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Implementation of Universal Design for Learning

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doctoral thesis

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Abstract

This study involves one school in an urban context that implemented the Universal Design for Learning (UDL) framework in order to help educators in providing successful learning experiences for all students. Using Rogers’ (2003) theory of Diffusion of Innovations as the theoretical framework and Fullan’s (2007) change process as the conceptual framework, this study examines the factors that influence the change process when the UDL framework is implemented. This study is a descriptive case study that employed different types of data collection: documentation, interviews, and observations. The data analysis used Saldana’s (2013) two-cycled approach.

Factors that challenged the implementation of UDL and affected the current and sustained implementation of UDL aligned with Fullan’s (2007) local factors, external factors, and characteristics of change. Local factors included leadership, time, teacher beliefs, professional development, resources, and students. External factors were the success for all students in one education system, professional development/training/coaching, time, the amount of curriculum to teach, funding, and resources. Characteristics of change included the practicality of UDL and how difficult it is to implement.

The implications of these findings are important for various educational stakeholders, as they provide insight into the implementation of a novel framework in an urban learning context, which may be extended to other learning contexts. Future research directions are discussed.

Keywords: UDL, Universal design for learning, implementation
Acknowledgements

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CHAPTER ONE: INTRODUCTION

High-quality education can be defined as “the cognitive development of the learner…and the role of education in promoting values and attitudes of responsible citizenship and/or creative and emotional development” (UNESCO, 2009, p. 10). In order to have high-quality education for all learners, it is critical that the education system is inclusive and equitable (UNESCO, 2009). Inclusive education, or inclusion, can be defined as “a way of thinking and acting that demonstrates universal acceptance of, and belonging for, all students…students will have equitable opportunity to be included in the typical learning environment” (Alberta Education, 2009, p. 5). Research has shown that students with diagnosed special needs or medical conditions, learning in an inclusive environment, perform better academically when compared with peers in a segregated educational setting (Rujis & Peetsma, 2009). In addition, students with special needs or diagnosed medical conditions do not have a negative impact on the learning of other students (Bru, 2009; Crisman, 2009); in fact, the “typical” students demonstrate higher academic achievement and stronger interpersonal skills when compared with students that are educated in non-inclusive classrooms (Kambouka, Farrell, Dyson, & Kaplan, 2007). In an educational system that values the success and equitable access to education for all students, it is essential that educators are equipped to meet the diverse student needs of all students in the day-to-day teaching and learning of their schools.

The idea that educators must meet diverse student needs in the classroom is not new, as reflected in various policy documents in Alberta (Alberta Education, 2010; 2011; 2013a; 2013b; 2013c). The education system in Alberta has placed an emphasis on providing learning opportunities that allow students to perform to their highest potential, to have equitable access to programs and instructional excellence, to have choice in learning activities, to value diversity in the classroom, and to promote excellence in achievement (Alberta Education, 2010). In addition, the first placement option for students with special needs or diagnosed medical conditions is the neighborhood school, namely in the inclusive
classroom (Alberta Education, 2011). It is clear that within Alberta classrooms, student diversity is the norm and not the exception.

In order to ensure that all students are successful in their educational experiences, some schools have chosen to adopt new teaching frameworks, or basic structures that shape how curriculum, learning activities, and assessment are created. The implementation of innovative teaching frameworks helps educators in providing successful learning experiences for all students. One such example of these frameworks is the Universal Design for Learning (UDL) framework.

Implementing an innovative framework such as UDL requires changes in teacher practice. The implementation of innovative practices in schools is a complicated process that goes far beyond the initiation of the change (Fullan, 2007). For this study, Rogers’ theory of Diffusion of Innovations (DoI) (2003) and Fullan’s (2007) change process are used to examine the factors that influence the change process when the UDL framework is implemented in one urban school context. The UDL framework is rooted in the neuroscience of learning, and aims to activate learning neural networks in the brain in order for students of all abilities to learn effectively (Rose & Meyer, 2002). In order to activate the networks of learning in the brain, the UDL framework entails incorporating multiple means of representation through providing different ways to access knowledge; multiple means of expression in order to show in different ways what was learned; and multiple means of engagement in order to allow students to incorporate their own interests in learning in order to make connections to prior experiences (Rose & Meyer, 2002).

**Statement of the Problem**

Effective teaching requires that all student learning needs must be met in order for students to reach their full potential (Fullan, Hill, & Crevola, 2006), which is why some schools have chosen to implement the UDL framework. By incorporating the UDL framework, an attempt is made to address diverse learner needs and to perhaps create learning conditions more conducive to student academic
success (CAST, 2015). Studies focused on the incorporation of the UDL in teaching have shown promising results in regards to achievement for all students in a variety of subject areas and with students who have special learning needs (Browder, Mims, Spooner, Ahlgrim-Delsell, & Lee, 2008; Coyne, Pisha, Dalton, Zeph, & Cook Smith, 2012; Dolan, Hall, Banerjee, Chun, & Strangman, 2005; Dymond et al., 2006; Friesen, Clifford, Francis-Poscente, & Martin, 2008; Kennedy, Newman Thomas, Meyer, Alves, & Lloyd, 2014; Lieber, Horn, Palmer, & Fleming, 2008; Marino, 2009; Metcalf, Evans, Flynn, & Williams, 2009; Niedo, Lee, Breznitz, & Berninger, 2014).

However, the research base surrounding the results of UDL is not well established (Edyburn, 2010). Furthermore, the processes of UDL implementation have not been well explored, which has implications for the measuring of its success in learning contexts (Edyburn, 2010; Katz, 2013; King-Sears, 2014). As a result, this study analyzes the implementation of the UDL framework using Fullan’s (2007) change process and Rogers’ DoI (2003) as conceptual and theoretical frameworks, respectively, in order to add to the research base and provide information as to what conditions may be required for successfully implementing an innovative framework in the context of one urban elementary school.

**Context of the Study**

For this particular study, it is important to note that I was a previous staff member in the school selected for the study. I was present for the initiation phase of UDL as a framework in the school.

When UDL was introduced in the school, two professional development days were provided so that teachers and administrators could learn about what UDL was and how it could be employed. In addition, for the first year, staff members were given approximately two hours a month during staff meetings to collaborate with their grade level partners and to share their UDL experiences. An emphasis was also put on how they were incorporating technology into their classroom, in support of UDL. It has been four years since the implementation of UDL in the selected school. An observation I had was that there was less emphasis of UDL. This was troubling to me, given that I had a good experience engaging
my students with the UDL framework. As a result, what happens over time when an innovation has been implemented became one of the reasons for why I chose to focus my study on the implementation phase of UDL. At that time, and currently still, I am in support of the use of the UDL framework as an effective way to meet students’ learning needs. In order to address my potential of bias with regard to UDL, I employed strategies in my research designed to enhance the study’s integrity. These strategies include triangulation, member checking, re-coding data, having an adequate amount of data, full disclosure of potential biases, using an audit trail, and using rich, thick descriptions (Merriam, 2009).

**Purpose of the Study**

The implementation of the UDL framework is specifically addressed in a kindergarten to grade six dual track (French immersion and English program) school located in an Alberta urban center. At the time of data collection, the school had 423 students and 26 teachers and school administrators on staff.

This school decided to incorporate UDL as a framework for daily teaching practice in the fall of 2012. The school board had identified this particular school as “in need” because provincial exam marks were considered lower than desired, and as a result different frameworks were considered to potentially influence student achievement. Teachers began planning learning activities and assessments and chose resources that incorporated the three main principles of the UDL framework: offering multiple means of representation, multiple means of expression, and multiple means of engagement (Rose & Meyer, 2002). In the 2012 academic year, staff participated in two professional development days focused on the incorporation of principles of UDL with the goal of accommodating diversity in student learning needs, with the goal being to increase academic results in the school. The professional development was focused on helping teachers to plan using the principles of UDL, how to implement UDL in their teaching practice, and how to use various technologies in support of UDL in both the teaching and in student learning. Staff meetings were devoted to teachers to collaborate in creating lessons that were based on the UDL framework (on average, two hours a month for the remainder of the 2012-2013
academic school year). Although the school has since devoted staff collaboration time to other district initiatives, using UDL to meet diverse student needs continues to be emphasized at the school.

It is unclear, however, what the status of the implementation efforts are with regard to UDL. Certain conditions may be required for teachers and/or administrators to ensure the continued success of the innovation, or certain barriers may influence the success or the impact of the use of UDL in student learning (Edyburn, 2015). Other conditions are possibly necessary to continue to sustain the implementation of UDL in teacher practice. Understanding the factors of implementation will impact the continued diffusion of the innovation (Rogers, 2003) and the continued implementation of the innovation, which could have an impact on other implementation efforts of UDL, and perhaps other innovations in schools.

This particular school has been implementing UDL since 2012. Therefore, as of the 2015-2016 academic year, it is in Fullan’s (2007) Implementation phase (rather than the initiation or the institutionalization phase). Fullan’s (2007) change process outlines several factors (local factors, external factors, and characteristics of change) that help in determining the factors that affect the implementation of the innovation. However, determining the possibilities of when to address the important factors is difficult to conclude with Fullan’s (2007) change process, because it does not provide very much detail in the large scale of innovation implementation. Rogers’ (2003) DoI, on the other hand, can provide information when looking at the school in a larger scale with the element of time, and indicates where certain factors could potentially be addressed earlier in the implementation process. These change theories were used in this study as theoretical (DoI) and conceptual (change process) frameworks that complement each other and compensate for each other’s weaknesses.

It is well known that change is a process, not an event (Fullan, 1985; 2007; Fullan & Hargreaves, 1992; Guskey, 2002; 2012; Hall & Hord, 2001), and change process has yet to be explored in UDL literature. “The time is right for the field of special education to articulate a research agenda that includes collaborative efforts to examine the application of UD[L] to educational environments, so that
the history of failed practices does not repeat itself” (McGuire, Scott, & Shaw, 2006, p. 172). As a result, the focus of this study was the implementation of UDL at this school, which was analyzed using Rogers’ (2003) DoI and Fullan’s (2007) change process in order to analyze the factors that influence the Implementation phase of UDL. These factors included the challenges and the elements required to ensure sustained implementation of the UDL framework.

**Research Questions**

The following research question guided the inquiry: What factors influence the Implementation phase of the UDL framework in teaching and learning within one urban school setting?

The following three sub-questions were investigated in this research:

- What factors support the implementation of the UDL framework in teaching and learning within one urban school setting?
- What are the challenges that influence the implementation of the UDL framework in one urban school setting?
- What factors support the sustained integration of the UDL framework in teaching and learning in one urban school setting?

**Significance of the Study**

The significance of the study is that there is a gap in the literature with regard to factors that influence the Implementation phase of the UDL framework in teaching and learning environments. Fixsen, Naoom, Blase, Friedman, and Wallace (2005) determined in their meta-analysis of implementation research that

…guidelines, policies, and/or educational information alone or practitioner training alone are not effective; that longer-termed multilevel implementation strategies are more effective; and not enough is known about the functional components of implementation factors…the few examples pale in comparison to the need for clear and effective strategies. (p. 20-21)
In addition, when examining the change process, consideration must be given to the examination of factors focused on the characteristics of the change, the local characteristics of the context, and the external factors influencing the context of change (Fullan, 2007). Furthermore, there are other factors at work in an implementation effort that need to be examined to gain a better understanding of what is required during implementation that could influence its success within an educational context.

**Definitions of Key Terms**

In Table 1, key terms found in this study are defined.

Table 1

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<td><strong>Term</strong></td>
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<td>Change Process</td>
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<td>Diffusion of Innovation</td>
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<td>Inclusive education</td>
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<td>Innovation</td>
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| Universal Design for Learning Framework (UDL) | ● A framework with three principles:  
  o Multiple means of representation (in order to activate the *what* networks in the brain): allowing different ways of representing the knowledge to be taught;  
  o Multiple means of expression (in order to activate the *how* networks in the brain): allowing students to express what they have learned in different ways; and  
  o Multiple means of engagement (in order to activate the *why* networks in the brain): allowing students to use their own interests in learning activities and assessments |

**Summary and Organization**

The introduction of this paper outlined the context, the rationale for the study, the research questions, the significance of the study, and the key terms of the study. Specifically, this study,
exploring the factors that influence the Implementation phase of the UDL framework in teaching and learning in one urban school setting, has been organized into six chapters:

- Chapter Two consists of a review of the literature, including sections on the paradigmatic orientation, the theoretical framework, the neuroscience of learning, followed by the UDL framework, its origins, evidence supporting the framework and a critique; the conceptual framework is then addressed, followed by the positioning of the study.

- Chapter Three describes in detail the research design, a descriptive case study, in addition to the methodology, the methods of data collection, data analysis methods, and a discussion of the integrity of the study.

- Chapter Four presents the findings of the study.

- Chapter Five is the discussion of the findings in relation to the research questions.

- Chapter Six outlines the summary of the findings, implications for practice, possible areas of future research, and a conclusion for the study.
CHAPTER TWO: LITERATURE REVIEW

The literature review aims to outline several pertinent topics for the proposed study. First, the paradigmatic orientation of the study is examined. Second, the theoretical framework of Rogers’ (2003) Diffusion of Innovations (DoI) is explored to explain how innovations spread through cultures. Third, an explanation of the relevant research related to the Universal Design for Learning (UDL) framework is examined to assess how it can impact learning outcomes for students. Fourth, the implementation of the UDL framework and the current state of knowledge regarding UDL implementation efforts are explored, including a critique of UDL. Fifth, the conceptual framework of the study, Fullan’s (2007) change process, is explained in regards to how it aligns with the UDL framework for the context of the proposed research study. In the sixth and final section, the work is concluded with an explanation of the positioning of the research study in the current context.

Paradigmatic Orientation

This case study is based upon the epistemology of pragmatism. Pragmatism, although comprised of diverse streams, essentially deals with the efficiency of practical application; in other words, what tends to work most effectively (Crotty, 1998; Rescher, 1995). Pragmatists state that knowledge, concepts, beliefs, and meanings in the world are best viewed not through their objective accuracy but through their practical uses and how they exist themselves in the world (Bernstein, 2010; Biesta & Burbules, 2003; Feilzer, 2010). James (1950) stated that pragmatism is “the attitude of looking away from first things, principles, “categories,” supposed necessities; and of looking towards last things, fruits, consequences, facts” (p. 15). In regards to how a pragmatist thinks about the world, “…the analysis of meanings (of signs, i.e., ideas, concepts, statements) is an analysis of certain kinds of action in certain contexts … meaning has reference, if sometimes only remotely so, to the ordinary situations and conditions in which actions occur” (Thayer, 1968, p. 429). In pragmatism, one cannot divorce the meaning of experience from the exploration of culture or context (Crotty, 1998).
In the context of the school, pragmatism provides the best fit for this case study. First of all, educators and stakeholders in education are typically very interested in the end result of an innovation: in this case, using a new framework in such a way as to increase and sustain positive student outcomes. Second, the semi-structured interview schedules for participants is used in order to try to capture the idea that experiences of individuals are rooted in the context, as the questions utilized for the semi-structured interview schedules are those that best answer the research questions. Finally, the focus on attempting to establish facts of events is highlighted by the use of classroom observations and the use of triangulation to compare student and teacher experiences.

The main advantage of the pragmatic epistemology is that it is results-based. In education, this is often the most important element of any kind of study: how does the implementation of UDL affect student learning and achievement? In addition, the nature of the research problem from a pragmatic point of view indicates the methodology used in a study (in this case, a case study), which can also indicate the most appropriate methods of collecting data to answer the research question. Disadvantages of the pragmatic epistemology are that this school of thought encourages individuals to accept knowledge based on what they know or based on results, and not necessarily a true representation of the world. This may entail inaccurate representations of the phenomena being studied. To alleviate this limitation, I used multiple data sources in order to have the most accurate representation of reality as possible. I also fully disclosed my position as investigator, which entails fully explaining my biases, dispositions, and assumptions in regards to this research study (Merriam, 2009): see Chapter Three. In this way, the readers have a better understanding of the point of view with which I take to interpret the data.

Theoretical Framework

Ellsworth (2000) reviewed various change theories that have been researched in education over decades. Consequently, there are various change theories that provide multiple perspectives in regards to
change in education, including Ely’s (1990) Conditions of Change, Havelock and Zlotolow’s (1995) perspective in *The Change Agent’s Guide*, Hall, Wallace, and Dossett’s (1973) Concerns Based Adoption Model, Zaltman and Duncan’s (1997) perspective in *Strategies for Planned Change*, Reigeluth and Garfinkle’s (1994) perspective in *Systemic Change in Education*, Rogers’ (2003) Diffusion of Innovations, and Fullan’s (2007) change process. All of these theories offer multiple perspectives that emphasize different aspects of the change process, however different models may be more appropriate depending on the question that is being answered. For this particular case study, Rogers’ (2003) Diffusion of Innovations was considered the most appropriate model for the theoretical framework because it focuses on the innovation component of change. However, DoI (Rogers, 2003) is insufficient because it does not adequately emphasize the change agents; that is, the individuals whom are actually implementing the change. This gap is where Fullan’s (2007) change process plays a role as the conceptual framework.

Rogers’ (2003) Diffusion of Innovations (DoI) explains how, at what rate, and why innovations spread through cultures. Rogers (2003) defines an innovation as “an idea, practice, or object that is perceived as new by an individual or another unit of adoption” (p. 12). Within the adoption of innovations across disciplines in organizations, Rogers’ (2003) DoI is a theory that has been widely adopted, and this model identifies “the most salient characteristics of innovations, as well as each characteristic’s effect on rate of adoption” (Ellsworth, 2000, p. 35). That is, the innovation itself is emphasized in the DoI framework, as between 49 and 87 percent of variance in the rate of adoption has been attributed to innovation characteristics (Ellsworth, 2000; Rogers, 2003). Ellsworth (2000) states that this particular framework can be of greatest use if practitioners are deciding how to adapt the innovation to meet local requirements, as teachers must do when implementing the UDL framework for their own classrooms. DoI can provide a framework for exploring how innovations are diffused and adopted by teachers in an educational setting (Sahin, 2006). The theoretical framework of DoI guides this case study because it emphasizes the importance of the characteristics of UDL that play a role in the
implementation of UDL in this context. However, it is unrealistic that DoI, with its focus on the innovation characteristics, can provide the most complete picture of the implementation of the innovation in this case study, as educators’ perceptions and experiences with the innovation must also be addressed. Fullan’s (2007) change process emphasizes the role of individual actors in educational settings according to their diverse characteristics (Ellsworth, 2000). As a result, in order to take into account the individual actors’ characteristics, Fullan’s (2007) change process is used as a conceptual framework when analyzing data in order to gain a more detailed picture of the associated factors affecting UDL implementation. Ellsworth (2000) suggested that “the key to understanding and managing change successfully is to bring the diverse models together in a “toolbox”, rather than to select only one model. Doing so will equip the practitioner with a full set of specialized tools for managing change” (p. 15). By using DoI (Rogers, 2003) as a theoretical framework and Fullan’s (2007) change process as a conceptual framework and therefore a focusing lens, the most detailed and descriptive account of the implementation process at this school can be obtained.

**Four main elements.** According to Rogers (2003), there are four main elements in the diffusion of innovations. The first element is the innovation itself, which may or may not have been invented a long time ago but is still novel for the individuals perceiving it as new. The newness characteristic is related to the three steps of the innovation-decision process (that shall be discussed below). Related to the innovations is the idea of uncertainty, as this results in consequences to either adopting or not adopting the innovation. To reduce this uncertainty, individuals considering the innovation should be informed about its advantages and disadvantages in order to reduce uncertainty. The second main element of the DoI is comprised of the communication channels, where communication “is a process in which participants create and share information with one another in order to reach a mutual understanding” (Rogers, 2003, p. 5). The individuals communicating in the channels are called sources, and the channel is the means by which messages are received. Although mass media can be considered a channel, Rogers (2003) stated that interpersonal connections are more powerful as a communication
channel as “diffusion is a social process” (p. 19). A third element is the social system, which is defined as “a set of interrelated units engaged in joint problems solving to accomplish a common goal” (p. 23). The social system can affect the individuals’ level of innovativeness, which can affect how quickly they adopt an innovation (to be explained under the stage of implementation). The fourth element is time, and Rogers (2003) argued that this element is often neglected in change theories; it shall be explored in relation to the rate of adoption, below.

**Rate of adoption.** In regards to rate of adoption, or the speed at which an innovation is adopted by members in a social system, Rogers (2003) stated that five variables are important: 1) the perceived attributes of the innovation, 2) the types of innovation decision, 3) the communication channels, 4) the nature of the social system, and 5) the extent to which change agents promote the innovation. These aspects are important because they are the variables determining the rate of adoption, and are linked to the dependent variable that is explained (Rogers, 2003). The perceived attributes of innovations explain 49 to 87 percent of the variance in rate of adoption (Rogers, 2003), and can be explained by five attributes including the relative advantage, compatibility, complexity, trialability, and observability of the innovation; these elements are further examined below. The type of innovation-decision is important as well, because innovations adopted by individuals diffuse sooner than innovations adopted by organizations. The communication channels influence the rate of adoption, as mass media can increase the rate of adoption for simple innovations, while larger innovations often require interpersonal communications to increase rate of adoption. The nature of the social system, that is, the degree to which communication is structured and interconnected, can influence the rate of adoption. Finally, the extent of change agents’ promotion efforts is important because, with just a small percentage of leaders adopting the innovation, less encouragement is needed subsequently to increase the rate of adoption (Rogers, 2003). These elements demonstrate that the subjective evaluations of an innovation can influence the adoption rate and drive the diffusion process, which rationalizes the importance of assessing the experiences of individuals through qualitative measures, as this study aims to do.
There are four prior conditions necessary to implementing an innovation, followed by the five-stage Model of the Innovation-Decision Process, followed by the attributes of an innovation, followed by a description of Rogers’ (2003) adopter characteristics. Support and criticisms for Rogers’ (2003) model follow.

Figure 1. Rogers’ (2003) Diffusion of Innovation Model (p. 163).

**Prior conditions.** The first prior condition is previous practice. If an organization has previous practice with an innovation, it may affect whether or not a different innovation will be introduced (Rogers, 2003). The second condition includes the needs/problems, which determines the social contexts’ need for an innovation to be put in place. Specifically, if an innovation is thought to improve worker performance, it may be more easily adopted (Rogers, 2003). The third prior condition is innovativeness, which is the degree of innovativeness compared to other innovations put in place (Rogers, 2003). The fourth prior condition necessary for the DoI model involves the norms of the social systems and the degree to which innovations are generally accepted by members in the organization (Rogers, 2003). These prior conditions are essential, Rogers (2003) proposed, because they influence
whether or not the social system will move forward in the five-stage Model of Stages in the Innovation-Decision Process.

**Model of stages in the innovation-decision process.** There are five discrete processes that an individual or organization goes through from the time they are introduced to an innovation to the time they accept or reject the innovation (Rogers, 2003). According to Rogers (2003), these stages are linear, although for this study only the Implementation phase is considered as the school in question is currently in this stage. Each of the five stages is discussed in the following section.

**The knowledge stage.** The decision-making unit (the individual or the organization making the decision) is first exposed to an innovation in this phase, and gains information about how it functions; that is, the mental activity of the decision-making unit is mainly cognitive (Rogers, 2003). Three characteristics of the decision-making unit are present in this stage: 1) the socioeconomic characteristics of the individual, because socioeconomic status can affect the likelihood of adopting innovations; 2) the personality variables of the individual, which are clearly unique; and 3) the communication behaviors. Rogers (2003) postulated that these characteristics play a key role in whether or not the decision-making units gain knowledge about an innovation and whether or not the decision-making unit has access to information about the innovation.

**The persuasion stage.** Favorable or unfavorable attitudes towards innovation are formed within this stage (Rogers, 2003). The mental activity in this stage is mainly affective in the sense that the decision-making unit actively seeks information about the new idea, and perhaps tests it out in order to help formulate an attitude regarding its use. In this stage, the perceived characteristics of the innovation include the relative advantage, the compatibility, the complexity, the trialability, and the observability of the innovation. These characteristics influence the rate of adoption of an innovation (Rogers, 2003).

The relative advantage of the innovation (in regards to the decision-making units) is important because it involves comparing the innovation with practices that are already in place. This can be measured in several ways, including social prestige, convenience, and satisfaction (Rogers, 2003). The
compatibility of the innovation is concerned with how the innovation fits with current existing values, past experiences, and needs of the adopters (Rogers, 2003). The complexity of the innovation is concerned with how the decision units perceive the innovation: if it seems too complicated, it is less likely to be implemented. The trialability attribute is concerned with how easy the innovation is to give a “test run”; the easier, the more likely it is that the innovation will be adopted. Finally, the observability of the innovation is how visible the results of the innovation will be (Rogers, 2003). Rogers (2003) stipulated that although all five attributes play a role, the relative advantage and the compatibility attributes are more influential in the Model.

**The decision stage.** This stage is concerned with the weighing of relative advantages and disadvantages of using the innovation (Rogers, 2003), and whether or not it is accepted. Rogers (2003) made the distinction of adoption, “a decision to make full use of an innovation as the best course of action available” and rejection, “a decision not to adopt an innovation” (p. 171). Of those that adopt an innovation, there are adopter categories (represented on a bell curve) that represent the individuals that adopt innovations at different rates (see Figure 2). The five adopter categories include the innovators, the early adopters, the early majority, the late majority, and the laggards (italics added for clarity) (Rogers, 2003).

![Diagram](https://via.placeholder.com/150)

*Figure 2. Rogers’ (2003) Categories of Innovativeness (p. 262).*
The *innovators* are individuals willing to take risks, have a high social status, and have the highest access to scientific sources and interaction with other innovators (Rogers, 2003). In a theoretically ideal system, the innovators represent about 2.5% of the innovators. Although it is possible to adopt innovations that ultimately fail, these individuals can absorb the financial risk and therefore are more likely to do so.

The *early adopters* also have high social status, but are more reserved in their decision-making process (Rogers, 2003). This category has the largest amount of leaders in most systems, and others look to them for advice in regards to adopting an innovation. The individuals in this category adopt a new idea and then communicate a subjective evaluation to peers through communication channels. In an ideal system, they represent about 13.5% of the innovators (Rogers, 2003).

The *early majority* are those who are willing to adopt innovations, but do so after a longer period of time as they are more deliberate in their decision-making. These individuals adopt the innovation just before most other people do, and they represent 34% of the innovators (Rogers, 2003). These individuals do not typically have a leadership role like the early adopters have, but still maintain a good interaction with other members of the social system.

The *late majority* are those that adopt an innovation after the average participant; they are likely to be more skeptical, have lower financial security, and generally lower social status than the other innovators before them (Rogers, 2003). They typically do not hold positions of opinion leadership in systems, but they are an important link in the diffusion process because they hold the position between the early and relatively late adopters of innovation. These individuals may deliberate for some time before adopting an innovation (Rogers, 2003).

The *laggards* are the last to adopt an innovation, and are more averse to changing. These individuals are more likely to be older and have the lowest social status when compared with their peers (Rogers, 2003). These individuals hold almost no opinion leadership in the adoption of innovations. These individuals often base their decisions on their own past experiences (Rogers, 2003). The laggards
are generally suspicious of change, and must be certain a new idea will be successful before they adopt. Because their socioeconomic status is often precarious, the laggards must be careful when adopting innovations, as they may not be able to withstand a loss if the innovation is not successful (Rogers, 2003).

**The implementation stage.** During the fourth stage of the model, the decision-making unit begins to use the innovation with varying degrees of fidelity (Rogers, 2003). The decision-making unit may seek more information about the innovation and may determine the usefulness of the innovation (Rogers, 2003). This stage may continue for an extended period of time, depending on the nature of the innovation, but this is the point in which the innovation has become institutionalized, or part of the regular adopter’s practice (Rogers, 2003). Re-invention may occur in this stage, where decision-making units adjust the innovation to suit their own context more efficiently (Rogers, 2003). Re-invention is not necessarily a negative consequence, but may be more likely under different conditions: when the innovation is complex and difficult to understand, because the decision-making unit does not fully understand the innovation, because it is a tool that could have multiple uses, when it is used to solve a wide variety of problems, or when decision-making units are encouraged to modify the innovation. Some individuals may end their innovation implementation at this stage, while others continue on to the fifth stage of the Model.

**The confirmation stage.** The decision-making unit seeks to avoid a state of dissonance between their current state and the innovation in this stage (Rogers, 2003). The decision-making unit may search for more information about the innovation they have adopted, and they may decide to stop using it based on this information (resulting in discontinuance). They may also seek more information in order to confirm the decision they made to adopt the innovation.

**Criticisms of diffusion of innovation theory.** There are several criticisms put forward by Rogers (2003). He categorizes the limitations as the pro-innovation bias, individual-blame bias, recall problem, and issues of equality. The pro-innovation bias is related to the idea that all innovations are
good and better than the previous iteration, and underemphasizes cases where the non-diffusion of innovation would be desired (e.g., using illegal drugs) (McMaster & Wastell, 2005; Rogers, 2003). The individual blame bias is the “tendency for diffusion research to side with the change agencies that promote innovations rather than with the individuals who are potential adopters” (Rogers, 2003, p. 114). One example of this would be blaming parents who allow their children to eat lead paint chips peeling off the wall; rather than blame landlords or paint manufacturers, the blame is put on parents (Rogers, 2003). The recall problem has to do with the element of time, because measuring when innovations are adopted is not as easy as it appears (Rogers, 2003). When participants in a study are asked to recall when they did something, the results are often unreliable (Rogers, 2003). Issues of equality are involved with the idea that not much attention is paid to the consequences of an innovation, in particular with the socioeconomic benefits of innovation that are distributed in a social system (Rogers, 2003).

Another criticism is the simplistic view of the implementation. While Rogers (2003) recognized the implementation stage of the framework, the complexity of actually implementing is not well established, and Rogers (2003) may not have assigned enough importance to the individuals actually doing the implementing (Ellsworth, 2000; Ely, 1990; Smith, 2011). In fact, participants in a study on a university encouraging their staff to implement innovative teaching and learning cultures were not even sure what “innovation” meant; the participants also outlined supports required for innovation to take place, such as aligning with university values, the availability of incentives and recognition for being innovative, and support from management for their ideas (Smith, 2011). In context, the adoption of innovations are exceedingly complex and varies from situation to situation; although Rogers (2003) accounts for the diversity in context, it may be insufficient to truly represent the adoption of innovations.

Despite such criticisms, DoI research has been adopted to support the adoption of innovations in many different contexts such as healthcare (Ball, Ogletree, Asunda, Miller, & Jurkowski, 2014), education (Sargent, 2015), and economics (Messinis & Ahmed, 2013). In response to the pro-innovation bias, Rogers (2003) recommended investigating the innovation as it is being adopted, not always after
the fact, in order to control only looking for successful adoptions of innovations. Rogers (2003) recommended using alternatives to the individual in the study of adoption of innovations to overcome the individual-blame bias. In order to avoid the recall problem, Rogers (2003) suggested collecting data at several points during the study, rather than at one time after the innovation is widely diffused. To address the issues of equality in the diffusion of innovations, special programs can be used to introduce innovations to those of lower socioeconomic status, which can actually make the socioeconomic gap smaller (Shingy & Mody, 1976, as cited in Rogers, 2003). In an educational context, these individuals could be represented by those of lower socioeconomic backgrounds, those diagnosed with medical conditions or learning requirements, or those with otherwise compromised access to educational experiences.

Although it may appear that Rogers (2003) had a simplistic view of the implementation process (Ely, 1990; Smith, 2011), there are many factors that add to its complexity such as the incorporation of time in the model (Sahin, 2006). Another element that is included in the model is the presence of prior conditions in the environment that influence whether or not the decision-making units are likely to consider the innovation. Rogers (2003) recognized that the innovation has attributes that play a role in whether or not it is implemented. Finally, Rogers (2003) recognized that both the individual and the organization can act as decision-making units, taking into account the complexity of the social system in which the diffusion of innovations take place. These elements add complexity to the DoI model and its application in context; and further complexity in the study context (in regards to the individuals involved in the Implementation phase) can be accounted for by using Fullan’s (2007) change process.

**Summary.** Straub (2009) made the distinction between adoption and diffusion theories, stating that adoption models focus on the individual and the choices this individual makes in regards to whether or not to adopt the innovation; whereas diffusion theories take the “macro perspective” and focus on the individuals as a whole, making decisions to see whether or not the innovation is adopted. Straub (2009) stated that Rogers’ (2003) DoI theory is one of the most influential theories of the diffusion of
innovations; it has been widely applied to the fields of sociology, education, and psychology. Straub (2009) also stated that Rogers’ (2003) DoI is flexible enough to be applied in a wide variety of contexts, which is beneficial in the proposed study, as it is an emerging area of research. Rogers’ (2003) DoI is also cognizant of both positive and negative attitudes regarding an innovation, which in this context provides more flexibility, and DoI recognizes that prior conditions are necessary in order to consider adopting an innovation. Ellsworth (2000) encourages choosing a change theory based on the type of question being asked, and for this case study, the other change models in their entirety are not sufficient. For these reasons, Rogers’ (2003) DoI was chosen as the theoretical framework for this study.

The Neuroscience of Learning

The theoretical framework of DoI (Rogers, 2003) helps clarify the aspects of the innovation, the Universal Design for Learning (UDL) framework, that affect implementation in this case study. The UDL framework is not a straightforward framework to put into practice, despite the relative simplicity of three guiding principles. The UDL framework draws from a variety of research including the fields of neuroscience, the learning science, and cognitive psychology. It focuses on incorporating flexibility into learning activities, resources, and assessments by offering multiple means of representation, expression, and engagement (Hall, Meyer, & Rose, 2012; Rose, 2001; Rose & Meyer, 2002). The UDL framework recognizes that variability in the brain is pervasive, as human brains are as unique as fingerprints; that variability can only be recognized and understood in context; and that variability is rather systematic and predictable (Glass, Meyer, & Rose, 2013; Izzo, Murray, & Novak, 2008; OECD, 2002; 2007). The brain can be considered a network much like a computer network, in the sense that the connections between the neurons help parts of the brain communicate (OECD, 2002; Rose & Meyer, 2002). Smaller networks within the larger network (although not literally separate) are essential to learning, and parallel Vygotsky’s (1962) work with the prerequisites for learning: the recognition, the strategic, and the affective networks (Rose & Meyer, 2002).
The recognition network of the brain (the *what* of learning) allows us to identify and interpret sensory information along with more complex patterns, such as concepts on equality or justice (Posner & Rothbart, 2007; Rose & Meyer, 2002). Positron emission tomography, a nuclear medicine imaging test that uses radioactive sugar to produce three dimensional images of body function and metabolism, has shown us that recognition processes are distributed within the brain, which results in more efficient processing: different areas process different input, based on the neurons’ area of specialization (Hao Yang & Chi-Yin Yuen, 2010; OECD, 2002; 2007; Posner & Rothbart, 2007; Rose & Meyer, 2002). In addition, functional magnetic resonance imaging, a neuroimaging procedure that measures brain activity by looking at changes in blood flow to the brain, has shown that students diagnosed with dyslexia have different neural patterns than comparative non-dyslexic peers (Shaywitz & Shaywitz, 2008).

Processing in the brain also occurs hierarchically, in a top-down and bottom-up fashion. For example, when learning to read, students recognize whole words in context rather than sound out individual phonemes, making use of the context in order to make reading more efficient (Posner & Rothbart, 2007; Rose & Meyer, 2002). Bottom-up processing, on the other hand, helps the same reader to decode words never seen before, or words in an unfamiliar context. The recognition network is the basis of why the UDL framework entails offering multiple means of representation: because students have different recognition networks, it is important to offer multiple ways of representing information so that students can access information in a way most efficient to them (Jensen, 2000; Restak, 2006).

The strategic network of the brain (the *how* of learning) is involved in planning every move individuals make, including planning, executing, and monitoring motor and thought patterns (Meyer, Rose, & Gordon, 2014; Rose & Meyer, 2002). This network is involved in basically everything humans do, including playing sports to composing an essay to understanding contextual cues of a situation. Interpreting the world around us is an immensely complex task, and the reason why the strategic network is able to do so efficiently is because its processing is distributed and hierarchical, much like the recognition network (Jensen, 2000; Restak, 2006). This network is the basis as to why the UDL
framework entails offering multiple means of expression: so that students may express what they have learned in a way that is most efficient for them.

The affective network of the brain (the *why* of learning) is the lens through which we interpret the world around us. Due to a myriad of factors such as emotional state, familiarity with a situation, or your interest level in a situation, how we interpret the world around us differs between each and every individual. The affective network attaches emotional significance to what we interpret in the world (OECD, 2002; Rose & Meyer, 2002; Schutz & Pekrun, 2007). Like the recognition and strategic networks, the affective network also processes hierarchically and is distributed in the brain, and there are physiological differences in people in regards to how they experience emotion (Rose & Meyer, 2002; Schutz & Pekrun, 2007). This is the network that is responsible for student engagement in the classroom, and as a result it is imperative that it is considered when designing learning activities and assessments. This network is the basis as to why the UDL framework offers multiple means of engagement: because students interpret any context through the lens of their own affect, we must ensure they can engage in the material as much as possible (Jensen, 2000; Restak, 2006).

All of these networks work in such a way that neural processing is distributed laterally and hierarchically (Hao Yang & Chi-Yin Yuen, 2010; Meyer, Rose, & Gordon, 2014; OECD, 2002; Posner & Rothbart, 2007). This entails processing many elements at once (e.g., color and shape) along with processing contextual cues and sensory information (Hao Yang & Chi-Yin Yuen, 2010; Rose & Meyer, 2002). The advantage in recognizing that each of these networks play a role in learning is that if we recognize where students are processing information differently, we can better understand what barriers in the curriculum or resources or teaching strategies need to be removed or reduced (Rose, 2001). It also ensures that student differences will be an absolute certainty in the classroom, as no two brains are alike; it also points out how educators label “disability” must reflect the inherent differences in all students: why would a student who has perfect pitch but difficulty reading be considered “disabled”, when a student who is tone-deaf but reads words easily is considered not disabled (Meyer, Rose, & Gordon,
As Glass, Meyer, and Rose (2013) state, “neural, developmental, and contextual variability are the rule, not the exception” (p. 100). It is important to realize that the differences in neural processing of all students ensures they fall on a huge continuum of “normal”, from scholastic ability to engagement levels, and as a result, education must reflect those differences (Edyburn, 2010).

The Universal Design for Learning Framework

In order to engage the three learning networks effectively, the UDL framework posits incorporating the following three principles into learning activities, curriculum, resources, and assessments:

- Provide multiple means of representation (to activate the what, or the recognition networks of the brain);
- Provide multiple means of expression (to activate the how, or the strategic networks of the brain); and
- Provide multiple means of engagement (to activate the why, or the affective networks of the brain) (CAST, 2008; Hall et al., 2012; King-Sears, 2014).

These three principles are without a doubt flexible in and of themselves, and may be difficult to imagine in a classroom environment. For a classroom-based example, we can refer to Hall et al.’s (2012) example for applying the UDL principles to reading comprehension instruction. Rose, Meyer, and Hitchcock (2005) called printed text “an unforgiving and unsupportive medium” (p.16) for many of today’s learners: those who cannot see, those who have trouble decoding text, those who have strategic difficulties, or those who are English language learners lacking “the vocabulary or background knowledge they need to succeed in a learning environment dominated by printed text” (p. 16). The limitations of text also apply to students without diagnosed disabilities, as they may prefer to learn through hands-on activities (McNeill, Gosper, & Xu, 2012; Murrells, 2013). These barriers are defined as any obstacle that prevents acquisition of a concept (Edyburn, 2015; OHRC, 2015). For example, in
this case, the textbook may be too difficult to read for English-as-a-second-language (ESL) learners or those diagnosed with learning disabilities, or it may be too easy for gifted students, or it may be boring for students that have difficulties paying attention for sustained amounts of time or those who see no link in the text content to their individual lives. In other words, some students have difficulty accessing the concepts of comprehension not because they are unable to understand, but because the methods with which it is presented are blocking their access to the material (Meyer, Rose, & Gordon, 2014).

The three principles (multiple means of representation, engagement, and expression), implemented in the design of lessons and assessments, allow teachers to “accommodate every student in the classroom by incorporating flexibility into their pedagogy and materials” (Rose, 2001, p. 67). This entails planning and addressing the needs of all students in the classroom by offering students multiple means of expression, engagement, and representation in learning activities. Incorporating a UDL framework offers teachers insights into proactively planning instruction that embraces academic diversity and the social aspects of most classrooms (Meyer, Rose, & Gordon, 2014). As King-Sears (2014) stated, the “how” of incorporating the UDL framework is complicated as the diversity among classrooms is as different as the diversity found in students. Hall et al. (2012) developed a rubric with guidelines and checkpoints to use as a tool for determining the practical ways to implement components of the UDL framework. This rubric has been provided in Table 2 below, adapted by adding additional explanation for each of the guideline bullets.
Table 2

**Guidelines for Applying the UDL Framework (adapted from Hall et al., 2012, p. 13)**

|---|---|---|
| **Guideline 1: Provide options for perception**
  - Offer ways of customizing the display of information: such as the use of digital textbooks or reading material set at the individual reader’s level
  - Offer alternatives for auditory information: such as providing notes in addition to lectures
  - Offer alternatives for visual information: such as providing recorded audio to support learning activities | **Guideline 4: Provide options for physical action**
  - Vary the methods for response and navigation: allow students different ways to demonstrate knowledge
  - Optimize access to tools and assistive technologies: allow students to use tools that reduce barriers in curriculum and allow them to fully participate in learning activities, such as the use of voice-activated software for those with learning difficulties | **Guideline 7: Provide options for recruiting interest**
  - Optimize individual choice and autonomy: to increase learner independence and engagement
  - Optimize relevance, value, and authenticity: to allow learners to make links to real-world situations
  - Minimize threats and distractions |
| **Guideline 2: Provide options for language, mathematical expressions, and symbols**
  - Clarify vocabulary and symbols: do not take for granted that students have the same background knowledge in curricular material
  - Clarify syntax and structure: ensure all students have the necessary background knowledge to understand material
  - Support decoding of text, mathematical notation, and symbols: using text-to-speech software, for example, to aid in decoding written information
  - Promote understanding across languages: do not take for granted that all students have | **Guideline 5: Provide options for expression and communication**
  - Use multiple media for communication: avoid overuse of one presentation method for information
  - Use multiple tools for construction and composition: allow students various ways to demonstrate their learning
  - Build fluencies with graduated levels of support for practice and performance: build in support for students that require assistance with concepts, while allowing them to demonstrate learning of the concept itself | **Guideline 8: Provide options for sustaining effort and persistence**
  - Heighten salience of goals and objectives: make it clear what students need to demonstrate in their learning
  - Vary demands and resources to optimize challenge for different learners
  - Foster collaboration and community
  - Increase mastery-oriented feedback |
the same vocabulary

- Illustrate through multiple media: reinforce the learning of concepts through providing different examples

Guideline 3: Provide options for comprehension
- Activate or supply background knowledge
- Highlight patterns, critical features, big ideas, and relationships
- Guide information processing, visualization, and manipulation: allow various materials to help understand concepts
- Maximize transfer and generalization: make links to real-world situations

Guideline 6: Provide options for executive functions
- Guide appropriate goal setting: to allow students to be more independent in learning
- Support planning and strategy development: to allow students to be more independent in learning
- Facilitate managing information and resources: to avoid student frustration
- Enhance capacity for monitoring progress: allowing students to monitor their own progress to increase independence

Guideline 9: Provide options for self-regulation
- Promote expectations and beliefs that optimize motivation
- Facilitate personal coping skills and strategies
- Develop self-assessment and reflection
Table 2 illustrates the different ways to apply the UDL framework in teaching and learning activities. CAST (2015) stated that the guidelines are not prescriptive in nature, but are rather “a set of strategies that can be employed to overcome the barriers inherent in most existing curricula” (p. 12). Ideally, CAST (2015) argued that the guidelines should be used to evaluate and plan methods, materials, goals, and assessments for creating a maximally accessible learning environment for all students.

As outlined in Hall et al. (2012), the first three guidelines of the UDL framework are regarding multiple means of representation. Guideline one demonstrates that it is critical to provide options in the ways that students perceive information and access knowledge; presenting information in multiple ways ensures that all students have access to curricular content. Guideline two reminds us that not all students have the same background knowledge regarding language, symbols, and expressions; as a result, teachers must not assume that all students have the required background knowledge to fully grasp a concept. Guideline three emphasizes that students need to be engaged in their learning in order to fully understand concepts; as a result, modeling and providing scaffolding to ensure that students fully activate their background knowledge to grasp new concepts is emphasized.

The fourth, fifth, and sixth guidelines of the UDL framework focus on providing multiple means of expression. Guideline four ensures that physical barriers do not hinder students from responding to information. For example, students with expressive language disorders may not be able to orally communicate their knowledge, but they may be able to make a slideshow presentation. Guideline five encourages students to express what they know in ways that interest them and builds on their current knowledge. Guideline six encourages teachers to help students practice their executive functions such as planning, strategy development, and monitoring progress, so that they see learning activities in a bigger picture and build skills that are useful in all contexts of learning.

The seventh, eighth, and ninth guidelines focus on providing multiple means of engagement. Guideline seven focuses on allowing the student to incorporate his or her own choice into learning
activities, to increase engagement in learning material. This is linked to providing the option for students to work collaboratively, which studies have shown can be beneficial to student learning (Andriessen, 2006; Mullins, Rummel, & Spada, 2011; Osman, Duffy, Chang, & Lee, 2011; Phipps, Phipps, Kask, & Higgins, 2001; Veerman & Veldhuis-Diermanse, 2006). Guideline eight focuses on providing the right amount of challenge depending on student needs. Guideline nine encourages students to reflect on their own learning activities in order to build skills that are useful in all learning contexts, and emphasizes valuing the learning process.

The guidelines are important because they help in determining examples of real-life application for the UDL framework. They provide the framework with which an observation checklist can be created, in order to be used in classroom observations to determine the nature of how UDL is implemented in the classroom, as has been done in this study based on Hatley’s (2011) dissertation work.

**Technology and the UDL framework.** There is a need to clarify the link between technology and the UDL framework. Rose (2000) stated:

> Although UDL would be theoretically possible using traditional materials, it is not practically feasible. Offering the varied content, tools, options for expression, and media to provide the necessary alternatives would consume more space, cost more, and require more logistical management than most schools could afford. (p. 4)

Digital multimedia allows a flexibility and versatility that is not possible to re-create with traditional teaching resources (Edyburn, 2010). For example, a computer can be used as an audio device, a textbook, a video game, a phone, a spreadsheet, or an exam. In addition, these functions can be combined with software that can further support students. For example, an exam with text-to-speech software or a phone that can be voice-controlled. Providing this kind of support with print-based materials would be cost-prohibitive, if not impossible in some instances. Text in particular is versatile on the computer: whereas print-based textbooks are one-size-fits-all, the digital version of the textbook can
be used with software to change text size, color, and the amount of content, or use hyperlinks to aid with clarity (Edyburn, n.d.; Rose, 2000; 2001). There is also the fact that it is not uncommon for students to be comfortable with the use of various technologies, both inside and outside the classroom (Hasselbring, 2001); it seems counterintuitive to not leverage the technologies and experience that students bring with them to class.

Rose (2000) cautioned, however, that just because media is digital does not mean it is based on the framework of UDL. For example, just because a math game is digital does not mean that it is accessible for all students; it has to be compatible with other software, the original math game must be designed with these supports already in place, and the teacher must have the knowledge required to encourage students to access these supports. Smith and Harvey (2014) reported in their review of 478 Khan Academy lessons, that despite being completely digital they were not, in fact, UDL when compared to the rubric put forward by CAST. The role of the teacher using the UDL framework is to ensure that if media is digital, it is also aligned with the guidelines of the UDL framework, and to ensure that students are using the supports effectively.

This has been seen in several studies incorporating technologies designed with UDL in mind. Coyne et al. (2012) created a literacy instruction program that incorporated UDL-scaffolded digital books that could be read in conjunction with word recognition software; in a study with 16 students from kindergarten to grade two with significant intellectual disabilities, significant reading gains were made on the Woodcock Johnson Test of Achievement III Passage Comprehension subtest, controlling for previous reading levels. In a 16-week quasi-experimental study investigating the effects of an Internet-based intervention designed with the principles of UDL, 240 students in grade five were assigned either the UDL treatment or a treatment based on traditional curriculum (Proctor et al., 2011). Results showed that students in the UDL treatment performed significantly better on vocabulary assessments (standardized and classroom-based) than the students in the control group, although the results for reading comprehension were not as significant (Proctor et al., 2011). In a science class, Rappolt-
Schlitchtmann, Daley, Lim, Lapinski, Robinson, and Johnson (2013) implemented a web-based science notebook, with 621 fourth-grade students from 28 different classrooms, that included text-to-speech technology, English to Spanish translation tools, a multimedia glossary, a “check my work” function that allowed students to ensure they had completed all assignment parts, and keyboard accessible actions. In a randomized controlled trial comparing the web-based science notebook with the traditional paper and pencil science notebook, students showed improved outcomes in science knowledge and higher interest levels. Fitzgerald (2009), in a case study, investigated how seven special educators worked with students to create a digital picture book to help teach a language arts concept, and showed that students were able to gain selective skills, have access to content in the curriculum, persist more in activities, and were more willing to use technology-supported media to express themselves. In these cases, it is not the technology per se that is “UDL”, but how the teacher uses it and how the students use it to access the content they need in order to reach curricular goals. Simply having technology available is not enough; it is how it is used that allows UDL to come to life in the classroom.

Related findings from a variety of studies corroborate that it is “how” technology is used that is essential when looking at technology effects on student achievement, because not all technology uses are constructive and helpful (Alsafran & Brown, 2012; Fedisson & Braidic, 2007; Kirschner & Karpinski, 2010; Lei & Zhao, 2007; Shapley, Sheehan, Maloney, & Caranikas-Walker, 2011). In a longitudinal study, over 200 middle school students completed surveys, and ten teachers and nine students participated in interviews in regards to their technology use following a school-wide implementation of a laptop computer for each student (Lei & Zhao, 2007). Over one academic school year, researchers found that students tended to use computers in ways that did not contribute to their academic achievement. The software being used also played a role on student outcomes; if students spent more time using software that focused on creating, academic benefits were seen when compared with students using other non-creative software. The technology used that had positive impacts was related to specific subject areas and emphasized student construction. In addition, the software programs
that had the highest impact on student achievement were often the least used in frequency. For example, using the Internet rated one of the highest uses, but did not increase student achievement. Conversely, a science-based software program that allows students to create experiments was among the least used programs, but had a positive impact on student learning. The researchers concluded that care must be taken when choosing technology, as they may have differing effects on student achievement. Another study found that students who used Facebook studied less hours per week than non-users of Facebook, and users reported having lower grade point averages than their non-user peers (Kirschner & Karpinski, 2010). The participants were 219 students, and they completed surveys over two semesters. Other studies, however, have shown positive results when integrating technology in student learning activities: a technology immersion study had a postive effect on technology proficiency, the frequency of collaborative small-group work, and small but consistently favorable growth in mathematics and reading when compared with a control group (Shapley et al., 2011). A comparative study between the United States and Singapore showed that when looking at the effects of technology on achievement, how the technology was used is essential: when used constructively, technology incorporation in middle schools can increase academic achievement (Alsafran & Brown, 2012). In addition, Fedisson and Braidic (2007) found that incorporating PowerPoint presentations in middle school language arts classrooms can increase achievement and student attitudes towards technology. The research focused on educational implications of technology use on achievement seem to show that the use of technology, and not just the presence of technology itself, dictates whether or not academic achievement is positively affected.

There is a difference between digital media and assistive technology. Assistive technologies are physical tools that provide students with access to curriculum that they would not have otherwise, because the curriculum itself is inflexible (Edyburn, n.d.; 2010; Newton & Dell, 2011; Rose, 2000; 2001). For example, a visually disabled student may use a text enlarger as an assistive technology because he or she would not be able to read without it. A UDL approach to reading comprehension for the visually impaired would be, perhaps, a digital copy of the book that allowed for enlargement of text.
along with text-to-speech software if that student found that it helped his or her comprehension. The focus of assistive technologies is to help a student with a disability by taking the current tool and modifying it after the fact so that the student may use it; this is seen in classrooms that use special applications for tablets to support student learning (Windman, 2013), determining which assistive technologies to use with the visually and auditory impaired (Nam, Bahn, & Lee, 2013), and implementing assistive technologies for students diagnosed with high-incidence disabilities for literacy instruction (Flanagan, Bouck, & Richardson, 2013). The focus of the UDL framework is to proactively create curriculum, assessments, and resources that allow for the educational access of all learners (Edyburn, 2010; 2006; Rose, 2000; 2001).

Some students with physical disabilities, for example, may require specialized equipment in order to function in an everyday environment. However, the goal of the assistive technologies is to enhance learner ability, rather than compensate for poorly designed curriculum, resources, and assessments (Rose, 2000). With UDL in place alongside assistive technologies, it is possible that students who require assistive technologies have, first of all, access to curriculum that would be impossible without the assistive technology, and increased access through the flexibility of offering multiple means of representation, engagement, and expression in learning activities and assessments.

The Origins of the UDL Framework

Universal design. The phrase universal design was first introduced in the 1970s by Ronald Mace, the founder of the Center for Universal Design at North Carolina State University (NCSU) (Scott et al., 2003). The research team at NCSU focused on creating environments that were accessible to not only the general population, but also to the margins of society. Environments that are universally designed encompass the following features:

- Equitable use, meaning that all individuals should be able to use the device;
- Flexible in use, in that more than one way exists to operate the device;
Simple and intuitive to use;

Perceptible information, or feedback from the device is perceptible on many levels, such as auditory as well as visual;

Tolerance for error;

Low physical effort; and

Size and space for approach and use (Colburn, 2010; Salmen, 2011; Shaw, 2011).

As time went on, more interest was generated in creating universally designed environments due to the fact that life expectancies are longer than ever, entailing more use of devices from the elderly, and modern medicine increasing the quality of life for those with medical conditions that render the individuals differently abled (Salmen, 2011).

A classic example of Universal Design (UD) is the deliberate incorporation of ramps in buildings. The ramps, while providing essential access for people in wheelchairs, also benefit people using strollers. Another example would be using large-print text for signs. While providing accessibility for the visually impaired, it also benefits the elderly and people in a rush. The idea behind UD is to make environments that allow everyone access, and planning ahead for human diversity. If we are to apply the principles of UD to learning contexts, we must ensure that students are able to access curriculum despite many differences in ability. The goal is to design education that is accessible for all while maintaining the integrity of the product, that is, the curriculum and objectives (Scott et al., 2003).

Edyburn (2010) stated that the incorporation of UDL principles is ultimately about the design of curriculum, lessons, assessments, and resources. As a result, a direct link from Instructional Design to UDL can be made.

**Instructional design.** Instructional design (ID) is an educational approach for teachers to organize and plan effective lessons and assessments. ID aims to determine the current learner state and identify his or her needs in order to reach a pre-determined learning goal, with supports or interventions implemented along the way if necessary (Merrill, Drake, Lacy, & Pratt, 1996). ID is not a model of
teaching and learning, but a field of curriculum and evaluation approaches that include a variety of
texts such as the ADDIE model (Branson, Rayner, Cox, Furman, King, & Hannum, 1975), Gagne’s
theory of instruction (Gagne, 1985; Gagne & Driscoll, 1988), the Systems Approach Model (Dick et al.,
2005), and in fact iterations of the incorporation of UD in educational models, including the UDL
framework. Based on learning objectives, learning experiences, and assessment, which rely on teacher
planning, gathering and arranging appropriate resources and experiences, and planning appropriate
forms and tools for assessing what students have learned from their learning experiences, these models
intend to address the major components of curriculum and evaluation.

These models were inspired by one of the first researchers in this area, Gagne (1985), when he
began his work in ID by defining the “conditions under which learning takes place” (p. 2) in order to
create a model of learning that would help define conditions that are conducive to learning. Learning,
according to Gagne (1985), is defined as “a change in human disposition or capability that persists over
a period of time and is not simply ascribable to processes of growth” (p. 2). ID is based on three
premises:

- Planning for learning must occur, as in the conditions for learning must be carefully planned with the
students’ capabilities in mind;
- Managing of learning must occur, as in what can continue to motivate students to continue learning
and what kinds of learning assessments will be of most value; and
- Instructing, or arranging the conditions of learning to be of most value to the students (Gagne, 1985).

As a result, Gagne (1985) and Gagne and Driscoll (1988) put forward the concept of ID that
encompasses evaluating what the students need to be successful in learning situations, an evaluation of
learning conditions that must be present in teaching, and nine events of instruction (gaining attention,
informing learners of objectives, stimulating recall of prior learning, presenting the stimulus, providing
learning guidance, eliciting performance, providing feedback, assessing performance, and enhancing
retention and transfer).
Gagne’s (1985) work provided the foundation for the evolution of ID models, such as the ADDIE model (Branson et al., 1975). The ADDIE model is comprised of five elements (Branson et al., 1975). The first element, Analyze, is the phase of content development, which refers to the gathering of information about the students, the objectives, the tasks to be completed, and goals of the project. The teacher organizes the content to be more applicable to the learners. The second phase, Design, is where the teachers create the project; information from the Analyze phase inform the structure of how the learning occurs. Development, the third phase of the process, is where the learning activities are created and the information from the Design phase are incorporated. Implement, the fourth phase, is where the developed content is implemented and all tools are evaluated to make sure they are applicable to learners. In Evaluation, the final phase of the process, goals are evaluated to see whether or not they have been achieved. Data collected can be used to alter the design in future iterations. The ADDIE model is dynamic in nature, as it allows the implementor to constantly revise and make adjustments to the learning environment and activities to make them more conducive to learning (Branson et al., 1975; Chevalier, 2011; Reiser & Dempsey, 2012).

An adaptation of the ADDIE model, the Dick and Carey Systems Approach Model, (Dick et al., 2005), looked at instruction as an entire system, taking into account context, content, learning, and instruction. Their components are conducted in parallel as well, and have more components than the ADDIE model:

- Identifying instructional goals, or in other words, the learning objectives;
- Conduct instructional analysis, which is to identify what the learner must learn to do to perform a task;
- Analyze learners and contexts, or identify prior skills, prior experience, and skills related to the task to be taught;
- Write performance objectives, which are a description of the behavior, the condition and the criteria, and how we know that the knowledge, skills, and attitudes have been achieved;
- Develop assessment instruments, or to identify the purpose of testing and the instruments to be used;
- Develop strategy, that is, how to present the material;
- Develop and select instructional materials;
- Design and conduct formative evaluation of instruction;
- Revise instruction in order to identify where students need more teaching; and
- Design and conduct summative assessment (Dick et al., 2005).

The concept of ID has been around for a long time, and has of course undergone modifications. In fact, the UDL framework is in effect a new framework similar to ID, but with the difference being that the UDL framework in fact plans ahead for diversity rather than taking action once students’ needs become evident in the classroom. Edyburn (2010) repeats this idea when he states that the UDL framework is essentially about ID: the framework of UDL is simply proactive, where ID is reactive. For example, in ID, although the teacher has to design the lesson before to ensure that students’ needs are met, this is done only after ascertaining what students “need to be successful”, or in other words what the teacher thinks the students need to be successful. This may involve some students falling through the cracks, as they may not have diagnosed disabilities or they may learn better in a way that even they do not know. This also misses opportunities for students to become even more engaged in their studies by exploring different topics in different ways. The UDL framework, in contrast, has flexibility built into the lessons, resources, and assessments, meaning that even students that appear to be successful could potentially be more successful through the flexible means of representing, expressing, and engaging in information. Table 3 outlines the similarities between the ID models and the UDL framework.
### Table 3: Similarities Between the UDL framework and Instructional Design Models

<table>
<thead>
<tr>
<th>Components of the UDL Framework (CAST, 2008)</th>
<th>Instructional Design Models</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multiple means of Representation</strong></td>
<td><strong>Multiple means of Expression</strong></td>
</tr>
<tr>
<td><strong>Multiple means of Engagement</strong></td>
<td><strong>Multiple means of Engagement</strong></td>
</tr>
</tbody>
</table>

#### Instructional Design Models

<table>
<thead>
<tr>
<th>Systems Approach Model (Dick et al., 2005)</th>
<th>- Analyze learners and contexts: to identify student needs and relevant information from the context that impacts learning.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Revise instruction: identify areas of need in instruction to improve learning.</td>
</tr>
<tr>
<td></td>
<td>- Develop instructional strategy: develop content presentation and learning activities.</td>
</tr>
<tr>
<td></td>
<td>- Develop and select instructional materials: choose those that are most appropriate for the student population.</td>
</tr>
<tr>
<td>Gagne’s theory of instruction (Gagne, 1985; Gagne &amp; Driscoll, 1988)</td>
<td>- Presenting the stimulus: the teacher gives emphasis to distinctive features of the information to be taught.</td>
</tr>
<tr>
<td></td>
<td>- Stimulating recall of previous learning: the teacher revises relevant information to make it easier to learn.</td>
</tr>
</tbody>
</table>

- **Gagne’s theory of instruction (Gagne, 1985; Gagne & Driscoll, 1988)**
  - Presenting the stimulus: the teacher gives emphasis to distinctive features of the information to be taught.
  - Stimulating recall of previous learning: the teacher revises relevant information to make it easier to learn.

<table>
<thead>
<tr>
<th>Gagne’s theory of instruction (Gagne, 1985; Gagne &amp; Driscoll, 1988)</th>
<th>- Eliciting performance: the teacher asks learners to respond in order to demonstrate their learning.</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>- Providing feedback: the teacher provides informative feedback to correct any misconceptions or errors.</td>
</tr>
<tr>
<td></td>
<td>- Gaining attention: ensuring that learners are paying attention through the application of a stimulus; for example, the abrupt change of a teaching method.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Gagne’s theory of instruction (Gagne, 1985; Gagne &amp; Driscoll, 1988)</th>
<th>- Conduct instructional analysis: identify what a learner must be able to do for a task.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Analyze learners and contexts: evaluate prior skills, experience, and demographics and identify characteristics related to the skill to be taught.</td>
</tr>
<tr>
<td></td>
<td>- Develop and select instructional materials.</td>
</tr>
<tr>
<td></td>
<td>- Identify instructional goals: the goal the learner is expected to acquire.</td>
</tr>
</tbody>
</table>
prior learning.

- Assessing performance: the teacher asks students to demonstrate their learning and provides feedback to reinforce the learning and show where they could improve.
- Informing learners of objectives: the teacher communicates the desired outcome to the students.
- Providing learning guidance: the teacher helps students in understanding the content.
- Enhancing retention and transfer: the teacher provides opportunities to revise skills acquired in order to reinforce and generalize them.

ADDIE model (Branson et al., 1975)

- Implement: the fourth phase, where the developed content is implemented and all tools are evaluated to make sure they are applicable to learners.
- Design: the second phase of the process, where the teachers create the project; information from the Analysis phase inform the structure of how the learning will occur.
- Development: the third phase of the process, where the activities are created and the information from the design phase are incorporated.
- Evaluation: the final phase of the process, where goals are evaluated to see whether or not they have been achieved. Data collected can be used to alter the design in future iterations.
- Analyze: the first phase of content development, which refers to the gathering of information about the students, the objectives, the tasks to be completed, and goals of the project. The teacher organizes the content to be more applicable to the learners.
Table 3 demonstrates the similarities between the UDL framework and ID models. It is clear that while the different models of ID divide teaching and learning activities, all of the elements are encompassed in the UDL framework. The major difference is that the UDL framework emphasizes planning for diversity in the classrooms, whereas ID places an emphasis on determining what students need to be effective in a learning environment in a reactive way. The ADDIE model (Branson et al., 1975) and the Dick et al. (2005) model are much more specific in their separation of learning conditions and there is emphasis on providing students multiple means of representation of knowledge, engagement, and expression; this is clear in the sense that the ID models recognize that students need different learning environments to be successful (Branson et al., 1975; Dick et al., 2005; Reiser & Dempsey, 2012).

The ideas of allowing students to access and represent knowledge while incorporating their interests are not new in the research; the innovation of the UDL framework lies in the fact that it is proactively planning for student diversity.

**Other iterations of the UDL framework.** Other iterations of the UDL framework exist, and include Universal Design for Instruction (UDI) and Universal Instructional Design (UID). All three models in this “UD family” incorporate principles that extend curriculum to diverse learners and aims to increase flexibility and access to curriculum (McGuire, 2014; Rao, Ok, & Bryant, 2014). Different ways in which educational resources and teacher practice can become more flexible and adaptive to learner needs are highlighted in all three models, so that the greatest number of students can be reached.

UDI is an approach to teaching that proactively designs and uses instructional strategies that could benefit learners with diverse needs (Scott et al., 2003). It encompasses eight principles that guide the design of instructional resources, activities, and assessment. First, an emphasis on class climate is important because it fosters a respect for diversity and inclusiveness. Second, interactions are encouraged between the teacher and students in order to ensure that open lines of communication are
maintained. Third, an emphasis on ensuring that resources, equipment, and materials are physically accessible is present. Fourth, a variety of delivery methods are required in order to ensure that learners can access the information adequately. Fifth and sixth, feedback must be provided on a regular basis, along with assessment practices that evaluate students using multiple and accessible methods. Finally, an emphasis on accommodation is required so that multiple, accessible methods and tools are available (Burgstahler, 2007a). UDI has been applied in post-secondary contexts in order to ensure that students of diverse backgrounds have maximally engaging courses through the design of lectures, discussions, visual aids, printed materials, and other learning activities (Bar, Galluzzo, & Sinfitt, 1999; Burgstahler, 2007a; Burgstahler & Coy, 2008; McGuire, 2014).

UID is another iteration of UD implemented in education (Chickering & Gamson, 1987; Higbee & Goff, 2008). Its eight principles emphasize creating welcoming classrooms so that all students feel valued, determining the essential components of a course so that essential information is conveyed effectively, communicating clear expectations to all students, providing timely and constructive feedback so that students may improve, exploring use of natural supports for learning, including technology to help access information, designing teaching methods that consider diverse learning styles, abilities, ways of knowing, and previous experience and background knowledge so that different learners may access curriculum effectively without taking anything for granted, creating multiple ways for students to demonstrate their knowledge, and promoting interaction among and between faculty and students to maintain open lines of communication (Higbee & Goff, 2008).

UDL is the most straightforward of the “UD family” members in that it only has three principles:

- Allowing students multiple means of representation of their knowledge by allowing different ways of accessing knowledge, such as using websites along with print-based materials such as textbooks (in order to activate the what, or recognition networks of learning in the brain);
- Multiple means of engagement through allowing students to incorporate their interests in their learning (in order to activate the why, or affective networks of learning in the brain); and
Multiple means of expression through giving students choice about how to demonstrate their knowledge, such as using projects instead of uniquely tests (in order to activate the how, or strategic networks of learning in the brain) (Alberta Education, 2012; Center for Applied Special Technology (CAST), 2008; Hall et al., 2012; King-Sears, 2014; Maryland State Board of Education; 2011).

By incorporating these principles, educators and policymakers are “instilling flexibility into methods and materials that maximizes learning opportunities not only for students with identified disabilities, but for all students” (Rose & Meyer, 2002, p. 3). The details of the “UD family” are outlined in Table 4, along with the guidelines associated with each.

Table 4

*Models and Guidelines/principles of the “UD family”* (Rao et al., 2014, p. 154)

<table>
<thead>
<tr>
<th>Model</th>
<th>Guidelines/principles</th>
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<tbody>
<tr>
<td>Universal Instructional Design (UID)</td>
<td>• Creating welcoming classrooms</td>
</tr>
<tr>
<td></td>
<td>• Determining essential components of a course</td>
</tr>
<tr>
<td></td>
<td>• Communicating clear expectations</td>
</tr>
<tr>
<td></td>
<td>• Providing timely and constructive feedback e.g. Exploring use of natural supports for learning, including technology</td>
</tr>
<tr>
<td></td>
<td>• Designing teaching methods that consider diverse learning styles, abilities, ways of knowing, and previous experience and background knowledge</td>
</tr>
<tr>
<td></td>
<td>• Creating multiple ways for students to demonstrate their knowledge</td>
</tr>
<tr>
<td></td>
<td>• Promoting interaction among and between faculty and students</td>
</tr>
<tr>
<td>Universal Design for Learning (UDL)</td>
<td>• Principle I: Provide multiple means of representation</td>
</tr>
<tr>
<td></td>
<td>• Principle II: Provide multiple means of action and expression</td>
</tr>
<tr>
<td></td>
<td>• Principle III: Provide multiple means of engagement</td>
</tr>
<tr>
<td>Universal Design for Instruction (UDI)</td>
<td>• Class climate</td>
</tr>
<tr>
<td></td>
<td>• Interaction</td>
</tr>
<tr>
<td></td>
<td>• Physical environments and products</td>
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<td></td>
<td>• Delivery methods</td>
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<tr>
<td></td>
<td>• Information resources and technology</td>
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<tr>
<td></td>
<td>• Feedback</td>
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<td></td>
<td>• Assessment</td>
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<td></td>
<td>• Accommodation</td>
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</table>
It is clear that there is some overlap in the “UD family”, so what makes them different from one another? Rao et al. (2014) stated:

The UDI and UID frameworks provide broader, less specific guidelines for lesson and curriculum design; however, these frameworks address additional factors such as student–instructor interactions, classroom environment, and accommodations. Although the principles of all three models are applicable to both pre-K–12 and post-secondary environments, the UDI and UID frameworks are often associated with post-secondary environments and courses in the literature. (p. 154)

UDL is different from its other family members because it is the most specific in regards to how to implement in the classroom; it is accompanied by a guideline rubric that is essential when incorporating the UDL framework into curriculum, learning activities and assessment (see Table 3). The UDL framework is also solidly based in research in neuroscience, and incorporates how the brain works into its framework. In addition, because the UDL framework is the UD model that has been implemented in the school where this study is planned to take place, and in fact most often in kindergarten to grade twelve contexts (Rao et al., 2014), it is of focus for this study and a focus on its three defining principles emphasized.

**Evidence Supporting the Use of the UDL Framework**

CAST (2015) made the claim that “UDL is based upon the most widely replicated finding in educational research: Learners are highly variable in their response to instruction” (p. 10). The individual differences found in results of studies are typically treated as sources of error variance, as distractions from the main effect of the intervention (CAST, 2015). However, when viewed through the lens of the UDL framework, these individual differences are essential to understanding and designing effective instruction. Foundational research informing UDL and implementation research is explored (CAST, 2015).
**Foundational research informing the UDL framework.** Research that has influenced the development of the UDL framework is from the fields of neuroscience, the learning sciences, and cognitive psychology (Meyer, Rose, & Gordon, 2014). Some of the earlier ideas were overtaken by new knowledge as ways of researching and understanding learning evolved over time. Each theory or explanation of learning provided a somewhat different definition of learning. For example, Illeris (2007) has forwarded a definition of learning based upon a number of contemporary learning theories. He contended that "learning can broadly be defined as any process that in living organisms leads to permanent capacity change and which is not solely due to biological maturation or ageing" (Illeris, 2007, p.3). CAST (2015) stated that the following researchers, in particular, influenced the development of the UDL framework: Piaget, Vygotsky, Bruner, Wood and his colleagues Bruner and Ross, and Bloom.

Piaget (1976) believed that students could only learn as much as their physiology allowed, meaning that cognitive structures in the brain had to physically develop before a certain type of learning could take place; for example, calculus could not be learned by a six year old because he would not be able to physically acquire the knowledge until his brain matured. Piaget (1976) theorized stages of development, in which children could accomplish certain tasks based on their age. These stages of development were the basis for Piaget’s learning theories, as he emphasized that educators must take into consideration the current level of knowledge of students when teaching. Piaget (1976) stipulated that learning can only take place when students have the matured mental structures necessary to understand a concept; this can be helped by educators providing adequate scaffolding of learning, that is providing supports for students to acquire knowledge in a way that builds on what they already know; the development of cognitive structures called schemata played a role in this process. With regard to UDL, we must take into account that students come to school with different background knowledge and different cognitive ability, which must be taken into account when teaching them.

Vygotsky’s social learning theory argued that social interaction precedes development, and that consciousness and cognition are the end product of socialization and social behavior (de Corte, 2010).
He emphasized that thought develops socially, through talking to oneself while learning and through conversations with peers in learning activities. Vygotsky (1962) argued that students need to recognize the application of strategies to process that information, which is also echoed in Rose’s research (2001) as a link to the strategic networks of the framework of UDL.

Vygotsky (1978) introduced the Zone of Proximal Development (ZPD), the range of tasks that a child completes during learning. The lower limit being the tasks that a child is able to accomplish independently, and the upper limit being the tasks that a child is only able to complete with the help of an educator or an expert in the task at hand. For UDL, this is represented in how the framework entails providing multiple means of representation, expression, and engagement because by offering this flexibility, students have access to different types and levels of scaffolding. Students are more able to express knowledge in ways that are most natural to them, being helped along the way.

Bruner (1977) was concerned with emphasizing the creation of structure that enabled learning. One such method in wide use today is the idea of scaffolding, and in fact he was the researcher who coined the term. Scaffolding, according to Bruner (1977), is the creation of mutually reinforcing knowledge that is attained through interaction; the educator’s responsibility is to help students learn through providing them with the scaffolding necessary to acquire new knowledge. The research of Wood, Bruner, and Ross (1976) paralleled the ideas of scaffolding in teaching practice.

Culture also played a role in Bruner’s (1996; 1977) ideas about education: he stated that although meanings and learning indeed occurs in the mind, they are undoubtedly influenced by the cultural influences of the surrounding learning context. He emphasized the importance of learning in a social context and the idea that students can in fact provide scaffolding for learning for each other, and that in fact only the weakest kinds of learning are done in a teacher-to-student kind of way. Understanding, rather than performance in education was paramount, and Bruner thought that simply being able to recall information (through, for example, a multiple choice test) was insufficient to demonstrate learning (1977). Rather, it was more important to be able to demonstrate knowledge in a deep way and go beyond
simple recitation of knowledge. Bruner (1996) stated that education works well when the learners are engaged, when learning encouraged participation and is collaborative, and when learning emphasizes constructing meaning rather than receiving information. In order to fully engage students, there must be a certain level of choice in their learning activities which is provided for in the use of UDL.

Bloom’s (1994) research was focused on creating taxonomy for the creation of educational objectives. These objectives were divided into the cognitive, affective, and psychomotor domains, and within each of these domains, learning at the higher levels was dependent on having achieved learning at the lower levels. Within education, the cognitive taxonomy is the one most used, and it includes the lower levels of thinking as knowledge, comprehension, and application. The higher levels of thinking include analysis, synthesis, and evaluation (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956). Although there have recently been arguments outlining the reconceptualization of the levels because the taxonomy oversimplifies the nature of thought and its relationship to learning (Anderson & Krathwohl, 2001; Marzano & Kendall, 2006), it is clear that Bloom’s taxonomy can inform the conceptualization of teaching and learning, and re-emphasize the importance of scaffolding for the individual learner. In the design of learning with UDL, students require different levels of support in order to achieve at higher levels of Bloom’s taxonomy.

Piaget (1976), Vygotsky (1978), Bruner (1961; 1996; 1977), Wood, Bruner, and Ross (1976), and Bloom (1994) informed the development of the UDL framework through their ideas about learning, and provided a lens through which a better understanding of how students learn. These researchers proposed theories that addressed all three networks in student learning: the strategic, the affective, and the representational modalities of learning (Felton, 2012). Through this lens, recognition of the inherent differences in all students and what they require to be successful in learning is paramount, and further emphasizes how the UDL framework can affect student learning.

**Implementation research.** In this case, “implementation” as defined by CAST (2015) refers to the implementation of the UDL framework in various contexts. It is not referring to the second step in
Fullan’s (2007) change process, but rather the studies look at the effects of incorporating the UDL framework in an educational context. The bulk of the published empirical studies about UDL (reviewed below) are focused on student outcomes such as academic achievement and student engagement, which should be disseminated in order to establish why the UDL framework might be useful in learning contexts.

Although it is mentioned in studies that future areas of research should include topics such as continued UDL implementation (Abell, Jung, & Taylor, 2011; Katz, 2013; Rappolt-Schlichtmann, Daley, & Rose, 2012; Rappolt-Schlichtmann et al., 2013; Rao et al., 2014), I was only able to find one unpublished dissertation that specifically focused on this theme (Hatley, 2011). This reflects a need to explore further the implementation efforts regarding UDL.

Studies incorporating the framework of UDL in classrooms have, in general, been found to have positive effects on student outcomes, including academic achievement and student engagement. A review of the research showing the effects of UDL implementation follows in order to provide the reader with pertinent background knowledge regarding the current state of the literature focused on the UDL framework.

**UDL and academic achievement.** One of the reasons to implement any kind of intervention is to have an effect on student outcomes (Edyburn, 2010); research has been conducted, below, to determine whether or not incorporating the UDL framework has any effect on student academic achievement.

Browder et al. (2008) found that three students with multiple disabilities increased their independent responses in shared story activities designed with the UDL framework in a multiple probe design. The three student participants in the study were identified based on their lack of participation in literacy instruction. The story books were adapted to incorporate multiple means of representation, expression, and engagement for the three students, and the researchers noted that doing so would further engage the whole class. The researchers noted that using digitized text would perhaps be easier to incorporate within such a study, rather than modifying print books (Browder et al., 2008).
In a different study, 16 students with significant intellectual abilities taking part in a technology-based literacy intervention made significantly greater gains on the *Woodcock-Johnson Test of Achievement II Passage Comprehension* subtest (Coyne et al., 2012). The technology-based literacy intervention emphasized reading for meaning using UDL-scaffolded e-books and letter and word recognition software, and when analyzing achievement the researchers controlled for previous reading level of the students. The researchers concluded that the results provided some additional support for the idea that UDL-based interventions can provide benefits for students with significant intellectual disabilities (Coyne et al., 2012).

In a design-based research study in a mathematics class, data analysis of the 26 students of all ability showed significant improvement in achievement (Friesen et al., 2008). The intervention included providing multiple means of representation, expression, and engagement through offering choice to students and incorporating digital media in the teaching and learning activities. The students were given a pre- and post-test with geometry questions related to PISA questions. Of the 36 students in the class, 11 were coded for special needs and had individualized program plans in place, and 27 students were included in the final data analysis. Because the pre- and post-test design could attribute to increased academic scores to maturation, qualitative measures were also included in the study to account for the context and for the subjective experiences of participants. The researchers concluded that creating a curriculum for mathematics, drawing upon the principles of UDL, could be beneficial for student learning, and provide a framework with which to redesign other curricula (Friesen et al., 2008).

Six second-grade students took part in a six-week intervention of spelling lessons aligned with the principles of UDL and combined with direct instruction (Metcalf et al., 2009). The spelling lessons were created from traditional spelling lessons, but expanded to remove barriers and provided choice for the students by using three multisensory activity centers. One student in particular was analyzed, and he showed significant gains in spelling, although the spelling words were diverse in their difficulty so the results should be interpreted with caution. The students in general, however, showed increased
participation in their UDL spelling lessons, and the researchers suggested incorporating the principles of UDL into other subject matter to further increase participation and potentially increase academic achievement (Metcalf et al., 2009).

In a study with 141 students with and without disabilities, students were given social studies vocabulary instruction using a multimedia-based instructional tool aligned with the principles of UDL. Students were randomly assigned to alternating treatments, and results showed that students with and without disabilities made significant growth on weekly vocabulary matching tests and scored significantly higher on the curricular post-tests (Kennedy et al., 2014). The researchers stated that the design of the multimedia tool was deliberate in its design to incorporate the UDL principles, and that typical multimedia may not have the same kinds of supports in place, so it is important to be selective when using multimedia in teaching with the aim of incorporating UDL (Kennedy et al., 2014).

In a study of 14 fourth-graders at risk for learning disabilities, students were either placed in a treatment group that incorporated a computerized rapid-accelerated-reading program based on the principles of the UDL framework to increase silent reading speed or wait listed for intervention. Students in the treatment group showed significant improvement on grade-levelled reading tests and comprehension accuracy levels (Niedo et al., 2014). The researchers stated that bringing attention to unmet needs in students may help educators determine what supports are required: for example, students given more time to complete a test may not perform better if their silent reading speed is not addressed, as was in this study (Niedo et al., 2014); that is, the principles of UDL should be in place but are only effective if they are specifically addressing student needs.

Dolan et al. (2005) showed that students’ scores significantly improved on reading passages using computer-based read aloud testing accommodations, aligned with the framework of UDL. The participants were given contrasting methods to deliver two forms of a test to ten high school students with disabilities, a paper and pencil test and a digital test that incorporated text-to-speech software. Using qualitative measures, the researchers also found that students in this study preferred the computer-
based testing accommodations. The researchers in general indicated that their results supported the use and creation of tests that align with UDL in order to allow students to perform to the best of their ability (Dolan et al., 2005).

In a pre-school setting with 58 students, Lieber et al. (2008) showed that students made gains in math and literacy scores on subtests, in a standardized test following a school-wide emphasis on the incorporation of the UDL framework through a new curriculum. The curriculum was developed by the researchers to enhance outcomes for students at risk for school failure, including students with English as a second language, students living in poverty, or those with identified disabilities. The researchers suggested that incorporating the principles of UDL can provide greater access to content for all students, potentially resulting in higher academic scores as shown in this study (Lieber et al., 2008).

Proctor et al. (2011) investigated whether an Internet-based vocabulary instruction program would affect student outcomes for fifth grade students. Over 16 weeks, 240 students were assigned to either the UDL program or an Internet-based program based on the traditional literacy curriculum. The UDL program incorporated elements such as additional instruction of words, student work logs, multimedia glossaries, pictures illustrating events from the text, access to multilingual definitions for multilingual students, read-aloud software, and choice in deciding the associated activities with the texts presented. Students were not required to complete all activities or access all of the supports, they were free to use whatever supports they deemed necessary for themselves. Upon completing the program, students were assessed using the *Gates McGinitie Reading Achievement Test*, an experimenter-developed test of vocabulary, and a test of vocabulary depth. Major findings indicated enhanced breadth and depth of vocabulary for students in the UDL treatment, although the results in regards to reading comprehension were not as significant (Proctor et al., 2011).

Marino (2009) reported that struggling readers were able to perform as well as their average peers when using a literacy computer program designed with the framework of UDL. The study included 1,153 students in 62 inclusive classrooms and took place over four weeks in middle school
science classes, and basic knowledge of vocabulary and science concepts were evaluated using pre- and post-tests. Marino (2009) determined that the results of the study supported the inclusion of technology that is designed with the principles of UDL in order for all students to have greater access to curricular content.

In a study involving 628 fourth-grade students, Rappolt-Schlichtmann et al. (2013) showed that using web-based science notebooks as infrequently as once a week allowed these students to perform better on a post-test when compared to the control groups using traditional pen-and-paper note-taking. This study investigated the potential for a digital science notebook, explored teacher and student use of supports in the digital environment and the relation to positive inquiry behaviors in science, and investigated the perceptions of the key affordances and challenges of the technology in learning. In the study, the more the digital notebooks were used, the more positive the outcomes for students, and in general the researchers found that strong teaching strategies combined with tools designed with the principles of UDL support learning skills. The researchers stated that when technology is used in a supportive learning environment with a skilled teacher, gains for students can occur for a variety of learners (Rappolt-Schlichtmann et al., 2013).

King-Sears et al. (2014) showed that when comparing chemistry classes with a total of 60 students in high school, there were no significant differences in academic results when comparing the students from the control group and the UDL condition. Students completed a pre-test, a post-test, and a four week delayed post-test. Students found the teaching strategies aligned with the UDL framework helpful despite the lack of difference between academic results. However, the researchers note that the presence of effective teaching practices were not equally distributed between the control and the comparison classes, which may have been a confounding factor, and refinements for the UDL interventions were recommended by the researchers (King-Sears et al., 2014). This study may have shown that simply the presence of UDL-based interventions is not enough to influence academic achievement, and that the teacher capacity also plays a role in student success.
As the review shows, research demonstrated that using the UDL framework in teaching and learning contexts may be related to improved academic performance in students. These studies show promise that the use of the UDL framework is associated with academic achievement in a variety of contexts and for a variety of students, indicating that it is indeed a teaching and learning framework that should be explored further in the research. In addition, care must be taken to address teacher capacity in addition to the presence of the UDL principles in teaching and learning.

**Student engagement.** Other studies (e.g., Abell et al., 2011; Basham et al., 2010; Katz, 2013; 2015a; 2015b; Kortering et al., 2008; McPherson, 2009; Schelly, Davies, & Spooner, 2011) looked at increasing student engagement in learning activities by incorporating the UDL framework. Engagement is linked to student achievement (Finn & Zimmer, 2012), and one of the challenges when engaging all students is that they may find different learning activities interesting. Because UDL is inherently flexible, it is possible to engage a wider range of students by allowing choice in activities and in how students present their knowledge (CAST, 2015; Hall et al., 2012; King-Sears, 2014). The following studies show that using UDL may have an effect on student achievement.

In a large study (N=1,223) utilizing surveys with post-secondary students, students reported that instructors trained in the UDL framework did provide information using multiple means of representation, expression, and engagement, and reported that their learning experiences were more engaging, even for those students that reported disabilities (Schelly et al., 2011). In a different study with several reports published emphasizing different elements, ten schools, both rural and urban, with a total of 631 students utilized the Three Block Model of Universal Design for Learning with results that significantly increased active engagement and promoted social engagement through increased peer interactions (Katz, 2013; 2015a; 2015b).

In a study conducted by Kortering et al. (2008) involving 320 high school students in algebra and biology classes, various UDL-based interventions were used (e.g., PowerPoint presentations, video projector and software; games, small group work, polling software, and a web page with notes, test
reviews, and other class information). Through closed- and open-ended surveys, participants reported that they enjoyed lessons with the principles of UDL more than other classes and in general very favorable views of the UDL teaching methods (Kortering et al., 2008).

A study that examined student perceptions of learning in classrooms that utilized the UDL framework was conducted by Abell et al. (2011). It included over 867 students in grades five to twelve. Results showed that high school students reported being more engaged in the UDL lessons than younger students, but in general the findings indicated that using the UDL framework may increase engagement and therefore academic achievement for students (Abell et al., 2011).

Basham et al. (2010) used a “digital backpack” to increase access for students in a design-based research study. The digital backpack, or a technology based tool kit for students with which they could use the supports they required to make connections between their in-school experiences and a museum experience, included detailed hardware, software and instructional support materials in order to provide for project-based learning experiences in different learning environments. The 21 high school students, involved in a three-cycle design-based research design, reported that the technology provided did indeed allow the 35 students in the study to be more engaged in the learning experience.

In a study using interdisciplinary projects for pre-kindergarten to grade four students in science, particular emphasis was placed on engaging the strategic, recognitions, and affective networks of the students. Participants from nine states and four countries were asked to collaborate through a blog, the researcher reported increased student engagement (McPherson, 2009), although this particular report was limited to anecdotal findings.

Because student engagement is linked with student achievement (Finn & Zimmer, 2012; Parsons & Taylor, 2011; Taylor & Parsons, 2011), it may be of value to educators to incorporate a teaching and learning framework that can engage all students despite differences in interest, ability, and background knowledge. This may encourage students to engage in the experience of Flow, put forward by Csikszentmihalyi (1975; 1990; 2000). The aforementioned studies show that using the UDL framework
in teaching and learning contexts may influence student engagement, which may in turn influence academic achievement for all students.

**Evaluating academic achievement and student engagement.** Academic achievement and student engagement have been shown to be important in the UDL literature, and some studies aimed at looking at both of these elements when incorporating the UDL framework in teaching and learning contexts. In a case study conducted by Dymond et al. (2006) involving one general education teacher and two special education teachers, researchers looked at the process of redesigning a high school science course to incorporate the principles of the UDL framework. The study included 101 students in four different class sections, and through interviews and reviewing documentation such as lesson plans and meeting minutes, the researchers found that students showed increased participation in educational activities, increased social engagement with peers, and improvement on end of year test scores.

In a study conducted by Marino et al. (2014) with 57 students with learning disabilities from four middle schools, students were followed during the school year as they alternated between classes that used transmissive learning activities and those that were supplemented with video games and alternative print-based texts to more closely align with UDL framework principles. Findings for this study did not show significant differences between the conditions of learning, despite reported higher levels of engagement. These results, however, could be attributed to contextual factors (Marino et al., 2014). Limitations include the fact that one study found conflicting results, despite their inability to measure engagement and achievement on multiple levels.

Edyburn (2010) stated that if there is no direct effect on student outcomes, there is no reason to implement any kind of intervention in a classroom. Studies that aimed to measure whether or not UDL could influence student achievement and engagement showed that there may be, in fact, value in incorporating the UDL framework in teaching and learning contexts.
Critique of the Universal Design for Learning Framework

It is important to note that despite various policy documents in the United States that emphasize that UDL is a scientifically validated practice (Edyburn, 2010), in reality “without an adequate base of primary research, an analysis of research evidence that establishes UDL as a scientifically validated intervention is not possible” (p. 34). “The literature about UDL is long on principles and ‘best practices’ but short on empirical evidence of benefits” (Schelly et al., 2011, p. 18).

First, there is a lack of agreement of how the framework of UDL can and should be applied, nor is there an agreement as to what elements need to be incorporated in order to be considered aligned with the UDL framework (Rao et al., 2014). Rao et al. (2014) put forward the argument:

For example, is a lesson universally designed if the teacher includes multiple means of representation within instructional materials? Or do several UD principles have to be applied to various components of the lesson such as instructional materials and teaching strategies?

Moreover, to make claims about the efficacy of UD in education, it will be necessary to define the UD components of an intervention and examine how those components contribute to increasing access to curriculum and instruction. (p. 155)

There are four limitations that surround the interpretation of the research surrounding the UDL framework. First of all, the generalizability of the studies mentioned above is limited due to the fact that comparison is difficult when incorporating such a flexible framework into different contexts. In addition, different methods were used to collect and interpret data, which makes it difficult to compare results. It is also difficult to compare results in regards to academic achievement and student engagement because the studies did not use the same definitions of achievement and engagement, limiting their validity as a whole (Rao et al., 2014).

A second limitation noted in the research is: How is the UDL framework any different from “just good teaching”? Edyburn (2010) stated that “good teaching” has resulted in our education system today, with students that are disengaged from their studies or falling through the so-called cracks. By
continuing to do what we have always done, we are simply maintaining the status-quo of teaching and
learning. The UDL framework entails proactively planning for diversity in every aspect of learning, and
is rooted in the neurosciences. While some aspects of the UDL framework may already be in place in
certain classrooms, it is unlikely that every aspect of the UDL framework can be embedded in all aspects
of teaching and learning simply “by accident,” because the UDL framework guides the use of
argued that “good teaching” is not an operational term, but rather, can vary from student to student, so it
is still not recognizing diversity proactively. Further to this argument is the idea that the UDL
framework occurs naturally, that teachers are already doing it: Edyburn (2010) states that this is
unlikely, and that like any other learned skill, applying the UDL framework requires practice and
training.

Friesen et al. (2008), in their study looking at UDL implementation in the mathematics junior high
class, put forward the argument that “…the conceptual understanding, which involves an understanding
of concepts, operations, and relations…is the focus of instruction, not the number and types of
manipulatives” (p. 26) and that “teaching for mathematical proficiency…requires that the teachers
design a learning environment that provides a solid foundation of detailed knowledge and clarify about
the core concepts around which that knowledge is organized to support effective learning” (Donovan &
Bransford, 2005, p. 569). The researchers believe that the UDL framework does not implement itself,
and that the teacher must have a solid conceptual understanding of the material in order to create a
learning environment that is truly representative of the UDL framework, and represents a third
limitation. This claim may present itself in the current study, which aims to determine the factors that
are necessary in the implementation of the UDL framework.

As a fourth limitation, although the research base has, to date, focused on student outcomes and
the usefulness of the UDL framework, there is very little mention of how the UDL framework is
supposed to be continued to be implemented in the classroom. We know that change is a process, not an
event (Hall & Hord, 2001), and as such it is important that ongoing discussions take place with teachers and stakeholders to see how the implementation effort is going at the school level. This area, the implementation of the UDL framework, is not well represented in the research.

**Implementation of the UDL Framework**

Implementing any kind of innovation in schools is more than simply knowing about the topic. In the context of this study, the UDL framework is the innovation that was put in place at this school. Innovations in education can be defined as when a change is required in order to address a need within the school (Fullan, 2007). The UDL framework, at this school, was seen as the most effective teaching framework that could address diverse needs and engage students in their learning.

However, introducing innovations in education is not an easy feat. It is important to note that change is a *process*, not an event (Hall & Hord, 2001), and as a result change is experienced on many levels. The participants in the change may go through various levels of change themselves (Fullan, 2007; Saunders, 2012). Change also has phases, which may or may not be experienced by all teachers: the initiation phase which leads up to implementation, the Implementation phase where new ideas or practices are put into place, and the continuation phase in which the change is sustained; the entire process can take between three and ten years (Fullan, 2007). The culture of the school may also play a role in how the innovation is implemented (Hall & Hord, 2001). Additionally, the change theory used to understand change can emphasize different elements of the change process: Rogers’ (2003) Diffusion of Innovations focused on the innovation itself, Ely’s (1990) Conditions of Change focused on the system’s receptiveness to change, Fullan (2007) focused on change agents, Havelock and Zlotolow (1995) focused on the change process, Hall, Wallace, and Dossett (1973) focused on the adopters of change, Zaltman and Duncan (1977) focused on resistance, and Reigeluth and Garfinkle (1994) focused on system (Ellsworth, 2000).
In regards to leadership, the role of the school leader is emphasized in the change process because it is essential to long-term success (Fullan, 2007; Saunders, 2012). In their longitudinal study looking at the promising practices of school leadership, Leithwood and Lewis (2012) used multiple methodological approaches, multiple theoretical perspectives, and a comprehensive source of leaders along with data collection from a wide range of respondents. They found that a variety of leadership practices directly or indirectly foster school improvement and student success; successful leadership practices directly and indirectly influence the quality of teaching and learning; the skills required at district and school levels to increase learning; described ways with which individuals can help each other learn; and identified the leadership characteristics of districts and schools that encourage values, capacities, and use of practices that improve student learning (Leithwood & Lewis, 2012, p. 1-2). Their results, however, demonstrated that many different practices in many different contexts can create environments conducive to school improvement, rather than a defined list of objectives. Levin (2012) went a step further and articulated that if an organization is to support change, the organization must engage and commit the adults in the system, use effective processes for educations to improve their practices, make use of an aligned and coherent system to create policies and practices, and use an appropriate allocation of resources (p. 120). Robinson (2011) discussed that if leaders are to support their staff in change, the leader must be willing to discuss pedagogy with their staff; they must model the importance of being a learner themselves; they must engage in professional discussions; and they must clearly understand the challenges put before educators so that they may take steps to remedy them (p. 105). Robinson (2011) also stated the importance of collaboration in teacher professional development, through she states that this can take many forms, as long as the teachers have the opportunity to learn from one another in some context. Clearly, implementing an innovation in a school with any degree of success is a complicated process.

When implementing an innovative practice in a school, professional development is often the solution to changing teacher practice in classes, for “schools can be no better than the educators who
work within them” (Guskey, 2009). As Guskey (1995) stated, “every modern proposal to reform, restructure, or transform schools emphasizes professional development as a primary vehicle in efforts to bring about needed change” (p. 1). Joyce and Showers (1988) have shown that staff development is essential when attempting to change instruction: “None will succeed in their goals unless they are supported by, and their initiatives nested in, an extensive and potent staff development system, one far more powerful and pervasive than the one that exists in the education agencies of today” (p. 5). Research demonstrates that teachers that engage in effective professional development can boost their students’ academic achievement (Yoon, Duncan, Lee, Scarloss, & Shapley, 2007). There is a risk, however, that professional development may not be effective if certain elements are not in place.

There are many reasons why professional development may not be effective. Fullan (2007) notes that despite pressure from administration, changing teaching practice may not occur if proper supports are not in place for teachers following professional development. He emphasized that there must be a shared meaning between all stakeholders in education (2007). Opportunities must be given for teachers to learn and practice their new skills, and a change in student achievement must be apparent (Gulamhussein, 2013; Guskey, 1986; Guskey & Yoon, 2009). Fullan and Hargreaves (1992) describe many barriers to change, such as an inadequate theory of implementation including too little time for teachers to prepare, lack of support and follow-through, trying to do too much with too little support, neglecting to develop school capacity so that they may drive the change process, lack of technical assistance, lack of the awareness of school-based limitations, teacher turnover, and the failure to identify the roles of individuals involved in the process.

In order to effectively change teacher practice and sustain the innovative practices, certain conditions of professional development are required. Guskey’s (1986; 2002) Model of Teacher Change explains that following professional development, there is a change in teaching practices, followed by a change in student learning outcomes, followed by a change in teacher attitudes and beliefs. This shows that in order for a continuation of the implementation of a innovation in the classroom, student
achievement has to change in order to convince teachers it is worthwhile. This model states that several conditions of effective professional development are necessary: first, the recognition that change is a gradual and difficult process for teachers; second, that teachers receive feedback regularly on student progress; and that continued support, pressure, and feedback is required (Fullan & Hargreaves, 1992; Guskey, 1986; 2002). Gulamhussein (2013) outlined five principles of effective professional development: sufficient duration, ongoing support during implementation, active engagement in implementation (rather than theory-based workshops), modeling of the practice, and discipline-specific training. How this is actually put into practice is different based on the needs and requirements of different school boards.

Both Katz (2013; 2015a) and Abell et al. (2011) have mentioned what factors could be of use in the UDL framework implementation, such as a need for collaborative planning time, professional learning communities, and differentiated professional development based on teacher needs. These factors were in part replicated in Hatley’s (2011) doctoral dissertation, in which she completed a mixed-methods study looking at teacher perceptions of implementing the UDL framework. Teacher concerns centered around not having enough time for collaboration, difficulty understanding the basic UDL language, difficulty applying the UDL principles in practice, and an uncertain level of support. This school district had 17 schools and over 11,000 students, and educator participants volunteered to take part in the study (the number of participants for the observational and interview parts of the study were 11, and the number of participants for the two survey portions of the study was 41 and 57, respectively). Hatley (2011) used the Concerns Based Adoption Model (CBAM) to frame the findings for her research. Findings from this study showed that while teachers could understand the principles of UDL and how to theoretically implement them in class, they doubted themselves when it came to actually teaching with the framework of UDL. To address this area of need, Hatley (2011) recommended that the district should assist teachers by providing them with more hands-on learning activities in regards to UDL, and perhaps make use of UDL facilitators to support teachers in their implementation. Hatley (2011)
recommends that a more in-depth analysis of teacher concerns is required, which this study aims to do by determining the factors that influence the implementation process of the UDL framework. In addition, the use of CBAM as a measurement tool has some limitations, such as the reliability and validity of the stages of concern (Bailey & Palsha, 1992) and the fact that CBAM does not recognize teachers’ positive perceptions of an innovation (Straub, 2009).

Katz (2015a) analyzed teachers’ perceptions of implementing UDL. The teachers were part of a much larger study looking at the effectiveness of Katz’s Three Block Model of UDL (2013), and 58 of them participated in a survey and individual interviews to assess their perceptions related to the outcomes of the implementation of the model. Teachers reported many positive aspects of UDL, but they also elaborated on the challenges of using UDL, which aligned with Hatley (2011): the teachers required time for collaboration, differentiated resources, professional learning communities, governmental barriers such as timetabling, and public education to educate parents and stakeholders as to what UDL was to help them successfully implement UDL. Katz (2013; 2015a) offered professional development and ongoing coaching for the teachers implementing UDL in these schools, but other implementation efforts were not documented.

Rose and Meyer (2002) discussed “the Concord model”, a school that successfully implemented the UDL framework since 1994. The researchers identified eight components of successful UDL implementation: technology infrastructure and support, administrative support, teacher training and support, redefined roles for special and regular education teachers, collaborative curriculum planning, parent and community involvement, and creative funding. These key components have ensured the success of the continued implementation (and, in fact, institutionalization) of the UDL framework at this specific school, and while Rose and Meyer (2002) state that these key components are necessary for sustaining the UDL framework, this has not been verified in other contexts.

Information summarized from interviews with four states in the United States regarding their UDL initiatives (Muller & Tschantz, 2003) indicated the following areas were essential in the continued
implementation of the UDL framework: the existence of collaborative relationships, the existence of a strong statewide infrastructure, the availability of necessary funds, and positive support from stakeholders.

Although the research base for the implementation efforts beyond the initiation stage (Fullan, 2007) involving the UDL framework is sparse at this point in time, some theories have been published. The province of British Columbia has put forward guidelines to implementation with a focus on advocacy, accommodation, and accessibility (BC Ministry of Education, 2010). They stated that it is important to establish a UDL team and it is important to get to know the students.

The National Center on Universal Design for Learning (2012) created an implementation series for the UDL framework. Within the video on their website, they propose a five-phase implementation of UDL, adapted from Fixsen et al. (2005). The phases are to explore the innovation, prepare the innovation, integrate the innovation, scale up the innovation, and optimize the use of the innovation. Although the National Center on Universal Design for Learning (2012) has created an evidence-based implementation framework, it has yet to be verified empirically. In fact, CAST has noted that this is one area that needs to be explored through research (CAST, 2015). There is no mention of ongoing efforts to evaluate the state of implementation and areas of need that may need to be addressed.

The Universal Design for Learning Implementation Research Network created a blueprint for implementing UDL (Nelson & Basham, 2014). The researchers have recommended that from the perspective of instructional practices, the process of implementing the UDL framework can be broken down into four critical elements: the establishment of goals, intentional planning for learner variability, the use of flexible methods and materials, and maintaining timely progress monitoring (Nelson & Basham, 2014). They noted that in order to provide a basic understanding of the characteristics associated with UDL implementation, there is a model developed by the National Implementation Research Networks that offers a structure that is beneficial when analyzing the implementation of the UDL framework (Nelson & Basham, 2014). These stages include:
• The explore stage, focusing on current attitudes and capacity of individuals;
• The prepare stage, where programs, initiatives, resources, and processes in place are investigated that relate to the UDL framework;
• The launch stage, where schools, districts, or states have implemented the UDL framework; and
• The expand/sustain stage, which investigates the monitoring and feedback systems related to the UDL implementation.

The expand/sustain stage addresses the ongoing efforts of sustaining the UDL framework, but has not been verified in a UDL context.

Nelson and Basham (2014) also specify a list of suggestions for moving toward school and district implementation, including elements such as: provide training, establish check-ins, identify instructional resources and technology, define desired outcomes, and define strategies that fit within the context. These recommendations, however, have yet to be investigated empirically: it may be that using a conceptual framework may provide direction when continuing to implement an innovation in a school.

**Conceptual Framework for the Change Process**

The conceptual framework for this study is based on the Implementation phase of Fullan’s (2007) change process. Ellsworth (2000), in his review of educational change models, stated that Fullan’s (2007) change process focused on “the human participants taking part in the change process” (p. 74). The Concerns Based Adoption Model (Hall et al., 1973) also focuses on the role of human participants, but this model assumes that all teachers must have concerns about adopting an innovation, and does not address positive attitudes in regards to UDL. For this reason, the Concerns Based Adoption Model (Hall et al., 1973) could lead to biased findings, and therefore is not the best fit for this case study.

Fullan (2007) stated that there are a number of dynamic factors that interact and affect the process of change in education, and while there are no hard-and-fast rules, there are implications given
that are specific to local contexts. Fullan (2007) stated that there are two ways to address educational
reform: the innovation-focused approach and the capacity-building focus; although not mutually
exclusive, the innovation-focused approach is useful when a specific innovation is in question, and the
capacity-building focus is concerned with changing the culture of an organization. For the purposes of
this study, the innovation-focused approach is taken, as the UDL framework is the innovation to be
studied.

Fullan (2007) stated that there are three broad phases to the change process:

- Phase 1: the initiation, mobilization, or adoption, which are the processes that lead up to and
  including the decision to adopt a change;
- Phase 2: the implementation or initial use phase, usually the first two or three years of use, which
  include the first experiences of attempting to use the innovative practice; and
- Phase 3: the continuation, incorporation, or institutionalization phase, which refers to whether the
  change gets incorporated as an ongoing part of the system or as it disappears by discarding the
  innovation (Fullan, 2007, p. 65).

There are also outcomes involved, including whether or not the student learning is enhanced and
whether or not the change increases the later capacity to deal with future changes.

Fullan (2007) described the change process as beginning with the decision to implement some
kind of change; eight factors influence the initiation process, including existence of the innovation,
access to the innovation, advocacy from central administration, teacher advocacy, external change
agents, community pressure and support, new policies and funding, and problem-solving and
bureaucratic orientations. Because the initiation phase has already occurred at this school, it is not
addressed in this study. The change then becomes implemented in the system, which can be more or less
effective; finally, the institutionalization phase refers to the time frame in which the innovation
continues to be sustained. The outcomes involved can include improved student learning and attitudes,
new skills, satisfaction in regards to the staff involved, or improved problem-solving capacity of the organization.

There are numerous factors involved in the change process that must be addressed. First, as outlined by Fullan (2007), there are numerous factors operating at each phase. Second, the process may not necessarily be linear, as factors may influence previous decisions that may alter the course of action: for example, a decision to use a specific program during the initiation phase may be altered during the Implementation phase. Third, the set of variables including who decides to make the change and the scope of change, which may range from organizational changes to small, locally-based changes. Fourth, time is a factor as it cannot be specified; different phases may take years, but it depends on how large the change is and the capacity within the staff. Fifth, it cannot be stated whether or not teachers or administrators really know what they have gotten into when they decide to adopt a change; as a result, the change process must be reflected on with an open mind. This study focuses on the Implementation Phase, or Phase 2, as the school in question has already initiated the UDL framework.

**Causes and processes of implementation and continuation.** As Fullan (2007) stated, “educational change is technically simple and socially complex” (p. 84). There are several factors that affect whether or not a change gets implemented beyond the initiation stage. Fullan (2007) stated that there seems to be a small number of key variables, although the question of what to do about these variables is complex. These factors causally influence implementation in the direction of the sought-after change: that is, the more factors supporting the implementation process, the more change in practice occurs. These factors do not work in isolation from one another; they work alongside each other, in a system, and these factors can be categorized related to the characteristics of the innovation, the local roles, and the external factors.

**Characteristics of change.** The characteristics of change include the following factors: the need for change, the clarity of the innovation, the complexity of the innovation, and the practicality of the innovation. The need for change addresses whether or not teachers and administrators believe that a
change is required. Clarity about goals refers to how teachers or other individuals implementing change actually go about making the change in their behaviors. Complexity refers to the difficulty and extent of change required by the individuals implementing the change. The quality and practicality of the program are important because these factors directly affect how the innovation moves beyond the initiation stage (Fullan, 2007).

**Local factors.** The local factors focus on the setting in which people work, and includes the principal, the community, the parents, the teachers, and the students (Ellsworth, 2000). The school leader must focus on providing a working environment that is conducive to change based on the needs of the individuals implementing change. Board and community characteristics are influential because their input can affect implementation of change. The principal strongly influences whether or not a change is implemented, and that the role of teachers (as an individual and as a whole) can impact the likelihood of change continuing beyond the initiation stage (Fullan, 2007). Of course, students are an essential component of local factors, because even though it may be difficult to paint a coherent picture of their role in educational change due to diversity (Ellsworth, 2000), they are arguably the most important individuals in the education system.

**External factors.** These factors place the school in question in context in society, in this case on a district and provincial level, hence the name government and other agencies. Government and other agencies have a necessary and productive role in educational change, because they are in a position to provide encouragement and coordination within a school system (Ellsworth, 2000). Governments and other agencies provide essential direction and support for the implementation of change in schools (Ellsworth, 2000). Fullan (2007) recommended that greater accountability, standardization, and closer monitoring may aid in a more successful implementation of change.

The use of this conceptual framework in order to understand the change process may reduce the amount of time required and increase the effectiveness of implementation and, as time goes on,
institutionalization (Fullan, 2007). Results from this study indicate specific areas of need that should be addressed in order to support the institutionalization of the UDL framework.

**Critique of Fullan’s change process.** Although Fullan (2007) stated that there are many factors that must be accounted for in the change process, and provides recommendations in order to resolve issues and support the change process, he was vague and did not state some of the contextual elements that would be of great interest to many educators and decision makers: what about poverty? What about lack of resources to support the change (Noguera, 2006)? What about schools that have so many initiatives it is difficult to manage them all? However, it is not the role of Fullan’s (2007) change process to have answers for every possible problem in every context; it is a conceptual framework that can be applied to different contexts simply because of its general nature. The results of this study confirmed, in fact, that local factors, external factors, and characteristics of change seem to be the factors that affect the Implementation phase of UDL at this school.

**Rationale for using Fullan’s change process.** In the context of this study, Fullan’s (2007) change process is seen as the most relevant because the Implementation phase aligns with Rogers’ (2003) DoI implementation phase. Both theories emphasize that it is in this point that decision makers are using the innovation and deciding whether to continue with it or not. While Rogers (2003) focuses on the elements of the innovation, Fullan’s (2007) model adds more detail to the phase outlined in Rogers’ (2003) work: for example, Rogers (2003) simply states that the innovation phase represents the stage at which the decision-making units are using the innovation with varying degrees of fidelity, and that this stage may extend for an unspecified period of time. At this point, the innovation becomes institutionalized or not (Rogers, 2003). On the other hand, Fullan (2007) takes care to emphasize the different factors that influence whether or not an innovation continues to be used, including the role of the individuals involved in the change process: the characteristics of the change itself (amount of change required, beliefs about the innovation), the local factors (associated with the school and the classroom), and the external factors (associated with Albertan education and societal values). Although Rogers
(2003) can provide a macro perspective of the influences at work within large-scale implementation of
an innovation. Fullan (2007) emphasizes that many contextual factors can influence whether or not the
innovation is implemented. In other words, Fullan (2007) focuses on the characteristics of the change
agents in addition to the innovation itself, which is less apparent in Rogers’ (2003) model. As a result,
using Fullan’s (2007) model as an extension to Rogers’ (2003) DoI phases may provide the most
complete view of the implementation processes at work in this case. The data collected in this study
aligned with these categories put forward by Fullan (2007).

Positioning the Study

From the literature review, there is reason to believe that incorporating the UDL framework in
teaching and learning could increase student engagement, academic success, or both. However,
implementing a new framework is a process, not an event (Hall & Hord, 2001). Research shows that
there are factors that increase implementation success of an innovation (Fixsen, Blase, Naoom, &
Wallace, 2009; Fullan, 2007; Fullan, Cuttress, & Kilcher, 2005), but it is unclear what these factors
would be in this educational context. The review of the literature shows that there has been no specific
focus on factors that affect the Implementation phase as outlined by Fullan’s (2007) change process, and
that these factors can in fact be mapped to Fullan’s (2007) Interactive Factors Affecting Implementation
(the characteristics of change, local factors, and external factors). By investigating these factors, more
specifically those that encourage, pose challenges, or are required to sustain implementation,
information can be used to inform specific areas of need for the school and future implementation
efforts.
CHAPTER THREE: RESEARCH DESIGN

The purpose of the research design section is to introduce the study’s research methodology, methods of data collection, and analysis for the purpose of exploring factors related to the Implementation phase of the Universal Design for Learning (UDL) framework in one urban Alberta school. This study used a case study methodology, and employed four different types of data collection: documentation, focus group interviews, observations, individual interviews and follow-up individual interviews. The data analysis was completed using Saldana’s (2013) first- and second-cycle coding methods. The integrity of the study is discussed, followed by its limitations, delimitations, and the role of the researcher.

Methodology

The research design used a descriptive case study methodology (Merriam, 2009). Case study is defined as “an in-depth description and analysis of a bounded system” (p. 40). Stake (2010) affirmed that qualitative research is distinguished for the “integrity of its thinking” (p. 31). “Understanding the case requires…an emphasis on its uniqueness…established not particularly by comparing it on a number of variables…but the collection of features and the sequence of happenings seen by people close at hand” (Stake, 2010, p. 31). As such, qualitative case studies share the search for understanding and meaning, using the researcher to collect data and analyze data with the final product being richly descriptive (Merriam, 2009). In descriptive case studies, the complexities of the situations are highlighted in order to contribute to the understanding of the phenomenon (Yin, 2009). Stake (1981) affirmed that case study knowledge differs from other qualitative knowledge in four ways: that it is more concrete, as the descriptions are more vivid, concrete, and sensory rather than abstract; that it is more contextual, as it is more distanced from abstract knowledge drawn from other research designs; that it is more developed by reader interpretation, as readers can make connections to their own experiences; and
that it is more based on reference populations determined by the reader, as the reader generalizes to other populations within their experience (p. 35).

The decision to use a descriptive qualitative case study was based on four factors put forward by Yin (2011), Stake (2010), and Merriam (2009). First, Yin (2011) affirmed that case studies were particularly advantageous when the research questions “deal with operational links needing to be traced over time, rather than mere frequencies or incidence” (p. 9). In this context, Fullan’s (2007) factors that influence the implementation phase are more related to the actual use of UDL in educational contexts, rather than whether or not they are present at all. Second, when the variables to be studied are not particularly well-defined, a qualitative case study is advantageous because the researcher can collect data from multiple sources to attempt to capture the most information possible and in its entirety (Merriam, 2009; Stake, 2010; Yin, 2011). Related to this, a third factor that supports the use of a descriptive case study is when the area of study is relatively new: using multiple sources for data collection can offer insights previously unexpected (Merriam, 2009; Stake, 2010). The fourth factor is that the descriptive qualitative case study is appropriate in contexts in which there is little control over contextual variables (Yin, 2011). Because this study took place in a school where UDL was already in place for some time, controlling contextual factors such as years of teacher experience, student assignment to groups, and amounts of professional development received was not possible. Given the context for my study addressed these criteria, the decision to use a descriptive case study as methodology was made.

The theoretical framework, Rogers’ theory of Diffusion of Innovations (DoI) (2003), guided the data collection because it emphasized the innovation itself and how it can be adapted to meet the requirements of the local context (Ellsworth, 2000); as a result, a variety of data collection processes took place, including observing, using both individual and focus group interviews, and document analysis to provide the most in-depth analysis of the innovation being used in context. Roger’s (2003) model, however, does not emphasize the characteristics of the change agents themselves in context,
which Fullan’s change process (2007) can compensate for in Roger’s (2003) model. The conceptual framework, Fullan’s change process (2007), provides focus in data analysis for the contextual factors that influence the implementation phase put forward by Rogers’ (2003), allowing a categorization of the influences that may provide more insight into the phenomena taking place in the learning environment.

**Rationale for case study methodology.** Creswell (2013; 2014) stated that qualitative research is best suited to address a “research problem in which you do not know the variables and need to explore” (p. 16). In addition, this study is situated in a natural setting in which it would be difficult to exercise any kind of control over contextual factors (Yin, 20011). The natural setting is the school in question, in which the UDL framework has been in place since September of 2012, and as such I studied the phenomena under real-world conditions (Yin, 2011). Advantages of a case study include that individual perceptions can be represented as-is; that the approach emphasizes the contextual conditions under which the phenomena take place; that it contributes insights into existing or emerging concepts; and that it strives to use multiple sources of information in order to get the most complete picture possible of phenomena at work. Yin (2011) also stated that the case study is particularly suited to situations in which the context is impossible to separate from the phenomenon’s variables, as is the situation for this study.

Merriam (2009) maintained that descriptive case studies are especially good for practical problems where the social complexities of the phenomenon can be highlighted, such as what factors influence the implementation of the UDL framework. “The merits…are related to the rationale for selecting it as the most appropriate plan for addressing the research problem” (Merriam, 2009, p. 50). The case study offers the means to investigate complex social units, including multiple contextual factors of importance when trying to understand the problem (Merriam, 2009). The case study provides a holistic, real-life account of a phenomenon, and can offer tentative avenues for future research (Merriam, 2009), which is essential in the emerging research involved with UDL implementation.
There are several critics of case study methodology. Miles (1979) stated that case studies are only useful in exploratory contexts, and that they require more work, which may be off-putting to the researcher. Case studies are not easily generalizable and they are difficult to defend against arguments focused on reliability and validity (Miles, 1979). Yin (2011), however, suggested that the decision of what research methodology to use is subject to three questions: what is the research question, the ability of the researcher to control variables, and the focus on contemporary versus historical events. For this particular study, the responses to these questions all pointed to the use of a case study methodology, because the research questions begin with “what” and “how”; I am unable to control contextual variables in the school; and the focus is on a rather contemporary event, that is the incorporation of the UDL framework. As a result, for the context of this study, the case study methodology is the most appropriate.

**Unit of analysis.** This case study explored factors that influence the implementation of the UDL framework in one urban school in Alberta. The unit of analysis, or the case, is defined as the phenomenon occurring in a bounded context (Miles, Huberman, & Saldana, 2014). In this study, the unit of analysis is Fullan’s (2007) Implementation phase of UDL in one school setting. The study investigated the individual and collective experiences of students, teachers, administrations, and district administrators with the implementation of the UDL innovation in one school in urban Alberta.

**Research questions.** Yin (2011) suggested using *how, why,* and *what* questions when formulating research questions, in particular with the use of case studies. The following overarching research question guided the inquiry:

- What factors influence the Implementation phase of the UDL framework in teaching and learning within one urban school setting?

The following three sub-questions were investigated in this research:

- What factors support the implementation of the UDL framework in teaching and learning within one urban school setting?
• What are the challenges that influence the implementation of the UDL framework in one urban school setting?

• What factors support the sustained integration of the UDL framework in teaching and learning in one urban school setting?

**Population and sample.** The school is located in an urban center in Alberta. In the 2015-2016 academic year, the kindergarten to grade six school has 24 teaching staff members and 423 students, and offers both French immersion and regular programming. The school is part of a school board whose district priorities emphasize success for all students.

In the fall of 2012, the school was identified as being “in need” of academic intervention due to lower-than-anticipated scores on provincial, standardized exams. It was determined that incorporating a UDL framework may affect student achievement, by allowing teachers to engage students more fully in their learning. As a result, the school decided to implement the UDL framework and engaged in three professional development days during the year focused on what UDL was, how to implement it in the classroom, and how to leverage technology in the context of UDL.

The school has continued to focus on the integration of the principles of UDL in the teaching and learning. Differentiated professional development has been offered in the school in the 2013-2014 academic year to support staff developing their skills further in order to address student needs using the UDL framework. The school has been committed to the UDL framework and meeting all student needs for some time, and as a result of this commitment a more thorough examination of the factors affecting the Implementation phase is required in order to determine the next steps as the school moves toward the final stage of Fullan’s change process (2007), institutionalization.

The sampling technique used in this study is purposive, in order to obtain the richest data, and involved locating key participants who meet the criteria established for the study (Merriam, 2009; Yin, 2009). The following people participated in the study: two district-level individuals responsible for providing support for the UDL framework implemented in schools, through individual interviews. At
this level, the only criteria used to select potential participants in the study were that they support district leaders and administrators with the UDL framework implementation. At the school level, the assistant principal participated in an individual interview. Teachers that participated in the study were selected using the following criteria:

- Equal representation of both Divisions One and Two, and
- Range of experience with the UDL framework within each Division (at least one representative from each category, in each focus group): novice (between zero and one year experience working with UDL), experienced (between one and three years’ experience working with UDL), or expert (three or more years’ experience working with UDL).

Five out of twenty-four teachers of the school participated in a focus group interview, and three of those five teachers allowed classroom observations and follow-up individual interviews. Fifteen students obtained parental consent to participate in the study through focus group interviews. These participants were selected based on the following criteria:

- Was a student of a teacher that had the researcher in the classroom for direct observation,
- Had parental consent, and
- Was present on the day of the focus group.

**Methods of Data Collection**

“Data collection is about asking, watching, and reviewing” (Merriam, 2009, p. 85). In case study research, a variety of data collection methods can be used, including documents, observations, and interviews (Yin, 2011). In this study, all three methods were used in order to gain the most information to result in deep, rich data.

**Documentation.** Documents are a ready-made source of data accessible to the researcher, and refer to a range of digital, visual, written, and physical material relevant to the context of the study (Merriam, 2009). Pertinent public documents were obtained in regards to the implementation of the
UDL framework at this particular school. Such documents included policy documents and informational documents regarding inclusive education at the district level. The identification and selection of these documents were determined in consultation with the district personnel and the assistant principal, who all agreed to participate in the study. In addition, although supporting documentation was asked to be shared with me from the teachers, no other documents were mentioned. This aligns with Merriam’s (2009) “whether in fieldwork or library work, the data collection is guided by questions, educated hunches, and emerging findings…” (p. 150).

Strengths of using documents in research included that they are a good source of data because they are available, free, and may contain data that would otherwise be hard to obtain (Merriam, 2009). The data from documents was to be used in the same way as interview and observational data. It is also a very stable source of information, as the researcher being present does not influence the content of the documents (Merriam, 2009).

Limitations of using documents included the fact that they were underutilized in today’s research because they appear “too historical” (Merriam, 2009) and that consumers of research seem to prefer other sources of data. Available materials may not “afford a continuity of unfolding events in the kind of detail that the theorist requires” (Glaser & Strauss, 1967, p. 182). The documents may be incomplete, sparse, or in a format that does not work with the analysis of other data (Guba & Lincoln, 1981). There is also an issue with accuracy and authenticity, as the documents have not been developed for research purposes (Merriam, 2009), although in this case the pertinent documents identified were district-based policy documents therefore in all likelihood accurate and authentic. To further moderate these limitations, the triangulation of results was utilized. In regards to the study at hand, documentation did not emerge as an important source of information; rather, it was referred to by the district administration and the school administrator as providing guidance for inclusive education and meeting student needs, but not as meeting professional needs outlined by teachers.
**Classroom observation.** Classroom observation takes place in the setting where the phenomenon actually occurs and provides a first-hand encounter of the phenomenon (Merriam, 2009). Merriam (2009) stated that it is the best technique to use when “an activity, event, or situation can be observed firsthand, when a fresh perspective is desired, or when participants are not able or willing to discuss the topic under study” (p. 119). Merriam (2009) put forward a list of elements that should be observed, which include the physical setting, the participants, activities and interactions, conversations, and subtle factors (such as informal and unplanned activities, nonverbal communication, what does not happen) (p. 120-121).

For this study, the observation period took place for the length of two lessons for each teacher (N= 3). The lessons ranged from 45 to 60 minutes each with the exception of one teacher whose lesson was a double lesson and therefore only one incident, for a total of five observations. Observation protocol was used to gather data (See Appendix). The purpose of the observation was to observe how UDL presented in the classroom and what UDL looked like in practice for these teachers. The observations indicated not only whether or not the teacher was incorporating UDL, but also provided more information for discussion later during the interviews. Instances of UDL included whether or not the lesson incorporated multiple means of representation, expression, and engagement for students, their activities, and student behaviors. A UDL observation checklist was used, based on the UDL guidelines (CAST, 2015) and modified from Hatley (2011). This checklist is comprised of UDL-specific elements based on the checklist put forward by CAST (2015), and was in fact validated for content by members of the CAST organization for Hatley’s (2011) doctoral dissertation. The observation checklist included a category for each UDL principle and a fourth category that focuses on curriculum and assessment (Hatley, 2011). The fourth category, curriculum and assessment, was added because it emphasizes learning aspect of the classroom.

For operational purposes when observing the classroom lessons, Hatley (2011) made several modifications. The operative levels used to score the presence of UDL principles were created by taking
the total number of identifiers for a category separately, and then dividing them by four to create quartiles. Although these quartiles indicate a quantitative nature to the data, the results were used to indicate the general level of use of UDL principles in class to determine whether or not teacher-reported levels of use align with the classroom observations; the quartiles were not analyzed further quantitatively. These quartiles then became the operative levels: Not Yet Evident, Emerging, Intermediate, and Advanced (Hatley, 2011, p. 70). For example, for a category that has ten identifiers to verify during a lesson, zero to two elements observed became Not Yet Evident, three to five elements became Emerging, six or seven elements became intermediate, and eight to ten elements became advanced. The points assigned to each category are zero to four respectively. As a result, if an observation had a raw score of four, the operative level would be emerging, and assigned the point value of one for that observation (Hatley, 2011). After each observation, all operative levels were determined and the average level was determined for each observation in order to provide an overall level of UDL use.

The advantages of using observation as a data collection method are that it is important for the triangulation of results, and to provide context to the specific applications of the UDL framework in the chosen classrooms. In addition, the observations may lead to the emergence of other topics to be addressed in future studies, and in some cases informed the student focus group questions that followed the observation periods, by providing examples of learning activities that were discussed (Merriam, 2009).

Critics stated that observations are highly subjective, and therefore unreliable as a means of documenting events and data (Merriam, 2009). Patton (2002) affirmed that although typical observers may be unreliable, conducting qualitative research requires that observations be made systematically and with the research questions in mind in order to produce trustworthy results. The observation checklist can be found in the Appendix.
Focus group interviews. Focus group interviews are a type of interview conducted with a small group of participants in order to gain insight into the participants’ insights, beliefs, and attitudes regarding a subject (Patton, 2002). “The ideal size of a focus group for most noncommercial topics is five to eight participants…four to six participants…are becoming increasingly popular because the smaller groups are easier to recruit and host and are more comfortable for participants” (Krueger & Casey, 2009, p. 67). For this reason, and because the comfort of participants was put at a premium, five participants was sufficient for the student and for the teacher focus group interviews. The focus group interviews were directed by myself and followed a semi-structured interview schedule (refer to the Appendix). Focus group interviews were conducted with five teachers (one focus group) and fifteen students (three focus groups, five students each).

The semi-structured interview questions were asked, with the questions reflecting the research question and based on Hatley’s (2011) questions. This is an interview format in which the same questions were asked to all participant groups with slight differences in vocabulary reflecting the different roles of participants (school district personnel, administrators, and teachers) in order to increase the comparability of responses (Patton, 2002). Semi-structured interviews have advantages such as allowing for flexibility in responses, in that if participants share information that was not directly elicited, it is still recorded and incorporated into the data set (Patton, 2002). Another advantage of this type of interview is that it allows for the participants to speak their mind and to hopefully capture an accurate representation of their experiences.

A disadvantage is that this type of interview requires careful wording of the questions before each interview to ensure that participants are exposed to the same stimuli, in the same order, and in the same way, to ensure a more accurate data collection and to make for greater comparability. Therefore, a full interview protocol (that is, a list of questions to be asked) was established before any interviewing took place. Another disadvantage is that there is a risk that important information will not be captured by the questions asked; therefore, at the end of each interview, the participants were given the opportunity
to add information not overtly sought in the questions (Patton, 2002). All focus group interviews were audio recorded for later transcription.

**Follow-up individual interviews.** Follow-up individual interviews occurred with three teachers who agreed to have me observe their teaching in the classroom. Of the three teachers, there was one self-reported expert UDL user (defined as having three or more years’ experience using UDL), one self-reported experienced UDL user (defined as having one to three years UDL experience), and one self-reported novice UDL user (defined as having less than one year experience using UDL). Although I had indicated that the number of years could be associated with the level of use of UDL principles, not all teachers used the number of years as a guideline for their level of use; they used their own personal perceptions to determine whether they were expert, experienced, or novice. These interviews followed a semi-structured interview schedule and were focused on the research questions and Hatley’s (2011) interview questions, although the teachers were free to share other information if they so desired. The individual interview occurred the same day as the observed lesson, based on what time was convenient for the teacher, because the lesson was more fresh in the teachers’ mind when talking about details. The topic of the interview was shared in the consent forms with sample questions, but the entire protocol was not shared until the actual interview.

**Data Analysis Methods**

The goal of data analysis is to find answers to the research questions, also called categories, themes, or findings (Merriam, 2009). Lincoln and Guba (1985) suggested that when categorizing data into units of data, which are potential answers (or parts of answers) to the research question, it is important that these units are both heuristic, where the unit must reveal information relevant to the study, and be the smallest piece of information that can stand alone without understanding of the context around it. Then, comparison of the units of data takes place in order to determine recurring themes, or categories (Merriam, 2009).
These categories must represent the answer to the research question, be exhaustive in the sense that all units of data can fit into a category, and should be mutually exclusive (where one unit of data can only be placed in one category at one time). Categories must also be sensitive to what they contain, in that the name of the category should tell something about the data it holds, and categories should be conceptually congruent, that is, the categories should have the same level of abstraction (Merriam, 2009). Thinking about categories, and the subcategories contained within them, may lead to the development of a model of the interrelationships. Merriam (2009) suggests that when analyzing data in case studies, all of the information from documents, interviews, and observations should be brought together and organized in a logical way, as the amount of data gleaned from these sources can be overwhelming.

**Coding Process.** Transcripts of focus group interviews and individual interviews, follow-up individual interviews, documentation, classroom observations (and the associated field notes) were analyzed using Saldana’s (2013) first- and second-cycle coding methods. The first cycle coding methods began with attribute coding, for managing all the data, and included notes at the beginning of each transcript or document or observation that included pertinent information such as the date, participant pseudonym, topic matter, and the data format (Saldana, 2013). Following attribute coding, structural coding was used to provide an overview of the information, and applied a content-based phrase that represented the topic related to the research questions (Saldana, 2013). Following structural coding, descriptive coding was used to summarize the basic topic of passages of data (Saldana, 2013). Finally, In Vivo coding was used in the transcripts to become familiar with the language used by participants and authors (Saldana, 2013). An example of the first-cycle coding procedures can be seen in Table 5.
Table 5

First Cycle Coding Example

<table>
<thead>
<tr>
<th>Attribute coding:</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARTICIPANT (PSEUDO): K.; LEVEL OF UDL EASE: Expert; YEARS EXPERIENCE TEACHING: 25+; GRADE: 5/6 FRENCH IMMERSION; FTE: part-time (0.8); DATA FORMAT: semi-structured interview</td>
</tr>
</tbody>
</table>

Topic inventory: need more money, need time, need resources, need training, student success for all, challenging gifted students, doing it by instinct, time, can’t always do it, increased student engagement, collaboration time, practice makes perfect

<table>
<thead>
<tr>
<th>Transcript</th>
<th>Structural Code</th>
<th>In Vivo</th>
<th>Descriptive coding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you think that UDL is necessary in day to day teaching?</td>
<td>^STUDENT DIFFERENCES</td>
<td>“different levels”</td>
<td>“express their learning”</td>
</tr>
<tr>
<td>1Yes, because the children are coming at all different levels, so it’s really important for them to express their learning in the best way they can. I have some kids that are horrible spellers and they should never be penalized for that. I have one child who has very fine motor skills difficulty, so quite often I’ll sit with him and scribe with him or I’ll let him answer orally cause I need to tap on their strengths.</td>
<td></td>
<td>“I need to tap on their strengths”</td>
<td>Success for all</td>
</tr>
<tr>
<td>Are the goals of UDL clear to you?</td>
<td>^CLARITY OF UDL</td>
<td>“waters are a little muddy”</td>
<td>“I’ve done more reading, I’ve put more things into practice, I’ve taken some inservicing that others haven’t”</td>
</tr>
<tr>
<td>2I would say so. I would say they are, sometimes the waters are a little muddy, but I believe I’m probably further ahead than some of my colleagues because I’ve done more reading. I’ve put more things into practice, I’ve taken some in servicing that others haven’t.</td>
<td></td>
<td>“good teaching strategy”</td>
<td>Clear</td>
</tr>
<tr>
<td>How hard is UDL to implement?</td>
<td>^GOOD UDL PRACTICES</td>
<td>“we do by instinct”</td>
<td>“time is always a factor”</td>
</tr>
<tr>
<td>3I wouldn’t say it’s hard to implement, it’s good teaching strategy and a lot of it we do by instinct.</td>
<td></td>
<td></td>
<td>Instinct</td>
</tr>
</tbody>
</table>
As a transition to second-cycle coding, code mapping of the first-cycle structural codes took place as a display strategy to outline common themes in the data (Saldana, 2013). Three iterations of reorganization took place in order to come up with the relevant and robust themes related to the research questions, and participants’ contributions were analyzed by group (teacher, student, administrator/district administrator) in order to retain the organization of responses, as these individuals responded to very similar interview questions.

After transitioning to second-cycle coding through code mapping, pattern coding was used for the categorization of the coded data (Saldana, 2013). Pattern coding entails identifying emergent themes or explanations and regrouping them into smaller constructs (Saldana, 2013). However, pattern coding is “…not always a precise science…” (Miles et al., 2004), and therefore it was essential that the conceptual framework of Fullan’s change process (2007) be used to guide interpretations of data. Following the second-cycle pattern coding, the “touch test” put forward by Saldana (2013) was applied in order to ascertain that the emergent themes were conceptual and not literal: “those things that cannot literally be touched are conceptual…and represent forms of abstraction that most often suggest higher-level thinking” (Saldana, 2013, p. 249). The themes were then aligned with the conceptual framework of Fullan’s change process (2007), along with the emergent theme of student factors, and organized in a superordinate and subordinate arrangement (Saldana, 2013). The draft of the results of pattern coding can be seen in Table 6.
Table 6

Superordinate and Subordinate Arrangement of Themes

<table>
<thead>
<tr>
<th>Students</th>
<th>Teachers</th>
<th>District admin/admin</th>
<th>Documents</th>
<th>Observations/field notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local factors (Fullan, 2007)</td>
<td>• Home life</td>
<td>• Time (to collaborate and plan)</td>
<td>• Building capacity</td>
<td>• Choice</td>
</tr>
<tr>
<td></td>
<td>• School life</td>
<td>• Professional development/training</td>
<td>• Ability to change</td>
<td>• Collaboration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Resources</td>
<td>• Teacher needs (time, money, resources)</td>
<td>• Collaboration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Leadership</td>
<td>• Success for all</td>
<td>• Engagement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• High student expectations</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Poor student choice</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Need to teach extra skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• High student engagement</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Meeting all student needs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External factors (Fullan, 2007)</td>
<td>• N/A</td>
<td>• District pressure</td>
<td>• Training</td>
<td>• N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• High standards</td>
<td>• Coaching</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provincial exams</td>
<td>• Too many initiatives</td>
<td></td>
</tr>
<tr>
<td>Characteristics of change (Fullan, 2007)</td>
<td>• N/A</td>
<td>• Unclear goals</td>
<td>• Practical</td>
<td>• N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Unclear implementation</td>
<td>• Necessary</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Impractical</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Natural</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Difficult to incorporate</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
To reduce researcher bias and to enhance the internal consistency of the coding, I coded the data, left it for a week, and came back to re-code to ensure consistency (Cooper, 2014; Lock, 2003).

**Integrity of the Study**

As with any case study, the reliability and validity must be addressed (Creswell & Miller, 2000). Researchers must have confidence in their study’s findings so that they may act on the results (Lincoln & Guba, 2000). “The qualitative study provides the reader with a depiction in enough detail to show that the author’s conclusion ‘makes sense’” (Firestone, 1987, p. 19). This goal can be obtained by taking measures to address the study’s dependability, its internal validity (or credibility), its reliability (or consistency), and its external validity (or transferability) (Guba & Lincoln, 1998). In general, the integrity of the study must be addressed in qualitative research in order to attempt to control for potential biases that may be present in the design, implementation, and analysis of the study.

**Credibility.** Credibility suggests that results are credible from the researcher, participants, and readers’ points of view (Creswell, 2012). Because reality must be assessed through the lens of something other than reality (as it cannot be objectively grasped), credibility can be considered a goal rather than a product (Merriam, 2009). Qualitative researchers, therefore, must assess the participants’ constructions of reality.

One strategy used to increase credibility is triangulation, “a validity procedure where researchers search for convergence among multiple and different sources of information to form themes or categories in a study” (Creswell & Miller, 2000, p. 126). Four types of triangulation include the use of multiple methods of data collection, multiple data sources, multiple investigators, or multiple theories to have different ways of accounting for the phenomena (Merriam, 2009). In this study, the first three of these four strategies were used, first by using the methods of data collection (e.g., individual interviews, focus group interviews, observations, and document analysis). Through engaging different data sources,
information has been analyzed to see whether or not similar outcomes have occurred. I did collect the data, and although it would be preferable to ensure interrater reliability (defined as a procedure used when two or more individuals record or interpret data to see if their results match or closely align (Creswell, 2012) by incorporating data analysis through involving more researchers, for this study it was simply not possible. Other methods have been used, however, such as re-coding by the researcher him- or herself (Cooper, 2014; Lock, 2003). In this case, the researcher re-codes his or her own data after a certain amount of time in order to report internal consistency. For this study, re-coding the data took place one week after initial coding, which resulted in an ability to report internal consistency. Structural and In Vivo coding were re-coded on one teacher interview, one district administrator interview, two documents, and one observation checklist, with 89%, 88%, 93%, 90%, and 91% agreement in codes, respectively.

A second strategy employed in this study was member checking, or respondent validation, where individuals are provided with the accounts of their interview so that they can ensure that what was written down is accurate (Merriam, 2009). In this way, meanings are less likely to be misinterpreted. The individual interview participants were emailed copies of their transcripts, and asked to review them to ensure the accuracy and completeness of their responses. All participants responded to their respective emails. Participants were given ten days to inform me of any changes that should be made; aside from several small corrections involving punctuation, the participants did not have anything to add or change in the transcripts.

Participants were also provided with a complete copy of the findings chapter of this dissertation. The findings were emailed to each participant, with the invitation to review the content and to let me know of any changes to be made within a two-week period. The participants were also informed that should they not respond within the time limit, this would be taken as acceptance of the findings. Five out of eight participants responded, without any suggestions to change; the participants agreed with the findings put forward in the chapter.
Adequate engagement in data collection is another way to ensure credibility in data collection; although it is difficult to know ahead of time how much time is required for observation or interviews, in the end the data must feel saturated (Merriam, 2009). This would be represented by no new information presenting itself as data collection continues. This is also related to the idea of discrepant case analysis, where the researcher purposefully looks for data that would confirm other hypotheses or disconfirm their own explanation for the phenomenon (Patton, 2002). After the data collection phase, although fewer participants were recruited than expected, I felt that the data was saturated and the same ideas were repeated throughout the data. Despite looking at the data from different perspectives, data that confirmed other answers to the research questions were not seen.

A third strategy used to increase credibility in this study is the disclosure of the investigator’s position, which entails fully explaining my biases, dispositions, and assumptions in regards to this research study (Merriam, 2009). In this way, the readers would have a better understanding of the point of view with which I take to interpret the data. My role in this study was to collect and analyze the data in order to formulate an answer to the research question. In this case, it was primarily an observer-participant role, in which I acted as an observer and interacted minimally with the classes while observing (Gold, 1958). Although I conducted the semi-structured interviews and the focus group interviews, care was taken to not share opinions or judgments regarding responses; I only occasionally probed for more depth or clarification. In addition, although I used to teach at the school in question, I have been in a different position in a different location since the fall of 2013, so I was not directly involved with the day-to-day workings of the school, the staff, or the students.

Further to this, I have a decade of teaching experience in a variety of teaching contexts and leadership positions, experiences that I undoubtedly brought to this research. Although these experiences may have had an impact on how I interpreted the findings of this study, it should be thought of as a part of the phenomenon being studied in the research (Merriam, 2009). However, I remained open to all possibilities that both corroborated and went against my findings and the published literature (Cooper,
In addition, triangulation, member checking, having an adequate amount of data, full disclosure of potential biases, using an audit trail, and using rich, thick descriptions (Merriam, 2009) aided in reducing researcher bias.

**Consistency and dependability.** Consistency, or reliability, refers to the extent with which findings can be replicated in other studies (Merriam, 2009). This poses a problem in qualitative research, because human subjects in context are often being studied and human behavior is never static (Merriam, 2009). Wolcott (2005) proposed that assessing reliability in qualitative designs is inappropriate because replicating findings would mean that a researcher would have to manipulate the context in such a way to make the same thing happen twice, which is impossible. A more important question to consider is “whether or not the results are consistent with the data collected” (Merriam, 2009, p. 221), characterized as dependability, which refers to the idea that results can be replicated by other similar studies (Lincoln & Guba, 1985).

Strategies that were used included triangulation, re-coding of the data, and disclosing the investigator’s position, which are the same strategies used to increase credibility (Merriam, 2009). An additional strategy is the audit trail, which is where the researcher ensures that if others were to collect data in the same way, they would be able to authenticate the findings (Lincoln & Guba, 1985). In order to leave an audit trail, I included describing how data was collected, how categories were defined, and the decision-making process throughout the inquiry. This strategy is apparent in the systematic way through which the data were coded and analyzed, outlined above.

**Transferability.** Transferability is the concept that suggests results can be generalized to other populations not included in the study (Patton, 2002). This can be problematic because qualitative analysis is the documentation of phenomena in context, and as replicating the same conditions in other situations is impossible, transferability may be difficult. That is not to say there is nothing to learn from qualitative studies, but that we can use strategies that ensure that the description of context is deep enough that conclusions can be drawn. As Wolcott (2005) stated: “every case is, in certain aspects, like
all other cases, like some other cases, and like no other case” (p. 197). In the case of this study, the goal is not to determine the influences of implementation for all schools in all contexts; the goal is to understand the influences of implementation of UDL in this particular school. While the results are certainly most applicable to the school in question, it is possible that generalizations could be made for similar schools in similar contexts (Stake, 1981); it simply depends on the answers that one is looking for and the context of the particular school in question.

In this study, trustworthiness was established using rich, thick description (Merriam, 2009): “a highly descriptive, detailed presentation of the setting and in particular, the findings of the study” (p. 227). By using rich, thick description, readers may be able to determine the similar aspects of the context of the study and their own context, leading the reader to perhaps apply the findings to their own context (Merriam, 2009). This increases the transferability of the study’s findings (Merriam, 2009).

Limitations

Limitations are the shortcomings, conditions, or influences that the researcher cannot control that place restrictions on the methodology and conclusions drawn. There were four major limitations to this study: potential bias, the limited availability of participants, generalizability, and the dissemination of results.

First, I taught at the school involved in this study for five years in total, and in a program designed for students with learning disabilities for three of those years. I lived the implementation and professional development of the UDL framework innovation, and have personally experienced it as a promising teaching, learning, and assessment framework that allows all students to have access to curriculum, allowing students to be more engaged in their learning and therefore demonstrate a higher level of academic achievement. The nature of self-reporting indicates that this may have resulted in a potential bias, therefore the consumer of research and I must always be aware of this fact (Merriam, 2009); triangulation was used, however, to help dissolve this limitation.
Second, a low participation rate impacted the findings of the study. As a result, the findings may not represent the focus of the study. In response to this limitation, data was collected until saturation (Merriam, 2009), indicating that no new perspectives could be gained from the participants that did take part in the study.

Third, because the case study had a single case of study, for some consumers of research, generalizability could be considered an issue (Merriam, 2009). Much can be learned from a particular case, and in fact it is important to acquire knowledge in a more holistic way in order to determine in which ways to direct future research (Yin, 2009). The results from this research may offer the opportunity for transferability, that is the ability for readers to apply findings to their own contexts (Yin, 2009), and may be useful for teachers from differing contexts.

Another limitation was in the richness of the case study’s data, as it was difficult to manage from my point of view and could be difficult to disseminate in a way that is accessible to policy-makers and other individuals that may not want to devote a lot of time to reading research reports (Merriam, 2009). The dissemination of research is particularly important so that relevant consumers can access the information. I chose to analyze the information that appeared most pertinent for stakeholders in education, as I am stakeholder in education as well. I also plan to share the findings of this study following the completion of my doctorate in accessible, plain-language presentations as requested by my school board.

**Delimitations**

Delimitations are the choices made by the researcher that describe the boundaries set for the proposed study. First, the study was limited to one school so it only provides information regarding this specific context. Second, only participants that volunteered within the school and district in question were involved in the study based on established criteria. Third, the data were collected over four weeks.
Fourth, people who have left the school from the time of implementation were not invited to participate in the study.

**The Researcher**

The role as a researcher was that of one who “seeks to discover and understand the meaning of experience” (Bloomberg & Volpe, 2012, p. 37). A potential source of bias is the fact that I was a previous member of staff at the school, and that I am a believer in using the UDL framework to address student needs. This role and these beliefs may have influenced the interpretation of data in this study. To address these limitations, I implemented strategies to enhance the integrity of the study, including triangulation, member checking, re-coding data, having an adequate amount of data, full disclosure of potential biases, using an audit trail, and using rich, thick descriptions (Merriam, 2009).

When I first began teaching in this school, I found myself struggling with the diversity of student learning needs in my classroom. I devoted much time to changing my existing activities to ensure that my students were engaged and supported in their learning. When I first became aware of the UDL framework, and its premise to proactively design multiple means of representation, engagement, and expression in teaching and learning activities, it was revolutionary to me. I decided to implement it in my own teaching, and had promising results. When the school decided to implement UDL a short time later, I observed how teachers were beginning to see how UDL could be beneficial in engaging their students and for meeting students’ learning needs. Staff meeting time, as well as two professional development days, was devoted to planning for and sharing the experiences of teachers implementing UDL.

Over time, it became evident that the emphasis on the UDL framework was not being taken up to the same degree as at the initiation phase. There were fewer discussions, less collaboration time devoted to it, and student work appeared to have reduced elements of UDL. The shift in focus from what Fullan (2007) referred to as the “process that leads up to and includes a decision to adopt or proceed” (p. 65) to
the implementation phase became an area of interest for me. As such, the foundation of my study was to investigate the implementation phase of UDL in this school’s context.

Originally, I was expecting that acquiring parental consent would be a challenge, and was unsure whether or not the students would be willing to discuss how they liked to learn. This did not pose a problem at all, however, as I had more than five students per class return their consent forms and the students seemed to enjoy talking about what and how they learned with me. In addition, I was concerned that scheduling the focus group interviews, classroom observations, and follow-up interviews would pose a problem, but in fact all of the data was collected within a month from all participants. The general feeling I got from participants was that it was a positive experience for all.

However, one element that did not work well in this study was with the limited number of participants that agreed to participate. A number of potential participants shared that they were too busy to participate in this research project. As a result, one focus group with five participants occurred rather than the proposed two focus group interviews. Following the data collection period, several teachers that did participate commented that participating in the study was easier than they expected; if this study were to be replicated, I would expect that more individuals would be willing to participate based on the incidental comments of others in the sense that participation did not impact their normal teaching practice very much. If this study were to be replicated, I would emphasize this, with the goal of gaining more teacher and administrator participants.

**Ethical Considerations**

Ethics permission from the University of Calgary Conjoint Faculties Research Ethics Board was obtained, followed by ethics permission from the particular school jurisdiction in which the school is located. In qualitative studies, ethical considerations must be addressed in regards to the collection of data and the dissemination of findings (Merriam, 2009).
In this case, the researcher-participant relationship was addressed: how informed was consent for the participant, how much did the researcher share, and what became of the relationship after the study was completed? Another source of ethical dilemma is related to the interviewing and observation processes, during which participants may have felt uncomfortable with sharing their experiences (Merriam, 2009). For this study, I was open to any questions about the study. When I initially contacted teachers about participation, several teachers reached out to ask questions about how participation may or may not affect their jobs. In the end, fewer teachers than expected decided to participate in the study, but those that did were comfortable with the data collection procedures and very open about sharing their experiences implementing UDL. Some teachers appeared nervous at first, but soon became comfortable throughout data collection, be it interview, focus group interview, or observation. And although I used to work at the school, professional relationships were not impacted and in fact were genial throughout data collection.

There may also have been a danger of long-term effects due to the interviews or the observations. The participants were provided with contact information for both me and my supervisor, in addition to the University of Calgary Conjoint Faculties Research Ethics Board, in case further follow-up was needed.

Other areas of concern include the confidentiality of participants, the possibility of deception or covert activities by the researcher or the participants, and the risk that “off the record” conversations get reported, whereby the information may harm participants (Creswell, 2012). This is addressed through member checking, where participants were asked to verify both their interview transcript and the findings of the study; they had opportunities to share concerns and appropriate changes were made.

**Summary of the Research Design**

This descriptive case study examined the influences of the implementation of the UDL framework in one urban school context. Four sources of data were used in this qualitative study:
documentation, individual interviews, follow-up individual interviews, and focus group interviews, observations, and field notes. The interviews, documentation, observations, and field notes were analyzed using Saldana’s (2013) two-cycled approach.
CHAPTER FOUR: FINDINGS

This chapter presents the findings from the three data collection methods and their analysis as outlined in Chapter Three. A description of the participants is presented, followed by the findings from the focus group interviews, the observations and related field notes, follow-up individual interviews, and the document analysis. Verification and a summary of findings conclude the chapter. All participant names are pseudonyms.

Study Participants

District administrators. The district administrator participants were identified as having a role in supporting schools in implementing Universal Design for Learning (UDL) as a framework in order to meet student needs. Originally, four district administrators were contacted via email to participate in the study. Two individuals declined, and the remaining two participants from this category agreed to participate in this study by taking part in individual interviews. One district administrator, Brigid, has a leadership role in inclusive education and the other, Randi, works with many schools aiding in the implementation of strategies and technologies that help meet student needs. Both individuals have more than 20 years’ experience in education and have worked with a variety of students and staff to build capacity for meeting student needs of all ability.

School administration. Both administrators at the school were contacted via email to see if they would be willing to participate in the study. One administrator (Jane) agreed to participate in the study. She took part in an individual interview. Jane has more than 15 years’ experience in school leadership, and over 25 years’ experience in teaching a variety of grade levels.

Teachers. All school teachers (N=24) were contacted via the distribution of an informational letter followed up by an informal, lunchtime presentation by myself as an introduction to my study, to which 14 teachers attended. Following some clarifying questions posed by the teaching staff, they were encouraged to consider taking part in the study. Five teachers in total agreed to participate in the
proposed focus group interview (Matt, Corinne, Katy, Karissa, and Krista). Four of the teachers taught between grades four and six (Division Two), and the other taught a grade level between kindergarten and grade three (Division One). Teacher experience ranged between three years and more than twenty-five years (Table 7). Teachers self-reported their level of UDL use as novice (between zero and one year of UDL experience), experienced (between two and three years), or expert (more than three years).

Table 7

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<thead>
<tr>
<th></th>
<th>Matt</th>
<th>Corinne</th>
<th>Katy</th>
<th>Karissa</th>
<th>Krista</th>
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</thead>
<tbody>
<tr>
<td>Years of teaching experience</td>
<td>25+</td>
<td>25+</td>
<td>0-5</td>
<td>5-10</td>
<td>25+</td>
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<td>Division</td>
<td>2</td>
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<td>2</td>
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<td>2</td>
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<tr>
<td>Self-reported UDL level</td>
<td>Experienced</td>
<td>Experienced</td>
<td>Novice</td>
<td>Experienced</td>
<td>Expert</td>
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Following the focus group interview, the teachers that participated were contacted to see if they would allow me to come and observe their classroom teaching over two lessons of their choice, followed by an individual interview and a focus group interview with a random selection of their students. Three teachers, Katy, Karissa, and Krista, agreed. All three teachers taught between grades four and six, and their years of experience are three years, seven years, and more than twenty-five years, respectively. Katy considered herself to be a UDL novice, Karissa considered herself to be an experienced UDL user, and Krista considered herself to be a UDL expert.

Students. The student participants in this study were randomly selected from Katy, Karissa, and Krista’s classes (Grades six, four, and a five-six split, respectively). In total, 40 completed student consent forms were received. From their classes, a total of 15 students were randomly selected for the focus group interviews (five from each class). The students represented a wide variety of ability and personalities, and of the 15 students that participated, 9 were girls and 6 were boys.
Individual and Focus Group Interview Results

The aim of this research was to investigate the factors that influence the Implementation phase of UDL at this school, accomplished through focus group interviews with five teachers and fifteen students, and individual interviews with the school administrator and two district administrators. Because the findings for these groups were similar, the individual and focus group interview results were grouped in this section. The responses from various participants aligned with Fullan’s (2007) change process: local factors, external factors, and characteristics of change. Fullan (2007) described local factors as elements that are present in the school district, board of community, factors related to the teachers and the leadership in the school, and the students. Fullan (2007) defined external factors as government and other agencies that influence the learning context, and the characteristics of change included whether or not there is a need for change, whether or not the goals and needs of the intervention are clear, how complex the innovation is, and the quality and practicality of the program (Fullan, 2007).

**District administrators.** Brigid and Randi participated in individual interviews that focused on their perceptions of UDL implementation from a district perspective.

**Local factors.** The local factors that emerged from this analysis included building capacity and providing support through modeling and/or coaching, leadership, and providing a learning environment for all students to be successful.

For both Brigid and Randi, building capacity through professional development in teachers was seen as a priority, and the idea that teachers cannot be expected to implement UDL in the same way. Both Brigid and Randi noted that teachers need more support when they are attempting to meet student needs, and that certain elements need to be in place for teachers to be successful: Randi stated “...I think that modeling and coaching piece is probably the biggest... and support consistently over a long period of time.” Brigid noted that:

…the schools recognize that the population is very different, it’s not that homogenous group that
10-15 years ago we believed we had. And so for schools, they want to make sure they are creating the environment that they are meeting every student’s needs...these are complex ideas, it’s not a one-time, go to one day, spend a day … and come away and know what you are doing. So the school’s needs are to work alongside, and help them, and to have coaching between consultant and teacher.

Randi also noted that coaching and modeling beyond initial professional development is essential for teacher success: “The biggest piece would be to have consistent follow-up, because those things tend to fall off the bus…but until somebody’s there to support consistently over a long period of time, and get dirty with it all, it just doesn’t happen.” These district administrators agreed that follow-up and support is essential when implementing an innovation.

The ability for the leader to implement change in schools was also an influence. Brigid noted that change is a process, and not an event, and that steps must be taken to ensure that the people actually implementing receive the supports they need to be successful. On a district level, teachers had been sent in previous years to University courses focused on UDL, and several communities of practice had been established for teachers to support each other. However, the number of individuals participating in these activities is small on the district scale, and encouraging these teachers to share their expertise formally was a challenge:

Change isn’t overnight, it’s a journey … How are we going to see this ramped up in the district? We have to help them feel comfortable and confident … So last year, we teased one or two of them out to come and present with one of the consultants, this year we have one or two teased out to come and do some presenting with the consultants for the training, so you have to do it in bite sizes, and be systematic, you can’t just let it go… but I’m not going to expect everybody to be there right now.

Brigid also shared that the leadership of the school was noted to set the tone in schools, for if the principal is committed there seemed to be a better level of implementation of UDL. She remarked,
“…you have to find your early adopters and coach them and work with them and support them, and create the space for those who are a little more frightened by it.”

Both Brigid and Randi said that students themselves play a role in the implementation of UDL, in particular because it is implemented (as Brigid noted) to “create the learning environment for all to be able to enter.” It was emphasized by both Brigid and Randi that all students have the right to access education, and that schools can no longer allow students to fall through the cracks. A priority for these participants is for “every child to be able to demonstrate their learning to their ability” (Brigid). As a result, the UDL framework was seen as a useful way to provide flexibility for students that have differing learning needs, in particular for inclusive classrooms. Randi stated “…if we are looking at an inclusive classroom, if they’re not using it … they’re [whisper] screwed.” Because Randi often works with students with low-incidence disabilities and their teachers, she especially found that UDL is essential to meeting student needs:

…teachers are struggling and they are overwhelmed. And I think they are clinging…to what they used to know, and what used to work, or what they thought was working, and if they continue to teach the same way given the new load of improving low incidence [disability] kids, they flounder, and don’t have enough steam or energy to even begin dealing with how complex these kids are, let alone with everything else in the classroom.

The two district administrators were committed to providing the support and helping to create the infrastructure required for schools, leaders, and teachers to provide students with the learning environment they need to be successful.

**External factors.** The external factors identified by the district administrators included meeting all student needs, funding, and the fact that the district had too many initiatives.

It was clear that from the district level, meeting student needs in order for them to be successful was paramount. Students come to school with a variety of experiences and abilities, and UDL can be used to help meet students at their level, no matter what school they happen to be enrolled in. The
district organized itself to send many people to specialized training, and has recruited practicing teachers to help work with others to provide support: Brigid said, “...we will model, we will demonstrate, and my team will continue to look at what the best practices are, hold onto that, and not let this one slide...” The school district in question will not mandate the use of UDL, as Brigid noted: “...we won’t mandate anything. We are a district of choice.” However, the district will do what it can to help provide support for leaders that want to incorporate and continue to implement UDL as a teaching and learning framework, in one respect by encouraging school leaders to create the release time within their schools:

...you do need to give it time; you have to create the release time. So one of the gifts the principals continue to do is that this group continues to come together in their community of practice. And these principals are giving their staff release time to do it.

Randi felt that adequate funding was essential in making UDL a reality in schools, in particular because her case load is so large she finds it difficult to help educators and students as much as she would like. She noted, “You know, it seems everything boils down to funding. So how do we find those teams of people and schools who are willing to come together and make a concerted effort to move toward the direction of truly implementing UDL?” Randi felt that if there were more funds available to devote to UDL, it may be more effectively implemented.

It was noted by Brigid that the district in question has a lot of current initiatives focusing on school and student improvement: “...we have too many initiatives.” As a result, it may be difficult for school leaders to filter through which initiatives to put into place in their schools, running the risk of overwhelming staff.

**Characteristics of change.** The characteristics of change identified from the district administrators focused on how UDL is essential, practical, and could be considered good quality teaching.

The UDL framework was seen as essential in meeting student needs for Brigid and Randi. They stated that although UDL requires extra planning and perhaps more effort in the beginning than other
methods, it is essential for meeting student needs: Randi noted that “…teachers need to know that it actually isn’t more work, it’s less [work].…” Randi went on to explain that although it may seem more complicated at first than other teaching methods, in fact it requires “a shift in how you think about education and how students demonstrate their knowledge.” Brigid also shared that UDL is “a philosophical lens on how you look at creating the learning environment for all to be able to enter.” Randi further explained that by taking the extra time to plan ahead, teaching activities would engage a wider range of students in the long term, allowing for more effective teaching, with the end results being “you end up with happier kids, you end up with a better community.” Brigid stated that using UDL becomes natural, and that incorporating the principles become easier with time, and that in fact many teachers may already be using UDL and are simply not aware of it. She said, “I don’t think this is new stuff. It’s just good stuff. It’s just good quality teaching.”

These participants strongly felt that a need for change in schools is essential, as the student population is seemingly becoming more diverse as educators learn more about the brain and how children learn. Brigid noted that the “cookie-cutter approach” to teaching was no longer appropriate, since over time recognizing student diversity in classes has become more common: “… how do we make good quality programming to serve all students…and then who needs more additional support.” According to Brigid, it is essential that teachers find a way to increase support for students that need it, while still being able to provide other students with the levels of support they need to be successful.

**School administrator.** Jane participated in an individual interview that focused on her perceptions of UDL implementation from a school administrator perspective.

**Local factors.** The local factors identified from an administrator point of view included changes in teachers and students, time, building capacity through professional development and coaching, and providing more resources.

It was clear that within the school, changes in teachers and students took place since the implementation of UDL:
I think teachers are definitely more aware of the different levels that their children are working at. You can’t use the cookie cutter approach anymore…they’re at least trying to give the students some choice and let them show their learning in other ways.

In regards to the local factors of time and building capacity in teachers, Jane noted:

…some teachers don’t believe in it….who’ve taught it the same way their whole lives, so they’ll continue to teach it the same way… people seem to think it takes more time, and so they are saying they don’t have time to do it, but I think the biggest challenge is the collaboration among staff, is having that time to actually talk and create UDL-type lessons. I think we don’t have the gift of time anymore.

Jane felt that because she did not want to overwhelm teachers, it was important to value the fact that they already spent a lot of time outside of work hours actively marking, planning, or other teaching-related tasks. She felt that “… we would need to give them time…where it’s not being done after school…we have to find release time for teachers to sit down together to work on it because otherwise it doesn’t happen.” In extension to this, the importance of developing capacity on staff and leveraging their skills to share with others was deemed important:

The biggest thing is developing expertise within the building and not relying on going outside…

I think it’s the key teachers who build the excitement. And I think once you rely on the expertise in their building, and you get them to share some things, and the other teachers will say, ‘I can do that, it’s not as hard as I thought’. So I think it’s by supporting your lead teachers and building the expertise.

Professional development sessions and peer coaching were discussed as useful for teaching staff, so that teachers could see what UDL looked like in each others’ classrooms, but this took place in the first year of implementation, and only on two occasions that Jane can recall. In addition, professional development sessions that focused on the conceptual aspects of UDL, that is the multiple means of representation, expression, and engagement, were useful but were found lacking in regards to actual
classroom implementation. In regards to building teacher knowledge about UDL, Jane stated, “I think it’s a journey. And I think it’s going to be a journey forever.”

Availability of resources was also seen as a limiting factor: “We have to make sure we have the technology available for students to use, so we have to make sure that that is available to be used by teachers.” Although the school has acquired four laptop mobile carts to use, and purchased word prediction and text-to-speech software for students to use, there was still opportunity to acquire more technology and more resources for teachers to use in their daily practice.

**External factors.** The external factors identified through analysis were district pressures, limited resources, and the availability of time.

One limitation that Jane noted was that many systemic factors (district pressures), were sometimes seen as taking up too much of teachers’ time to possibly plan for UDL. There are many competing factors that also need collaboration time (such as district evaluations, provincial evaluations, assessment practices, etc.), so UDL was not always the top of the priority list. In addition, finances and funding played a role in UDL implementation. Jane listed the current resources that supported the effective implementation of UDL: leveled books, technology, training for teachers, and release time for teachers, all of which cost money. She said, “…there isn’t a lot of money for PD [professional development]. So money plays a role… [we need to] get the finances to support these kinds of projects, for release time, for resources.”

**Characteristics of change.** The characteristics of change that were identified from an administrator perspective were that UDL is practical and natural.

Jane stated that because research emphasized allowing students’ flexibility in their learning in order to succeed, UDL was seen as a good way to do that:

…if you allow students different ways of responding, they’ll do better…we can see that they [the students] are not just being evaluated through written format anymore, that they are actually being tested on what they know, so by using the UDL model, that allows us to have them show
their understanding… And as well, for those students who are above average, it gives them the opportunity to be challenged and further their learning.

Jane further explained that she believes that some teachers may already be incorporating UDL principles into their teaching without being aware of it, and that although to her it is a practical framework to implement, she respected that it may not come easily to all teachers:

I think it’s practical, but every teacher has to make it their own, cause not everybody can do everything, and there are people at different stages, and you have to accept that as an administrator, and hope they take baby steps, and they start coming aboard, and then for those that are willing to go beyond, then they go beyond and they can be the models.

Jane went on to discuss that some educators at schools were quicker to adopt UDL as a teaching framework than others, and that there continued to be an emphasis on encouraging teachers to meet student needs at their own pace. Although Jane stated that there have been improvements in student achievement and student engagement, teachers still seemed reluctant to implement UDL because of its apparent drain on time. Jane explained that, “We have to realize that you don’t have to offer choice in everything you do… I think we need to, as professionals, figure out when choice is good and when choice isn’t necessary.”

**Teachers.** Five teachers participated in the focus group interview. Corinne was from Division One (kindergarten to grade three) and Matt, Katy, Karissa, and Krista (N=4) were from Division Two (grades four to six).

**Local factors.** The local factors identified by teachers included time, professional development, resources, leadership, high expectations, and student factors.

All teachers communicated that time was essential in implementing UDL. The teachers stated that if they were to continue to implement UDL, and if they were to incorporate it more in their teaching, they would need release time to do so. The time would be used to collaborate with professionals, collaborate with colleagues, and to plan their own lessons. Matt stated that in order to
keep any kind of balance in life, release time would be needed so that it was not a question of additional responsibility on top of regular teaching responsibilities: “there’s only so much you can do while keeping a balance in life so you’re not grumpy all day.” Katy stated that already she used so much of her own time to keep on top of administrative requirements, and the idea of adding more on top of everything else made implementing UDL on a more regular basis is difficult. Karissa went on to express the idea that collaboration time was essential in order to be more efficient in planning:

Time is the biggest…Collaboration with other teachers is a huge part of UDL being successful, since we don’t want to reinvent the wheel ourselves every time. Our colleagues can teach us so much about how to implement this by what they’ve been doing in their classrooms all along.

All five teachers also expressed a need for more resources, which is linked to having enough funds to have the necessary materials to implement UDL. They made statements such as “leveled books, a variety of interesting books, graphic novels” (Katy) and “fidgets [i.e., fidget toys that help some students concentrate], chairs [i.e., special chairs that help some students concentrate], materials, and hands-on stuff” (Karissa). They reported that over the years, the school had acquired four mobile laptop carts that could be taken to class for student use, and teachers saw these as essential when putting supports in place for students through the use of word prediction software, searching the Internet for information, and accessing different representations of knowledge. The school had recently acquired thousands of dollars’ worth of leveled books in French to help address student needs, and some of these books came with digital versions so that students could use text-to-speech software to read them. However, Krista in particular expressed that while these resources were welcome, there was still room for more resources in the classroom: “A lot of UDL does involve technology, and it does require money…A lot of what we do requires money. If we don’t have the money, it’s hard to offer the quality we like.”
Professional development was identified as a key requirement for continued implementation. All five of the teachers felt that while they had a good understanding of what UDL is (multiple means of representation, expression, and engagement), they were still unclear of what that looked like in the classroom. Matt and Katy had a discussion in the focus group interview in regards to what could be considered UDL: “Is that UDL then? … I know we had quite a few arguments when we first brought in UDL in school, we’d say that’s not an example of UDL…And people were fighting about what is UDL” (Matt). Katy and Karissa expressed that even though initial professional development was useful and informative, it did nothing to show what UDL could look like in different grade levels, classrooms, and subject matter: Karissa would like to have access to the expertise of professionals with UDL implementation. Continued coaching was determined to be beneficial for Katy, as well:

I need to be taught how to do it practically. I never learned in University how to do it practically… professionals to teach me about these variety of kids in my class, ’cause I don’t have a specialized degree in that…Coaching. Someone to help me implement in my classroom.

Karissa also identified the leadership aspect of implementing UDL. Because the school had begun to focus on assessment practices for the 2015-2016 academic year, UDL had taken a back seat to other priorities, and it was not discussed as often as it was in the past which made teachers implement it less than they would have in previous years. Karissa commented:

…administrative responsibilities… I have to do my MIPIs, HLATs, long-range plans, COPs, contact those parents… It takes a lot of energy to work, to think outside the box, to work against what may come naturally to me as my preferred learning style to make sure that other students get what they need.

All of the teachers agreed that in certain cases, tried-and-true teaching methods (such as “direct teaching”) were preferable over using UDL because results were, from the teachers’ points of view, more guaranteed and more efficient. They saw using UDL as risky because they did not want to waste classroom time on teaching in a way that may not provide the best results for students. Matt commented:
I look and think to myself, UDL? Why don’t we just get through the basic objectives? … we have to stick to the basics. [I want] these kids [to] come out of elementary school with fundamental learnings. I’m not really interested in the rest, I’m interested in are these kids making progress, how do I get them there, what is really in their best interests. New theory does nothing for me.

Katy elaborated on this response:

I try to incorporate it…there’s a limit to its practicality in the current constraints of our system, when I have 20-whatever children, and I have these outcomes to measure, and I have this little amount of time I can do it, but I have no assistants so I can only do it to a certain point. I won’t always be able to follow the framework for certain assignments, I won’t always be able to give a choice or I might not always be able to help a specific child’s learning style because I just don’t have the time or the means. I would like to, but the system is limited.

Student factors also emerged as a theme of discussion for these teachers. One challenge when implementing UDL was the importance of teaching skills for students to express knowledge in different ways (e.g., training them how to use movie making software), which took more time than anticipated. Matt commented “I think you actually have to teach them some pretty important skills … So often times you’ll see UDL as, ‘you can do this fun activity’, but they don’t have the skills to actually do it.” Katy, Krista, and Matt found that the students got caught up when provided with choice, because they ended up spending too much time learning how to use the technology of choice rather than focusing on the learning objectives: “…so if you don’t correct them and you don’t teach them the skills, what you end up getting is garbage” (Matt). The quality of the outcomes, therefore, suffered. However, teachers also agreed that when they did focus on providing multiple means of expression, engagement, and representation, students did seem more engaged in the subject matter. Krista explained,

I think there’s two sides, there’s student engagement and excitement at the beginning, and for other kids there’s the sense of loss cause they were having so much fun exploring
that the purpose of the project got lost. They’re enthusiastic but you have to be careful cause sometimes the message gets lost.

There was also discussion of providing students with skills they will need in the future, which some teachers thought were not emphasized enough when incorporating UDL. Matt believed that it is important to push students to be their best, and that may mean encouraging them to learn in a way that is more teacher-centered:

… the kids are less engaged these days…but I think that we step in and do everything for them.

We give them replacement exams, we give them five different ways to get something they lose [e.g. an assignment], and we need to say no…we are going to force you to listen for the next 15-20 minutes and then practice this skill. I don’t think we demand enough from our kids.

**External factors.** The external factors identified through data analysis included district pressures, high standards, and preparing students for provincial exams.

In this study, Katy, Matt, and Karissa determined that there was a lot of pressure from the district for all students to be successful while maintaining high standards. Matt explained,

One of my colleagues went through each of the objectives in grade five. He said we have 150 minutes a week to teach social studies. If you look at the objectives under the curriculum for social studies, it is impossible to teach the objectives. So essentially what you’re doing is you are ramming through some of these objectives to do your job… this is way too much.

Katy also noted that the provincial education policies indicated that all students must be successful, and this is difficult to do for every student, especially for students that would be writing provincial exams that year:

In grade six I feel more pressured by PATs [Provincial Achievement Tests]; I don’t want to leave my kids hanging for that. I know I shouldn’t teach to the test, but I don’t want to *not* prepare them. I have a professional obligation to teach the subject matter.
All five teachers agreed that if UDL was to continue to be implemented in the school, it had to be done progressively and with support, and that each teacher had to find their own way by making UDL their own. Matt explained:

I think for the success of UDL…it [should] move slowly and progressively, but I think if it’s rammed down people’s throats it will be another casualty on the sidelines. When people say you must do A, B, and C…you have to believe in it, and you have to make it yours.

These teachers felt that although UDL could be a worthwhile framework, it is still unclear how it should be implemented and it may not be the most appropriate framework to use in their teaching context without further support.

**Characteristics of change.** The characteristics of change identified through data analysis were that UDL is unclear in its goals and implementation, and that sometimes it was perceived as impractical.

All five teachers agreed that the principles of UDL could be useful in the classroom in order for all students to meet their full potential. However, there were several aspects of UDL that posed challenges.

Corinne, Karissa, and Krista expressed that incorporation of how they use UDL is natural. Upon examining their practices, Karissa, Corinne, and Krista shared that they used UDL often: “I just can’t see not doing it, once you’ve seen it. There’s no point in not doing it” (Corinne). Karissa stated “I really wish we’d just call it good teaching!” and Krista shared “it’s good teaching strategy and a lot of it we do by instinct.” Matt and Katy stated that using UDL in the classroom was unclear for them, because they were not always sure how to incorporate UDL principles, nor were they always certain what they were doing could be considered UDL. Katy explained, “…sometimes UDL is so subtle that you are doing it and you don’t know that you are doing it. Like fidgets, allowing children to chew gum, you’re doing it automatically without thinking. That is UDL, you are providing them with tools to concentrate.”

Matt, Katy, Karissa, and Krista were in agreement that the framework is not possible or practical to implement in all learning contexts for various reasons, the main one being that teachers agreed that
some learning objectives were better conveyed in a more direct style. Matt shared, “When people say they are doing UDL all the time, I don’t think they are teaching the skills and preparing the tool belt for the kids to actually have those kids show great success.” The teachers seemed divided on this point: on one hand, UDL is the most effective framework to use because it allows for student diversity, yet on the other hand, it is only useful in certain contexts, and not when there is a lot of content to cover.

**Students.** Fifteen students were interviewed in three focus group settings in order to see what they think about learning in the UDL environment. Five students from each of the teachers that allowed me to observe lessons participated in the focus group interviews to discuss various aspects of learning. Students enthusiastically shared their perspectives on learning. Through the analysis of the focus group interview data, two themes emerged: home life and school life, which can be aligned with local factors (Fullan, 2007). This section provides students’ perspectives when learning within a UDL context, and although the results are not directly related to Fullan’s (2007) change process, it does show what students think about learning with UDL and about how they are different as learners. This adds to the rich, thick description of case studies (Merriam, 2009).

**Home life.** The students in these three focus group interviews were incredibly busy. Students shared that they were signed up in various extracurricular activities, and some students were busy almost every night of the week. Because these students were so busy, they shared that having extra homework is very difficult for them and causes stress. Some students said they worked on homework sometimes for two- or three-hours at night, to play catch up. One student reported missing a lot of school because she was involved in professional theater and dance, which had many time commitments during certain times of the year: “…when I miss school, I’m stressed out. I have extra homework and I’m behind…I am a dancer, I do have night performances, this year I’m going to miss a lot because of the Nutcracker. It just gets me stressed out.”

Some of the students who had less extra-curricular activities nevertheless spent hours studying at home in the evening, working on take-home projects and preparing for exams. Students also shared that
they found tests stressful. In class, some strategies were being put into place to reduce stress, such as breathing techniques and allowing more time to complete tests. Other calming techniques included using music: “…during tests, I get stressed out. So this year, Madame [the teacher] and I have been working on this thing to calm me down…[like] music…we tried it out and it helps, it calms me down.”

It was clear from these interviews that these students have many commitments that do not always allow for hours of homework and studying, which may have implications for their performance at school. In regards to UDL implementation, using UDL in the classroom may provide students with the flexibility required in order for them to feel more able to complete the schoolwork necessary to success in a way that suits them best. These students appreciated that measures could be taken to complete schoolwork online, or use different strategies to reduce stress, which are all part of using the UDL framework in teaching and learning.

School life. Students reported the many things they find enjoyable at school. First of all, using technology was put at a premium. Students enjoyed using computers to do research and loved choosing how to share what they learned using technologies such as Google Docs, iMovie, making presentations and posters. One student shared, “It’s easy to learn at our school. It’s easier when I’m playing a game. Also when I’m moving around. I like to move around a lot. And computers!” They enjoyed completing assignments that were posted online and liked the idea of handing in assignments online. When school had to be missed, students felt like there was more flexibility when assignments were posted online and they could complete them when they had time: one student reported that she felt less behind than her classmates because of this: “It’s way less stressful and I keep up better when I can do it at home.”

Student choice was also put at a premium. Any time students had the opportunity to choose, they seemed empowered choosing who they worked with, when, and when applicable, subject matter: “…most of the time she [the teacher] gives us the choice.” This was apparent in how students shared a variety of ways they learned best: creating their own study guides at home, creating “cheat sheets” to study from, cutting and pasting different information into a master document to review, asking parents
or teachers for help when required. One student shared: “...we have multiple ways [to complete assignments], we can usually write on the computer or a piece of paper, and we can decide partners.”

Students reported choosing from a variety of activities to show what they have learned: worksheets of varying difficulty, videos, making presentations, using technology for reading and writing. Students reported that they enjoyed being assessed in ways that did not involve a paper and pencil test (for example, Krista used videos to assess the mastery of a mathematics concept that students later shared with their parents). All students were very excited by the different projects they could choose and were obviously engaged in learning, despite being in different focus groups.

One item that reappeared in the student focus group interviews was how different each and every one of them was, as a learner. Some students liked choosing partners, other students liked to work alone, some students enjoyed certain subjects and other students did not. Different students also disliked different things, and appreciated different things about how their teacher organized the class. In fact, the diversity of student preferences and learning styles is the link that brought all the student focus groups together, for it was remarkable all the ways that students enjoyed learning.

In regards to how teachers accommodated these preferences from the students’ point of views, it was clear that it depended on the teacher. Some students felt that certain teachers were more likely to allow for student choice and flexibility than others: “...it depends on what teacher you have. All teachers have different ways of teaching. It depends on how I learn, and how they teach...sometimes they don’t go together.” If teachers can expect to meet students’ learning needs, some degree of flexibility would aid them in this endeavor.

**Summation of findings.** The findings for the student focus group interviews, the teacher focus group interview, and the individual interviews (district administrators and the school administrator) can be organized in a superordinate and subordinate arrangement, shown in Table 8, as put forward by Saldana (2013).
### Table 8

**Superordinate and Subordinate Arrangement of Themes in Focus Group Interviews and Individual Interviews**

<table>
<thead>
<tr>
<th></th>
<th>Local factors</th>
<th>External factors</th>
<th>Characteristics of change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Students</strong></td>
<td>Home life</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>- Extra-curricular</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Stress</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>School life</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- Depends on teacher</td>
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<tr>
<td></td>
<td>- Student differences</td>
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<td></td>
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<tr>
<td></td>
<td>- Choice</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Study strategies</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Technology use</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Teachers</strong></td>
<td>Time (to collaborate and plan)</td>
<td>District pressure</td>
<td>Unclear goals</td>
</tr>
<tr>
<td></td>
<td>- Professional development/training</td>
<td>High standards</td>
<td>Unclear</td>
</tr>
<tr>
<td></td>
<td>- Resources</td>
<td>Provincial exams</td>
<td>Implementation</td>
</tr>
<tr>
<td></td>
<td>- Leadership</td>
<td></td>
<td>Sometimes impractical</td>
</tr>
<tr>
<td></td>
<td>- High expectations</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Poor student choice</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Need to teach extra skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Administrators</strong></td>
<td>Teacher change</td>
<td>District pressures</td>
<td>Practical</td>
</tr>
<tr>
<td></td>
<td>- Increased student success</td>
<td>Resources</td>
<td>Natural</td>
</tr>
<tr>
<td></td>
<td>- Time</td>
<td>Time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- PD/training</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Coaching</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>District administrators</strong></td>
<td>Build capacity</td>
<td>Meeting all student needs</td>
<td>Essential</td>
</tr>
<tr>
<td></td>
<td>- Support</td>
<td>Funding</td>
<td>Practical</td>
</tr>
<tr>
<td></td>
<td>- Modeling</td>
<td>Too many initiatives</td>
<td>Good quality teaching</td>
</tr>
<tr>
<td></td>
<td>- Coaching</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Leadership</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Inclusive classrooms</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Access for all</td>
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Observation, Follow-Up Individual Interviews, and Field Notes Findings

The aim of this research was to investigate the factors that influence the Implementation phase of UDL at this school. I observed in three teachers’ classrooms (Krista, Karissa and Katy) and they engaged in a follow-up individual interview after the observed lessons.

Teachers. Krista, Karissa, and Katy, teachers of a grade five-six combined class, a grade four class, and a grade six class (respectively), allowed me to come and observe two of their lessons that incorporated the principles of UDL. These observations took place over 45-60 minutes, over two different lessons, except in Katy’s case where the lessons were back to back and resulted in a 1.5 hour observation. The checklist helped identify the indicators of UDL that were present in the lesson and in what sense. The observation checklist included a way of determining the level of UDL use of the teacher through scoring the number of elements of UDL that were present. The scoring simply indicated that in all cases, teachers’ self-reported level of use and comfort of UDL (either novice, experienced, or expert) was accurate.

The lessons observed had a variety of subjects, including mathematics, health, language arts, and social studies. The observations indicated that there was no particular area that teachers did not address as a whole: all categories of the observation checklist were represented at least once in the observations.

Krista. Krista’s lessons observed were of grade six mathematics and grade five-six French language arts. In her mathematics lesson, Krista provided students with a warm-up activity that included the use of manipulatives and a review activity that emphasized working collaboratively with peers. The lesson itself was about using numerical operations to problem-solve. While students were working on an activity (that had differing levels of difficulty that students could choose themselves), Krista took students into the hall to video record them with an iPad while they completed problems involving numerical operations, to use for assessment purposes later and to share with their parents during parent-teacher interviews. For the classroom assignment, students were given the choice of using calculators or multiplication tables and working either individually or in pairs. Students were encouraged to consult
with peers if they had trouble completing the worksheet. Krista also gave students “hints” to try if they needed them as she circulated the class. Students were then assigned a variety of homework problems (differentiated based on what students said they could complete that evening). Following the activity, students expressed how much fun it was to work with their peers and how it was so nice to be able to choose the difficulty of their classroom assignment and how many problems to complete for homework.

In her combined grade five and grade six French language arts lesson, students were to write a friendly letter to their pen pals in France. Students had already completed a paper outline, and students were given broad subjects they may want to address in their friendly letter. Krista emphasized French verb tenses, and students were reminded that they could use a word-prediction software to help writing their letter if needed. Students were shown the rubric that was to be used in grading their letter, and were reminded to use both a self- and a peer-editing checklist before submitting their letter for evaluation. Students wrote their letter in Google Docs and were reminded to use online dictionaries, spellcheck, visuals on the wall, and verb dictionaries when composing. As students were composing their letters, Krista took students aside in their balanced literacy reading groups to complete a guided reading activity focused on fluency.

Krista self-reported as an expert user of UDL, and my observations aligned with her report. On both occasions of the observations, Krista demonstrated multiple means of representation, engagement, and expression. Students were allowed various means to represent their knowledge, including websites, textbooks, and had access to assignments via Google Docs in order to use supporting software such as Read and Write Gold (for word prediction and text-to-speech) to help clarify information. Students were visibly engaged during their activities, and were allowed various ways to incorporate their own interests and abilities into their assignments. Students were encouraged to use software, manipulatives, verbal explanation, scratch notes, and worksheets to help demonstrate their knowledge. A summary of Krista’s observation results can be seen in Table 9.
Table 9

Summary of Observations for Krista

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Provide multiple means of representation</th>
<th>Raw score</th>
<th>Operative level of UDL component</th>
<th>Overall UDL use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson 1</td>
<td>Provide multiple means of action and expression</td>
<td>10/12</td>
<td>Advanced</td>
<td>Advanced</td>
</tr>
<tr>
<td></td>
<td>Provide multiple means of engagement</td>
<td>9/10</td>
<td>Advanced</td>
<td>Advanced</td>
</tr>
<tr>
<td></td>
<td>Clear, defined curriculum – focused on mastery of standards</td>
<td>9/10</td>
<td>Advanced</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clear, defined curriculum – focused on mastery of standards</td>
<td>24/28</td>
<td>Advanced</td>
<td></td>
</tr>
<tr>
<td>Lesson 2</td>
<td>Provide multiple means of representation</td>
<td>12/12</td>
<td>Advanced</td>
<td>Advanced</td>
</tr>
<tr>
<td></td>
<td>Provide multiple means of action and expression</td>
<td>7/10</td>
<td>Intermediate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Provide multiple means of engagement</td>
<td>8/10</td>
<td>Intermediate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clear, defined curriculum – focused on mastery of standards</td>
<td>24/28</td>
<td>Advanced</td>
<td></td>
</tr>
</tbody>
</table>

**Karissa.** Karissa’s lessons observed were of grade four social studies and French language arts.

In her social studies lesson, students were to work collaboratively on a Google Docs research project. Students were to collect information to fill in a pre-determined outline using the Internet and textbooks. Students were encouraged to work collaboratively while filling out their sections of the research project, and Karissa provided several models of previous projects to remind students of expectations. Students were assigned other students’ projects to evaluate and peer-edit, to ensure that all aspects of the project were completed. Karissa circulated during class to provide students with feedback and helpful hints in their research.

In French language arts, the students were to complete a similar research project using the topic of their choice. They had several models that Karissa went over in class, to remind students of expectations, in preparation for an oral presentation later in the week. Students were to use the Internet and various resources from the library or home to complete their research, and students were encouraged to choose how they would present their material individually. Microsoft PowerPoint presentations, posters, and speeches were used to convey information in the past, and Karissa expected students to use the same variety of formats for this project. Students were to complete an auto-evaluation at the end of
their project, to emphasize how they could improve next time and to highlight the successes of this particular project for the individual students.

Karissa self-reported as an experienced user of UDL, which aligned with the observational data. She provided flexible ways of representation by allowing and encouraging students to consult various sources of information. Multiple means of engagement were apparent through students allowed to choose the topics of the French language arts projects; in social studies, they were encouraged to choose images and information that they thought the rest of the class would think interesting. Multiple means of expression were seen through how students could choose the output of their projects in order to convey the information appropriately. Some opportunities to expand her UDL use were seen in assessment, because students were not reminded or shown how they would be evaluated, although it is possible that this occurred and it was simply not observed during the designated times. In addition, although different resources exist that may provide students with more support, Karissa explained that she had yet to train these students on how to use these resources, and that she planned to do so in the future. A summary of Karissa’s observation results can be seen in Table 10.

Table 10

<table>
<thead>
<tr>
<th>Summary of Observations for Karissa</th>
<th>Raw score</th>
<th>Operative level of UDL component</th>
<th>Overall UDL use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lesson 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide multiple means of representation</td>
<td>8/12</td>
<td>Intermediate</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Provide multiple means of action and expression</td>
<td>7/10</td>
<td>Intermediate</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Provide multiple means of engagement</td>
<td>8/10</td>
<td>Intermediate</td>
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</tr>
<tr>
<td>Clear, defined curriculum – focused on mastery of standards</td>
<td>21/28</td>
<td>Intermediate</td>
<td></td>
</tr>
<tr>
<td><strong>Lesson 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide multiple means of representation</td>
<td>7/12</td>
<td>Intermediate</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Provide multiple means of action and expression</td>
<td>7/10</td>
<td>Intermediate</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Provide multiple means of engagement</td>
<td>8/10</td>
<td>Intermediate</td>
<td></td>
</tr>
<tr>
<td>Clear, defined curriculum – focused on mastery of standards</td>
<td>20/28</td>
<td>Intermediate</td>
<td></td>
</tr>
</tbody>
</table>
Katy. Katy’s lessons observed were of grade six health, focusing on identifying and dealing with one’s emotions. The students were given various models using the interactive white board to complete their activity, and were encouraged to act out their emotions with a peer. Illustrations using an interactive whiteboard tool were used, in addition to various video clips. Students were encouraged to incorporate physical activity by taking ten steps and then discussion subject matter with the peer closes to them. Assessment was not completed in this lesson, but was to take place at a later date.

Katy is a self-reported novice when it comes to incorporating UDL, and the observations collected during her lessons aligned with this; the observation scoring showed her UDL teaching practices were emerging. Katy offered students multiple ways to represent knowledge, through videos and discussion of emotions, largely teacher-directed. Students were offered multiple means of expression through the ways they were demonstrating their emotions, and students seemed engaged in the lesson although there may have been opportunities to expand on this area: students were not observed being given feedback to help increase their mastery, nor were student expectations varied given their individual strengths and weaknesses, although it is possible that these activities took place in a later lesson, unobserved. A summary of Katy’s observation results can be seen in Table 11.

Table 11

<table>
<thead>
<tr>
<th>Summary of Observation for Katy</th>
<th>Raw score</th>
<th>Operative level of UDL component</th>
<th>Overall UDL use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double lesson</td>
<td>7/12</td>
<td>Intermediate</td>
<td>Emerging</td>
</tr>
<tr>
<td>Provide multiple means of</td>
<td>4/10</td>
<td>Emerging</td>
<td></td>
</tr>
<tr>
<td>representation</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Provide multiple means of action</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>and expression</td>
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<td></td>
<td></td>
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<tr>
<td>Provide multiple means of</td>
<td>5/10</td>
<td>Emerging</td>
<td></td>
</tr>
<tr>
<td>engagement</td>
<td>14/28</td>
<td></td>
<td></td>
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<tr>
<td>Clear, defined curriculum –</td>
<td></td>
<td></td>
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<tr>
<td>focused on mastery of standards</td>
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</table>

Analysis results. Upon the analysis of the follow-up individual interview data, and the observation checklists and associated field notes, findings aligned with local factors, external factors, and the characteristics of change (Fullan, 2007).
Local factors. Local factors identified through analysis included meeting student needs, time, professional development, offering choice, high levels of collaboration, and high student engagement in the class during activities.

All teachers noted that meeting student needs is a priority in their classrooms, and that using the UDL framework was a useful way to do so. Karissa shared, “every child needs to be able to be successful. From what we know about multiple intelligences, we know that you can’t ask kids to show their learning in all the same way,” Katy shared, “I think to a certain extent yes, certain components are necessary…to reach all the kids,” and Krista shared “the children are coming at all different levels, so it’s really important for them to express their learning in the best way they can.” There were certain elements that needed to be in place for these teachers to continue on their journey to implementing UDL: time to plan and professional development.

Krista stated that time to plan and time to collaborate with others, both teaching colleagues and experts in UDL, is essential to continuing to incorporate UDL principles in her teaching practice. In order for her to continue to successfully implement UDL, time to collaborate and plan is a factor: “Time is always a factor…and I keep thinking wow, if I had time to create something like that it would be amazing.” Karissa emphasized that planning her lessons with UDL increases her workload, and that these lessons need to be “extra structured” in order to ensure that students will be learning what they need to know. In order for her to continue learning and incorporating UDL into her daily teaching, certain elements need to be in place: “…an extra three hours a day … more training about implementation and training…more access to manipulatives…and to be able to really give kids more real life experience….but not all the curriculum is tailored to that.”

Students were offered choice in many of their classroom activities, and it was clear that the students enjoyed choosing their activity. In Krista’s mathematics lesson, students were allowed the choice of the level of difficulty of their review activity and their assignment for input/output tables: there was a “hard” and an “easier” review activity and worksheet.
Figure 3. “Easier” review activity sample for input/output tables. “Entrée” is French for the beginning number to the problem, and “sortie” is French for the resulting number after the operation. “Règle” is French for the rule students have to determine that results in the “sortie” number.

Figure 4. “Hard” review activity sample for input/output tables. “Règle” is French for the rule students have to solve.
Figure 5. “Easier” assignment sample for input/output tables. “Entrée” is French for the beginning number to the problem, and “sortie” is French for the resulting number after the operation. “Règle” is French for the rule students have to determine that results in the “sortie” number.

<p>| | | | | | |</p>
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<tbody>
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<td>4</td>
<td>13</td>
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<td>4</td>
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</tbody>
</table>

Règle: ________

Figure 6. “Hard” assignment sample for input/output tables. “Entrée” is French for the beginning number to the problem, and “sortie” is French for the resulting number after the operation. “Règle” is French for the rule students have to determine that results in the “sortie” number.

Students mentioned several times throughout the lesson that they appreciated the choice in the level of difficulty, and one student in particular asked the teacher if they were going to continue this format, because she loved having really hard assignments. In Karissa’s class, students were allowed to choose how they were going to fill out the requirements of their social studies and French projects, through looking at the criteria she shared and determining how they were going to find the information (through textbook, library book, or Internet searching). In particular, the French research project had many students excited, and several had brought resources from home to supplement the Google Docs project they were creating. In Katy’s class, students had the choice of partner and how they were going to demonstrate different emotions (through acting or drawing). The field notes indicated that when provided with choice, the students in these classes were not only excited to start their activity but appreciated that they could demonstrate what they know in a way that was more appropriate for them.
Their appreciation was obvious through their incidental comments and from the ways that students knew which resources to access (e.g., word prediction software, calculators, manipulatives, textbooks, and the Internet).

In all of the lessons observed, students were in some part required to work collaboratively. In Krista’s mathematics and French lessons, students were allowed to consult with their peers for hints on the assignment or to edit each other’s work, in addition to ensuring all parts of the assignment were in place using the rubric as a checklist for each other’s work. In Karissa’s class, students were required to edit and review each other’s work, and students that were working on similar projects were allowed to work together if they so chose. In Katy’s class, students were required to work with a partner that sat beside them, then later with a different partner chosen at random. In all instances, students worked with another peer and took the editing roles seriously, as they had engaged in this activity previously. In one instance, the teacher was helping students via Google Chat if they had a quick question. I also noticed that while students were working together, the teacher would help those students that needed assistance or engaged in small group work with other groups of students.

Throughout the lessons, students needed very little or no reminders to stay on-task, and worked on their projects until the bell rang. Katy stated that as a result of incorporating UDL, most students were more engaged in their learning compared to more direct-style lessons. She stated that she knew her students better, and because she knew more about how her students learned, she was better able to address their learning needs. There were no instances of dealing with classroom behaviors, which may in part have been due to an outsider (myself) being present, but after a few minutes, students forgot I was there and got to work. The absence of any kind of negative behavior was remarkable, and when I inquired whether or not this was typical, all three teachers stated that this was normal activity and behavior for them.

**External factors.** This category was not robust, but it nevertheless emerged in the follow-up individual interviews: the main external factor was district pressure to perform well on provincial
exams. Katy stated that she felt this pressure, and that sometimes using UDL was risky and could take up too much time in class, which should be better spent focusing on mastering curricular outcomes in order to perform well on exams. She has “a professional obligation to teach the subject matter” which means that devoting classroom minutes to UDL was not always ideal when curriculum had to be covered. Karissa felt that the curriculum limited her ability to implement UDL, because she had a curriculum to cover: “…but not all the curriculum is tailored to that. That’s where that gap is.” She felt that the requirements of the curriculum limited her ability to use UDL consistently, because otherwise she would risk not covering all of the necessary learning objectives.

**Characteristics of change.** Through data analysis, participants identified that using UDL was a useful framework that addressed student needs and is natural to use. They also mentioned, however, that UDL can be difficult to incorporate, impractical in certain contexts, and has unclear goals.

All three teachers who were observed agreed that UDL is a useful teaching framework to use in order to meet student needs, and that it can increase student engagement in learning compared to more direct-style methods. However, UDL can be difficult to determine how to incorporate it in one’s classroom. Katy stated that what UDL can look like in the classroom can be unclear, and that she is not always sure that what she is doing is in fact UDL:

Sometimes I’m not exactly sure…if something is considered UDL, or just partially, or whatever. Fully UDL means that you are constantly doing a variety of teaching techniques but also giving kids a variety of choice, and I don’t know if that’s possible. I guess that’s what I’m not sure about it, the clarity part is do you have to always implement it…

Krista, in contrast, shared that she was comfortable using UDL in her day-to-day teaching: “I wouldn’t say it’s hard to implement, it’s a good teaching strategy and a lot of it we do by instinct…” For this teacher, while the complexity of UDL does not pose an issue, she would require more time to plan effectively.
In regards to practicality, Katy and Krista stated that UDL is not always practical to use in all lessons because there are some things that students need direct teaching to master. The UDL, for Krista, comes into play after students have mastered foundational skills that she is planning to assess: “And for some activities you don’t want to do it, some activities I want direct teaching.” Katy and Krista noted that some outcomes are more efficiently taught in a teacher-centered manner, and that they preferred to convey the information without using UDL in order to be more efficient. They saw “direct teaching” in some cases as more effective and less risky than using UDL. Karissa, although she saw UDL as a practical framework, saw time and her own capacity as the limiting factor:

It’s a good framework. Not every subject is gonna get a UDL treatment cause I would need eight different brains to think differently, my strengths are my strengths and I’m not going to share some of the strengths with my students…without a lot of collaboration time it’s not realistic.

The findings for the classroom observations, follow-up individual interviews, and field notes can be organized in a superordinate and subordinate arrangement, shown in Table 12, as put forward by Saldana (2013).

Table 12

Superordinate and Subordinate Arrangement of Themes in Classroom Observations, Associated Field notes, and Follow-up Individual Interviews

<table>
<thead>
<tr>
<th>Local factors</th>
<th>Success for all</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time</td>
</tr>
<tr>
<td></td>
<td>Choice</td>
</tr>
<tr>
<td></td>
<td>Professional development/training</td>
</tr>
<tr>
<td></td>
<td>Collaboration</td>
</tr>
<tr>
<td></td>
<td>Engagement</td>
</tr>
<tr>
<td>External factors</td>
<td>District pressure to perform well on provincial assessment</td>
</tr>
<tr>
<td>Characteristics of change</td>
<td>Necessary</td>
</tr>
<tr>
<td></td>
<td>Natural</td>
</tr>
<tr>
<td></td>
<td>Difficult to incorporate</td>
</tr>
<tr>
<td></td>
<td>Unclear goals</td>
</tr>
</tbody>
</table>
Document Analysis Findings

The relevant documents were determined in collaboration with the administrator, Jane, and the district administrators, Brigid and Randi. These participants indicated that a variety of documents were used to guide the focus of the schools and classroom teaching in general at the school level and at the district level. The documents included *How to create inclusive school communities: Administrator’s handbook* (Edmonton Public School Board, n.d.), *The pyramid of intervention: A framework for supporting all students Verification of Findings* (Edmonton Public School Board, n.d.), *The pyramid of intervention: Helping parents participate, a planning tool* (Edmonton Public School Board, 2013), and *An educational strengths-based approach* (Edmonton Public School Board, n.d.). These documents were analyzed using Saldana’s (2013) two-cycled approach, outlined in Chapter Three. Four themes emerged from the analysis of these documents: collaboration, elements in place in the school environment, success for all students in one education system, and policy. These themes can be aligned with Fullan’s (2007) local factors (collaboration and elements in place in the school environment) and external factors (Success for all students in one education system and policy). The third factor outlined by Fullan (2007), characteristics of change, was not addressed, although this makes sense since the school board in question is a district of choice and does not mandate specific interventions.

**Local factors.** The factors that emerged in the document analysis had to do with collaboration and the elements in place within the school environment. Collaboration was emphasized in these documents in respect to engaging family in decision-making, working with colleagues and experts in the field to meet student needs, and building relationships between all stakeholders (Edmonton Public School Board, n.d.; 2013). In addition, effective service delivery was of particular importance, because it is a resource that is available for teachers when they need help to meet student needs (Edmonton Public School Board, n.d.).

The elements in place within the school environment included the importance of providing a learning environment that welcomes all students, despite differing abilities. A culture shift was outlined
in the sense that educators need to recognize that all students are different and therefore will require flexible learning environments that can meet their needs (Edmonton Public School Board, n.d.; 2013). A universal acceptance for all students was emphasized, as well as targeted and specialized instruction for those that need it. UDL specifically was mentioned, as was the incorporation of technology and respecting and using data to make informed decisions (Edmonton Public School Board, 2013). In general, these documents provided information as to why this school in particular has decided to focus on UDL as a teaching framework: It is cited specifically and an emphasis on universal acceptance for all is repeated several times (Edmonton Public School Board, n.d.; 2013).

**External factors.** The external factors that emerged through analysis had an emphasis on success for all students in one education system and policy. Success for all students means that the first placement option for students is the neighborhood school, and these guiding documents repeated the idea that there is a place for every student at every school. While supports may need to be developed to help students reach their full potential, this can be accomplished within any school. The documents outlined the benefits of inclusion and effective inclusive practices within schools, as well as providing equal access to education.

In regards to policy, the documents quoted various provincial policies stating that inclusive education is paramount in this district. The documents quoted various policies and legislation that support inclusive education, and outline the rights and responsibilities of parents, school boards, schools, and teachers in regards to educating students. In general, the documentation provided support for why this school in particular has a focus on creating flexible learning environments that welcome all. The findings for the document analysis can be organized in a superordinate and subordinate arrangement, shown in Table 13, as put forward by Saldana (2013).
Table 13

Superordinate and Subordinate Arrangement of Themes in Document Analysis

<table>
<thead>
<tr>
<th>Documents</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Local factors</td>
<td>• Collaboration</td>
</tr>
<tr>
<td></td>
<td>• Elements in place within the school environment</td>
</tr>
<tr>
<td>External factors</td>
<td>• Success for all students in one education system</td>
</tr>
<tr>
<td></td>
<td>• Policy</td>
</tr>
</tbody>
</table>

Verification of Findings

The complete findings, as presented in this chapter, were provided to the district administrators, the administrator, and the teachers that had agreed to participate in the study. The participants were asked to read the chapter and verify that the findings were indeed accurate and that the information presented was correct and true, from their perspective. A draft copy of the findings was sent to the participants via email in February, 2016, and the participants were asked to communicate any changes or clarifications within two weeks, and that if they did not respond, it would be assumed that they agreed with the findings. Five participants indicated that they reviewed the draft findings and had no changes to make, and three of the participants did not respond to the email. Given that no constructive feedback was received by participants, I assumed that the findings accurately demonstrated the factors that influence the Implementation phase of UDL in one school in an urban setting.

Summary of Findings

The emergent themes in all data sources confirmed that local factors, external factors, and characteristics of change (Fullan, 2007) were indeed important influences in UDL implementation. These themes had differing levels of emphasis depending on the data source (e.g., the document analysis did not reflect any themes aligned with characteristics of change because the documents do not address the implementation of a single intervention), yet the same ideas were confirmed repeatedly on the whole. Triangulation of all data indicated that, for these participants, local factors, external factors, and characteristics of change played a role in the implementation of UDL in one urban school setting. Table
14 shows the emergent themes for the aggregate teacher, school administrator, and district administrator data sources, and is organized by the research sub-questions of current factors that influence the implementation of UDL, the challenges that influence the implementation of UDL, and the factors that influence sustaining the implementation of UDL.

Table 14

*Superordinate and Subordinate Arrangement of Themes From Teachers, School Administrator, and District Administrators Organized by Research Question*

<table>
<thead>
<tr>
<th>Local factors</th>
<th>External factors</th>
<th>Characteristics of change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currently support UDL implementation</td>
<td>• Time</td>
<td>• Success for all</td>
</tr>
<tr>
<td></td>
<td>• Leadership</td>
<td>• PD</td>
</tr>
<tr>
<td></td>
<td>• Resources</td>
<td>• Time</td>
</tr>
<tr>
<td></td>
<td>• PD</td>
<td>• Resources</td>
</tr>
<tr>
<td></td>
<td>• Student factors</td>
<td>Just good teaching</td>
</tr>
<tr>
<td>Challenges for UDL implementation</td>
<td>• Time</td>
<td>• Curriculum</td>
</tr>
<tr>
<td></td>
<td>• Student factors</td>
<td>• Funding</td>
</tr>
<tr>
<td></td>
<td>• Leadership</td>
<td>Need</td>
</tr>
<tr>
<td>Requirements to sustain UDL implementation</td>
<td>• Time</td>
<td>• PD</td>
</tr>
<tr>
<td></td>
<td>• Resources</td>
<td>• Funding</td>
</tr>
<tr>
<td></td>
<td>• PD</td>
<td>Complexity</td>
</tr>
</tbody>
</table>
CHAPTER FIVE: DISCUSSION

This chapter includes a discussion of the study findings as they pertain to the following research question and sub-questions:

- What factors influence the Implementation phase of the UDL framework in teaching and learning within one urban school setting?
- What factors support the implementation of the UDL framework in teaching and learning within one urban school setting?
- What are the challenges that influence the implementation of the UDL framework in one urban school setting?
- What factors support the sustained integration of the UDL framework in teaching and learning in one urban school setting?

The results are discussed in relation to existing implementation literature on Universal Design for Learning (UDL) and Fullan’s (2007) change process, and linked to Rogers’ theory of Diffusion of Innovations (DoI) (2003). In Chapter Four, the findings indicated that the following three elements were identified as important when implementing the UDL framework: local factors, external factors, and characteristics of change (Fullan, 2007). Although originally it was considered that different factors may support, challenge, and continue to sustain the Implementation phase of the UDL framework at this school, the findings indicated that the same three factors (local factors, external factors, and characteristics of change) generally influenced the Implementation phase of UDL, pose the same challenges, and need to be addressed in the future in order to sustain implementation, as will be outlined in the following sections. In the broader context of DoI (Rogers, 2003), Fullan’s (2007) change process factors add detail to
Rogers’ (2003) DoI; conversely, Fullan’s (2007) change process does not look at the implementation of UDL on the broader scale of the entire implementation process. The two models can be combined to complement each other, as will be explained further in the sections below.

**Factors That Influence the Implementation of the UDL Framework**

The implementation of the UDL framework was influenced by local factors including leadership, time, professional development, resources, and students. External factors were the success for all students in one education system, professional development/training/coaching, time, and resources. Characteristics of change included the practicality of UDL and how difficult it is to implement.

**Local factors.** In regards to leadership, Randi shared that “the administration is very important” because they set the tone of meeting student needs in the school. She went on to explain:

> There’s a few pockets [of UDL]. It takes a while for things to grow, to catch on, but…leadership needs to be on board, they need to understand what it looks like in the classroom…they need to model, and the expectation needs to be there that it’s gonna happen… you have to find your early adopters and coach them and work with them and support them.

The importance of leadership in a school has been well established in the literature (Leithwood & Louis, 2012; Levin, 2012; Robinson, 2011). In their five-year study looking at the effect of leadership on student learning, Leithwood and Louis (2012) determined that “leadership is second only to classroom instruction on student learning” (p. 3) and that “leaders have the potential to unleash latent capacities in organizations” (p. 3). The discussion of leadership factors
in play at this school, is out of the scope of this research at this time, but may indicate a need for further research in this area.

In regards to time as a local factor, Brigid shared that “[t]ime’s a big factor, if you don’t give the time, that’s a barrier.” Brigid discussed that providing the time to allow teachers to become familiar with, explore, and experiment with the innovation while learning about it theoretically is essential, and this aligns with findings in the professional development area of research (Fullan & Hargreaves, 1992; Gulamhussein, 2013; Guskey, 1986; 2002; Joyce & Calhoun, 2010; Joyce & Showers, 1988; 2002). Brigid also discussed that providing time for teachers to collaborate with colleagues helped immensely in the district in regards to UDL implementation. Jane agreed with this idea, and shared “I think we don’t have the gift of time anymore.” Speaking as an administrator of the school, she further outlined that due to district pressures to focus on assessment, the staff meeting time recently had been devoted to increasing assessment capacity for teachers: “…we have monthly collaboration and it’s not always UDL-related.” Although she indicated that she would like to review UDL more with her staff, there simply is not time to do so. The teachers also voiced a need for more time: time to plan and collaborate with colleagues was essential in supporting the implementation of the UDL framework.

UDL studies (Abell et al., 2011; Hatley, 2011; Katz, 2013; 2015) recommended that ongoing collaborative and planning time be worked into schedules to allow teachers to continue with their implementation, however all of these studies focused on initial implementation of the UDL framework. What is unique with this particular study is that if time was examined in terms of the implementation stage. Teachers continue to require time to support their implementation
efforts well beyond the initiation stage and into the implementation stage, as was succinctly stated by Karissa:

   Time is the biggest. The more curriculum we’re expected to get through, the less time there is for the development of critical thinking skills and exploring UDL. Collaboration with other teachers is a huge part of UDL being successful...

   The literature surrounding UDL-specific implementation has also recommended that adequate time (depending on teacher needs) be given to teachers in order to plan and collaborate, but these models were theoretical and their findings were not verified in context (Fixsen et al., 2005; Muller & Tschantz, 2003; National Center on Universal Design for Learning, 2012; Nelson & Basham, 2014; Rose & Meyer, 2002). Findings from this study align with their recommendations. This is particularly important because “time” was still defined as a need by participants three years after the initiation of UDL that took place in 2012; in order for these teachers to feel successful in implementing UDL, they communicated that they need more time to plan for its use and collaborate with their colleagues.

   Perhaps, however, there is more going on for these teachers than a lack of time to plan and collaborate using the framework of UDL. From the findings in Chapter Four, it is clear that there are a number of items that are affecting the amount of time available for planning for and incorporating UDL into their practice: the number of prescriptive outcomes in the program of studies, the pressures of standardized testing, and the diverse learners in their classes that require varied amounts of support to be successful. It is possible that time is available, yet so much of it must be devoted to systemic pressures such as teaching a certain number of objectives and trying to ensure student success on provincial exams that the system is not yet ready for the implementation of UDL as a teaching framework. This could indicate an area of future research.
Professional development was identified as a local factor. Randi stated, “I think probably the biggest need would be modeling and coaching.” There was an effort to train a small group of teachers in the implementation of UDL in the district, by sending them to intensive initial training in UDL followed by the establishment of a community of practice to help support their efforts, with great success (Brigid). This aligns with Joyce and Showers’ (1988) work in regards to effective professional development:

The development of school norms that support the continuous study and improvement of teaching apparently build capability for other kinds of change…by building permanent structures for collegial relationships, schools organize themselves for improvement in multiple areas. (p. 124)

From a district administrator perspective, it may be beneficial to create a larger-scale, more permanent project of this sort when implementing UDL in order to provide the supports needed to implement an innovative framework.

Three out of five teachers in the focus group (Krista, Katy, and Karissa) and two of the three teachers observed (Katy and Karissa) noted that professional development and training on how to use UDL in the classroom was essential. Krista stated, “…in reality, most teachers are not professionals or knowledgeable about special needs and we need those people [i.e., experts] to help us.” Katy shared that she needed “…professionals to teach me about these variety of kids in my class…Coaching. Someone to help me implement in my classroom.” Corinne felt that as a Division One teacher, she was at an advantage because of all the expertise and training she had access to:

I’m very lucky because I have access to OTs [occupational therapists], SLPs [speech-language pathologists], behavior consultants, I’ve seen a lot of specialists that a lot of
teachers … never see. I’ve seen 20 times the amount of specialists working with kids and seeing it in action. I think it’s powerful and I wish it upon my colleagues because I feel very lucky that I have access to that and the training in the setting.

These perspectives show the importance of professional development, which has also been established in the literature.

In studies looking at the elements of successful professional development, simply providing in-services will not result in lasting teacher change (Fullan & Hargreaves, 1992; Gulamhussein, 2013; Guskey, 1986; 2002; Joyce & Showers, 1988; 2002; Showers & Joyce, 1996; Yoon et al., 2007). It was also shown that ongoing support for teachers is essential when expecting any kind of lasting change to occur (Fullan & Hargreaves, 1992; Guskey, 1986; 2002; Joyce & Showers, 1988; 2002; Yoon et al., 2007). Although this has been mentioned as a recommendation in other UDL studies (Abell et al., 2011; Hatley, 2011; Katz, 2013; 2015), research to date has not been focused on the continuing professional development needs in long-term implementation, indicating a future area of research.

It would appear that professional development needs to go beyond the initial implementation efforts. Rather, over time the teachers may need additional professional development to support their particular needs. For example, Randi mentioned that continued coaching with experts in regards to different ways to implement UDL in teachers’ own classrooms would be beneficial, based on the teachers’ current level of need. Differentiated professional development may also be of value, because of different levels of use in the school itself: Katy, who defined herself as a UDL novice, communicated the most need for additional training: “You need training… but no one came to me specifically and said do you understand what this [UDL] is,” whereas Karissa, an experienced user of UDL, expressed much less of a
need for additional training. It is reasonable to believe that teachers will require different professional development to be successful, and offering differentiated professional development would perhaps allow these teachers to expand their use of UDL by providing them with the support they need to be successful.

Resources were identified as a local factor. The aspect of resources was also linked to time, however, because teachers would also require the time to learn about the technology and time to plan how to incorporate these resources into their daily teaching. In the initiation stages of UDL, the school had devoted professional development time and collaboration time to showing teachers how to use various technologies, with good results:

…[some staff] has gone from ‘I refuse to use technology’ and ‘don’t give me a Smart Board cause I’ll never use it’, to using the Smart Board to using Google Docs…staff really started to allow kids opportunities and different ways to show learning...

When implementing change in a school, studies have shown the importance of providing the implementers of the innovation with the tools necessary to their success (Ellsworth, 2000; Fullan, 2007; Rogers, 2003). Although this school certainly had more resources in place than some schools (e.g., four mobile computer carts, interactive whiteboards in every classroom, and text-to-speech and word prediction software at its disposal), it may be of benefit to ensure that teachers have what they feel they need to be successful.

When asked what resources would be useful to the teachers, responses ranged from having more manipulatives, more hands-on materials for subjects such as science, more high-quality resources, and more learning resources that were not solely textbooks (Karissa, Jane, and Matt). Jane indicated the need to have more resources in the sense of technology, apps for Chromebooks and iPads, and acquiring more differentiated literacy material that is compatible
with computers. These teachers indicated that the school could provide more in terms of making learning materials more flexible for students, mainly through incorporating more technology.

Although the use of technology in teaching and learning activities has not been equivocally determined as beneficial (Alsafran & Brown, 2012; Fedisson & Braidic, 2007; Kirschner & Karpinski, 2010; Lei & Zhao, 2007; Shapley et al., 2011), using technology can help increase student engagement which has been shown to have an effect on student learning and achievement (Abell et al., 2011; Basham et al., 2010; Edyburn, 2010; 2015; Finn & Zimmer, 2012; Katz, 2013; 2015a; 2015b; Kortering et al., 2008; McPherson, 2009; Schelly et al., 2011). Students from this study’s focus groups unequivocally loved using technology: all of Karissa’s students in their focus group interview said, “I love computers!” and one of them shared, “I used to dislike social studies but now it’s more fun on computers.” One of Krista’s students shared, “I like computers … I like using it in ELA [English Language Arts], for word prediction.” In addition, theoretical implementation research for UDL has shown that technology is very important to its success (Edyburn, n.d.; Nelson & Basham, 2014; Rose & Meyer, 2002); and most of the studies in Chapter Two that focused on academic achievement or student engagement made use of technology in their interventions, indicating that it is one way to incorporate UDL (Basham et al., 2010; Browder et al., 2008; Coyne et al., 2012; Dolan et al., 2005; Friesen et al., 2008; Kennedy et al., 2014; Kortering et al., 2008; McPherson, 2009; Proctor et al. 2011; Rappolt-Schlichtmann et al., 2013).

Students were identified as a local factor, with emergent themes focused on student engagement and student choice. All teachers in the focus group interview stated that without a doubt, students were more engaged in learning when taught lessons that incorporated UDL principles, compared to more direct teaching style lessons. A discussion in the teacher focus
group centered on how UDL allowed students that may not be successful in more traditional
learning environments to successfully communicate their knowledge in multiple ways. The focus
group participants also stated that students enjoyed having the choice when learning: Karissa
stated,

They get really excited about using different technology… and not doing paper-pencil
activities… they choose technology, and it’s just more fun. And frankly, we are flying
through the material when we are using this structure.

Krista shared, “My students are engaged. You can tell they are engaged, they love what they are
doing.” In the classroom observations, it was clear that the students were engaged in their
learning and there were no behavioral problems observed in any of the lessons. Students were
also engaged when working collaboratively with their peers, and the absence of any behavioral
issues was remarkable in all lessons observed.

The increased engagement of students using technology has been reported in the
literature, although the link to academic achievement is based in how the technology is used in
learning activities (Alsafran & Brown, 2012; Fedisson & Braidic, 2007; Kirschner & Karpinski,
2010; Lei & Zhao, 2007; Shapley et al., 2011). In regards to the students enjoying the option to
work with their peers collaboratively, research has also shown that this can be beneficial to
student learning (Andriessen, 2006; Mullins et al., 2011; Osman et al., 2011; Phipps et al., 2001;
Veerman & Veldhuis-Diermanse, 2006). This aligns with Csikszentmihalyi’s (1975; 1990) idea
of Flow, where a learner is provided with just the right amount of support in order to be
challenged and therefore engaged in learning. Making the link to UDL principles, it is possible
that the multiple means of representation, expression, and engagement provide students with
enough support (or challenge, for that matter) that they find the learning activities neither too

hard nor too easy, and they can more easily engage in their learning activities. UDL studies have shown that students’ engagement is increased in lessons utilizing the UDL framework (Abell et al., 2011; Basham et al., 2010; Katz, 2013; 2015a; 2015b; Kortering et al., 2008; McPherson, 2009; Schelly et al., 2011).

**External factors.** For this study, the main source of external factors came from the documentation analysed that was identified through the school administrator and the district administrators, as the documentation sets the direction of education for students within the entire district.

In regards to success for all students in one education system as a local factor, Brigid shared that the school district in question is committed to inclusive learning and the success for all students:

Inclusive learning is the unit that provides the support to our schools for students that need additional support needs … how do we make good quality programming to serve all students…Our team is responsible to help schools to be able to design the environment to support all children.

In her role in putting supports in place to help all students be successful, she indicated that because schools are in such different places, it can be difficult to create learning environments that support all. The district will not mandate any particular intervention, which means that the schools themselves need to evaluate which intervention will work best for them.

The documentation analyzed repeatedly expressed that creating a learning environment for all students to be successful is paramount: “…founded on the belief that all children can learn and reach their full potential given opportunity, effective teacher, and appropriate resources” (Edmonton Public School Board, n.d., p. 3). The district took an approach that encouraged
educators to provide universal supports for all students, targeted interventions for students that may need more support, and specialized interventions for students that have the highest levels of need to be successful (Edmonton Public School Board, n.d.), and stated “…a Universal Design for Learning approach is inherent” (Edmonton Public School Board, n.d., p. 6). Despite Brigid saying that the school district will not mandate any specific interventions, this citation shows that indeed UDL is important in this district to providing all students with environments conducive to learning and success.

Research has indicated that the district has an important role to play in school improvement (Leithwood & Louis, 2012). In this case, the message that the district schools have a place for every student in the inclusive classroom and that all students must reach their full potential was evident in discussions with the administrator of the school and the teacher participants. However, the role that this particular district has to play in the implementation of UDL is unclear, because even though the pressure is there for all students to be successful, it is not clear the steps that have to be taken to ensure student success for all. This may indicate an area of future research.

In regards to professional development/training/coaching, time, and resources, although they are undoubtedly local factors, they also represent external factors because the district plays a role in allowing these things to take place. In interviews, teachers stated repeatedly that time and professional development was necessary to implement UDL, along with the availability of high-quality resources. If the district were to devote more funding to staff professional development and school acquisition of resources, school leaders could perhaps create release time for teachers, provide more professional development, and allow for the purchase of resources. Leithwood and Louis (2012) claimed that the district can play a role in student success
through creating district policies that promote the engagement of community, through instilling confidence in their principals, through a coordinated approach to succession, and using data to make informed policy choices. In addition, it should be mentioned that systemic changes that are preventing teachers from feeling as if they can incorporate UDL (such as pressure to perform well on provincial assessments and getting through curriculum) should be addressed, if not at the district level, then at the provincial level. Although the documentation analyzed in this study did in fact address these areas in their policy frameworks, this is an area that could be explored further in future research.

**Characteristics of change.** In regards to the practicality of UDL and how difficult it is to implement, Jane, Brigid, and Randi were of the mind that UDL is “just good teaching” (Brigid) and that the framework itself is necessary and practical when creating a learning environment that is conducive for learning for all (Jane and Randi). Karissa’s opinion of the practicality of UDL was also optimistic, as she stated that UDL is both essential and practical in most situations.

These participants stated repeatedly that addressing diverse student needs is necessary in the inclusive classroom, and that UDL can be a useful framework to help do that. However, Edyburn (n.d.) argued that UDL is not as simple as “good teaching”. Certainly, using the UDL framework can help create a learning environment that allows students flexibility in engagement, expression, and representation, and studies have shown that there is promise for UDL to be effective in increasing academic engagement and academic success for students of differing ability (Abell et al., 2011; Basham et al., 2010; Browder et al., 2008; Coyne et al., 2012; Dolan et al., 2005; Friesen et al., 2008; Katz, 2013; 2015a; 2015b; Kennedy et al., 2014; King-Sears et al., 2014; Kortering et al., 2008; Lieber et al., 2008; Marino, 2009; Metcalf et al., 2009; Niedo et al.,
2014; Proctor et al., 2011; Rappolt-Schlichtmann et al., 2013; Schelly et al., 2011). Care must be taken, however, when disseminating this information because it may not come as naturally to some teachers as others; in fact, being a master teacher may not be enough, as using an innovative framework does carry risk. What if the framework does not work? What if students do not perform better academically? Perhaps the level of comfort teachers have with taking risk also plays a role. For example, would a novice teacher, concerned with simply getting through the curriculum, be less likely to take the risk of implementing UDL (such as Katy)? Perhaps the programs of study have become more like a list of information for teachers to convey to their students, rather than concepts with teachers to design learning activities that link information together from many disciplines. This indicates an area of future research.

Other, conflicting opinions were shared by the teachers in regards to the practicality of UDL. Katy stated:

I think it’s a good framework…in a specific situation…[it’s] practical, but you have to have certain things in place…I definitely think there are times when it’s not practical, like if you have a massive class and you have to correct all the projects, and you don’t have the time…I try to incorporate it into my teaching but there’s a limit to it, there’s a limit to its practicality in the current constraints of our system, when I have 20-whatever children, and I have these outcomes to measure, and I have this little amount of time I can do it, but I have no assistants so I can only do it to a certain point.

Matt agreed:

I think there’s some practical sides to it, but when you look at curriculum, how charged, how full it is of things to do…well I think I’ve been doing UDL my whole teaching career. I think I’ve tried to bring it down to the point where I’ve said, “how can I help
you express your understanding”, but I think it becomes ridiculous and absurd when we are forced to do something with a lot of kids that don’t need it.

Although these teachers seem to agree that UDL can be practical in certain contexts, it appears that other pressures influence their decision whether or not to use it. It was also interesting that although teachers raised concerns about its practicality and usefulness in the classroom, they also appeared to believe that they were using it “naturally”, as when Matt said he has been doing it “his whole teaching career”. Jane stated: “I’ve been doing it my whole life… Sometimes UDL is so subtle that you are doing it and you don’t know you’re doing it… I think it’s instinct.” Katy, as a more recent graduate from her education program, shared “…my mindset going into it [education] was UDL” and Corinne said “I think it comes back to darn good teaching.” Karissa explained, “…[UDL] is what I do every day!” The teachers, although they stated that incorporating UDL may only be practical in certain contexts, also feel that using the framework for them is natural and instinctual.

It is important to note here that during several occasions, UDL was discussed as being “natural” and that teachers are doing it without realizing it. Using the UDL framework was likened to being “just good teaching”. There appears to be a disconnect between findings, because participants would discuss how they could implement UDL “by instinct” and yet they still felt unsure at times of what using UDL meant in regards to their own teaching practices, or that it was not practical, despite their own comments regarding how students found learning more interesting with UDL than with direct-style lessons. Furthermore, despite many years of implementing UDL, it was still determined that teachers need more time, coaching, technology, and resources in order to continue to support their implementation efforts of UDL, which is contradictory to their statements that UDL is natural and instinctual. There appears to be a false
dichotomy between “direct teaching” and “UDL” that could be explored further. Perhaps what is lacking is a deep understanding of what the UDL framework means.

How can a deep understanding of the UDL framework take place? The uniform response from schools to creating a deep understanding and creating a lasting change in practice is more professional development. Guskey (1995) stated, “every modern proposal to reform, restructure, or transform schools emphasizes professional development as a primary vehicle in efforts to bring about needed change” (p. 1). Gulamhussein (2013) and Yoon et al. (2007) put forward some ideas regarding effective professional development that align with Guskey’s (1995) and Joyce and Showers’ (1988; 2002) work: sufficient duration (upwards of 50 hours, in some cases), ongoing support during implementation, active engagement in implementation (rather than theory-based workshops), modeling of the practice, and discipline-specific training. Perhaps through providing professional development in this way, teacher attitudes could be changed, but there may be more systemic problems that need to be addressed in the school (e.g., amount of curriculum to teach, provincial exams) before teachers are ready to commit to implementing the UDL framework. What this would look like in regards to UDL itself, however, is unclear, as the UDL framework is unique in the way that it will look different in different contexts. Simply reviewing the principles may be inadequate, as participants stated that they would prefer to have support in their own classrooms for their own individual implementation of UDL. This indicates an area of future research.

Challenges That Influence the Implementation of the UDL Framework

The challenges that influenced the implementation of the UDL framework related to local factors included leadership, time, teacher beliefs, resources, and student factors. Systemic factors are also addressed. The challenges related to external factors included availability of funding and
the amount of curriculum to teach. Characteristics of change included whether or not UDL is necessary.

**Local factors.** Leadership is second only to the classroom teacher as an effect on student achievement (Leithwood & Louis, 2012). Leadership emerged as a factor when looking at the challenges surrounding the implementation of the UDL framework. Brigid shared:

… one of the challenges is a change in administrator leadership. And if the innovation is too early in its implementation, you will get slippage. And you will get loss, traction that you have been moving for. So I think the administration is very important…you have to find your early adopters and coach them and work with them and support them, and create the space for those who are a little more frightened by it…

Levin (2012) stated that “the reality is that most schools have been inundated with change” (p. 64). Over time, studies that implemented change had pessimistic results because the changes were never really brought into effect, they did not last long enough for results to emerge, or they did not cause improvements for students (Levin, 2012). Effective leadership can help remedy these problems, by providing support for practitioners and setting the expectation for teachers to implement, although this comes with the need to balance the need for change with the ongoing functioning of the school (Levin, 2012). In addition, Levin (2012) explained that individuals expect leaders to be perfect, which is unrealistic; and while many publications have outlined effective leadership strategies, contextual elements can make certain aspects more essential than others. Although commenting on what leaders can do to effectively implement the UDL framework is beyond the scope of this study, it indicates an area of future study.

In regards to time as a local factor, it was determined that time would be needed for teachers to collaborate and plan. Brigid shared, “[t]ime’s a big factor, if you don’t give the time,
that’s a barrier…using your staff meetings effectively… professional communities of teachers communicating.” This idea also relates to leadership and the decisions the leader makes in regards to prioritizing initiatives within the school. The leader, if he or she expects teachers to make lasting changes, must provide the resources necessary (such as time) to staff members, much in the same way teachers would provide support for students if they needed them to learn. Robinson (2011) stated, “…direct involvement in professional learning enables leaders to learn in detail about the challenges the learning presents and the conditions teachers require to succeed” (p. 105). If the challenges outlined by teachers are to be addressed, the leadership within the school will likely have to take on an active role of reducing the barriers, such as time. Jane stated that although collaboration time was available in the school, it was not always devoted to UDL-specific activities, as there were other priorities that had to be addressed, which may indicate systemic barriers such as reducing curricular demands or decreasing emphasis on provincial exam results. In relation to time, she also shared that some teachers may not agree with using UDL:

… some teachers that don’t believe in it…who’ve taught it the same way their whole lives, so they’ll continue to teach it the same way, so when they take baby steps, those teachers are still taking baby steps after several years, people seem to think it takes more time, and so they are saying they don’t have time to do it, but I think the biggest challenge is the collaboration among staff, is having that time to actually talk and create UDL-type lessons. I think we don’t have the gift of time anymore.

This idea can be related to leadership aspects of change in schools. Teachers cannot be expected to make any kind of lasting change without having the time to do so, as was repeatedly voiced by the teachers, the administrator, and the district administrators. All of the teachers in the
focus group (Matt, Corinne, Katy, Karissa, and Krista) and the teachers observed (Katy, Karissa, and Krista) said that time was essential to implementing UDL: time to plan, time to work with others, time to create lessons and materials that could be used in teaching and learning activities. Time to explore the resources and software currently in the school was also seen as beneficial to the teachers, as there were some software programs that were not being used because the teachers had yet to have the time to learn how to use them. Karissa explained:

Not every subject is gonna get a UDL treatment…I’m missing out on some know-how, how to assess different types of learning or even just missing out on some suggestions to suggest to kids…without a lot of collaboration time it’s just not realistic.

Hatley (2011), in her doctoral dissertation analyzing the perceptions of teachers using UDL through the Concerns Based Adoption Model, found that teachers were also concerned with time. The teachers in Hatley’s (2011) study had no time for collaboration, although as their comfort with using UDL increased the teachers eventually came together more often to collaborate, so it is possible that those teachers found the time within their own schedules to commit to UDL. Ellsworth (2000) stated that time is vital in educational change, and that schools providing “company time” to collaborate are supportive of teachers.

Although it may be difficult to provide educators with more release time to work on their UDL implementation, time is an important barrier of implementation for these teachers. Robinson (2011) stated,

When professional development challenges teachers’ existing practice and understandings, it may take time for teachers to understand the difference between their current and proposed practice, to develop the pedagogical content knowledge that
supports the new practices, and, finally, to become comfortable with using them in their own classrooms (p. 113-114).

Robinson (2011) explained that decisions about how long to provide the time depends on monitoring the impact of the innovation on the target audience, in this case, the students. It was clear in the student focus groups that learning in a UDL-based classroom was more engaging and allowed most students more opportunity to show their learning; yet these results may not have been communicated to the other teachers using UDL, so the effectiveness of UDL may not be highlighted for teachers. If more communication and more time were devoted to honing the skills needed to implement UDL, teachers may have more opportunity to share their successes and therefore be encouraged to continue to implement UDL. However, as in Hatley’s (2011) study, teachers may find time to come together more often if they found the value of incorporating UDL to be convincing enough to change their practice, which aligns with Guskey’s (1986; 1995; 2002) Model of Teacher Change.

In regards to student factors, Katy shared:

… if you give the students a project and options for it, [you need] scaffolding so that each student is trained how to show their work in that specific way, otherwise it gets lost… encouraging kids to pick something they might be good at…and most of the kids would end up picking the same thing, whichever was less work.

Karissa experienced the same issues when providing students with flexible options. She explained that she recognized that students would need to have “play time” with the technology before she could expect them to use it effectively, and as such, she build in time for them to explore the technology.
It would appear that for these teachers, using UDL was simply not effective to use for all teaching objectives, and that certain subject matters was more effectively taught using direct, teacher-centered methods, in order to save classroom time; for example, teaching the extra concepts associated with using different technologies takes far longer than having students complete traditional assessments. Students did not always make the “right” choice when choosing how to present what they learned, or how to find out the answers to their questions. Students also sometimes chose “the easy way” to present their findings, rather than pushing themselves to complete high-quality work.

Why, however, did these educators feel that teaching the extra skills necessary was not efficient? Why did they feel that students were making poor choices? It may be that these teachers are experiencing a desire to balance their innovative practices with “tried-and-true”, teacher-centered ways of teaching that have been in use for over a century (Levin, 2012). This institutional style of teaching, while useful 100 years ago when training students to become factory workers, may no longer be appropriate for students today who are 21st-century learners (Levin, 2012). In addition, the policy documentation published by the school board of this study repeatedly stated that all students must reach their full potential, and that UDL is a useful way to approach differing student needs (Edmonton Public School Board, 2013). The question remains, where is the disconnect between the policy directives and teacher attitudes or perspectives in regards to UDL? This may indicate an area of future research.

**External factors.** One of the external factors was determined to be funding. In regards to sustained funding, Randi shared:

[In regards to UDL implementation]…probably funding…class size, lack of support for EAs [educational assistants] and teachers in terms of some of the complex kids they have
to work with. I think that the consultative model isn’t effective, so unless we have a team of people that can support a team of schools moving forward, I’m not seeing a whole lot of change.

Jane stated that at the school level, “Money definitely advances UDL….if you can get the finances to support these kinds of projects, for release time, for resources.”

Implementing change in schools cannot be done without providing the resources necessary to create change (Levin, 2012). Through the appropriate allocation of resources from the school district, this challenge could be addressed. In regards to curricular content as a local factor, it would appear that the amount of information required to teach in the curriculum was a barrier and affected decisions in regards to using class time effectively. Katy shared,

One of the big challenges is the amount we have to teach in the new curriculum. I think in grade six there’s a ton of outcomes, and when I want to do a project, and actually show them, guide them how to do all these choices, taking the time to go through that, there’s no way I could get through my curriculum. Either I teach everything, or skip over it.

Matt shared the same idea, stating that getting through the curriculum was essential and that “sticking to the basics” was important. Matt further explained that for him, “the basics” entailed being able to read, write, and demonstrate the mastery of curricular outcomes through the completion of assignments and evaluations. However, the policy directives for this school board, in addition to the perspectives shared by district administration and the school administrator, as well as the teachers themselves, stated that a priority was to create learning environments in which each child is able to flourish. There appears to be conflicting responses in regards to what entails “student success” theoretically and actually creating those learning environments in the classroom.
These teachers saw that teaching with the UDL framework involved too much time in the classroom, where the minutes could be better spent teaching in a more direct manner, especially when there were provincial exams to be responsible for (Katy); they saw student achievement and the UDL framework at odds with each other. Perhaps these teachers were missing vital information in regards to student learning and engagement: student engagement is linked to student achievement (Finn & Zimmer, 2012; Parsons & Taylor, 2011; Taylor & Parsons, 2011), and teachers themselves (along with the classroom observations) stated that students were very engaged in their UDL-based learning activities. This finding may indicate that sharing information such as this may alleviate this challenge.

**Characteristics of change.** In regards to challenges, only teachers stated that characteristics of change posed a barrier, in regards to whether or not it was really necessary. The main challenge in regards to the characteristics of UDL was shared by Matt. He stated,

> I look and think to myself, UDL? Why don’t we just get through the basic objectives? …I use differentiation, I help them obtain the objectives, but they have to learn how to read, write, speak, and visualize. Those are the sorts of things we have to do, we have to stick to the basics. I’m not really interested in the rest, I’m interested in are these kids making progress, how do I get them there, what is really in their bests interests. New theory does nothing for me.

It is clear from this quote that Matt is committed to helping all of his students reach their full potential. In Guskey’s (1986) Model of Teacher Change, Guskey states that before teachers can start changing their attitudes in regards to an innovation, they must see that it affects student learning in a positive manner. One of the advantages of professional collaboration is the sharing of successes between teachers (Joyce & Showers, 1988; 2002); perhaps a more effective sharing
of experiences between teachers would illustrate the successes of using the UDL framework in teaching.

Factors That Support the Sustained Integration of the UDL Framework

In order for UDL to be sustained as an innovation, local factors that supported the UDL framework included time, resources, and professional development. External factors included availability of funding and professional development. Characteristics of change focused on the complexity of UDL.

**Local factors.** In regards to time, Jane shared, “I think we would need to give them time…where it’s not being done after school…we have to find release time for teachers to sit down together to work on it because otherwise it doesn’t happen.” This finding is important when expecting teachers to implement UDL, even years after its initiation. Researchers have shown that ongoing support is required when expecting teachers to change their practice (Fullan & Hargreaves, 1992; Guskey, 1986; 2002; Joyce & Calhoun, 2010; Joyce & Showers, 1988; 2002; Yoon et al., 2007), and this administrator’s comment aligns with their findings. Corinna stated,

…what are [the] fundamental…guiding blocks that will make it so my kids will make it next year? …If I have 30 kids this year, what do I have to do to those are decisions I have to make…we need time.

Karissa, Katy, Corinna, and Krista shared similar conditions they would need in order to continue to implement UDL. The conditions focused on time (“An extra three hours a day”, said Karissa), training in regards to UDL and technology to help implement UDL, and collaboration time with colleagues.
The need for time for these teachers comes through loud and clear. Even though UDL has been in place since 2012 at the school, time was still seen as a future element of success for educators to continue to use UDL. Research that addressed UDL implementation has supported this finding, but all of the studies have focused on either the initiation phases of UDL (Hatley, 2011; Muller & Tschantz, 2003) or were theoretical (BC Ministry of Education, 2010; Nelson & Basham, 2014; Rose & Meyer, 2002). Clearly, according to the participants, the need for time is a continuing factor. It should be explored, however, what amount of time would be necessary for teachers to feel like they had enough; perhaps examining more successful UDL implementations would be beneficial, in order to see what other educators are doing in their own classrooms. This indicates an area of future research.

In regards to resources as a local factor, Krista expressed, “I think technology. A lot of UDL does involve tech…A lot of what we do requires money. If we don’t have the money, it’s hard to offer the quality we like.” These findings are supported in the literature, and Levin (2012) stated that if a change is going to take place in any sustained manner within a school, the appropriate allocation of resources is a requirement.

In regards to professional development, it was again deemed as an important local factor. Karissa shared that “[p]roviding models for teachers to follow so they don’t need to re-invent their methods…guidance and encouragement on how they can further diversify their teaching.” While conceptual professional development is undoubtedly important, it was found that actual implementation of UDL can be difficult to accomplish in a classroom. This finding was corroborated by Hatley (2011).

**External factors.** In regards to professional development, district administrators stated that professional development was essential, especially following the dissemination of the UDL
principles: once the theoretical part of UDL was established, it was important to provide feedback and coaching on how to use UDL more effectively. In addition, continued professional development sessions were identified as important for teachers to continue to review the different ways that UDL can help meet student needs. Brigid shared,

>I think we do have to find other means to ramp it up, you can’t just use your three PD [professional development] days in a year. We had the luxury of giving this group fairly intense training [a group sent to University training]. So how do we give that increased opportunity to schools? We have seven or eight sites that I know of that are strongly immersed…I’d love to see our own district do a summer institute or intense training.

Levin (2012) stated that effective collective processes for educators to continue to improve their practices are essential in organizations that are hoping to make lasting change. It would appear that Brigid is on the right track in organizing this kind of support district wide, but creating that kind of infrastructure on a district scale would pose its own challenges.

In regards to funding, Randi shared: “You know, it seems everything boils down to funding.” Providing sustained funding is important because without funding, supports cannot be put into place. This ties into creating aligned, coherent, and supportive system policies and practices, with an emphasis on sustained funding (Levin, 2012).

**Characteristics of change.** Matt likened UDL to “discovery learning”, which he explained was when students are left to their own devices to learn curriculum through different ways. He expressed that he would prefer to use methods that created high expectations for students:

>I am not a discovery learner … we are not training kids to be autonomous…I think we are caving in too quickly to this new fad…I question if kids are becoming better writers
and spellers. There has to be a lot of direct teaching to specific sorts of areas so that kids’ tool belt is prepared [for the future].

Previously, Matt said that he does use the UDL framework in some of his teaching, and he incorporates high expectations for all of his students. He said he was willing to provide different avenues of learning for students that he thought needed it, but that UDL runs the risk of allowing students flexibility that he did not see as necessary. Guskey (1986) stated that in order to change attitudes, teachers must see the positive effects of the intervention on their students. Matt shared “I think you would use it [UDL] when required to help kids say understand the concepts and express their ideas in a different way.” Yet he does not see the value in incorporating UDL more than occasionally. Levin (2012) stated that engagement and commitment to an innovation must take place in order to help increase its odds of successfully being implemented; perhaps more effort should be placed on creating that kind of commitment for educators.

**Diffusion of Innovations and the Change Process: The Big Picture**

In this study, I approached the phenomenon of change with the assumption that change can be understood and managed. Ellsworth (2000) wrote, “[t]he key to understanding and managing change successfully is to bring the diverse models together in a ‘toolbox’, rather than to select only one model. Doing so will equip the practitioner with a full set of specialized tools for managing change” (p. 15). It is with this theory in mind that the work of Rogers (2003) and Fullan (2007) can be brought together in an attempt to fully understand the change process at hand, so that perhaps recommendations can be made to manage the change process in such a way as to make it more successful in this context.

Both of these models are not without their drawbacks, however. Although Doi (Rogers, 2003) is a framework that can address the large-scale aspects of the change process, this study
was conducted over a short period of time, and therefore the level of detailed analysis completed was only in one of Rogers’ (2003) five stages of the Innovation-Decision Process, the Implementation phase. Although when looking at the implementation process over time, DoI could be helpful in guiding the decision-making units with steps to take to ensure that implementers are progressing appropriately, very little is explained in the Implementation phase in regards to how to support individuals throughout their change process (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004). Similarly, although Fullan’s (2007) change process has detailed factors that may affect individuals in his Implementation phase (local factors, external factors, and characteristics of change), little is mentioned about the big-picture process of implementation besides his Initiation phase (before Implementation) and his Continuation phase (after Implementation).

Taking Ellsworth’s (2000) approach of equipping a toolbox for interpretation, DoI (Rogers, 2003) was used to situate the study taking place in the big picture, and Fullan’s (2007) change process was used to guide the data collection appropriate to most fully capture the processes taking place for these individuals in the change process.

In this study, it was found that participants (teachers, school administrator, and district administrators) indeed voiced local factors, external factors, and characteristics of change as factors that supported the implementation of UDL, the challenges of implementing UDL, and as factors that would influence the implementation of UDL in the future.

In summary, local factors included leadership, time, resources, professional development, and student factors were important in their current implementation of UDL. Curriculum requirements were also seen as a barrier to implementing UDL. These factors were also seen as
posing challenges for the implementers of the innovation, and would need to be addressed in the future implementation of UDL.

External factors found to influence the implementation of UDL included funding and success for all students. These factors also posed as challenges when implementing UDL. In order to support the continued implementation of UDL, professional development and funding would have to be addressed.

In regards to the characteristics of change, it was found that while UDL can be difficult to implement, sometimes, it also comes naturally. Participants stated that UDL is practical in the way that it helps all students be successful. Future implementation may require a simplification of sorts of UDL, or a better dissemination of what UDL means in order to reduce the view that it is dichotomous with more teacher-centered methods.

The factors that influence the implementation of UDL at this time, years after the initial stage of implementing UDL, hinder the implementation process of UDL. Placing these findings in the larger picture of DoI (Rogers, 2003), these factors could potentially be addressed in earlier stages of DoI so that the implementers have fewer influencing factors in the later stages, which may create conditions conducive to a better implementation of UDL, and perhaps create better outcomes for students. Then as the users of the innovation pass to the Persuasion stage, where attitudes are generated about the innovation, participants may remain more open-minded.

The local factors could potentially be addressed in Rogers’ (2003) DoI stage in the Decision stage. This stage is concerned with weighing the relative advantages and disadvantages of using the innovation, and whether or not it is accepted (Rogers, 2003); the implementers at this stage that choose to adopt the innovation do so at different rates, from the early adopters to the laggards. At this stage, it would be essential for the early adopters to participate in
collaboration activities with other teachers in order to support each other in their implementation practices; this could potentially address the factors of time and professional development, if the school leadership team had them available. The leadership team could also provide additional support at this time, and be implemented in the events surrounding whether or not to accept the innovation. Providing resources at this time would be opportune as well, because the early adopters of the innovation could indicate what resources were needed, and as more individuals adopted the innovation, more information could be obtained to find out what was needed to make the implementation of the innovation a success.

Addressing the external factors through Rogers’ (2003) DoI would pose more of a challenge in this case, as the government bodies are driving forces that function outside of the school itself. Reducing or changing the emphasis of the amount of curriculum required to teach, reducing the emphasis on success on the provincial exams, providing sustained funding, and providing professional development would have to be addressed outside of Roger’s (2003) DoI.

The characteristics of change could potentially be addressed in Rogers’ (2003) Knowledge stage of DoI. The Knowledge stage of DoI is when the participant is first exposed to an innovation and gains information about how it functions. The participants of this study presented differing opinions in regards to what UDL was: practical, “natural”, “instinctive”, or difficult to implement and confusing to put into practice in the classroom. The conflicting responses indicated a certain level of confusion as to what the UDL framework could look like in the classroom. These themes could be addressed much earlier in the change process, so that stakeholders have a better idea of what implementing UDL means in the classroom.
Summary of the Discussion

This chapter presented the discussion of the findings that examined factors that influenced the Implementation phase of the UDL framework in teaching and learning within one urban school setting. The discussion focused on the factors that influenced UDL implementation, the challenges associated with the implementation, and the factors that supported the continued implementation of the UDL framework. The discussion made the links between current research surrounding UDL and was aligned with Fullan’s (2007) change process, with a further big-picture analysis of Roger’s (2003) DoI.

By bringing together Roger’s (2003) DoI and Fullan’s (2007) change process, a better understanding of the factors underlying the implementation of UDL has been established. As a result, recommendations can be made for future implementation efforts based on this organization of information. In the following chapter, a summary of the research findings and the implications for practice are addressed.
CHAPTER SIX: IMPLICATIONS, FUTURE RESEARCH, AND SUMMARY

This chapter presents the summary of research findings, the implications, and the future research directions.

Summary of Research Findings

Through the analysis of focus group interviews, individual interviews, documents, observations, and follow-up individual interviews, the research question and its sub-questions have been answered.

The factors that influence the current Implementation phase of the Universal Design for Learning (UDL) framework can be summarized as leadership, time, professional development, resources, student factors, success for all students in one education system, and the perceived difficulty of implementing UDL in the classroom context. The factors that pose challenges for the implementation of the UDL framework can be summarized as leadership, time, student factors, funding, the amount of curriculum to teach, and whether or not UDL is really necessary to implement in the classroom. The factors that could be required in order to sustain the implementation of the UDL framework can be summarized as providing time, resources, professional development, ensuring sustained funding, and reducing the complexity of UDL.

These findings are novel in the sense that research to date has not looked at the Implementation phase of UDL implementation in schools. The findings are corroborated in part in the research looking at sustaining change in schools (Guskey, 1986; Levin, 2008), effective professional development (Fullan & Hargreaves, 1992; Gulamhussein, 2013; Guskey, 1986; 2002; Joyce & Showers, 1988; 2002; Yoon et al., 2007), and leadership in schools (Leithwood & Louis, 2012), in addition to various suggestions put forward in the current UDL research base (Abell et al., 2011; Hatley, 2011; Katz, 2013; 2015).
In summary, the findings show that different stakeholders in education perceive the implementation of UDL in different ways, and therefore require different levels of support in regards to its successful implementation. Fullan’s (2007) local factors, external factors, and characteristics of change can be put into a larger context using Rogers’ theory of Diffusion of Innovations (DoI) (2003), which may indicate where these factors could be potentially addressed earlier in the implementation process in order to provide educational stakeholders with the support they need in order to effectively implement UDL.

**Implications for Practice**

The implications of these findings are situated at five levels in the education system. Educational researchers, district administrators, administrators, teachers (including myself), and the general public (including students) should have interest in these findings as they provide insight into the implementation of a novel framework in an urban learning context, which may be extended to other learning contexts.

Educational researchers could use these findings to gain a clearer picture of what the implementation of UDL looks like in the long term. Although UDL is a relatively new area of study in regards to its implementation (CAST, 2015), as it begins to take hold in more classrooms and more schools, and as more research is conducted indicating that it could be beneficial for learners, more must be known about how to support stakeholders in the implementation effort. In addition, this study provided valuable observational data in regards to what UDL looks like in the classroom, using Hatley’s (2011) observational checklist as a guide. This tool could be the base of more materials that help determine what UDL looks like in practice, in order to more effectively show educators how to put it in use.
District administrators could use these findings in their district planning in order to determine what they could do to make the implementation of UDL easier for teachers and administrators. Currently, funding uncertainties make any long-term processes difficult to put into place, and this problem could be addressed by creating a more sustainable funding model. The district could also use these findings to plan professional development initiatives that allow teachers time and access to expertise they need in order to feel successful when implementing UDL. In regards to addressing systemic barriers, the district could explore ways of reducing potential barriers in order to support schools in their UDL implementation.

Administrators could use these findings in their own annual planning in order to provide the supports that teachers need within their own schools to effectively implement UDL. They could engage teachers in discussions that allow teachers to express what they need, or they could arrange for differentiated professional development opportunities. They could arrange to use school meeting time in such a way that allows teachers to contribute and learn from each others’ experiences, and they could find ways to increase the amount of resources that teachers say they need.

Teachers could use these findings to learn from others that are also implementing UDL in the classroom. They could see what students had to say about learning with UDL, and perhaps begin to incorporate some of the elements that students appreciated the most in regards to UDL. Teachers could also use the information to have a better idea of what UDL looks like in the classroom, from teachers with varying capacities and experiences with implementing UDL. Teachers that are not willing to incorporate UDL could perhaps have a better understanding of why teachers that use UDL do so.
The general public, including students themselves, could use these findings to learn about student diversity and how schools are coming to terms with meeting all student needs in different ways. The study may help educate the general public about how technology can be used to leverage multiple means of flexibility, representation, and engagement for students. They may also benefit from seeing first-hand student accounts (through observations and focus group interviews) about how students like to learn.

Finally, this study has supported my teaching practice by reinforcing what I know about UDL from experience. I used UDL as a teaching framework in my own classroom and found that it was a useful way of planning proactively for learners of all ability, and that students were more fully engaged in their learning activities when compared to more direct styles of teaching. Through the dissemination of results, I will share what I have learned throughout this study and so that colleagues and educators may have a better idea of what to expect when implementing the UDL framework. In addition, this study has provided me with valuable insights regarding what teachers need to be successful when implementing UDL.

**Recommendations for Future Research**

The review of the findings and their relation to the existing body of literature has raised additional questions that can be used to guide the implementation of UDL in learning contexts. Further research should explore the following three areas: the role of leadership in UDL implementation, effective, long-term professional development for teachers implementing UDL, and the role of systemic pressures in UDL implementation.

**The role of leadership in UDL implementation.** Existing literature is clear that leadership plays an important role in student success, but research to date has not been focused on the role of leadership in UDL implementation. The following questions need to be further...
explored: What could principals do to help support their teachers in implementing UDL? What do principals currently do to support teachers that they could expand upon? Do the principals, in turn, require more support themselves in order to support their teaching staff? These questions could be addressed by interviewing principals in education about their experiences, successes, and challenges in implementing UDL.

Furthermore, these questions could be extended to what district personnel do in order to support UDL implementation: Levin (2008) stated that the district can play a role in school change, but to date the research has not been focused on the role of the district in UDL implementation. Districts may have supports in place, but are they sure that teachers are aware of their existence? Other questions could be addressed, such as: Is there a disconnect between district values and how to implement the reality of these values in schools? How does the district support change in schools, and what could be expanded upon to meet the school needs? Is there a disconnect between the policy documentation put forward by the district and teacher attitudes and/or perspectives regarding UDL? If a school board is truly committed to meeting student needs so that all students may be successful, could this message be more effectively communicated to teachers? The methodology of a case study could be used, for both principals and district leaders, because this is an emerging area of research (Merriam, 2009).

**Effective, long-term professional development for teachers implementing UDL.** It was clear from the results of this study that despite efforts to provide effective professional development to teachers, they still feel that they could benefit from more. That leads to the question, what does effective, long-term professional development look like for teachers implementing UDL? Design research methodology, based on existing studies focusing on effective professional development, could be used over the long-term in order to determine the
specific factors that may help teachers to feel confident in their implementation efforts and to provide them with the supports they need to effectively change their practice in order to meet student needs.

**Exploring the systemic factors that influence the implementation of UDL.** Systemic factors, such as the amount of curriculum required to teach, as well as the emphasis of performing well on provincial exams, could potentially be playing a role in the implementation of UDL. Could these systemic factors have a role in how teachers perceive their use of time in the classroom? Could these factors prevent teachers from taking risks (such as incorporating UDL in more of their teaching) that may benefit student learning? Would a reduction in systemic pressures help teachers be more comfortable with changing their practice? At what level would these systemic pressures need to be alleviated? Are the systemic pressures preventing teachers from seeing that UDL is a framework to be applied in all teaching contexts? Perhaps examining other contexts where UDL is being implemented would be beneficial, in order to determine what factors are in place that support schools implementing UDL.

There are many factors that come into play when expecting change to take place in a school, and these additional directions for future research could help in obtaining a clearer picture of the needs of educational stakeholders in schools that are experiencing change.

**Conclusion**

The purpose of this study was to gain insight into the implementation efforts of the UDL framework used in one school in urban Alberta. With the theoretical framework of DoI (Rogers, 2003) and a conceptual framework of Fullan’s (2007) change process, it was determined that local factors, external factors, and characteristics of change come into play for various stakeholders implementing UDL, and that these factors could potentially be addressed earlier on
in the implementation process in order to encourage a more streamlined implementation process. Although UDL could be a worthwhile framework that can help educators meet student needs, its effective implementation requires that these factors be addressed in the change process.
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Appendix: Instruments

Focus Group Questions

The focus group questions below are for different participant groups (Hatley, 2011).

1. The school district personnel responsible for supporting UDL implementation
   a. What factors influence the continued implementation of the UDL framework in teaching and learning within schools?
   b. What factors support the implementation of the UDL framework in teaching and learning within schools?
   c. What are the challenges that influence the implementation of the UDL framework in schools?
   d. What factors will be needed in the future to support the continued implementation of the UDL framework in schools?
   e. Is there anything else you want to share about the implementation of UDL?

2. School administrators
   a. What factors influence the continued implementation of the UDL framework in teaching and learning within schools?
   b. What factors support the implementation of the UDL framework in teaching and learning within schools?
   c. What are the challenges that influence the implementation of the UDL framework in schools?
   d. What factors will be needed in the future to support the continued implementation of the UDL framework in schools?
e. Please describe any specific changes that were required in administration before and during the continued implementation of the UDL framework?

f. How are teachers doing in regards to implementing UDL?

g. Are there supports in place for teachers to implement UDL?

h. How do you motivate staff to engage with UDL?

i. Have you noticed any changes in staff since UDL has been implemented? What kinds of changes?

j. Have you noticed any changes in students since implementing UDL? What kinds?

k. Have you noticed any changes in teaching since implementing UDL? What kinds?

l. Have you noticed any changes in learning since implementing UDL? What kinds?

m. Is there anything else you want to share about the implementation of UDL?

3. Teachers

a. What factors influence the continued implementation of the UDL framework in teaching and learning within schools?

b. What factors support the implementation of the UDL framework in teaching and learning within schools?

c. What are the challenges that influence the implementation of the UDL framework in schools?

d. What factors will be needed in the future to support the continued implementation of the UDL framework in schools?

e. Have you noticed any changes in students since implementing UDL? What kinds?
f. Have you noticed any changes in your teaching since implementing UDL? What kinds?

g. Have you noticed any changes in learning since implementing UDL? What kinds?

h. Is there anything else you want to share about the implementation of UDL?

4. Students

a. What types of activities do you enjoy most in class?

b. Which of these activities help you to learn? And why?

c. How much choice do you have in selecting different types of learning activities?

d. What types of resources do you use regularly?

e. How often do you use a range of technologies in your learning?

f. How do you show what you have learned to your teacher?

g. Describe the types of activities you dislike the most in class.

h. Is there anything else you would like to share about your learning experiences?
Follow-up Individual Interview Questions

The individual interview questions for the expert, experienced, and novice UDL teachers are listed below (Hatley, 2011).

1. How has UDL affected your lesson planning or activity planning?
2. How has UDL affected how you present lessons or activities?
3. How has UDL affected how students are engaged with the lessons or activities?
4. How has UDL affected student learning?
5. What successes have you encountered during the implementation of UDL?
6. What challenges have presented themselves during your implementation of UDL?
7. What changes have you seen (that have taken place) during the implementation of UDL?
8. What are your personal perceptions of UDL?
9. Looking at the ‘big picture’ – how are things going for you right now in regards to UDL?
10. In order to be successful in the future with implementing UDL, what do you think you will need?
11. Is there anything else you would like to share with me?
**Observation Checklist**

The observation checklist is below based on the guidelines put forward by CAST (2015) and Hatley (2011, p. 183).

<table>
<thead>
<tr>
<th>UDL Observation Checklist</th>
<th>Teacher: Class number:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. Provide multiple means of representation</strong></td>
<td></td>
</tr>
<tr>
<td>1.0 Provide options for perception</td>
<td>Evidence/Artifact</td>
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<tr>
<td>1.1 Offer ways of customizing the display of information</td>
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<tr>
<td>1.2 Offer alternatives for auditory information</td>
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<tr>
<td>1.3 Offer alternatives for visual information</td>
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<tr>
<td>2.0: Provide options for language, mathematical expressions, and symbols</td>
<td>Evidence/Artifact</td>
</tr>
<tr>
<td>2.1 Clarify vocabulary and symbols</td>
<td></td>
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<tr>
<td>2.2 Clarify syntax and structure</td>
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<tr>
<td>2.3 Support decoding of text, mathematical notation, and symbols</td>
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<tr>
<td>2.4 Promote understanding across languages</td>
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<tr>
<td>2.5 Illustrate through multiple media</td>
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<tr>
<td>3: Provide options for comprehension</td>
<td>Evidence/Artifact</td>
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<tr>
<td>3.1 Activate or supply background knowledge</td>
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<tr>
<td>3.2. Highlight patterns, critical features, big ideas, and relationships</td>
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<tr>
<td>3.3 Guide information processing, visualization, and manipulation</td>
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<tr>
<td>3.4 Maximize transfer and generalization</td>
<td>(Number of evidence/artifacts present = operative level of UDL component)</td>
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<td>(Number of evidence/artifacts present = operative level of UDL component)</td>
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<td>0-3 = Not yet evident 4-6 = Emerging 7-9 = Intermediate 10-12 = Advanced</td>
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<td>(indicate level here)</td>
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<tr>
<td><strong>II. Provide multiple means of action and expression</strong></td>
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<tr>
<td>4: Provide options for physical action</td>
<td>Evidence/Artifact</td>
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<tr>
<td>4.1 Vary the methods for response and navigation</td>
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<tr>
<td>4.2 Optimize access to tools and assistive technologies</td>
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<tr>
<td>5: Provide options for expression and communication</td>
<td>Evidence/Artifact</td>
</tr>
<tr>
<td>5.1 Use multiple media for communication</td>
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<tr>
<td>5.2 Use multiple tools for construction and composition</td>
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<tr>
<td>5.3 Build fluencies with graduated levels of support for practice and performance</td>
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<tr>
<td>6: Provide options for executive functions</td>
<td>Evidence/Artifact</td>
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<tr>
<td>6.1 Guide appropriate goal-setting</td>
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<td>6.2 Support planning and strategy development</td>
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<td>6.3 Facilitate managing information and resources</td>
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<td>6.4 Enhance capacity for monitoring progress</td>
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<td>(Number of evidence/artifacts present = operative level of UDL component)</td>
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<td>0-2 = Not yet evident 3-5 = Emerging 6-8 = Intermediate 9-10 = Advanced</td>
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<tr>
<td><strong>III. Provide multiple means of engagement</strong></td>
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<td>7: Provide options for recruiting interest Evidence/Artifact</td>
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<tr>
<td>7.1 Optimize individual choice and autonomy</td>
<td></td>
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<tr>
<td>7.2 Optimize relevance, value, and authenticity</td>
<td></td>
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<tr>
<td>7.3 Minimize threats and distractions</td>
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<tr>
<td>8: Provide options for sustaining effort and persistence</td>
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<tr>
<td>8.1 Heighten salience of goals and objectives</td>
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<tr>
<td>8.2 Vary demands and resources to optimize challenge</td>
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<tr>
<td>8.3 Foster collaboration and community</td>
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<td>8.4 Increase mastery-oriented feedback</td>
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<tr>
<td>9: Provide options for self-regulation Evidence/Artifact</td>
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<tr>
<td>9.1 Promote expectations and beliefs that optimize motivation</td>
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<tr>
<td>9.2 Facilitate personal coping skills and strategies</td>
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<td>9.3 Develop self-assessment and reflection</td>
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<td>(Number of evidence/artifacts present = operative level of UDL</td>
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<tr>
<td>Advanced</td>
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<tr>
<td><strong>IV. Clear, defined curriculum – focused on mastery of standards</strong></td>
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<td>10. Clearly articulated goals and objectives Evidence/Artifact</td>
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<tr>
<td>10.1 Goals aligned with standards</td>
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<td>10.2 Goals/objectives written in measurable terms</td>
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<td>10.3 Scaffolds with customizable objectives for various learners</td>
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<td>10.4 Provides appropriate accommodations, supports, challenges</td>
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<td>10.5 Maintains high achievement/expectations for all</td>
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<tr>
<td>10.6 Reduces barriers</td>
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<td>10.7 Students can describe intended outcome</td>
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<td>10.8 Students can describe expected learning objectives</td>
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<td>(Number of evidence/artifacts present = operative level of UDL</td>
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<td>Advanced</td>
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<tr>
<td>11. Flexible Instructional Methods Evidence/Artifact</td>
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<tr>
<td>11.1 Provides flexibility in presentation /accessible information</td>
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<tr>
<td>11.2 Set high expectations</td>
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<tr>
<td>11.3 Background information/make connections to prior learning</td>
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<tr>
<td>11.4 Collaboration with team members</td>
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<tr>
<td>11.5 Varying levels of challenges</td>
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<td>11.6 Active student involvement with options for student choices</td>
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<td>11.7 Digital tool use imbedded in methodology</td>
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<td>12. Flexible Instructional Materials</td>
<td>Evidence/Artifact</td>
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<tr>
<td>12.1 Technology is available and functioning</td>
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<tr>
<td>12.2 Curriculum presented in digital format</td>
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<tr>
<td>12.3 Options for student feedback choice includes digital tools</td>
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<tr>
<td>12.4 Assistive technologies where needed</td>
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<tr>
<td>12.5 Model multiple examples</td>
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<tr>
<td>12.6 Reduces barriers</td>
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<tr>
<td>12.7 Model effective use of digital tools</td>
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<tr>
<td>12.8 Students recognize appropriate digital tools for objectives</td>
<td></td>
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<tr>
<td>(Number of evidence/artifacts present = operative level of UDL component)</td>
<td>(indicate level here)</td>
</tr>
<tr>
<td>0-2 = Not yet evident 3-4 = Emerging 5-6 = Intermediate 7-8 = Advanced</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>13. Standards-Based Assessments and Progress Monitoring</th>
<th>Evidence/Artifact</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.1 Assessments based on mastery of standard/non-competitive</td>
<td></td>
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<tr>
<td>13.2 Provide multiple ways student can demonstrate success</td>
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<tr>
<td>13.3 Provide frequent, ongoing, relevant feedback</td>
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<tr>
<td>13.4 Students are able to monitor their own progress</td>
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<tr>
<td>13.5 Provides feedback for future success</td>
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Other information