instructors who are tasked with teaching students how to learn when they have not been taught to teach or learn in online environments" (p. 37). Understanding the support in place for educators when learning new instructional practices through professional development or professional learning is discussed further.

Professional Development for Distance and Online Learning

In most K–12 districts nationwide, professional learning has focused on instructional practices for the face-to-face, traditional setting. The skills required for teaching in an online setting are different from those needed to teach in a physical classroom because online students are separated by time and space (Storandt et al., 2012). In this environment, educators get coursework on pedagogy, content, and technology that is typically presented in isolation versus infused content and pedagogy (Archambault, 2011). Online educators must have the ability to (a) hold a social presence, (b) understand online instructional design to engage online learners, (c) foster online communities, and (d) provide prompt, constructive feedback that encourages the online learner (Novak & Thibodeau, 2016; Palloff & Pratt, 2011). With the onset of the pandemic, many teachers were unprepared to teach online. Understandably, many educators did not have online teaching experience (Rice & Dawley, 2009). Therefore, the research gap was knowing what skills and knowledge educators needed in professional learning to transition to online instruction.

Very little about effective professional development practices for teachers transitioning from a traditional setting to an online classroom was known (Rice & Dawley, 2009). Educators must understand their content and methods of instruction, but

they must also utilize technology to facilitate communication, provide materials and resources, develop online communities, and deliver instruction asynchronously or synchronously. However, applying these skills within a virtual space requires a different layer of knowledge and skills (Roblyer & Davis, 2008). Therefore, teachers will need support to transform their skills into an online environment. In a national survey conducted by Rice et al. (2009), teachers reported a critical need for training related to communication technologies, time management strategies, academic dishonesty policy, and student internet safety. These areas are necessary for interacting and conducting virtual classrooms; however, they do not fall into the significant areas described in the various online teaching standards (Rice et al., 2009). As a teacher transitions from a face-to-face setting, utilizing communication tools, managing tasks and responsibilities, and knowing the premade course content's sequence would be the initial steps in teaching online.

Nevertheless, these elements are more teacher centered and not student centered. Baran et al. (2011) reviewed the literature regarding online teachers' roles and competencies and found various knowledge and performance-based competencies defined within the literature concerning online teachers. In the literature on transitioning teachers from a brick-and-mortar setting to an online teaching environment, Baran et al. (2011) found three areas that needed further development to create learning experiences for emerging online teachers: (a) empowering online teachers, (b) promoting critical reflection, and (c) integrating technology into pedagogical inquiry. The researchers found a teacher's role in the online environment was dynamic and multidimensional because it

required an integrated look as teachers worked through pedagogical problem solving within their disciplines and used various online technologies.

Given K–12 virtual schools have only existed for 2 decades, the research topic of professional development in online instruction still needs to be explored. However, some connections made from the research and theory on professional development and adult learning were relevant. For example, teachers working in district virtual instruction programs can network with each other through virtual PLCs, and this type of virtual engagement promotes distributed cognition (Laferrière et al., 2006; Putnam & Borko, 2000). Research was emerging in the area of online professional development and communities of practice.

Learning Communities and Communities of Practice

A foundation of research around effective teacher professional learning in general emphasized several factors in the most successful teacher learning experiences. Cameron et al. (2013) considered teacher practice that characterized schools as responsible for developing and maintaining teaching and learning environments. This characterization included considering pedagogical and content learning needs and needs associated with an educator's experience in the field and personal needs. One term for what is perhaps the most popular of these structures is the PLC.

In the 1980s and 1990s, research into PLCs became focused on the theoretical assumptions that knowledge exists in the day-to-day lived experiences of teachers and is best understood through critical reflection with others and that engaging teachers in PLCs would increase their professional knowledge and enhance student learning (Vescio et al., 2008). Researchers of that time also found that teacher collaboration was a critical

component and tool for building instructional staff's capacity (Foltos, 2014; Fullan, 2011). Dufour's (2012) conception of success factors for PLCs seemed more focused on administrative interests, ensuring teachers know expectations and ensuring they were clear about why they were to engage in PLCs. Therefore, Dufour and Reeves (2016) contended that effective PLCs actually

1. assume "collective responsibility for student learning;"
2. establish a "guaranteed and viable curriculum;"
3. implement curriculum-based common formative assessments;
4. identify which students understand and which do not, identify which teachers were influential in their instruction and learn from them, identify which concepts were difficult for students to grasp, and
5. create a "system of interventions" through which students identified as not understanding might receive additional instruction (pp. 69–70).

Although this is a remarkably simplified version of the PLCs originally envisioned by researchers in the late 1900s, it is the most widely accepted model among K–12 educational systems (Sawchuk & Keller, 2010). Many PLC models align with Kesson and Henderson's (2010) standardized management paradigm and are intentionally fueled almost entirely by discussions around standardized assessment data, progress monitoring data, and data from common assessments administered following a common lesson or unit of instruction.

PLC implementation in recent years, however, has not been automatically limited to goals in keeping with the standardized management paradigm. In one study, Dooner et al. (2008) concluded that uniformity was not a goal for teacher PLCs. Instead, educators'

goal was combining collegial support through necessary dialogue for meaningful professional growth. Dooner et al. (2008) called for more attention to this research area, particularly for educators interested in promoting inquiry-based professional learning for teachers. Other researchers, who have come to question the effectiveness of PLCs as a means for supporting active professional development, supported this call (Bausmith & Barry, 2011; Matzat, 2013). With such a range of PLC models being implemented in schools, Dufour (2004) argued the term PLC was at risk of losing all meaning. This approach also could explain why researchers have questioned the effectiveness of PLCs; there has been little consistency between the models implemented from school to school.

Online Professional Learning for Teachers

As more teachers began to seek professional learning experiences online, researchers questioned whether online professional learning could offer educators an equally rich experience as face-to-face professional learning. By and large, researchers determined the social aspects of professional learning could translate quite seamlessly to an online community, but suggested cognitive presence may be trickier to achieve when educators lack physical cues to attend to tasks and engage in higher order thinking (Akyol & Garrison, 2011). The movement to online learning cannot be viewed solely as a preference motivated by a desire to do something different. The core desire to access professional learning is not altered in moving from the physical to the virtual space.

Crowley (2016) suggested that thriving online communities of learners have a purpose for engaging in virtual experiences drawn from a deeper and more purposeful place. Crowley added that common goals and beliefs are crucial to building thriving

virtual learning communities, just as they are vital to building healthy nonvirtual learning communities. Hough (2004) found more successful online communities:

- have a more focused purpose or problem base for discussions,
- frame the discussions and suggest to participants what kinds of discussions are expected, and
- tend to support trust among members through efforts to build community and feelings of ownership (p. 383).

Hough established how educators could work together to apply their new learning with their team in the PLC.

Fishman et al. (2013) further examined the differences in online professional development and face-to-face professional development and their impact on teacher and student learning. Their study focused on the differences between face-to-face and online professional development conditions concerning teacher outcomes, the changes in teachers' beliefs concerning self-efficacy in teaching environmental science or teaching in general, and differences in student outcomes. They found no significant differences in outcomes between the modalities of online professional development and face-to-face professional development. Despite this, the more critical issue was the actual design of professional development regardless of the format (Moon et al., 2014).

Moon et al. (2014) argued that online or face-to-face professional development should be the main effect but educators must first consider professional development goals and resources. Once the objective of professional development is determined, leaders should determine the which delivery method will best meet teachers' needs. The majority of online teachers have transitioned from traditional, face-to-face learning

before becoming online teachers (McQuiggan, 2012). Teachers in transition bring their knowledge, beliefs, and attitudes about teaching from their traditional face-to-face experiences (Baran et al., 2011). Baran et al. (2011) suggested that professional development systems provide critical reflection opportunities and foster a change in attitudes, beliefs, and knowledge about teaching and learning online. Professional development systems include components of Guskey's (2002) model of teacher change. This model involves a set of fundamental principles for understanding how educators process change:

1. Change is a gradual and challenging process.
2. Ensure that teachers receive regular feedback.
3. Provide continued follow-up, support, and pressure (p. 22).

Specific to professional learning and instructional technology, Zyad (2016) focused on understanding barriers that prevent educators from integrating technology into classroom lessons. Combining hardware and software technologies to enhance classroom lessons is one way of integrating technology, and different educators will leverage technology in classroom lessons at different levels. Zyad (2016) found several factors stunt or eliminate technology integration in the learning environment, including personal bias, integration impact, technical limitations, and pedagogical factors. Preparing and equipping adults for teaching with technology is an art.

As synchronous and asynchronous online teaching and learning has become more prevalent in the COVID-19 pandemic, K–12 educators need professional learning experiences and instructional goals that promote and enhance quality course design, accessible online instruction, and intentional and purposeful use of technology. Hough

(2004) argued that online teacher learning could be a viable tool for achieving these goals regardless of the PLC's meeting space. For this case study, a theoretical framework was used to understand better how adults learn and apply their learning. This study was designed to capture how three Texas ISD teachers used their learning opportunities to grow their expertise and practice with instructional design to help them reach all learners in the remote synchronous learning environment and then later in the blended environment that included synchronous remote and socially distanced in-building instruction.

Theoretical Framework

Knowles' (1975) theory of andragogy was the theoretical framework for this case study. *Andra* translates as the word adult, which makes andragogy the art and science of teaching adults (Knowles, 1970). Andragogy was appropriate as this study's framework because it is well established in the literature, and the participants in the case study were adults in a public K–12 education system (Finn, 2005; Novak & Thibodeau, 2016; Ortiz, 2014). Discussions of andragogy, including connections to the research questions and goals, are addressed further. Additionally, the next section includes an introduction of Thomas R. Guskey's (2002) evaluation of the professional learning goals embedded in questioning as in the Ortiz (2014) study.

Knowles's Theory of Andragogy

Knowles (1975) defined andragogy as "the art and science of helping adults learn" (p. 19). In the theory of andragogy, Knowles described adults as being learner-focused and self-directed, whereas pedagogy is described as educator-focused and educator-

directed. This theory includes a set of assumptions for designing instruction with learners who are self-directed rather than educator-directed (Ortiz, 2014). Table 1.1 details Knowles's (1975) six key assumptions: self-concept, experience, readiness to learn, orientation to learn, motivation to learn, and need-to-know. The framework, which served as a guide for the research questions, outlines the factors that could affect educators' experiences when applying basic UDL guidelines; experiences may result in the continuance of its use because they are the set foundation for how adult learning occurs.

As in the Finn (2005) and Ortiz (2014) studies, Knowles's (1975) theory of andragogy supported the research questions in this case study into how learning occurs when participants view and interact with the UDL framework. The Texas ISD's UDL professional learning was the intervention in this study. A visual representation adapted from Ortiz's (2014) study (see Figure 1.3) shows the flow of this study. The first step of the intervention was the district's remote professional learning training. The instruction was delivered online to all interested professional staff members of the school district, and educators were asked to apply the basic UDL principles in their course design. In the second step, the output portion of the study, participants attended the online professional learning programming and began implementing what they learned in their PLC, applying UDL strategies in their online and blended courses. The third step was to measure the initial change, a concept supported by Finn (2005) and Ortiz (2014) in their study on professional development and how change can be measured. Fundamental change will be addressed in a later chapter.

Alignment of Andragogy and Research Questions

Knowles's (1975) theory of andragogy has been criticized due to the lack of documented research and empirical studies (Davenport & Davenport, 1985; Houde, 2006; Novak & Thibodeau, 2016). Other critics have claimed a lack of identifying and developing best practices in instructional strategies for adults, including appropriate instruments to measure andragogy (Holton et al., 2009). Regardless of its criticism, comparing Knowles's (1975) theory of andragogy with other theories of adult learning creates a continuance of its use in adult learning (Holton et al., 2009; Ortiz, 2014). Knowles's (1975) theory was used in this study to provide additional documented research on the topic.

Knowles (1975) mentioned that as an individual matures, their self-concept moves from dependent to self-directing. All participants in this study had already tried teaching strategies that supported a UDL approach to meeting the needs of variable learners. Knowles's second key element involved utilizing past experiences accumulated over time to support further learning. The educators and the PLC had minimally implemented UDL concepts in previous school years. Another introduced goal for participants was to provide suggestions for using UDL for diverse learners. The third assumption of Knowles's theory of andragogy, readiness to learn and applying what was learned in their control, implies the educator should take the self-directed initiative of implementing what was learned after participating in the professional development session.

The purpose of the UDL professional learning session was to provide basic applications under UDL guidelines that were relevant for the diverse learners enrolled in

the teachers' courses. The researcher gathered information about how educators within the PLC made content accessible by applying the UDL framework's features. After the educators implemented UDL in their courses, they provided follow-up support in the form of discussions, campus personnel, and feedback through web conferences, emails, and PLC meetings.

The third research question concerned collaboration efforts and educator perceptions of the UDL framework during a pandemic. According to Knowles' (1975) fourth and fifth assumptions, orientation to learn and motivation to learn, educators applied and implemented strategies and materials after being exposed to UDL concepts, including internal rather than external factors where curiosity drove the implementation of new concepts. Goals 5 and 6 followed Knowles's (1975) sixth assumption: the need-to-know. This resulted from the effects of the COVID-19 pandemic on public education, creating a need to educate during a stay-at-home order from the state and the later slow reopening of schools. Knowles (1975) stated that adult learners tend to learn when there is a need-to-know, and the immediacy of implementing what was learned is warranted either for themselves or another individual. The pandemic provided this impetus for learning and applying UDL principles. Findings from this research study contribute to the existing empirical studies of andragogy in providing further insight into how adults learn.

Summary of Literature

A paradigm shift was necessary to design and implement a diverse but inclusive classroom in both face-to-face and online settings. Since the U.S. litigation of the IDEA, the Higher Education Opportunity Act, and the Every Student Succeeds Act, special education and general education have followed the same paths in K–12 and

postsecondary education. In sum, federal and state policies required that all students be taught, supported, and assessed in the general education environment and curriculum. An initial architectural concept, universal design, was focused on designing environments that would be physically accessible by all, without the need for adaptation or specialized design. CAST (2009) began to consider how universal design might relate to the learning environment, which led to the development of UDL.

UDL was based upon Lev Vygotsky's concepts of learning and neuroscience research. The UDL core principles emerged from an understanding of how the brain learns through the three areas of recognition, strategic, and affective neural networks (Rose & Strangman, 2007). The three UDL core principles are multiple means of representation, multiple means of expression, and multiple means of engagement. By removing physical barriers to the learning environment, use of the UDL framework supports learning goals for individuals with vast differences in their functional educational abilities. Use of UDL involves expanding instructional design, teaching and learning methods, instructional materials, and types of assessments to make educational goals accessible for all students (Rose & Meyer, 2002). Specifically, developed guidelines and checkpoints from CAST (2021) to support implementing UDL principles intended for educators to design instruction for any type of learning environment. The curriculum design components are inclusive of goals, methods, instructional materials, and assessments. With federal and state accountability at the forefront of 21st-century educational policy, educators focus on the types of assessment, seeking to better understand them in the context of UDL for any kind of learning environment.

Amid the COVID-19 pandemic, online learning has become a new and integral part of American public education. Cavanaugh and Clark (2007) defined online learning as "a type of distance education, or formal study in which teacher and learners are separate in time or space" (p.5). However, there was limited research regarding the UDL framework in K–12 online learning environments, let alone during a pandemic. Understanding the implementation of UDL in K–12 online environments is a critical theoretical and design consideration in the current state of education. In this chapter, a discussion on Knowles's (1975) theory of andragogy explained how adults learn and how they use the acquired knowledge. In this study, the need to use acquired knowledge about UDL arose from the need to deliver content in an online setting and later in a blended instructional setting where the educator taught in synchronous remote and socially distanced in-building settings. Of specific interest was how knowledge of andragogy impacted professional development programming regarding best instructional practices for using UDL in online or blended learning environments. This multiple case study provides insight on the application of UDL and attempts to fill the research gap regarding how UDL strategies, when integrated into initial course design and used in conjunction with digital tools, can help educators meet the diverse needs of students and grow teachers' instructional practices and efficacy amid a pandemic.

CHAPTER THREE

Methodology

This chapter contains information addressing the methodology used to gain a deeper understanding of three eighth-grade ELAR teachers' application of the UDL framework and their perceptions regarding the UDL framework in the blended learning environment. According to Stake (1995), a qualitative study capitalizes on ordinary ways of getting acquainted with things and allows the researcher to concentrate intently on analyzing responses from a small number of participants. Thus, there is a more intimate exchange between participants and the researcher during qualitative data gathering than during a quantitative study. Qualitative research methods such as ethnography, phenomenology, and use of case studies were considered for this research. While each method provides valuable information from a different angle, this study's most illuminating method was determined to be the case study. Therefore, a qualitative approach was adopted. This involved conducting individual pre- and postinterviews, running a focus group, and collecting artifacts to identify teachers' perceptions of their efforts to address learning variability amid a pandemic by implementing the features of UDL.

Background and Context

Before this study, the Texas ISD already maintained a K–12, one-to-one initiative, meaning every student in the district had received an iPad. Texas ISD aimed to ensure its educators were intentional with technology implementation and communication to

optimize relevance, value, and authenticity, as recommended by Novak and Rodriguez (2016). Over the past 10 years in this one-to-one learning environment, several systems were revisited with district leadership and community stakeholders to ensure a safe online learning environment where teachers could create balanced learning experiences that enabled students to collaborate, create, communicate, and connect. With the school-issued device, students have had access to assistive technology as well as the applications the district identified as safe for providing accessibility tools that would benefit all students. As a result of these policies, Texas ISD was well-positioned in the digital learning environment when the COVID-19 pandemic began, with a lack of access to technology and resources not a barrier to online teaching and learning. However, educators required more support to meet the challenges of delivering all instruction remotely during the spring semester of 2020 and the 2020–2021 school year. Specifically, the community and district leadership wondered how their educators could refrain from providing emergency education during the pandemic. This study collected data to evaluate how use of the UDL framework helped educators create accessible online content during the pandemic in a synchronous remote and socially distanced in-building setting.

Research Questions

This multiple case study was designed to answer the following research questions:

1. What practices, if any, of the UDL framework with district-approved digital tools, do three eighth-grade ELAR educators already employ, and what is their comfort level within the synchronous remote and socially distanced in-building learning environment?

2. How does the district's UDL implementation impact three eighth-grade ELAR teachers' UDL application of instructional practices using district-approved digital tools in a synchronous remote and socially distanced in-building learning environment?
3. How are teachers' perceptions regarding the application of UDL shaping synchronous remote and socially distanced in-building learning practices?

Research Design

A multiple case study design was used in this study (Creswell, 2012; Merriam, 1998; Ortiz, 2014; Stake, 2006; Yin, 2017). A 2-phase data collection process was conducted. Phase 1 involved a Google Form survey used to collect background information and data about past experience addressing accessibility and using UDL. Phase 2 consisted of qualitative data collection methods (i.e., pre- and postinterviews and a focus group) with three eighth-grade ELAR educators who met the criteria of the study. The multicase analysis was conducted using a step-by-step process of coding, categorizing, and creating themes to generate findings with data (Merriam, 1998; Ortiz, 2014; Saldaña, 2009; Stake, 2006). In what Stake (2006) would describe as multiple case study design, each participant was a certified, Grade 6–8 core content (i.e., math, science, language arts, or social studies) educator in the Texas ISD who taught in the synchronous online learning environment for at least 4 weeks. The multiple case study was bound by time in a school year calendar set by the district's school board.

UDL is a relatively new concept in education and online learning, and valid methods of researching professional development programming were critical in this study (Desimone, 2009; Ortiz, 2014; Roberts et al., 2010). Although analysis of UDL

implementation was not in-depth, an exploration of educators' use of basic UDL applications was observed. Maxwell (2013) explained that qualitative and quantitative methodologies are distinctly different in both theory and process, yet both in this study contributed to filling the gap in research. During the first phase of the study, quantitative methods were used to collect descriptive statistics because this method relies on mathematical concepts to establish statistical relationships between variables. In contrast, qualitative research is focused on people, situations, and events. This method allows the researcher to explore and analyze themes and connections.

For the second phase of the study, a qualitative method was used because it is consistent with interests in processes rather than outcomes (Merriam, 2009). The strength of qualitative research is that it allows the researcher to gain in-depth descriptive information rather than numerical data. For this reason, a qualitative methodology was chosen to explore the participants' perceptions relating to their implementation and application of UDL. Case study, unlike other qualitative research designs, allows the researcher to use inductive reasoning to evaluate multiple sources of data. According to Merriam (1998), there are four types of case studies: ethnographic, historical, psychological, and sociological. Coupled with a sociological emphasis, the qualitative method can enlighten the variables impacting an issue. Thus, the case study method was determined to have the most significant potential for yielding data relevant to the research questions.

The methodology used consists of multiple case study analysis. Creswell (2012) explained that multiple cases are necessary to effectively explore a question because the researcher selects one issue or concern to view through multiple cases that provide

varying perspectives. The issue in this study was the accessibility of learning in the pandemic teaching and learning environment. In moving from a general view delivered in Phase 1, Phase 2 provided an in-depth view of the quintain. The quintain in this case was the application of UDL to improve accessibility in a synchronous remote and socially distanced in-building learning environment during a pandemic.

Multicase case studies are also bound together by time, place, or physical surroundings (Creswell, 2012; Merriam, 1998; Stake, 2006). The cases in this research study were bound by all three characteristics because the computer or device acted as the place where learning occurred; learning was asynchronous and synchronous, and the physical location was either remote or socially distanced in-building.

Case studies can be particularistic, descriptive, or heuristic (Creswell, 2008; Merriam, 1998). Particularistic case studies are those focused on a particular situation, event, or program. The situation or event in this study was the optional district-wide UDL professional development session and the eighth-grade ELAR teachers' application of UDL within the online courses. UDL professional learning is discussed in more detail in Chapter 4. Merriam (1998) explained that descriptive case studies are those that include variables portraying interaction over time with findings that describe techniques, elicit images, and provide analysis of situations. In addition to the general descriptive variables included in Phase 1, descriptive variables are those describing the educators' awareness of their teaching practices and the evolution, if any, of those practices. Merriam (1998) described a heuristic as a way for the researcher to understand concepts that emerge and illuminate the phenomenon. Using particularistic, descriptive, and heuristic characteristics, this research study focused on how UDL applications affected educators'

instructional practices and perceptions of pandemic teaching and learning environments.

As shown in the flow of the study illustrated in Figure 1.3, the Texas ISD provided their educators with the UDL professional learning sessions at the onset of the 2020–2021 school year, and this provided the baseline input for this study. District and campus leadership at the institution who had been trained in the UDL framework created the course content for their K–12 educators who would be engaged in the pandemic teaching and learning environment. Web conferences over Zoom were used as the meeting space for the adult learning.

Through the capture of the baseline input in a Google Form survey, the researcher identified each participant's teaching and learning experience and the level of the current use of district-approved digital learning tools and UDL strategies. To follow up, one-on-one web conferencing interviews and one focus group session were conducted to discuss the application and perceptions of the UDL framework and the use of district-approved digital tools to gauge the output and initial changes resulting from the professional development session. The researcher coded all recorded web conferencing sessions to understand how UDL training enhanced teaching during the pandemic. Table 3.1 outlines the phases of this study.

Table 3.1

Brief Descriptions of Research Phases

Phase	Description of research collection
Phase 1	An initial Google Form survey was used to collect participants' demographics, general teaching background, current online teaching practices, and level of knowledge of the UDL framework to provide accessible means of instruction, use of district-approved digital tools, and comfort level in the remote synchronous learning environment.
Phase 2	An initial virtual 30–45 min individual interview, virtual 45–60 min focus group session, a virtual 15–30 min individual exit interview, and review of grading period artifacts provided an in-depth view of the application, perceptions, and use of UDL in pandemic instruction.

Note. UDL = universal design for learning. Adapted from *Accessibility in Distance Education: Implements of Universal Design for Learning* [Doctoral dissertation, University of Hawai'i at Mānoa], by T. Ortiz, 2014, ProQuest Dissertations Publishing. <http://search.proquest.com/docview/1611919767/>

In sum, the multiple means of collecting data permitted the researcher to ask participants to rephrase and clarify during data gathering to measure the change in educator practice and perception.

Participant Selection

Educators teaching during the COVID-19 pandemic were the target sample for this research study (Merriam, 1998). The selection criteria were that the participants had to be employed by the district for at least 2 years, certified to teach and serve as a Grade 6–8 core content educator (i.e., language arts, math, science, and social studies), participants in the school district's optional 2020–2021 UDL professional development session, and a teacher of record who had used a remote synchronous method for at least 4 weeks of instruction. To start selecting who would participate in the study, the researcher

was provided an Excel sheet from district leadership that recorded who attended the virtual professional learning session. From there, the researcher narrowed down possible participants based on the study criteria. The invitation to participate in this research was distributed electronically via email to staff who met the criteria. Staff members who were selected were informed via invitations sent over email. These invitations were collected individually. All participants were invited, but not required, to participate in the data collection process.

Per university guidelines, participation (i.e., one initial Google Form survey within 5 days, one individual 30–45 min interview, one virtual 45–60 min focus group session, and one individual 15–30 min individual exit interview) was detailed in the consent portion of the invitation. Full disclosure regarding the nature, purpose, and requirements of the study was provided in writing to each participant to maintain ethical standards (Creswell, 2012). Participants were required to participate according to the study's predetermined progression, and participants were also required to verbally consent to be involved in the study and acknowledge their rights during each research activity. Throughout the study, participants were reminded of their right to discontinue involvement at any time.

Ethical considerations were given to participants through participation agreements that outlined the scope and purpose of the research. The researcher informed volunteer participants of the video recording of personal and group interviews and consent to record the interactions was obtained. During the study, participants remained anonymous. No incentives were offered to those who volunteered to participate.

Participants' Historical Instructional Context

All participants had been working the Texas ISD school district since the district's one-to-one implementation of the Apple iPad in 2011. Consequently, they had witnessed the evolution of the one-to-one model as it grew to include improving the user learning experience, updating instructional supports, adopting digital materials, and updating building infrastructure to support the one-to-one device usage. Texas ISD educators believed that technology could be used as an instructional tool that, when selected and used correctly, enhances learning experiences in one or more ways, including: (a) accelerating learning; (b) enriching the learning experience; (c) engaging the learner; (d) addressing the learner's specific needs; (e) providing an opportunity for immediate feedback; (f) offering a unique learning experience not possible without the technology; (g) enhancing existing resources; (h) emulating real-world applications; (i) providing access to a variety of learning media or modes; (j) increasing efficiency of instructional time; (k) providing collaboration opportunities with authentic audiences, including students and experts across the nation and world; (l) accommodating for specific disabilities, (m) providing 24/7 remote access, including from home; and (n) providing student data to drive instructional support. The district expectation was that all instructional decisions regarding instructional technology should be guided by consideration of individual student learning needs, learning targets or desired educational outcomes, the content presented, and alignment to curriculum standards.

All participants believed that effective instruction should include various instructional methods, including balancing those that did and did not incorporate technology. This was evidence that the participants and the students they served had a

well-laid foundation in how to utilize technology (i.e., their district-issued iPad, Google Classroom, and other digital applications) before the pandemic.

Figure 3.1 details the participant's pandemic teaching timeline for the spring of the 2019–2020 and fall of 2020–2021 school years.

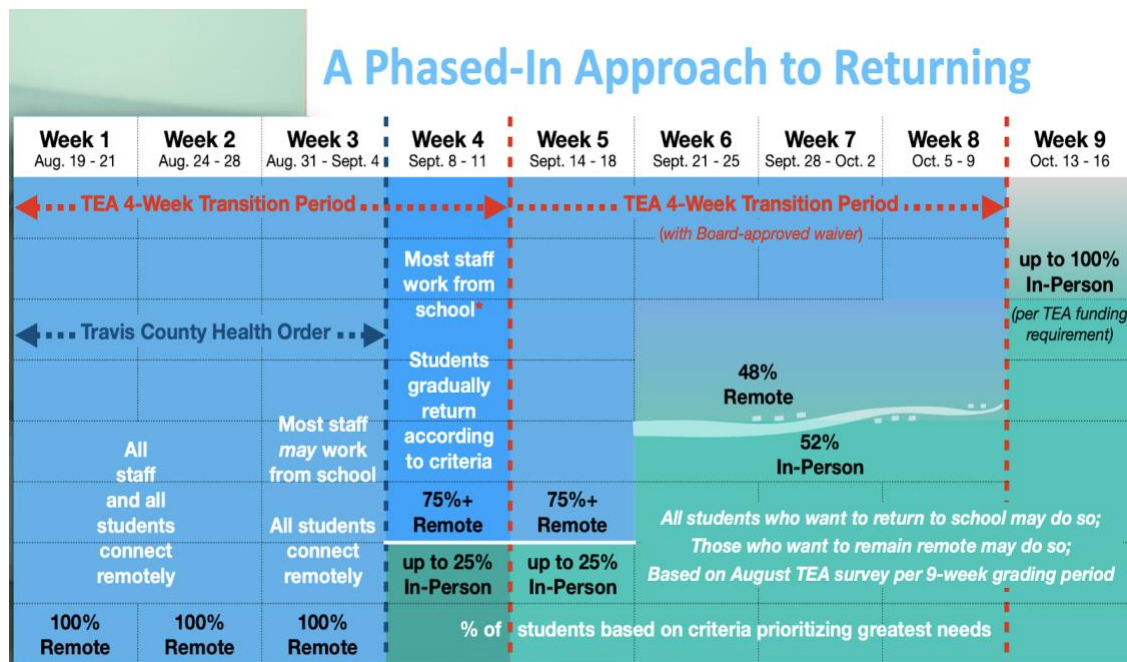


Figure 3.1. Timeline of Instructional Context in Texas Independent School District. Reprinted with permission from the district.

The researcher collected data during the first grading period of 2020. As shown in Figure 3.1, all three participants performed remote synchronous instructional from August 19, 2020 to September 4, 2020, then taught in a synchronous remote and in-building setting for the remainder of the grading period at varying levels of capacity. Within both contexts, teachers were to address the same TEKS across both remote and in-building settings. They were also to use TEKS from the final quarter of 2019–2020 and incorporate them where appropriate into the first semester of 2020–2021 with diagnostic components to guide instruction. Staff had the opportunity to access a variety

of methods for content delivery to support students on multiple platforms. (e.g., blended learning, flipped classroom, recorded content for students to review, cross-curricular ties), Moreover, the staff used UDL guidelines in their instructional practices. Teachers were to provide time for small-group instruction and time for both remote and in-building learning. Teachers were also encouraged to continue instruction in synchronous and asynchronous methods to support continued learning while social distancing.

All participants were to utilize particular assessment practices according to their plan posted on the district's website. Specifically, teachers were to incorporate guidelines of UDL into assessment, especially for action and expression, with a focus on the application of learning. The options for assessment considerations included open book resources, portfolios, choices, shorter and more frequent assessments delivered in a variety of ways (e.g., oral assessments and student self-assessments), and project-based tasks with appropriate and equal access for remote learning materials. District leaders noted that some assessments for instructional planning could involve feedback rather than an assigned grade. Teachers were encouraged to use formative preassessments and summative postassessments and were asked to develop a plan for benchmarks not already online. These could include reading assessments, quarterly benchmarks, State of Texas Assessment and Academic Readiness, and end-of-course benchmarks. Teachers were to also use the Northwest Evaluation Association Measures of Academic Progress as a universal screener at the start of the school year to measure learning losses or gains that may have resulted from the pandemic's effects on the end of the 2019–2020 school year.

When in-building learning started, all Texas ISD teachers were also provided new safety guidelines that disrupted their instructional contexts. Teachers were required to

perform a health screening each school day to check for COVID-19 symptoms.

Whenever possible and developmentally appropriate, the district required that no group or pair work be assigned that would require students to regularly interact within 6 ft of one another. There was recognition that this would be impossible for some students with special needs. Consistent with the TEA guidance and the actions taken by many organizations across the state, staff and students for whom it was developmentally appropriate were mandated to wear and provide protective equipment (e.g., a face mask) as necessitated by governmental ordinances or local directives. Face coverings were mandated in hallways, between classes, and at the beginning and end of the school day when students were likely to congregate. Whenever possible, students, teachers, and staff maintained consistent groupings of people to minimize virus spread on the campus. Visitors and volunteers were not permitted on campus without authorization. The pandemic in-building instructional setting safety protocol was a factor the participants considered when approaching course design. They all reflected that their previous practices of using Google Classroom as an LMS and having background knowledge of teaching and learning with a device supported their approach to teaching and learning with UDL during the pandemic.

All three participants were in the same PLC. The eighth-grade ELAR section was offered six times per day, allowing the PLC one daily class period for planning as a team and another class period for individual conferencing or planning. Each class period was 45 min, and students were provided 10 min of passing between periods. Because all work must be accessible via the Google Classroom LMS, one instructional day a week was off-screen with no content delivered, and the homework load was minimal due to the length

of screen time during the day. This was an adjustment from the previous year's practices dictated by COVID-19. Before the pandemic, classes were 10 min longer and passing periods were only 5 min long, and the amount of screen time and homework was not monitored at the middle school level. The three participants had been together on the same PLC for 5 years and had access to a district-issued MacBook Air and an iPad that mimicked the student view to support their classroom troubleshooting. Figure 3.2 details the schedule for both in-person and remote learning.



6-8 Remote and In-Person Schedule
Aug. 19 and Later: The Schedule Whether Remote or In-Person

6th Grade		7th Grade		8th Grade	
1st Period	8:35-9:20	1st Period	8:35-9:20	1st Period	8:35-9:20
2nd Period	9:30-10:15	2nd Period	9:30-10:15	2nd Period	9:30-10:15
3rd Period	10:25-11:10	3rd Period	10:25-11:10	3rd Period	10:25-11:10
LUNCH	11:10-11:40	4th Period	11:20-12:05	4th Period	11:20-12:05
4th Period	11:50-12:35	LUNCH	12:05-12:35	5th Period	12:15-1:00
5th Period	12:45-1:30	5th Period	12:45-1:30	LUNCH	1:00-1:30
6th Period (Adv./WCT)	1:40-2:00	6th Period (Adv./WCT)	1:40-2:00	6th Period (Adv./WCT)	1:40-2:00
7th Period	2:10-2:55	7th Period	2:10-2:55	7th Period	2:10-2:55
8th Period	3:05-3:50	8th Period	3:05-3:50	8th Period	3:05-3:50

Figure 3.2. Texas Independent School District Middle School Bell Schedule. Reprinted with permission from the district.

Study Setting

The researcher did not foresee any risks to the study participants. The survey, observation, and review of documents, and interviews all took place in an online environment. The survey was disseminated to each participant, as described in the

previous section and was sent electronically following the UDL professional learning session. Individual interviews and the focus group session were conducted through the Zoom web conferencing platform and were recorded with each participant's consent. No immediate benefit for the participants came from their participation in the study.

The researcher used the information obtained from the participants, along with information gained from a thorough literature review, to gather data on the application of UDL professional learning in pandemic teaching and learning contexts. The goal of the research was to produce knowledge that would positively impact the district where the research occurred as well as other school districts experiencing similar challenges related to teaching during the pandemic.

After reviewing the profiles of the individuals who attended the virtual professional learning session, three eighth-grade ELAR educators were chosen. All three participants were in the same PLC in the same middle school and school district. All had received the same amount of UDL training and had experienced the one-to-one environment from the start of the initiative in the 2011–2012 school year. All were delivering remote synchronous instruction at the end of the 2019–2020 school year and the start of the 2020–2021 school year and later provided blended instruction in the synchronous remote and socially distanced in-building environment. The collection of data occurred during the school district's first 9 week grading period.

Theoretical Framework

Knowles's (1975) adult learning theory provided the conceptual framework for this study because in it, Knowles describes how adults learn and outlines an approach to instruction that is learner-focused and self-directed. Andragogy provides a set of

assumptions for designing instruction with learners who are more self- rather than teacher-directed (Birzer, 2004; Conner, 2004; Ortiz, 2014; Taylor & Kroth, 2009). Knowles's (1975) six key assumptions are self-concept, experience, readiness to learn, orientation to learn, motivation to learn, and need-to-know. This study was designed to understand the level of awareness, aims, and efforts of secondary educators who used UDL best practices in an online learning environment.

This research utilized Knowles's (1975) theory of andragogy to provide a deeper understanding of how educators use learned information from professional development and applied it in practice. The researcher adopted a multiple case research study approach using descriptive statistics and qualitative case study analysis for more in-depth insight. As noted in Figure 2.1, the first phase involved a survey used to collect data on participant practices for pandemic teaching and learning. The second phase followed up with qualitative case study data collection and analysis of how practices changed after lessons learned during a UDL professional development session were applied in the district's evolving pandemic instructional context.

Role of the Researcher

A qualitative researcher's role is to become part of the investigative process while also serving as a critical analyst (Bloomberg & Volpe, 2012). In the first phase, the researcher contacted the individuals after the UDL professional learning experience by sending an email with the initial Google Form survey. The researcher then acted as a neutral observer analyzing the descriptive data generated from the survey. During the qualitative part of the study (i.e., Phase 2), preconceived protocols were not implemented. Gathering the data, creating codes for emerging categories and themes, and performing

analysis were performed without bias because there were no expectations of participants' procedures.

According to Stake (1995), the researcher's experiences played a crucial role in determining significant understanding and formulating appropriate interpretations. The researcher had been previously employed by Texas ISD and was a certified district instructional coach in K–12 educational leadership. No conflict of interest or programmatic bias contributed to the research's interpretations, and the researcher had no administrative oversight of the intervention implementation, output implementation, or initial change of the implementation. The researcher also did not have an evaluative or supervisory role over the participants. Multiple data collection methods were used to alleviate concerns and reduce bias that could have impacted the participants' reported outcomes.

Data Collection and Analysis

Data Collection

A 2-phase data collection process was employed in this study. First, an initial Google Form survey was sent to participants who attended the district's optional professional learning session about the UDL framework. Interested participants filled out the Google Form survey within 5 days of receiving the email correspondence. Once the researcher identified individuals who met the study criteria using the survey data, potential participants were invited via email to take part in the study. Once an individual accepted the invitation and all paperwork was provided, the participant and researcher set a date for the initial 30–45 min individual virtual interview.

The purpose of the initial Google Form survey questions was to gather participants' base data to confirm the study's participant criteria is met and learn more about the participant's background and experience with UDL. The first part of the survey focused on demographic and professional background information, including years of experience, certification levels, and years of service in the district. Open-ended survey questions were asked about participants' experiences with lesson design and UDL, and participants were asked about their understanding of UDL as well as accommodations and accessibility practices they had used in their previous remote synchronous courses. These questions were asked to solicit a more profound response to help the researcher get to know the candidate better. Descriptive statistical analysis was generated by a feature within the online survey tool for gathering data to confirm criteria selection. This is discussed further in Chapter 4.

The second phase of data collection consisted of qualitative methods. To better comprehend how implementing basic UDL applications affected online instruction and teacher perceptions, the researcher (a) conducted recorded individual interview sessions where each participant was asked to describe their experiences with UDL, course and lesson designs, and desired learning environments; (b) conducted one focus group session to observe participants' interactions with colleagues; and (c) collected artifacts such as lesson planning documentation as well as other relevant information from participants as the researcher or participants deemed necessary for better understanding.

Qualitative data for this study was collected using a semistructured remote web conferencing or virtual interview process to establish an in-depth and holistic picture of the three teachers' perceptions of UDL application. The interview questions were

designed to solicit a more in-depth response from participants and clarify responses. Finally, a virtual 45–60 min focus group was designed to capture the participants' application of the UDL framework within the collegial setting of their PLC, thus allowing a greater depth of input from each participant than could have been gained through the survey or individual interview questions alone. While the research questions were overlapping, the information was solicited in the sequence of individual interviews and a focus group interview. Table 3.2 details the research instruments, uses for each, and the intended purpose for each step in the study.

Table 3.2

Research Instruments, Uses, and Intended Purpose

Study activity	Use	Purpose
Initial qualifying semi-open-ended, Google Form survey	Phase 1: Descriptive statistical analysis supported by Knowles's theory of andragogy	• Demographics • Teaching experience and background • Participants' awareness, attitudes, practices of UDL, and comfort with being a remote synchronous educator
Initial open-ended, semistructured individual interview	Phase 2: Questioning supported by Knowles's theory of andragogy—coded for themes	• Further understanding of participants' experience and perceptions of UDL • Participants' application of UDL in the course and lesson design • Participants' comfort with being a remote synchronous and in-building educator with this type of planning
Open-ended, semistructured focus group interview	Phase 2: Questioning supported by Knowles's theory of Andragogy—coded for themes	• Educators' experience and perceptions after applying the UDL framework in a unit plan of instruction • Participants' comfort with being a remote synchronous and in-building educator with this type of planning
Exit open-ended, semistructured individual interview	Phase 2: Questioning supported by Knowles's theory of Andragogy—coded for themes	Attainment of further insights on the application of UDL professional development
Documentation: Products and notes from PLCs and posts in the LMS	Phase 2: Course documents and PLC's notes and products	Basic application of UDL professional learning in such things as the course syllabus, meeting notes, and calendars.

Note. UDL = universal design for learning. PLC = professional learning community. LMS = learning management system. Adapted from *Accessibility in Distance Education: Implements of Universal Design for Learning* [Doctoral dissertation, University of Hawai'i at Mānoa,], by T. Ortiz, 2014, ProQuest Dissertations Publishing. <http://search.proquest.com/docview/1611919767/>

Data Analysis

Very little is known about teachers' perceptions regarding UDL in online learning environments. Creswell (2012) supported qualitative methodology to understand participants' perceptions, attitudes, and processes. The use of open-ended questions on the initial Google Form survey, the initial and exit individual interviews, and the focus group allowed participants to respond and expand upon their thoughts without restriction. The interviews and the focus group were effective in this study because they allowed the researcher to control the questions and probe for more clarification, but not impede participants' responses.

Participants' interview responses were digitally recorded to permit the researcher to concentrate on the individual rather than on note-taking and coding (Creswell, 2012). The interviews were also virtual to ensure the health safety of the participants and the researcher during the COVID19 pandemic. In this environment, participants were set up in a safe space and able to provide in-depth personal experiences and background information to help clarify their responses.

By using open-ended questions, the researcher ensured that participants could provide additional information and artifacts if desired. The instruments used in this study were appropriate for the intended purpose. Specifically, interviews and the focus group provided access to participants' perceptions that would not otherwise be available through quantitative measures (Weiss, 1994). Likewise, open-ended surveys extended well beyond numerical restrictions to provide depth and linkages among teacher perceptions. Participants were invited to review their data to ensure accuracy and were encouraged to

meet with the researcher to discuss the findings during the exit interview portion of the study.

Provisions for Trustworthiness

The researcher was the only person with access to the district and campus chosen for the multiple case study. When transcribing interviews, the researcher changed the names of the campus participants interviewed to protect their identity. When storing and sharing data with a third party like a writing coach, the secure Baylor University password protected digital storage platform called Box was used. Only the researcher had the password. At no time did a third party have access to information that identified the district, campus, or participants interviewed. A confidentiality agreement was also used when a service was utilized. There were no physical artifacts because of the COVID-19 health restrictions; therefore, every aspect of this study was housed on this secure platform provided by Baylor University. The researcher made plans to keep the original identifiers, according to Baylor University's guidelines, for 3 years. The data will be securely disposed of after the allotted time period expires.

Assumptions

Within this study, it was assumed the participants were aware of the unique needs of students based on their access to confidential information about them. The assumption was that participants were interested in supporting strategies that produce positive learning outcomes and promote inclusion of all students in the online and blended learning environments. It was further assumed that participants understood the questions and responded honestly and objectively to them during the study. A final assumption was

that the organized analysis of qualitative information gathered in surveys, individual interviews, the focus group session, and artifacts would be conducted without projecting biases or preconceived theories concerning this study's topic.

Limitations

While this study presented some implications for the application of UDL, there were also some limitations. One limitation was the small size of the sample. The researcher chose a small sample in order to deeply know each participant's' craft and perceptions, which aligns with the qualitative research model. Another limitation was the composition of the sample. To fully understand teachers' perceptions regarding the implementation and application of UDL, a broader range of educators should have been included for further study. Additionally, time was a limitation as it would have been beneficial to have more time to observe each case beyond one grading period.

Summary

The purpose of this chapter was to give sufficient information about the study's data collection procedures, data analysis tools used, ethical considerations, and safeguards for ensuring internal and external validity. This chapter addressed the steps of how the research was conducted using a 2-phase, mixed-methods data collection process. The methods used to analyze the data and reasons for choosing a mixed-method, multiple case study research design were also discussed, including the procedures implemented in Phases 1 and 2 of the research. The next chapter includes details about the data analysis and results of the study.

CHAPTER FOUR

Case Study and Findings

Introduction

The educators in the Texas ISD aspired to create a curriculum inclusive of technology in a one-to-one learning atmosphere that would provide an accessible education for all students. This effort was intended to increase student interaction and engagement and reduce barriers. The assumption was that applying UDL would allow educators a better chance of meeting their students' needs while reducing challenges when delivering courses remotely or at a social distance within buildings. However, to apply a concept or strategy, there should be understanding of how it operates, what results may occur, and the practice of benefiting from such results (Ortiz, 2014). This multiple case study provides insight on the application of UDL in an attempt to fill the research gap regarding how UDL strategies, when integrated into initial course design and used in conjunction with digital tools, can help educators meet the diverse needs of students and grow teachers' instructional practices and efficacy amid a pandemic. The researcher explored three eighth-grade ELAR teachers' teaching and learning practices providing synchronous remote and socially distanced in-building instruction. Three questions drove this research:

1. What practices, if any, of the UDL framework with district-approved digital tools, do three eighth-grade ELAR teachers already employ during the pandemic, and what is their comfort level within the synchronous remote and socially distanced in-building learning environment?

2. How does the district's UDL implementation impact three eighth-grade ELAR teachers' UDL application of instructional practices using district-approved digital tools in a synchronous remote and socially distanced in-building learning environment?
3. How are teachers' perceptions regarding the application of UDL shaping synchronous remote and socially distanced in-building learning practices?

Because the participants in this study were adults implementing and applying their learning, the Knowles (1975) theory of andragogy was used as the theoretical framework. The research in this study was collected in two phases. In Phase 1, the researcher used a Google Form survey to collect background information about previous and pandemic teaching and learning experiences and the application of UDL. Phase 2 of the data collection entailed one-on-one interviews with each participant and a focus group session and exit one-on-one interviews to build on the findings of each data point. The interviews were transcribed and emerging themes were found using deductive coding. This chapter includes descriptions of each participant in the study and showcases common themes identified by the researcher.

Research Design

This research was focused on how UDL applications affected the instructional practices and perceptions of educators' who were teaching during a pandemic. As shown in Figure 1.3, the Texas ISD provided their educators with an optional UDL professional learning session at the onset of the 2020–2021 school year, which provided the baseline input for this study. District and campus leadership at the institution who were trained in the UDL framework created the course content for their K–12 educators. In the 2-phase

data collection process, Phase 1 entailed the researcher collecting background data using a Google Form survey and Phase 2 consisted of qualitative methods collecting data (i.e., individual initial and exit interviews and a focus group session) from three eighth-grade ELAR educators who met the study criteria.

In the multicase analysis, a step-by-step process was implemented to perform deductive coding, categorize data, and identify themes that generated findings with data using the study's theoretical framework (Merriam, 1998; Ortiz, 2014; Saldaña, 2009; Stake, 2006). Knowles's (1975) adult learning theory provided the conceptual framework for this study because Knowles describes how adults learn and refer to an approach that is learner-focused and self-directed. Knowles's six key assumptions are self-concept, experience, readiness to learn, orientation to learn, motivation to learn, and need-to-know. In sum, individual surveys, individual interviews, a focus group session, and a review of artifacts permitted the researcher to ask participants to rephrase and clarify during data gathering to measure change in educator practice and perception using Knowles's adult learning theory.

Data Collection Procedures

The researcher reviewed and organized all collected data by taking the findings from the virtual survey and interview sessions and aligning each case participant's responses to this study's research questions and theoretical framework. The goal was to interview all 12 eligible middle school core content educators enrolled in the optional 2020–2021 UDL professional development session. However, the researcher sought out educators serving in the same PLC. This decision was made in accordance with the research from Putnam and Borko (2000), Laferrière et al. (2006), Vescio et al. (2008),

Fullan (2011), and Foltos (2014) who found teacher collaboration to be a critical component and tool for building the capacity of instructional staff and increasing their motivation to learn. In light of these findings, the researcher asked three eighth-grade ELAR educators to participate in the study by email.

After each participant agreed to take part in the study, the researcher sent all three participants further information about the study and included the link to the Google Form survey. In Phase 1, all participants opted to use the online survey and web-based virtual format rather than an in-person or phone interview. Consent forms were provided by email before participants were given access to the survey link. In Phase 2, participants were informed that the one-on-one interview and the focus group session were voluntary and were told they could choose to refuse to answer any question or to end any of the interviews at any time. The researcher collected all data from the online questionnaire, interviews, and program documents obtained in this multicase study and used established procedural methods for qualitative data collection (Lincoln & Guba, 1985). The researcher chose a multicase study for its standardized format and found it the appropriate method for this study (Denzin & Lincoln, 1998; Yin, 2014). Data was triangulated from collected sources and a cross-case analysis was completed to ensure trustworthiness (Stake, 2006; Yin, 2014). Members were invited to check the narrative and stated responses (Lincoln & Guba, 1985) during a 15-min exit interview. This research provides a deeper understanding of how educators use learned information from professional development and applied it by utilizing Knowles's (1975) theory of andragogy as the theoretical framework.

All three participants provided answers to the survey questions in an online Google Form. Google Forms has a feature that automatically graphs percentages using data collected from checkbox or multiple-choice responses. Four of the interview questions had options for checkbox or multiple-choice responses, which allowed the researcher to assess that data from a visual perspective. There were 10 background questions, 15 reflection or short answer questions, and four scale questions. All responses were organized in an Excel spreadsheet and color-coded according to the response. As part of a close reading of the responses, the researcher compiled and compared annotations with the program's documents. Finally, data was entered into Worksheets 5 and 7 from Stake's (2005) *Multiple Case Study Analysis* to triangulate the data and search for emergent themes. The survey questions' alignment with the study's research questions and theoretical framework is highlighted in Table 4.1.

Table 4.1

Alignment of Survey, Research Questions, and Knowles's Theory

General background and reflection		
Survey question	Research question alignment	Knowles's theory alignment
Background: (i.e., name, gender, age, degree(s), certification(s), # of years in K–12 education, # of years in the school district, campus, # of years at current campus, grade level(s) and current grade level(s) taught	Introductory question	Self-concept and experience
How did you become a teacher?	Introductory question	Self-concept and experience
Why did you become a teacher?	Introductory question	Self-concept and experience
Current teacher of record for which grade level	Introductory question	Experience
Number of years teaching aforementioned grade	Introductory question	Experience
Current department	Introductory question	Experience
Number of years in current department	Introductory question	Experience
What is your current professional position?	Introductory question	Experience
Please rate your level of comfort in the remote at home or on campus synchronous learning environment. *1 very uncomfortable, 5 very comfortable	Research Question 1	Self-concept experience
Do you believe you have access to adequate district provided electronic devices, instructional tools, and WiFi to perform your duties as a remote synchronous teacher either at home or on your campus?	Research Question 2	Readiness to learn

(continued)

Instructional Context and Practice		
Survey question	Research question alignment	Knowles's theory alignment
Please describe any professional experience(s) you have encountered with regard to learner variability or accessibility of course content.	Research Question 1	Self-concept experience
Have these personal and/or professional experiences affected your professional instructional practices? If so, how?	Research Question 1	Self-concept experience
Identify and describe the district mandates you must adhere to that influence your instructional decisions (inclusive of COVID 19 protocols).	Research Question 1	Self-concept experience
What professional development influences your current teaching practices (before and during the current pandemic)? Please explain.	Research Question 1	Self-concept experience
How does your professional learning community (PLC) influence and/or support your application of professional development?	Research Question 3	Orientation to learn Motivation to learn Need to know
How do the characteristics of your classes (i.e., ethnic, linguistic, and cultural diversity; learner variability; cognitive, social/behavioral, attentional, sensory, and/or physical challenges of students with exceptional needs; a mix of in-person vs. remote learners) influence and/or support your application of professional development?	Research Question 3	Orientation to learn Motivation to learn Need to know
Why did you choose to attend the UDL professional learning session provided by the district in August 2020?	Research Question 3	Orientation to learn Motivation to learn Need to know
(continued)		

Instructional Context and Practice		
Survey question	Research question alignment	Knowles's theory alignment
How would you rate your current practices of applying UDL in your course(s) taught in the remote synchronous learning environment?	Research Question 2	Readiness to learn
How would you rate your current thoughtful use of technology using the district approved digital tools in the remote synchronous learning environment?	Research Question 2	Readiness to learn

Note. UDL = universal design for learning. Research Question 1: What practices, if any, of the UDL framework with district-approved digital tools, do three eighth-grade ELAR teachers already employ during the pandemic, and what is their comfort level within the synchronous remote and socially distanced in-building learning environment? Research Question 2: How does the district's UDL implementation impact three eighth-grade ELAR teachers' UDL application of instructional practices using district-approved digital tools in a synchronous remote and socially distanced in-building learning environment? Research Question 3: How are teachers' perceptions regarding the application of UDL shaping synchronous remote and socially distanced in-building learning practices? Theoretical concepts from *Self-Directed Learning: A Guide for Learners and Teachers*, by M. S. Knowles, 1975, Cambridge.

The researcher took the information from the Google Form survey into consideration when crafting the one-on-one interview questions. The researcher aimed to understand participants' perceptions, attitudes, and processes when approaching instruction in the pandemic. The use of open-ended questions on the initial Google Form survey, the initial and exit individual virtual interview, and the focus group allowed participants to respond and expand upon their thoughts without restriction. Interviews and the focus group were effective in this study because they allowed the researcher to control the questions and probe for more clarification, but not impede participants'

responses. The questions and their alignment to this study's research questions and theoretical framework are listed in Table 4.2.

Table 4.2

One-on-One Interview and Research Question Alignment

Interview question	Research question	Knowles's theory
Tell me about your experiences prior to teaching in this remote synchronous learning environment. What have been the biggest challenges and/or opportunities?	Research Question 1	Self-concept experience
Tell me about your experiences concerning your current role as a remote synchronous teacher.	Research Question 1	Self-concept experience
Since returning to work, in what ways did the online UDL professional development provided by the district help you make instructional decisions to meet learner variability in the remote synchronous learning environment of your course? 4. How did you apply the UDL framework in your course(s)? a. What barriers, if any, did you and/or your professional learning community or department identify in the remote synchronous learning environment?	Research Question 3	Orientation to learn Motivation to learn Need to know
How did you apply the UDL Framework to your course?	Research Question 3	Orientation to Learn Motivation to Learn Need to Know
Thus far, what has been your greatest learning experience in your transition to becoming a remote synchronous teacher? a. Explain why this was a meaningful experience in positively impacting your practice.	Research Question 2	Readiness to learn

(continued)

Interview question	Research question	Knowles's theory
What district-approved digital tools have supported the application of UDL in course design and/or lesson design? Please explain how and why.	Research Question 2	Readiness to learn
What district and campus instructional staff or logistical supports in your schedule were of most value to you in applying the UDL framework to your course(s)?	Research Question 2	Readiness to learn
Do you anticipate your instructional practices will change in the 2020–2021 school year as a remote synchronous teacher because of your application of the UDL framework?	Research Question 3	Orientation to learn
a. If so, in what ways will they change? If not, please explain why.		Motivation to learn
b. How do you believe these changes will come about?		Need to know

Note. UDL = universal design for learning. ELAR = English language arts and reading. Research Question 1: What practices, if any, of the UDL framework with district-approved digital tools, do three eighth-grade ELAR teachers already employ during the pandemic, and what is their comfort level within the synchronous remote and socially distanced in-building learning environment? Research Question 2: How does the district's UDL implementation impact three eighth-grade ELAR teachers' UDL application of instructional practices using district-approved digital tools in a synchronous remote and socially distanced in-building learning environment? Research Question 3: How are teachers' perceptions regarding the application of UDL shaping synchronous remote and socially distanced in-building learning practices? Theoretical concepts from *Self-Directed Learning: A Guide for Learners and Teachers*, by M. S. Knowles, 1975, Cambridge.

The individual interviews and the focus group session provided access to participants' perceptions that would not otherwise have been available through quantitative measures (Weiss, 1994). Alignment of this study's research questions with the focus group session is outlined in Table 4.3. Participants were invited to review their data to ensure accuracy and were encouraged to meet with the researcher to discuss the findings during the exit interview portion of the study.

Table 4.3

Focus Group Interview and Research Question Alignment

Interview question	Research question	Knowles's theory
This is your second-year learning about UDL as a Professional Learning Community, correct? What was your motivation to learn more about UDL?	Research Question 3	Orientation to learn Motivation to learn Need to know
You all mentioned how valuable you found your grade level's PLC. Can you walk me through what those typically look like in planning?	Research Question 3	Orientation to learn Motivation to learn Need to know
Beyond your PLC, what supports were of value to you during the UDL learning process, and why?	Research Question 2	Readiness to learn
What type of student did you notice, if any, benefit from applying UDL in your lessons or unit of study?	Research Question 3	Orientation to learn Motivation to learn Need to know
What benefits are there to having students who already know how to use digital applications?	Research Question 2	Readiness to learn
What district-approved digital tools supported your ability to apply UDL strategies? Please explain how these tools improved this practice.	Research Question 2	Readiness to learn
What are the barriers still present despite utilizing UDL in your lessons? Why?	Research Question 3	Orientation to learn Motivation to learn Need to know

(continued)

Interview question	Research question	Knowles's theory
Would you apply UDL again in your course?	Research Question 3	Orientation to learn Motivation to learn Need to know
Would you recommend UDL be used in all courses and learning environments (face-to-face and/or online) pandemic or not? Why or why not?	Research Question 3	Orientation to learn Motivation to learn Need to know

Note. UDL = universal design for learning. ELAR = English language arts and reading. Research Question 1: What practices, if any, of the UDL framework with district-approved digital tools, do three eighth-grade ELAR teachers already employ during the pandemic, and what is their comfort level within the synchronous remote and socially distanced in-building learning environment? Research Question 2: How does the district's UDL implementation impact three eighth-grade ELAR teachers' UDL application of instructional practices using district-approved digital tools in a synchronous remote and socially distanced in-building learning environment? Research Question 3: How are teachers' perceptions regarding the application of UDL shaping synchronous remote and socially distanced in-building learning practices? Theoretical concepts from *Self-Directed Learning: A Guide for Learners and Teachers*, by M. S. Knowles, 1975, Cambridge.

Data Analysis

Several qualitative coding methods were used to analyze the data collected through the survey, interviews, and the lesson planning documents provided to the researcher. The coding process for qualitative research is logical and intuitive, so the researcher utilized inductive and deductive reasoning within three cyclical phases of coding. Inductive reasoning begins with observation of parts of the whole or units and ends with generalizations. Deductive reasoning starts with generalizations and ends with parts of the whole or units. Manually reading the content line-by-line is an essential part of the coding process and was performed throughout the coding process in this study. The researcher also used the NVivo 2020 qualitative coding process for coding support.

The data from the one-on-one interviews were subject to open coding or first pass line-by-line coding to develop descriptive themes and assign category titles. This phase included NVivo 2020 qualitative coding or selection of specific words and phrases from the content for titling purposes. The focus group interview was subject to axial coding for exploration of patterns and emerging themes. In this phase, the researcher began merging, clustering, retitling, and eliminating categories. Meaning was interpreted and synthesized in a cyclical and repetitive data analysis process until redundancy occurred. Triangulating data makes a study more credible and trustworthy (Miles et al., 2014). To maintain anonymity, each participant was treated as a case and was assigned the code “P” and a number, in random order. The demographic makeup of the participants in this study is represented in the next section of this chapter.

Case Study Participants

This study's participants were asked to describe their teaching background and explain what influenced their decisions to become educators through the initial Google Form survey. As shown in Table 4.1, participants were also asked to discuss their experiences with UDL professional development, including their overall impressions. Feedback from participants allowed the researcher to gauge their level of familiarity with UDL. Each participant's overall impression and degree of applying what they learned from the professional development session was of interest. Participants were asked about any experiences they had teaching students with various learning needs. This information provided specific insight into their assessment of why or how their teaching practices would be affected by UDL. Table 4.4 provides a snapshot of the demographic information.

Table 4.4

Case Participant Information for the 2020–2021 School Year

Participant	Age	Gender	Teaching background	Years teaching	Years at current campus	Courses
1	50	Female	• Certified through an alternative teacher preparation program • B.A. in speech communications; • M.Ed. in school counseling certified to teach ELAR and English as a second language	21	13	Grade 8 ELAR pre-AP Grade 8 ELAR collaborative
2	53	Female	• Certified through an undergraduate teacher preparation program • B.A. in secondary English • M.A. in theology • Certified to teach secondary ELAR and English as a second language	31	21	Grade 8 ELAR pre-AP Grade 8 ELAR
3	41	Female	• Received an alternative certification through a region center • B.A. in English • M. Ed. • Certified to teach Grade 4–8 ELAR and English as a second language	16	8	Grade 8 ELAR pre-AP Grade 7 ELAR pre-AP

Note. ELAR = English language arts and reading. AP = advanced placement.

The next sections provide a review of the case studies' instructional context, an introduction to the case studies, a discussion of the descriptive findings of the uses and practices of UDL utilized by each participant, and a description of the emergent themes.

Case Participants' Instructional Context

All case participants have been in the Texas ISD school district since the district's one-to-one implementation of the Apple iPad in 2011. The one-to-one model evolved to include improving the user learning experience, updating instructional supports, adopting digital materials, and updating building infrastructure to support the one-to-one device usage and instructional needs. The district expectation was that all decisions regarding instructional technology should be guided by consideration of individual student learning needs, learning target or educational outcome, the content presented, and alignment to curriculum standards. All participants believed that effective instruction should include various instructional methods, including a balance between those that did and did not incorporate technology. This was evidence that the participants and the students they served, had a well-laid foundation for utilizing technology (i.e., their district-issued iPads, the Google Classroom LMS, and other digital applications) before the pandemic.

As noted in Figure 3.1, all three participants performed remote synchronous instruction from August 19, 2020 to September 4, 2020. They then delivered synchronous remote and in-building instruction for the remainder of the grading period at varying levels of capacity. Within both contexts, teachers were to address the same TEKS across both remote and in-building instructional settings. They were also to use TEKS from the final quarter of 2019–2020 and incorporate them into the first semester of 2020–2021, with appropriate diagnostic components to guide instruction. Teachers were also

encouraged to continue instruction using synchronous and asynchronous methods to support social distancing and continued learning. When in-building learning started, all Texas ISD teachers were given new required safety guidelines, which also disrupted their instructional contexts. They all reflected that their previous use of Google Classroom as an LMS and their background knowledge on teaching and learning with a device supported their approach to teaching and learning with UDL during the pandemic.

All participants were in the same PLC and had been for the 5 years prior to the study. The eighth-grade ELAR section was offered six times per day, allowing the PLC one daily class period for planning as a team and another class period for individual conferencing or planning. Each class period was 45 min, and students were provided 10 min of passing between periods. All work was required to be accessible via the Google Classroom LMS, so one instructional day per week was off-screen with no content delivered, and the homework load was minimal due to the length of screen time during the day. The three participants had access to a district-issued MacBook Air and an iPad that mimicked the student view to support their classroom troubleshooting. The following section highlights each participant within the instructional context of one grading period during the fall of the 2020–2021 school year.

Case 1: Participant 1

Background

P1 was a 50-year-old female, veteran educator who had served at the same middle school campus in the Texas ISD for 13 years out of her 21 years in the profession. P1 explained that she loved learning and could go to school nonstop if it was possible. She

enjoyed watching students learn and "find their stride" because it kept her in the classroom. She explained in the survey that "Those days when I see a lightbulb moment for a student or they reach a pinnacle that always seemed out of reach are the best days." She had taught eighth-grade in the English department with her current PLC for 5 years. She was also the University Interscholastic League Campus Coordinator, the facilitator of on-campus announcements, and was a University of Texas Teacher Mentor.

Experience with Accessibility and UDL

When reflecting on her experience with accessibility, P1 mentioned that in high school, she dropped trigonometry to take horticulture because "I wasn't 'good at math.'" She mentioned that in college, she took her math courses twice and generally believed math was hard, and the researcher inferred these were courses she did not find accessible. Therefore, she struggled. Concerning professional experiences, she mentioned an experience where as a new hire, she was unaware of how the campus functioned and that it was challenging for her to remember campus-specific acronyms, codes, and procedures. The researcher concluded that this experience made P1 feel unable to access content to allow her to be successful promptly based on her reflection of how the experiences affected her instructional practices. She said, "For me, this was a good lesson in clarity for my students. I try to provide them with clear, succinct, and organized information from the daily agenda to assignment instructions."

P1 also referenced her experience in the collaborative teaching course when reflecting on her professional experience with accessibility. In the one-on-one interview, she explained that she had been doing collaborative teaching with a special education teacher for 10 years. In Texas ISD, collaborative teaching is when the general education

teacher and special education teacher collaborate on a course together. When reflecting on this course, P1 said,

I think just that in and of itself provides me with a different set of skills for looking at how we're creating something. Whereas one of my other colleagues has mainly only taught [preadvanced placement] for many years. And I think there's a UDL there, but I think it's a UDL higher up on the staircase that doesn't work for the kids down at the bottom.

Thus, P1 has a lens to support her PLC when looking at the entire scope of how students access the content that differs from her colleagues based on her experience working with a population with higher needs.

P1 also connected her previous learning to her current learning concerning the UDL and her previously learned Crain curriculum training provided by the school district. She explained the Crain session was provided in the early 2000s, a time she believed education was characterized by a shift in how kids could learn. P1 explained, “And [Crain’s] thing was always, the bar has to be as high as it can go, but you can't make it so high that your lowest kid can't get over it.” She connected that statement to the UDL sessions taken over the 2019–2020 and 2020–2021 school year, explaining that she saw UDL as something that

comes in to maybe give that kid a step so that they can get over the bar. . . . I feel like it's that cartoon of the kids trying to watch a baseball game that it's like, what's fair isn't equal and what's equal isn't fair. And it's everybody has the same height box, but the one kid still can't see the baseball game. But if you give everybody the box size they need, then everybody can see the baseball game. That's how I picture UDL and how it helps the kids with lessons and executive functioning, and completing their work.

Overall, the researcher found P1 to be a reflective practitioner in the field of education based on her reflections of her past and current learning and personal experiences.

Influences in Previous Teaching

When P1 looks at her craft through the lens of her life experiences and approaches to students, she identifies her craft's influences by naming the programs, authors, and instructional workshops she has attended over her career. She explained that the John Crain workshop on curriculum development she attended 16 years prior still impacted her work alongside the UDL and social and emotional learning professional development she had attended. She reflected that, "From Dr. Crain to UDling, I learned the importance of raising the bar and looking out for the struggling students and providing materials that are good for all." Adding to this, she identified the teacher-author Penny Kittle as an influencer on her approach to implementing individualized reading goals.

Concerning the influences of her craft, P1 referenced her PLC as a space where her team puts students first regardless of disagreement because they "talk through things" and "work well together." To learn more about this collaborative effort, the researcher asked her to expound upon this in her one-on-one interview. She explained,

when something is said, all of us are very quick to go, "oh yeah, that's true." Even though it might be something that I'm more adept at seeing first, I don't think any of us have any lack of seeing it if we were put to task to see it.

This collaborative effort was what she believed set her PLC up for success when teaching and learning.

P1 also shared in her one-on-one interview that she felt more thoughtful in her use of technology before the pandemic than she was after it started. She explained that technology was used every single day in pandemic teaching and that beforehand, Google Classroom was mostly used to submit assignments. She said:

Back in the day, maybe we would go a whole week without picking up the iPad. Or, there would only be one video that we had watched that integrated into the

lesson we are doing, that we would watch that video multiple times, but we would all watch it together in class. And there is a part of me that just feels like all the technology right now is just survival. . . . I don't feel like I'm utilizing technology as a classroom tool to enhance what is happening. I feel like I'm using technology as a bulldozer just to push stuff along.

P1's reference to "back in the day" showed the researcher she now had to shift her practices, beliefs, and understanding of her instructional context to better support her synchronous remote and in-building students through the pandemic.

Influences in Pandemic Teaching

P1 attended the UDL professional development provided by the district because

It sounded like one of the more interesting courses offered. . . . I think there's more I could do, but I am now thinking of the students with the most need and what I can provide each time I work through an assignment.

She explained in her one-on-one session that looking at the assignments through the UDL lens allowed her to see directions as kids needed to see them. She explained that frequently her directions were "too wordy" or "too formal for the kids." When reflecting further on the UDL framework's use, it was evident P1 perceived that her PLC continuously aimed to support all students while teaching in the pandemic. This was explicitly cited when P1 described her PLC's approach to improving their content and course delivery. She said, "Everything from the learning management system to the directions on assignments and trying to put that lens over, if it's good for one kid, let's make it good for all the kids." This was valuable for P1 because she frequently found herself trying to better deliver the course content to improve her students' access, ability to process content, and opportunities to show their learning mastery level. Use of UDL allowed her to look at different ways to overcome barriers that were evident for her learners in the virtual and in-building setting because the Google Classroom LMS was

the only way for content to flow amid the pandemic. With that came changes in course design and technology use.

P1 reflected on how her reason for using technology shifted, saying that the Google Classroom LMS was typically her classroom's "base" before the pandemic. This meant she did not depend on the LMS for every item of the day as she did in the remote and in-building contexts. Specifically, when reflecting on her use of technology during the pandemic, she said, "I feel like I'm using technology as a bulldozer just to push stuff along." During the pandemic, P1 and her team had to approach classroom routines in the context of the web conferencing application, Zoom. She explained in the one-on-one interview that after the class completed their 10 min of independent reading time, a classroom routine her PLC put in place to start each class period, she provided her students with time to do a 2-min table talk. The 2-min table talk was an activity where P1 gave students a question (e.g., Describe the conflict of your book to your classmate). In the pandemic, this activity was adjusted for the instructional context of having remote and in-building students. She explained:

Online, they're going into breakout rooms of three, four, five people and doing that conversation with each other. In the classroom, they are partnered with one other person who is in relative proximity to them so that just the two of them can have that conversation and have that social distancing.

Though she was providing physical and virtual space for students to collaborate as they did before the pandemic, she noted, "The in-class kids definitely aren't getting as much of a collaborative experience as the online kids are." She attributed this finding to COVID-19 social distancing protocols.

When asked if the pandemic and use of the UDL framework had changed her instructional practices, P1 confirmed a change. When reflecting on the pandemic context,

P1 explained that she did not move from her desk because she did not want to increase her contact with her students. In the one-on-one interview, she continued that she recently had a student test positive for COVID-19 and six other students sent home for COVID-19 contact, which had her very concerned for her safety. Thus, her practice of physically checking in on students, having side conversations, and grouping kids, had to be changed for safety purposes. With that change, she reported pros and cons. One example was noted when she reflected on her students working through a personal narrative:

We wanted to do some peer editing. And usually, in the past, we either have the kids print out their narratives, and they could trade, or they could just trade iPads. And this year, we said... you're going to have to email your partner your paper. It's just thinking through those things and how we're going to make it work.

P1 explained that the use of UDL while teaching during the pandemic positively affected her practice. She explained that she did not like to appear unprepared or uninformed and mentioned that, based on parent feedback, she did not think her students or families noticed she was new to these techniques. P1 said, "For me, it's affected my practice just in and of myself and probably not so much with the kids." She referred to the class's daily agenda. The team broke it down into steps so that if a student had issues online or could not come to school that day, the daily agenda was a tool that led students through the day's activities. All of the links were provided through the agenda. P1 reflected on the workflow, saying:

And then, as far as teaching it in class, the remote kids, once I give the instructions, I put them into individual breakout rooms and then talk to the kids in the room, ask if there are any clarifying questions or anything like that. And then once I've answered those in the classroom, I come back to my online kids, send a chat message to all the rooms who need me; what questions do you have? And then I start popping into breakout rooms, just one-on-one with kids to try and give them some sense of I see you, I hear you as an individual kind of thing.

P1 noted that this work was more the executive aspect of UDL, trying to help students manage the virtual and physical world because they were still tuning in and engaging with assignments virtually.

Content Delivery, Collaborating, and Application of UDL in the Pandemic

P1 felt as though she and her team collaborated to apply UDL strategies when providing content to students throughout the grading period captured in this study. When P1 was asked if she and her team used the UDL rubric to guide decision making for course content, she explained that she did not always use a UDL rubric: "I think that it's just thinking about my levels of kids and what's going to help the kids." Though the use of UDL was not formalized, P1 named instances where she had to think through barriers in the pandemic teaching context with her team to support her students. She explained that the PLC had been together for 5 years, so very little was formalized:

There just is not any time for that. . . . Sometimes we just talk to each other as people . . . when we're looking at something or applying the UDL as a PLC. . . . We just say, "That's going to confuse the kids."

This open dialogue of practice and delivery allowed the PLC to get to the point and address barriers. One barrier they had to tackle concerned the pace of the course and important content. P1 reflected:

I think that as far as another curriculum is concerned, we've definitely had to separate the wheat from the chaff and really decide what hits multiple TEKS that the kids need. As well as getting rid of things that, even though we love them, they're just not practical.

The discernment between what to teach and when is something the group, according to P1, referred to often concerning content and delivery.

Concerning campus and district support for UDL during the pandemic, P1 valued her time with her PLC and did not regularly lean on outside support to understand and apply UDL as an educator. P1 found it distracting to her team when others came to their PLC planning session saying: "When these new people are popping in, all of us, it's just a visible, 'Oh no, I have to be on stage.'" The researcher concluded that P1 did not see that campus and district support was a need for her application of UDL, and P1 confirmed this was the case during her one-on-one interview.

Case 2: Participant 2

Background

P2 was a 53-year-old female who had served at the same middle school campus in the Texas ISD for 21 years. The 2020–2021 school year was her 31st year in education. P2 explained that she had always felt called to service. When reflecting on why she was a teacher, she explained that she believed she could fulfill her calling by supporting teenagers in developing a lifelong love for reading and writing as an educator. P2 stated that she had learned a lot from her colleagues who shared their own successful experiences and professional best practices with her. She explained that she learned best from "people in the field" who were current with real-life instructional strategies. To keep her focus on her craft, she also enjoyed listening to motivational speakers who reminded her of her "why" and her heart for teaching.

P2 had taught eighth-grade in the English department with her current PLC for 5 years. She was also the middle school's ELAR department chair. The role of department chair allowed her to support sixth-, seventh-, and eighth-grade ELAR teachers and

students alongside the campus administration team and district-level support staff. During this study, P2 taught two sections of eighth-grade ELAR and three sections of preadvanced placement (pre-AP) ELAR.

Experience With Accessibility and UDL

When reflecting on personal experiences with learner accessibility and variability, P2 explained that her second son had struggled with an "I'm a slow reader" mindset, and she explained that approach to reading crippled his ability to attend to longer reading assignments. When thinking of her professional experiences with learner accessibility and variability, P2 explained that she had worked with a lot of students who believed they "can't write" or "can't read" well; therefore, she explained that some of her students were afraid to "push themselves in their reading, choosing instead to stay with levels and genres they've always read." She further explained that several of her students with dyslexia allowed their disability to be an excuse for being unable to complete work. In sum, P2 believed these personal and professional experiences kept her on alert for instructional strategies to help her son and students alter their mindsets. She noted: "A lot of focus is spent on what is going well so that they can first grow in confidence, followed by a growth in skill." She had learned that lots of encouragement was needed before any work got accomplished.

P2 decided to attend the UDL professional development offering in the fall of the 2020–2021 school year because she understood she served a variety of students who had varying learning levels in the remote in-person instructional setting. She aimed to learn how to further create lessons that would benefit all of the learners she served because it "is paramount to success this year. There is such a large expectation right now that no

students get left behind.” Overall, P2 saw the UDL professional learning opportunity as follows:

No matter what is presented, my reflections all center on how can the technique be presented in a way that is beneficial for all students . . . especially as remote learners have access to so much more at their fingertips when assessing knowledge.

The application of UDL to her instruction was relatively new to her considering her previous instructional context with the eighth-grade ELAR and eighth-grade pre-AP ELAR courses on her campus.

Influences in Previous Teaching

P2 said that the most beneficial professional development she had recently attended was geared toward finding effective digital platforms to assess students in creative, nontraditional ways. In the one-on-one interview, P2 recalled practices from her pre-COVID-19 teaching. She said:

In the past, I would have separated those two and made pre-AP be on their own feet so much more in that skill of, "you go dive in and find answers, and you figure out where that is," and I'm not sure this type of education, this type of setting is going to be successful if we don't do UDL this year for everybody. But typically, I would make . . . like pre-AP, when we just did figurative language, if you don't know what an illusion is, I would expect a pre-AP kid to go figure it out. And a grade level kid, I would explain it, with tons of examples. But this year, everybody gets it.

In essence, pre-AP students were expected to know things with little to no review or supports for review, and P2 admitted that way of thinking was relatively new to her and her previous instructional context based on the history of the pre-AP course. The researcher concluded that applying UDL was relatively new to P2, and she was experiencing a change in mindset, too.

Influences in Pandemic Teaching

The context of the pandemic and P2's growing UDL lens provided some shifts in her practice and perceptions. The use of the Google Classroom LMS did not change during the pandemic; however, P2's awareness of the workflow was heightened to better support her students. In the survey she reported her use of the Google platform (i.e., Google Docs, Google Slides, Google Forms) and other applications with which she was familiar were what she stuck to in this context because of her comfort level and desire to continue with what she already knew. In her one-on-one interview, P2 reflected more on this point, explaining she was making Screencastify videos to provide a visual component to her instruction and later planned to add Loom, an application where pictures would provide steps. Her goal was to branch out and use various assessment tools that would give her a glimpse into student learning because, at the time of the survey and interview, she still felt as though she did not fully know her students.

P2 realized during the pandemic that she "banked on" her use of proximity to know her students. She said:

A kid is much more attentive when I am close by. . . . I don't ever get to just walk around the room and spend 30 minutes just checking in with each kid because there are kids out in remote land who are feeling left out and not paid attention to if I'm not looking at them.

This made her realize that though she was providing instruction in person, the restrictions for instruction while in the building were limiting her practice and her ability to build a thriving classroom culture. P2 reflected that her instructional delivery had changed due to COVID-19 protocols and safety procedures. She said: "I don't move around a whole lot, especially now that we have 50% of the kids in the room. And so my several classes are

pretty full." She also recalled how she perceived herself as not getting to know her students well. She explained:

There's just none of that time where you're just being with kids and learning about kids and hearing them talk. And because even between classes, they're standing in the hallway while we clean our desks. So, there's not even that time, where you're in the back, and they're just talking to each other, and you listen in and learn stuff, and you check in with them, and it just feels like none of that is happening.

When reflecting on her instruction, she mentioned the same desire to know how her students learned at home. She explained in her one-on-one that most at-home learners turned their cameras off, and she reflected that she missed getting body language feedback. She added, "The few that stay on camera are my kids that are highly attentive, so they're not the ones that I'm worried about for that part of it." P2 valued the way relationships and making connections could grow her classroom culture, yet the online context inhibited her ability to connect in the ways she had prior to the pandemic. She provided the following example when reflecting on her inability to grow relationships with remote learners:

We've been told not to mention anything that's around them in their rooms to draw attention to their settings because of the disparity of what someone might have in someone might not have, which is in the classroom, a little girl walked by me, and she had the cutest little hand sanitizer. It's small, but it's a hand sanitizer bottle. And I can comment on that because she's right there, and we can talk about where she got it. But if I see it on a desk in someone's house, I'm not supposed to say anything. So it feels like, "Aw, dread. I would like to talk about that." . . . So it just feels like that barrier is hard.

P2 also noted that her inability to check-in on her remote students inhibited her ability to know their progress developing skills compared to her in-building learners. For example, P2 explained what it would look like if students worked on a writing assignment in class as compared to a remote learner:

I watched a kid who left his camera on the other day, and I thought he's not really writing, like he's pretending to write, but he's not. And so when it was over, I said, "Could you take a picture of what you wrote?" Because we wrote for seven minutes, and he wrote two lines. And I said, "What was going on?" He goes, "I just couldn't think of anything." Which if in a classroom, I could see that walk over and go, "Hey, here's an idea. Here, write about this." So part of that, that's where I have trouble as an educator because I feel like I'm not serving them best, right? You know what you would do for a kid who was there, and you just can't do it. Well, I can't just do it.

In this transaction, P2 expressed feeling barriers between herself and her remote students, recognizing what she could and could not do during synchronous in-building and remote instruction.

P2 reflected on her inability to control the learning environment occurring at home. Some of her students were learning in pods or situations where several students were grouped in a home during remote learning. She explained:

You know how you turn to your partner that says, "Hey, where are we?" And your partner leans over and says, "Hey, here we are." But they don't do that because they don't. . . . There's no one there. Well, other than the children who are all sitting in rooms together at their houses, but they're being distracted. . . . So, there's lots of those learning pods with kids that are all together at home, but they're not in the same class. So, it's not a helpful tool to them as far as being on task. They're just a little distracted. Like when they turn their mic on and I'm hearing history in the background and math in the background, and I think, "That's got to be hard to pay attention in English." Socially, it's what they need.

When asked if the pandemic and use of the UDL framework had changed P2's instructional content and practices, she confirmed a change. P2 explained how this year she always provided a student example or "Here's what a final product looks like," for all students to reference. She explained:

There's always a mentor text for everything for them to look at. And then just lots of, like before they wrote their first-person narrative, we just gave them lots of first-person narratives that you could go read of every kind of level. From just kind of basic ones to ones that were professionally written to just let them see different examples, trying to think of what else.

Content Delivery, Collaborating, and Application in the Pandemic

P2 found shifts in content delivery, her form of collaboration, and her ability to apply UDL as instruction continued. Specifically, she explained she was continuously trying to figure out a better way to make her delivery of content on the LMS a one-stop where all needed content was available for students. To get to her point, she detailed the value and collaborative effort made to reach her goal when working with her eighth-grade ELAR PLC. P2 reflected on each gift her PLC members brought to the team, mentioning that P3 honed in on available research and remembered it all when it came to planning, and P1 kept an eye out for how the professional development could be applied to the grade level's collaborative students. She reflected that her strength was to focus on different ways to assess student learning. She noted:

By bringing so many different angles to our meetings, we are able to plan fuller, more inclusive lessons. . . . Our PLC creates an equal learning platform for all students. If a completed student example is necessary for some, we provide it for all. If a tutorial video would help some, we create one for everyone to access.

She reflected on a typical workflow assignment and closed with,

It feels somewhat elementary sometimes to me that it's so laid out that I want them to figure some of it out on their own, but because there's so many that I don't know if they're figuring it out on their own, we're laying it out for everybody.

Case 3: Participant 3

Background

P3 was a 41-year-old female who had served at the same middle school campus in the Texas ISD for 8 years. The 2020–2021 school year was P3's 16th year in the profession. P3 explained that she never wanted to be a teacher but had always enjoyed kids and being around them. In college, she majored in premed for the first 3 years and took mostly science and math courses with little to no interest in the content. Then, she took a chance and enrolled in an introduction to education course and fell in love with it, saying,

In this course, I had the opportunity to work with fifth grade [English as a second language] students in a Title 1 school in Lansing, Michigan. I fell in love with them, switched my major to English, and decided to become a teacher.

She has taught eighth-grade in the English department with her current PLC for 5 years. During this study, P3 taught three sections of eighth-grade pre-AP ELAR and two sections of seventh-grade pre-AP ELAR.

Experience With Accessibility and UDL

When reflecting on her personal experience with learner accessibility, P3 shared a story about her struggles saying, "I was the kid who always bombed the test, had to come in during lunch for tutorials, then retook the assessment and brought my grade up." Though she was an A student, she attributed her success to the many retesting opportunities she was provided and to her high performance on daily work and homework. When looking at her professional experiences regarding learner variability and accessibility, P3 honed in on her remote students who struggled to access online

course content due to poor internet connections or an inability to focus or follow along. She believed both her personal and professional experiences had reinforced her belief in the importance of providing students with choice. This had challenged her to think about potential barriers to learning when designing instruction. P3 decided to attend the UDL professional development offering in the fall of the 2020–2021 school year because she wanted to learn how to create an engaging online learning environment that supported all of her students. In the one-on-one interview, she said:

One of the biggest, I think takeaways that I got from the UDL was just providing kids with a lot of choices and a lot of different opportunities to show what they know instead of just kind of a one-size-fits-all or here's what you're doing, type thing.

Influences in Previous Teaching

P3 referenced professional books and the author, Penny Kittle, when asked about current teaching practices, explaining that because of her previous learning, "Independent reading is an everyday occurrence in my classroom, and I feel it's so important to instill a love of reading in my middle schoolers." Regarding influences on her craft, she referenced her PLC as a space where her team helped her problem-solve and encouraged her to challenge herself. P3 expressed that she felt very fortunate to be on a PLC with three other educators and the special education teacher (who was not a participant). She explained that whenever the team designed a lesson, one colleague always "jumps in and says, 'Well, what about this?' or, 'I don't know if that's going to work for my collab kids' or 'How can we modify it for the [gifted and talented] kids?'" This exchange of ideas made P3 feel the PLC didn't necessarily need to bring out the UDL framework all the time, explaining, "It's just kind of ingrained in our PLC. We've worked together for the

past 5 years, and we all feel pretty comfortable together in asking questions and voicing our concerns." P3 also identified district staff called educational partners, whom she found helpful with technology applications instead of curriculum support. She said she used the educational partners to know which applications were best for the delivery of content, explaining, "I feel the support with the curriculum has just come within our PLC."

Influences in Pandemic Teaching

P3 expressed that teaching synchronously to remote and in-building students was more challenging because balancing both groups of students and making sure they had the same learning experiences was challenging. P3 felt that everything the team had done in the past had to be redesigned. She explained that there was not a lot she did the previous year that she would do the same way this year. Though serving in-building students, P3 reflected that social distancing protocols created the most need for changes. She explained:

The kids who are in-person aren't able to do some of the same activities. All of my students are in rows, and they're facing forward, and that was something that was mandated by the district that we set up our classrooms that way. We have strict seating charts, and the kids have to stay there for contact tracing. Activities that I've done in the past, where the kids are standing up and walking around the room or moving to a corner based on how they answered a question, partnering up with someone else, working in groups, we haven't been able to do that this year. And then, just for the kids who are at home, figuring out how they can interact with their peers, even though they're by themselves at home with their iPad. How do I get them interacting with other kids in the classroom?

P3 aimed to overcome that challenge by having her in-person kids participate in the Zoom session; however, the district protocols did not allow that due to Wi-Fi bandwidth restrictions. She explained:

I have my in-person kids and then my Zoom kids; I usually project them on airplay so that my in-person kids can see them. But the challenge is my Zoom kids can't see my in-person kids. So, it's just a one-way street, but at least we can get the feedback from Zoom kids.

This was a barrier the PLC members aimed to address in planning.

In this environment, P3 said she found herself "constantly learning as I go" and trying to make remote learning equitable compared to in-building learning. She explained:

Just talking with kids and having conversations with them about the pros and cons of being in-person and remote, my in-person kids all say there are fewer distractions in school. They're able to get things done because they don't have a video game or can't take out their cell phone; they can't turn on the TV, they don't have the rest of their family there to distract them. So, I think that that's probably why the in-person kids are able to get their work done, and the remote kids sort of struggle. Because when I look at work completion, the kids who aren't turning in assignments are the remote students. And it's easier for me as a teacher to check in with my in-person students, right? And I think if you're in-person, you feel more comfortable asking a question than when you're in the remote environment. That's just something that I've noticed with my kiddos.

While reflecting on this point in the one-on-one interview, P3 realized she was not able to do quick check-ins on learning progress with her remote students either: "It's a lot harder when kids are remote to check-in with them and to see if they're truly understanding." She mentioned that though students were asked to keep their screens on, that could not be mandated. She expressed empathy with why students might not want their screens on and referenced how learning pods can be distracting, too. She also said that the remote learning environment had, on the other hand, been a thriving environment: "Just the ability to work at your pace . . . I feel I'm learning a lot about kids and how they learn, right? Through this whole experience."

Content Delivery, Collaborating, and Application in the Pandemic

P3 found shifts in content delivery, her way of collaborating, and her ability to apply UDL as instruction continued. P3 explained executive functioning seemed to be an immediate challenge in pandemic teaching. In this context, she tried to put more in writing because her remote students sometimes could not log in to Zoom, or they were kicked off the platform and would come back 10 min later. She explained that as a team, her PLC addressed barriers by creating a daily agenda and posting it in their Google Classroom daily with links and documents tied to it. She explained:

So, it's basically as soon as kids open the daily agenda, anything that they need for the day is right there. So, if a child does get kicked off of Zoom or is having trouble with WiFi, they can always come back and refer to that daily agenda to know what they're supposed to be doing and where we are in class. So, I think that that's helped a lot, both the in-person kids and the kids who are remote.

This support proved to be good practice for all learners and not only remote students.

Having a checklist improved her practice and pacing.

P3 also noted another example of change when she reflected on her students work load and time:

I feel I'm constantly learning as I go. I think one of the things that I've learned this week is that we've been giving kids... too much to do when they're learning in the remote environment. It takes a lot... There's more time it's needed between tasks and I think this week, especially with our personal narrative, we're trying to revise it and we put too many tasks on the kids' agenda. And so maybe instead of trying to do as many tasks, we need to do fewer and just really dive deeper into those.

Though students were accustomed to working in groups in the virtual and in-building setting with writing and P3's PLC tried to make it manageable, the PLC members had to reimagine how to make the best practice come to life for both types of learners during the pandemic.

Case Study Findings

This section provides an exploration of findings and common themes that emerged with an emphasis on Knowles's (1975) theory of andragogy. Several other topics are discussed in the following sections, including findings that stemmed from how use of the UDL framework evolved, how it was being implemented, and what changes occurred as a result of applying UDL practices. The researcher identified three themes using deductive coding from this study: change in purpose, change in course materials and content delivery, and change in teaching perspectives. The patterns discussed show one to several subthemes depending on the type of change observed.

The theme, change in purpose, was supported by participant decisions to engage in new learning despite their previous experience and self-concepts. The subtheme was: ready-to-learn based upon life situations created a need-to-know and apply for survival. The theme, change in course materials and content delivery, was supported by how participants selected and delivered content. The subthemes were: (a) the validity of the content, (b) how the content was structured, and (c) the importance of clarity concerning how information was being delivered to their students. The next pattern supported a different theme, change in teaching perspectives. First, the educators modified teaching strategies as their awareness of learner variability increased. This led to innovation and adoption of nontraditional teaching methods as the participants saw how their students learned differently in their synchronous remote or in-building settings. As the study progressed and changes emerged in instruction, it became apparent that content delivery was not something that occurred on a whim or without intention. Educators began to share their ideas with colleagues even more during their PLC time, and they came to

believe UDL practices benefited all students. Table 4.5 provides an overview of the findings and alignment with the framework.

Table 4.5

The Multiple Case Study Findings and Alignment

Research question	Theme	Knowles's theory
Research Question 1 What practices, if any, of the UDL framework with district-approved digital tools do three eighth-grade ELAR educators already employ during the pandemic, and what is their comfort level within the synchronous remote and socially distanced in-building learning environment?	Change in purpose Survival mode	Self- concept experience
Research Question 2 How does the district's UDL implementation impact three eighth-grade ELAR educators' UDL application of instructional practices using district-approved digital tools in a synchronous remote and socially distanced in-building learning environment?	Change in course materials and content delivery • Validity of content • Content structure • Clarity	Readiness to learn
Research Question 3 How are teachers' perceptions regarding the application of UDL shaping synchronous remote and socially distanced in-building learning practices?	Change in teaching perspectives • Modifying teaching strategies • Innovation • Beneficial for all • PLC Collaboration	Orientation to learn Motivation to learn Need to know

Note. UDL = universal design for learning. ELAR = English language arts and reading. Research. PLC = professional learning community. Theoretical concepts from *Self-Directed Learning: A Guide for Learners and Teachers*, by M. S. Knowles, 1975, Cambridge.

Research Question 1

The first research question was developed to provide opportunities for the participants to discuss their comfort level with the pandemic teaching and learning environment and their use of UDL. The aim was to identify and discuss general online learning concepts and district-approved digital tools to know how educators applied previous pandemic teaching and learning to their instructional practice specific to lesson design and their use of UDL. The data analysis revealed a change in purpose for all three participants. One subtheme was revealed through this research question: ready-to learn-based upon life situations created a need-to-know and apply for survival. Based on the interview questions, P1, P2, and P3 had the same professional learning background related to the UDL framework. The district-provided UDL professional learning opportunity was optional, and when participants were asked to reflect as a PLC on what their motivation was for signing up to learn more about UDL, all three attributed it to survival. P1 expanded on this, saying, "Not just survival for us, but survival for the kids too, that we're providing more support and scaffolding of how to get your work done." The participants noted their change in purpose for learning and applying UDL during the pandemic was necessary to improve their comfort level in the new instructional context and to improve their use of digital tools. P2 said:

All three of us knew UDL was going to be so necessary because we're going to have learners everywhere. And so, our pre-AP kids sitting at home don't have the advantage of being here with face-to-face contact, and so there was a greater desire to level the playing field, even knowing ahead of time that that was going to be an issue this year, more than usual.

Their purpose for instruction was no longer about having the opportunity to provide content to students. It was about how students were going to access content

beforehand. They all reflected that it was an ongoing learning experience, and they were thankful for each other and their PLC. In the end, all of the PLC members acknowledged that UDL reminded them to be purposeful in how they provided materials to students and how they asked students to show mastery of the content.

Research Question 2

The second research question was developed to identify how educators implemented the UDL framework using district-approved online learning tools during the pandemic. The aim was to provide a format that might support educational leaders when creating a district-wide transitional plan. The data analysis revealed a change in course materials and content delivery for all three participants. Three subthemes were revealed through this research question: validity of content, content structure, and clarity. Based on the interview questions, P1, P2, and P3 consistently referenced their efforts to validate what they were teaching and how they structured their content for their learners while also evaluating the assignments for clarity and types of appropriate assessments.

P1, P2, and P3 looked at the validity of the content they taught amid the pandemic. Though the teachers were to teach to the state standards and keep in mind vertical alignment, the participants also made decisions about the depth of what they taught and aimed to get the "biggest bang" for long-lasting learning. As reflected in all three participants' one-on-one interviews, they agreed they changed much of the curriculum because of their shortened time and the unavoidable inequities of working simultaneously with remote and in-building learners. P1 explained that as a whole, the team was more thoughtful on what content they selected during their synchronous 45-min class period. P1 and P2 explained how the team approached "Watch it Wednesday," an

activity where students watched a video to pull out the meaning for application to a literary term or concept. P2 said, "Instead of just putting one in a slot, it's like, which one fits now? And I know we do that because we've changed midweek." P2 shared that the PLC created a Google slide deck with examples of introductions for an assignment and allowed all students to access the background knowledge information. She said:

In the past, I would just say, "Okay, pre-AP kids, everybody, take your book out and talk to your neighbor about the lead of your book. What did your author do to start the book?" And they could talk about that . . . my kids in the room can actually turn and talk to someone; the kids at home can't. Unless I put them in a breakout room.

Each educator's moment of pause and reflection on the flow of the content and the selection of materials made a difference in the structure of the assignment or assessment.

All three participants were hyper-focused on the structure of the content within the LMS because the dictates of the pandemic meant all Texas ISD educators were required to move every aspect of learning through Google Classroom. Consequently, the eighth-grade ELAR team realized they had to revise their plans for delivering instruction. Their collaborative practices among themselves and with the department had to shift to do this. P1 explained that the entire eighth-grade staff realized the need for equitable instruction in the new environment. She explained:

We are literally doing the same exact thing in both settings with the kids. We want the kids at home to be able to talk to anybody in the school and say, "Hey, how do I do this assignment?" And not have that disjointed feeling between if you're online or if you're at home.

This was a barrier the group said they addressed weekly, if not daily, to ensure their students fully understood the expectation and knew how to access information on the LMS or other applications as needed. P2 reflected on how appreciative she was that the students were accustomed to being in a one-to-one digital device district. She said: "I

can't imagine teaching that layer before getting to teach any context." P1 explained she had her students troubleshoot with each other to be sure the content was accessible to everyone. She said: "Whenever there is a technology question, I don't want to use my brain space to learn the kid's side of the iPad. . . . So I always tell them that they're my best experts."

The participants also looked at various district-approved devices to support the structure of the content they were providing students. All three agreed they used multiple applications within their LMS, Google Classroom. When deciding which to use, P1 reflected on a recent PLC conversation about using the presentation application Nearpod for the upcoming lesson. She explained the number of clicks, the purpose of the application versus the use of Google Slides, and as a group, they decided Slides would be better for structure and to perhaps use Nearpod if check-ins on understanding were needed for a lesson during direct teaching. Discussing the matter as a team to better understand needs through a UDL lens supported that decision.

P1, P2, and P3 expressed concern for the level of clarity they achieved when delivering content through the LMS. Specifically, P1 explained UDL had been helpful because it allowed her and her PLC members to think about ways to make the workflow more manageable for themselves and their students in the LMS. Their goal was to facilitate student navigation of the many different educational applications, so they tried to keep them in the Google Classroom as much as possible. Their aim was to avoid the need for students to navigate out of the LMS too often, but then they were also intentional about what the output would be. To address the barriers faced by students with challenges related to executive functioning and meet their goal, P2 created daily

agendas for the PLC to use in their Google Classroom. All participants said that supported their students' ability to navigate from the LMS to other applications like Flipgrid or other aspects of the Google Suite like Docs, Slides, and email. This act allowed students to access the necessary information seamlessly.

Research Question 3

The third research question was developed to identify how educators perceived and used the UDL framework using district-approved online learning tools during the pandemic. The data analysis revealed a change in teaching perspectives for all three participants. Four subthemes were revealed through this research question: modifying teaching strategies, innovation, beneficial for all, and PLC collaboration.

The data analysis revealed that all participants found themselves modifying their teaching strategies after they learned about UDL. P3 explained:

My idea of UDL has shifted too, in the sense that before I think I thought of it just in the academic setting, providing . . . so for example, we just gave the monkey man assessment, and everyone received the study guide 5 days ahead of time. It wasn't just the grade-level kids, or the kids who had that as a part of their accommodation. It was for everyone.

P2 added:

There's been a much more conscious effort on our part. Because we look at the whole week and the checklist for the week, and we make sure there's never more than a kid can accomplish. Because we're laying it out for them. Where here's everything due this week, and when it's due. Which then from our side is a mindfulness of, is that doable?

Participants also found ways to pivot their practices and be innovative in their application of UDL. As reflected in all three participants' one-on-one interviews, they agreed they had changed much of the curriculum because of their shortened time and awareness about the inequities between remote and in-building learning. When asked to

reflect on whether they felt they were doing twice the work or planning for two different courses, all three said they did not feel that way because of their application of UDL. P2 explained:

I don't feel like it's two separate things. I think we are so deliberate in our planning to make sure. And I think it's mostly remote. That's our main, how are we going to make sure they all get it, that whatever we plan for them, we make sure it works for our kids in the room... I don't feel like I'm planning two separate things. I think we are just making sure that everything we plan is best for remote.

Building on that reflection, P3 revisited her concern about opportunities for collaboration or discussion of content that was presented in the in-building versus the remote setting, saying,

I'm always conscious too. Do I give them opportunities to talk or to talk with peers? Am I putting them in breakout rooms? Do you know what I mean? I think I'm doing more work, but I don't feel like it's two different courses.

All three participants found themselves looking to see if their practices were benefiting all students and found UDL was useful for growing their practice. P2 explained how they changed an assignment that was an essay to an audio note. The team made this decision because it gave students a choice "when they feel like there's no control over so much."

All participants said that UDL was something they would recommend to other school district leaders as a model for instruction in a pandemic or not. P1 explained, "Why wouldn't we do something that's good for every kid? That reduces the anxiety that provides a way for kids to make it through the day a little easier?" P3 said she valued the "barriers piece" because when the team designed something, they were always thinking of the problems the kids could encounter, and she explained: "It's made us more purposeful with our planning and our instruction." She continued by sharing a moment where she covered a class for the week due to a substitute shortage. The assignment that

had been left for the class was not "UDLed," meaning the teacher had not made it accessible for her remote or in-building students. P3 reflected: "There were so many questions that I had about the assignment, but they were questions that I know our PLC would have explained." P1 tied in the parents, saying, "I think we have now trained our parents that, no, no, your child has everything they need to complete the assignment."

P1, P2, and P3 noticed a shift in their collaborative practices with the use of UDL. The team still held virtual meetings to plan, and although they met daily, they missed the off-hand reflective moments. To address that barrier, the team began sending quick texts or emails in the moment and agreed to check these messages more often. They still shifted practices and adjusted as needed. It simply looked different under the constraints of the pandemic because safety mandated it. P1 mentioned that they often had to shift their assignments or assessments based on new protocols, so as a PLC, they agreed to make the adjustments and move forward. What they had learned about UDL had allowed them to be more flexible as a group because their assignments were already as "UDLed" as they needed to be to ensure opportunities for success for all learners.

Summary

This multiple case study provides insight on the application of UDL in an attempt to fill the research gap regarding how UDL strategies, when integrated into initial course design and used in conjunction with digital tools, can help educators meet the diverse needs of students and grow teachers' instructional practices and efficacy amid a pandemic. The teaching and learning practices were explored of three eighth-grade ELAR teachers who were providing synchronous remote and socially distanced in-building instruction in the Texas ISD. Through the study's online questionnaire, two one-

on-one interviews, a focus group session, and document collection, the researcher analyzed and cross-analyzed data to gain insight into how use of the UDL framework in the synchronous remote and socially distanced in-building learning environments helped teachers meet the diverse needs of students amid a pandemic.

Change in instruction is typically a slow process, yet in the pandemic context, evidence emerged that it was not slow when educators are forced to shift into survival mode. In this context, this willingness to change quickly led to the PLC members' use of UDL to plan lessons that could address the barriers to access that arose in the synchronous remote and socially distanced in-person settings imposed by the pandemic. Furthermore, participants' responses throughout the study showed evidence of change. Change in purpose, change in course material and delivery, and change in teaching perspective were three main themes that emerged. However, delivery of content and change in delivery methods occurred more quickly during the pandemic because the teaching perspective needed to shift before any new action could be taken. In sum, the conditions of the pandemic led to changes that occurred out of a need for what the participants called “survival” of the educator and the student. Measuring the extent of change would constitute further research not allotted within this study's time frame.

CHAPTER FIVE

Conclusions, Implications, Limitations, and Discussion

Introduction

The purpose of this qualitative multiple case study was to gain insight into the application of UDL strategies to contribute to the literature on the effectiveness of UDL-based practices in addressing learner variability during a pandemic and traditional schooling. The general problem raised in this study was that K–12 leaders were confronted with the complex task of designing sustainable system-wide pandemic teaching plans that required expert, prescriptive, and comprehensive solutions, not singular concepts geared to inform individual classrooms, courses, or faculty (Bailey et al., 2014; Garcia, 2019; Halverson et al., 2012). A qualitative multiple case study format was chosen to provide insight from the perspective of three eighth-grade ELAR educators who were teaching in a synchronous remote and socially distanced in-building learning environment in a one-to-one public school district. The aim was to learn more about the effectiveness of UDL implementation and application during the COVID-19 pandemic.

Knowles's (1975) theory of andragogy was the theoretical framework used in this study. This theory involves a set of assumptions for designing instruction with learners who are self-directed rather than educator-directed (Ortiz, 2014). The framework was used to guide the research questions. As in the Finn (2005) and Ortiz (2014) studies, Knowles's (1975) theory of andragogy supported the research questions in this case study by providing an understanding of how learning occurred when case participants learned about the UDL framework. Three eighth-grade ELAR educators from the same PLC

provided the case samples. Instruments in this case study included a digital survey, two one-on-one interview sessions, one focus group session, and summary of collected digital documents. The researcher analyzed respondent quotes to explain or support participant views and then compared their responses to ascertain similarities or differences (Miles et al., 2014; Yin., 2014). The researcher triangulated the data to provide more in-depth insight as to how the activities facilitated the participants' goal of developing an accessible curriculum in the synchronous remote and in-building environments (Seidman, 2013; Stake, 2006). The analysis continued with an iterative process of categorizing data to make connections until saturation was reached (Miles & Huberman, 1994; Stake, 2006). Members were invited to review the narrative and survey style responses, and an independent reader reviewed the results (Lincoln & Guba, 1985). In the exit interview, participants were able to review all transcripts and data summaries and ask further questions.

This chapter provides a discussion of the study's implications, including factors that may have influenced the study. Implications are based on responses to the research questions and the theoretical framework for the study. Recommendations or suggestions about the study's findings connect the community of practice professional development program and K–12 education. The researcher connected the goals of the research to the findings to show connections made to the themes and to illuminate the need for future practice and research. These recommendations include ways UDL professional learning can be expanded to support teaching and learning in all instructional settings. Finally, the chapter closes with overall conclusions from the research.

Summary of Findings and Conclusions

Three main themes and eight subthemes emerged from the data analysis. The themes that arose during the interviews were illuminated by the six elements of Knowles' (1975) theory of andragogy, providing further insight into what educators explored for themselves. An overview of the major themes concerning the theoretical framework is discussed. Table 4.5 provides an overview of the findings and their alignment with the framework.

Change in Purpose

The researcher's goal for the first research question was to identify and discuss general online learning concepts and district-approved digital tools to know how educators applied previous pandemic teaching and learning to their instructional practice specific to lesson design and their use of UDL. This question was also designed to provide insight that might support educational leaders when creating a district-wide transitional plan during a pandemic. The subtheme, ready-to-learn based upon life situations, exposed a need among the educators to know and apply UDL instructional practices for survival. When participants discussed the term "survival," it was in the context of their purpose for teaching. During the interviews, all three participants provided background information about why they became educators. This was important for the researcher to understand when looking at Knowles's (1975) six key assumptions because the information showed how learning may occur and how an adult uses experiences to identify the need for further learning.

Each case had their varying purposes for working in public education. P1 became an educator because she loved learning and liked to see kids learn. P2 felt called to

service, so she became an educator to help others in their journey of becoming lifelong readers and writers. P3 became an educator because she loved being around children. During pandemic teaching, none of the participants perceived they could achieve their purpose for being in the profession. The participants' narrative responses revealed a change in purpose in specific examples relating to their experiences implementing and applying UDL in their courses after taking part at the beginning of the year UDL professional development.

The participants reflected on their comfort level within the instructional contexts imposed by the pandemic, and all agreed the information and guidance they got from their PLC increased the ways they applied the framework so that they could feel like they were meeting their students' needs achieving their purpose as educators. Through their PLC time, they were able to review aspects of their current practices to see how they could apply UDL concepts to them using district approved digital tools so that their students could access the materials and show they understood the content. Collectively, the participants were confident in their use of technology and worked together to overcome barriers in the synchronous remote and socially distanced in-building instructional settings. All of the participants were motivated to improve how they approached accessibility because not doing so would be detrimental to the student learning they aimed to promote. This action aligns with Knowles's (1975) self-concept experience. A similar change was found by McQuiggan (2012) who showed virtual education requires online teachers to transform their teaching practices and challenges educators to view education from a new perspective. Rice (2006) noted the online K–12 educator also evolves to show clear expectations for ongoing parent contact, protocols for

communication and feedback, and clear expectations for the online course's access, pace, and integrity. As the participants learned more about the UDL framework and began to use the language of UDL in their PLC, they discovered a new way of thinking about teaching and learning that increased their comfort level with the instructional setting. This, in turn, provided some sense of peace during their mode of survival.

Change in Course Materials and Content Delivery

Through the second research question, the researcher aimed to provide suggestions for successful remote and in-building instructional practices using district-approved digital tools. These suggestions would grow from professional learning that was provided so educators could implement the UDL framework using district-approved digital tools during the pandemic, which could provide a format that might support educational leaders when creating a district-wide transitional plan. The data analysis revealed a change in course materials and content delivery for all three participants. Three subthemes emerged through this research question: the validity of content, content structure, and clarity. During the interviews, P1, P2, and P3 consistently referenced their efforts to confirm their teaching, how they structured their content for their learners, and how they evaluated their assignments for clarity and types of appropriate assessments. The participants shared a consensus that the materials used during course delivery were chosen to increase accessibility and reach all learners in any learning environment. Additionally, the participants' awareness of UDL affected the PLC's practices concerning student learning. This aligns with Knowles's (1975) element of andragogy in using past experiences towards current practices. All participants had the opportunity to teach in the synchronous remote setting in the spring of the 2019–2020 school year, and they all

pointed to that experience as a learning opportunity that had them attend the UDL training. They agreed their fall 2020 pandemic teaching experience and the UDL professional learning changed their teaching practices and the content that they delivered in the 2020-2021 school year. The result was that the PLC aimed to maximize their use of the district-approved applications and the work flow of the LMS to be more accessible for all students.

During the study, the PLC members reflected on the workflow and delivery of what they assigned, including the method of how materials were provided to students and what materials should be chosen. Though they stuck to the digital tools they were accustomed to using, they thought through how students received the information. Frequently, they provided videos, checklists, examples of products, and step sheets to support all students and not only those students identified as needing special education or instructional accommodations. This made all content on their LMS easily accessible to students and parents in the pandemic. These findings build upon Coy's (2013) and Ortiz's (2014) studies where teachers were more likely to present information using multiple means according to UDL guidelines and that teacher alignment varied with the UDL framework during individual lessons.

Though participants were teaching in two types of instructional contexts at one time (i.e., synchronous remote and in-building students), they did not see themselves as teaching two different courses. The participants worked together to create content that could be delivered in any setting, and they attributed that to the fact that the district had already adopted a one-to-one device policy, so the students and teachers were already familiar with the digital platforms used before the pandemic. This foundational knowledge made it easier to think about accessibility, problem solve, and reimagine ways

to collaborate in the pandemic teaching and learning environment. The PLC members reflected on overcoming the barriers imposed by social distancing protocols for activities that were typically carried out in groups. Solutions were implemented to bypass barriers and the PLC members consistently checked in on students and families to determine needs for added improvements.

The participants had access to district support throughout the UDL framework implementation, yet they did not find it useful or needed. When asked what supports were available for the UDL application, the PLC members said they had access to a campus administrator and two educational partners. An educational partner is a person who supports technology integration and content alignment with district curriculum and state standards. If another staff member outside of their PLC was needed, the technology minded educational partner was usually consulted for quick, professional development on an application or on ways of delivering a content item on their LMS. Collectively, the participants found their PLC and their special education collaborative teacher to be all they needed for discussing their application and implementation of UDL in their course.

These findings are unique to UDL course design research and instructional practices and are in alignment with DuFour and Reeve's (2016) PLC foundational work where educators collectively assumed responsibility for student learning, established a guaranteed viable curriculum, implemented curriculum-based formative assessments, identified needs of students, and created a system of interventions (pp. 69–70). The findings of this study are unique because of the context of the pandemic. Though the PLC had worked together in years prior, the pandemic may have created a higher need for collaboration thus creating a sense of unity while learning. In the six assumptions of adult learning, Knowles (1975) implied this could happen based on their orientation to learn.

This finding also adds to the findings of Hough (2004) and Fishman et al. (2013) because the PLC worked online as a group during their meeting time thus growing their professional development in a virtual setting to meet the new safety protocols put in place for the school year.

Change in Teaching Perspectives

The data analysis revealed a change in teaching perspectives for all three participants. In the third research question, the researcher had four goals related to this type of change: to share the application of UDL professional learning within the PLC during the pandemic and beyond, to learn how teachers may benefit from addressing learner variability with the UDL framework, to understand fundamental instructional strategies in their instructional contexts, and to share how educators use the pandemic as a motivation to learn and apply UDL. Four subthemes were revealed while answering this research question: revising teaching strategies, innovation, beneficial for all, and PLC collaboration.

All participants found themselves revising their teaching strategies and reflecting on accessibility because they learned about UDL. As the three participants navigated the evolving instructional setting (i.e., a setting that transitioned from synchronous remote to synchronous remote and socially distanced in-building), they modified their teaching strategies to fit the needs of their virtual classrooms so the material would be accessible to both remote and in-person learners. They continued their use of the LMS and district-approved applications and reflected on assignment and assessment strategies and students' workflow. With this pivot to online instruction came innovation. All three educators had to think of ways to encourage students to collaborate and have social

interactions that were appropriate to their needs and well-being as teenagers. Specifically, they aimed to have their remote and in-building learners feel as if they were a part of the same classroom. The participants never thought of the two groups as separate, which proved to be best for their well-being and that of their students. This led all participants to come to the realization about the supports needed to increase accessibility for all students and not just those highlighted by outcomes or feedback they were receiving from the community.

Collectively, these findings confirm what was said in Chapter 2: that a UDL-inspired course design positively affects user perceptions and academic performance (Coyne et al., 2004; Kennedy et al., 2014; King-Sears et al., 2015). P1, P2, and P3 often found themselves asking if the unit, lesson, assignment, or assessment was "UDLed" for all students. This, in turn, shifted how the PLC members worked together. The context of their work environment changed in the sense that they refrained from meeting in the same room daily, yet the depth of their discussion on their use of time, materials, and resources became more intentional. They believed their conversations shifted to reflect a more holistic view of the grade level they were teaching instead of being course driven.

Implications

Research and Practical Implications

During the pandemic, districts were charged with ensuring all students received an education either in person or remotely. In the summer of 2020, the Texas Commissioner of Education explained: "We cannot allow this public health crisis to become a generational education crisis." With this charge came many obstacles and the

responsibility of providing an appropriate learning environment for all students, despite the constraints imposed by the pandemic. Many aspects of the learning environment were disrupted when schools were forced to transition from traditional to pandemic teaching, and the district leaders understood they would be held accountable in the long term. Understanding the implementation of UDL in K–12 online environments was a critical theoretical and design consideration in these unusual circumstances. However, there was limited research about use of the UDL framework in K–12 online learning environments, let alone during a pandemic.

Throughout the course of this research, it was challenging to find studies of UDL use in an online environment. Most recent literature focused more on face-to-face applications of UDL as opposed to remote applications (Edyburn, 2010; McPherson, 2009; Rose et al., 2006). UDL was first implemented in face-to-face classrooms where teachers began to recognize the benefits of designing courses from the outset in ways that would help all learners. Pace and Schwartz (2008) attempted to address accessibility in an asynchronous online environment by providing a preview of class presentations, an outline of class notes, a review for examinations, and access to readings online, yet the focus of their study involved classroom technology using clickers to increase overall class discussions.

One study conducted by Finn (2005) and another by Ortiz (2014) did appear. Finn (2005) presented a UDL module to online instructors to determine the effectiveness of an online faculty development UDL module. Similarly, in Ortiz's (2014) research, a UDL module was used as the treatment and during the course of the study, supplemental materials supplied to the participants on accessibility and UDL were used as guidelines to help in their provision of accessible course material. Participants highly favored the

supplemental resources and used the information in the implementation of their own course. This researcher's study had a smaller sample size and did not provide additional supplemental aides to participants on accessibility, yet the researcher studied how the group relied on each other in the PLC to collectively grow their understanding and effectively integrate UDL into their courses.

Overall, this study produced significant findings concerning a positive shift towards changing how teaching and learning occurred in a pandemic setting and the importance of having accessible content available at the course's onset regardless of instruction. The findings in this study show that UDL is a plausible framework for any type of instructional setting and, if digital resources and policies are in place for educators and students, can be a solution for teachers who need best practices during and after a pandemic. For district leaders striving to provide a valuable learning experience for students in multiple settings, these results show the benefit of laying a strong foundational understanding for teaching and learning in the one-to-one learning environment so that UDL can be as impactful as noted in this study.

Theoretical Implications

Due to the different levels of predicted knowledge and different uses of UDL, challenges occurred when evaluating participants' use of new skills. According to Guskey (2000), there are four challenges to evaluating participants' use of a newly developed skill. The first challenge is to name right indications of use. To overcome this challenge, the researcher identified the UDL application used by the instructors by taking them from the examples presented in the professional development session and from the narrative that emerged in the research document. Though the researcher could view the content and

hear the narrative around the practice, the first level of understanding and use remains relatively unknown.

The second challenge was specifying frequency, adequacy, and regularity of use. How often was UDL used or applied and to what degree remained unknown to the researcher. This information was anecdotal and provided through documents shared with the researcher. The participants indicated they rarely looked at the principles of the UDL framework. The researcher recognized that the participants held onto phrases from the UDL professional development that was delivered the previous school year and reiterated in the following school year's optional session. However, the qualitative section of the study offered an in-depth analysis to assist in overcoming this challenge.

The third challenge was deciding if adequate time had been used to notice if appropriate utilization occurred. The participants' teaching and learning practices were reviewed during one grading period, and the interviews were spaced out over one semester to allow participants time to reflect on their practice and application. The group planned and changed their practice frequently throughout the study based on the dictates of the pandemic and the district's staffing needs. This allowed adequate time for the group to reflect on and apply what they had learned.

The final challenge to evaluating the participants' use of a new skill was affording flexibility for adaptation. The participants' first use of UDL may not have been recognized. Comprehending UDL concepts and guidelines by viewing the professional development, utilizing some of the resources provided to the PLC from district and campus educators, and discussing UDL applications during the one-on-one interviews, allowed for better comprehension of its use during the virtual one-on-one interviews and the virtual focus group. This is important to note because of the context of the pandemic.

In Finn (2005), Anastasiades et al. (2010), Coy (2013), and Ortiz (2014), the ability to showcase how educators changed over a similar amount of time was not impacted by the immediate need for change that the pandemic created. Finn (2005) showed that a change to instruction is possible with the application of UDL online, and Coy's (2013) study of an online synchronous environment showed the ability to align the UDL framework with content. These findings were consistent with prior research indicating that synchronous learning supports collaborative learning activities (Anastasiades et al., 2010). Coy's (2013) study revealed that teachers were more likely to provide multiple means of representation than they were to follow other UDL guidelines and that teacher alignment with the UDL framework varied during individual lessons. Additionally, Ortiz (2014) found although there was a positive shift in attitudes towards creating accessible online materials using the UDL framework, the content and resources that make up a course are more challenging to make accessible. Therefore, comprehensive, accessible online courses continue to fall short in some areas. The current study adds to this growing research because it shows that UDL is beneficial enough to warrant further exploration, especially given the need for access to material in the blended learning environment that evolved during the COVID-19 pandemic.

With this further need, creating future professional development using Knowles's (1975) adult learning theory would benefit district leaders during a pandemic because the motivation to learn is heightened during crises that alter the instructional setting, and the application of UDL in teaching and learning can impact change. Knowles (1975) stated that adult learners tend to learn when there is the impetus of need-to-know and when the immediacy of implementing a new method is warranted either for their benefit or that of another individual. The need to social distance that was imposed by the pandemic

disrupted traditional approaches to instruction, creating a need-to-know situation that led to the learning and application of UDL. Findings from this research study contribute to the existing empirical studies of andragogy by providing insight into how adults learn. The results show it would be beneficial to support professional development centered around the application of UDL in a variety of instructional settings.

Limitations

All research studies have their limitations. In this study, limitations included challenges related to evaluating the participants' use of new skills, participant recruitment, course observation criteria, generalizability, and time to conduct the research. A weakness of this study is the small number of participants. Given the pandemic context, many educators were not interested in optional professional development sessions at the onset of the 2020–2021 school year. The sample size that met the criteria of this study was small, and the researcher aimed to pull learning experiences from a PLC because they represented a unique way for educators to learn from other educators. Though a larger sample size may have expanded the study's themes and provided greater insight into topics directed by the virtual questionnaire or discussed by the study's participants in the narratives, the narrative responses from members of the same PLC were rich. To make this study well rounded, the researcher should have included educators in administrative roles because they were not represented in the study and may have had views that reflected different experiences. Responses from other educators may have uncovered other issues related to teaching and learning during a pandemic that were not raised by the three educators in this study. Data that was

inconsistent due to the small sample size concerned the program's use of digital tools to mirror the in-building learning environment.

Only increased knowledge of UDL and accessibility can be documented as having occurred. Therefore, measuring improvements in students' learning would have to occur by evaluating and assessing the performance of students who were directly in contact with the participants. Due to the time and access constraints of the pandemic environment, the researcher could not complete a comprehensive analysis of improved student learning. This topic does create opportunities for future research. Although a change in course material and change in teaching perspective were the initial indicators of change, to gain a fuller picture, the consistent application of UDL should be studied over several years with the UDL principles rather than over a grading period or semester.

The duration of this study was 3 months (i.e., one grading period). The virtual survey, individual interviews, focus group sessions, and course documents overlapped. As a result, communication with participants was sometimes challenging because efforts to meet with participants on a one-on-one basis encountered scheduling conflicts and time constraints. With the new instructional environment created by the pandemic, the researcher was sensitive to the study's pacing to ensure participants were not doing anything extra for this study and to ensure they were not put under undue stress. Communication with the participants over the course of an entire school year that tracked specific UDL principal use would have provided richer data on the effects of implementing UDL to support pandemic teaching and learning.

What is unknown based on the data is whether the participants were already digital learning experts. Though the researcher aimed to collect data to show their comfort level with instructional technology before the pandemic by asking about digital

tools such as their established LMS in the virtual survey, a more solid baseline data point could have been acquired. With the school district not doing a technology knowledge survey, it was hard for the researcher to capture the participants' prior knowledge and use of technology. The level of knowledge and comfort with the tools, however, proved to be high considering the participants did not reach out to their campus or district support personnel during their application of UDL. There were other aspects of earlier instructional practices like uses for assessment and typical design that were challenging for the researcher to fully capture, thus making it hard to generalize the results or compare them to other studies. Regardless of the limitations, this study is valid in its findings, which can help close the research gap around UDL practices with technology.

Recommendations for Future Practice, Context, and Research

Based on the results of this qualitative study, there were findings that can be applied further within the instructional context of the pandemic. The researcher also identified areas for further practice and exploration with regard to the theoretical framework and the UDL framework. The following sections highlight recommendations for district leaders and researchers to pursue based on this study's three themes and eight subthemes shown in Table 4.5.

Recommendations for Future Practice

Based on the results of this qualitative research study, there were three themes and eight subthemes that emerged from the PLC in this high performing, suburban, one-to-one school district. Of those themes, were change of purpose, change of materials and content delivery, and change of perspective. These were all attributed to the participants'

collective effort to reach students during a pandemic. As such, the findings of this research coupled with the literature lead to the following recommendations for practitioners.

- The results of this study suggest crisis or pandemic teaching can shift an educator's purpose and teaching perspective. Therefore, district leaders must utilize this time in education for intentional, thoughtful change within a learning organization's teaching and learning practices.
- The results of this study suggest the UDL framework is effective and should be an area of focus for school districts struggling to reach all students in the asynchronous and synchronous learning environment produced by the need for remote or socially distanced in-building instruction. This framework allows teachers to create content that is accessible and purposeful for all students.
- The results of this study suggest educators and students need a strong working foundation of a learning organization's instructional technology. This multiple case study involved educators and students who were already well trained with district technology and instructional materials, and they agreed this working knowledge attributed to their level of success implementing the UDL framework.
- The results of this study suggest that district and campus leadership teams should commit to implementing UDL in all district systems especially with PLCs. Applying UDL to all aspects of leadership and decision making will provide a model for UDL thinking and application throughout the learning

organization and can serve as a model for educators to use in their own classroom. PLCs and collaboration were vital for this sample's growth.

- The results of this study suggest districts leaders should familiarize themselves with Knowles's (1975) theory of andragogy when planning or purchasing professional development materials for their staff. Knowing this information could support allocating appropriate funds and staff to support a district initiative.

Recommendations for Context

Based on the findings of this qualitative research study, the Texas ISD could apply what was learned here to grow their application of the UDL framework. The following recommendations could benefit Texas ISD moving forward in their systemic approach to the long-term implementation of UDL.

- The results of this study suggest district leaders should consider Knowles's (1975) theory of andragogy when creating professional development opportunities. Using this theory in the preplanning stages of content development, would encourage district leaders to think about ways to connect the experiences and readiness-to-learn of adult learners with their orientation and motivation to learn new concepts.
- The results of this study suggest Texas ISD leaders should be intentional with their plans for long-term implementation of UDL by using this data to inform next steps in the initiative. Based on this study's findings, crisis such as a pandemic put educators in a mindset to embrace new ways of thinking to ensure they could continue to reach students. To meet this goal in a pandemic,

participants were forced to change their teaching perspectives and become more willing to revise their teaching strategies and their ways of validating and clarifying content structure. This study validates the Texas ISD's use of the UDL framework; therefore, study's findings can serve as progress monitoring of the framework in Year 3, which could inform decision making with regard to allocation of staff, further professional development, and systematic accountability structures in teaching and learning. The district should consider providing campus leadership with team goals related to use of the framework along with methods of accountability that will ensure teacher efficacy and collective action toward reaching all students in all subject areas.

- The results of this study suggest external input should be considered to review or examine current UDL implementation and accountability practices with leadership teams or committees. This applies not only to the development and design of UDL implementation at the district level but also at the campus level. This should be an ongoing process of external review by UDL consultants or through benchmarking against other UDL school districts or data points. This will also allow district leaders to track the use of UDL principles in practice and the teacher's or PLC's targeted growth.
- The results of this study suggest district and campus leaders must remain committed to allowing teachers to have planning time with their PLC throughout the school year. Campus and district leaders should prioritize team planning time so that efforts to implement UDL can come to fruition. With this type of planning, allocation of staff such as educational partners and

campus administrators should be revisited to ensure campus and district support are available as staff navigates district learning initiatives and goals related to the implementation of UDL.

- The results of this study suggest principals need to train campus leadership and revisit accountability structures to ensure PLCs maintain high levels of collaboration and fidelity. This element proved valuable with this multiple case study's findings. The educators in this study had a rich history of professional experiences and a long-lasting relationship that allowed the group to be efficient and purposeful in their efforts to implement the UDL framework within the PLC.

These recommendations are not intended to imply that Texas ISD has not already deployed successful structures for their staff, but they do suggest there may be opportunities to reinforce and highlight the importance of intentional, targeted implementation and long-term instructional planning.

Recommendations for Research

It is uncertain what the future holds for education during the pandemic. At the time of this research, Texas school districts were trying to find ways to provide safe education opportunities that would not contribute to community spread, provide devices to students who need to stay home, provide meals and other supports for basic survival, and provide a guaranteed viable curriculum to progress society. Though this study's scope was limited to understanding the UDL implementation efforts of one eighth-grade ELAR PLC in a one-to-one Texas ISD during a pandemic, the researcher found UDL is beneficial to district leaders facilitating virtual academies, traditional schooling, or

pandemic teaching. Therefore, the recommended next steps for research in this area are to study the way other K–12 districts used professional development programming to address the need to continue teaching in a pandemic. Researchers could then better understand which components of the transition to pandemic teaching and learning are valued and could determine if UDL is the best option for teachers to use to support their students.

Several researcher topics for the study could build on these findings. Therefore, future researchers could conduct this same study, or a similar study, using qualitative methods incorporating focus group sessions with online or in-person educators to gain further insight into participant discourse and discussion of UDL implementation through PLCs or other content areas. Additionally, conducting a similar study over a more extended period of time would allow participating educators to access more professional development opportunities and to utilize more support at the district and campus level. The information generated about the use of UDL to increase accessibility could be measured for more than one semester and could include learner outcomes. Further study could be conducted in districts with a foundation in UDL to see if their transition was smoother. Another scope would be to follow a district, campus, or team that starts UDL implementation during or after the pandemic for the first time and follow their growth in the use of the framework and as a team. Another avenue of study would be to follow the support from department chairs and other administration as it could be vital to providing educators the support needed when developing not only courses but entire programs intended to provide accessible online and face-to-face instruction.

Since the results of this study indicated that instructors' attitudes shifted towards a more positive outlook based on the effectiveness of making content accessible, it is

recommended that further research entail the study of the transition to UDL in other instructional contexts. This is recommended because that type of research would grow the scope of research on this approach to instruction beyond suburban, affluent school districts and established PLCs. This would allow practitioners and district leaders to learn how to implement a shift to UDL across various systems and to more diverse learners.

This study showcased the teachers' point of view on whether the professional development provided through a district session and elective PLC application was meaningful; further research, however, would illuminate how districts could plan professional learning for UDL. Since technology has afforded new and innovative methods of learning and teaching, the means by which individuals access information has become increasingly more flexible as well. The challenge is to educate those who may benefit from such methods. Educational leaders at universities and institutions of higher learning, region centers, school districts, and campuses have the authority to implement training in areas of accessibility. Institutions should seek or create professional development for educators to help them deliver content in a blended learning environment appropriate for the pandemic or other setting.

Closing

Several national laws and policies are in place to help ensure learner variability is addressed, and most cite UDL as a best practice (Every Student Succeeds Act, 2015; Higher Education Opportunity Act, 2008; ED, 2010, 2016, 2017). Considering how a person learns online and in person and attending to questions of accessibility in a learning environment can lead to equal access for all learners (Edyburn, 2010). After all, providing an accessible learning environment is the moral and ethical thing to do

(Edyburn, 2010; Lin, 2007; Moore & Kearsley, 2005). When the global pandemic hit, educational leaders were forced to make accessibility a priority while also attending to existing inequities and broken aspects of their educational system. As schools aim to provide equitable and accessible online schooling, UDL can provide solutions to challenging ethical questions concerning accessibility.

The main problem for district leaders who need to transition to a 21st-century learning environment is the lack of practical models to support comprehensive plans for making content accessible for all students. This study found that use of the UDL framework effectively supported educators as they designed actionable plans for synchronous remote and socially distanced in-building learning. UDL offers a curriculum planning framework that supports inclusivity and addresses all learners' needs in any instructional setting, including in face-to-face and online learning environments. This framework proved possible to implement because the school district's foundational technological knowledge provided educators and students the ability to focus on teaching and learning. Systemically, the district had already provided instructional practices and technology policies for their learning community that supported implementation of UDL in a blended environment. In sum, educators who apply UDL to their practice engage in a common goal of reaching all students. Those in this study also collaborated to tackle barriers to accessing content in the blended environment induced by the pandemic. In truth, the pandemic proved to be the catalyst to change for the PLC in this study, and if the application of UDL is taken across an educational system, the possibilities could be endless.

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