

Effects of Coaching on Universal Design for Learning  
Implementation

By

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## Abstract

This mixed methods study investigated the effects of instructional coaching as a single element of professional development on teachers' knowledge and application of the UDL framework. Participants were recruited from a district in the United States that adopted UDL as its instructional framework to guide decisions for instruction. Participants came from all levels of teaching (K-12), content areas, and years of experience. Treatment participants received instructional coaching on UDL implementation. Comparison participants continued as usual. Participants completed a pre/post questionnaire and had pre/post-observations conducted. A subgroup of treatment group participants were interviewed. The researcher hypothesized that the teachers receiving instructional coaching would show a larger growth in knowledge and observed application of the UDL framework than comparison teachers. While the results did not offer statistical significance, the results showed that teachers made gains in knowledge and application of UDL. Qualitative data revealed that teachers valued and changed practice from the use of coaching.

*Keywords:* coaching, professional development, Universal Design for Learning

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## Table of Contents

Abstract .....	iii
Acknowledgements .....	iv
Table of Contents .....	v
List of Tables .....	viii
List of Figures .....	ix
<a href="#">Chapter I: Introduction</a> .....	1
Coaching as Professional Development .....	2
Overview of the UDL Framework.....	4
Multiple Means of Engagement.....	5
Multiple Means of Representation.....	5
Multiple Means of Action and Expression.....	6
Professional Development and UDL Implementation.....	7
Rationale and Research Questions.....	8
<a href="#">Chapter II: Overview on the Literature of Coaching</a> .....	10
Introduction.....	10
Literature Search Procedures.....	11
Selection of Studies.....	12
Types of coaching.....	15
Common attributes of coaching.....	17
Coaching dosage .....	18
Effects of Coaching on Teachers' Practices.....	20
Measuring teacher results.....	20

Effects of coaching as isolated PD.....	21
Effects of coaching with PD on teacher practices.....	22
Conclusion .....	25
<a href="#">Chapter III: Method</a> .....	27
Rationale and Research Questions.....	27
Participants.....	27
Setting.....	28
Research Design.....	29
Universal Design for Learning Coaches.....	31
Intervention.....	31
Observations .....	36
Training .....	36
Feedback .....	38
Fidelity of Coaching Cycles.....	38
Measurements and Procedures.....	40
Questionnaire.....	40
Observations.....	42
Interviews.....	44
Data Analysis Procedures.....	45
Quantitative Analysis of UDL-IFT and UDL-UA Data .....	45
Qualitative Data Analysis and Coding Process.....	46
Hypotheses.....	47
<a href="#">Chapter IV: Results</a> .....	48

Quantitative Data Analyses.....	48
Impact on Teacher Knowledge Acquisition.....	48
Application of Universal Design for Learning.....	49
Observed Use of Universal Design for Learning.....	49
Teacher Interview Findings.....	52
Change and/or Improvement of Practices.....	53
Coaching as a Resource.....	56
Relational Aspects of Coaching.....	58
Overall Effectiveness of Coaching.....	60
Conclusion .....	62
<a href="#">Chapter V: Discussion</a> .....	63
Introduction.....	63
Implications.....	64
Limitations.....	67
Recommendations for Future Research.....	70
Conclusion .....	72
<a href="#">References</a> .....	73
Appendix A. Recruitment Email Flyer.....	84
Appendix B. Coaching Log Sample and Protocol .....	85
Appendix C. Universal Design for Learning – Understanding and Application Questionnaire ....	88
Appendix D. Teacher Interview Protocol and Questions .....	92
Appendix E. Participant Letter of Consent .....	94

## List of Tables

Table 1. Review of Coaching Studies.....	13
Table 2. Demographics of Study Participants.....	28
Table 3. UDL Coaches Experience and Assigned Participants.....	32
Table 4. Steps of Instructional Coaching Cycle .....	33
Table 5. Universal Design for Learning-Understanding and Application Questionnaire Results..	50

## List of Figures

Figure 1. Request for Educational Planning Form.....	35
Figure 2. Learning Environment Design Form.....	37
Figure 3. Coaching Log.....	39
Figure 4. Effectiveness of Coaching on Knowledge Acquisition of UDL.....	51
Figure 5. Effectiveness of Coaching on the Application of UDL.....	52
Figure 6. Effectiveness of Coaching on Observed Implementation of UDL.....	53

## Chapter I: Introduction

Classrooms of today contain a diverse population of students and projections show this trend continuing. Approximately 23% of students between the ages of 5-17 speak a different language other than English at home (Gargiulo & Bouck, 2020). Students with exceptionalities increasingly are part of the general education classroom (U.S. Department of Education, 2019). Efforts to include all learners, particularly those with identified disabilities, grows with the expectation that students on an Individualized Education Plan (IEP) will spend up to 80% of their instructional day in the general education setting (McLeskey et al., 2014). This diversity of learners in classrooms grows (Kena et al., 2014) and creates demands that teachers must address effectively. Teachers must alter instructional efforts to address the growing learner variability in general education classrooms and plan for additional student development (e.g., social emotional learning; Meyer et al., 2014; Barlow et al., 2014).

Professional development (PD) remains a primary method for educators to build and implement their repertoire of effective practices in the classroom (Fixsen et al., 2009). Increasingly, educators must be well-informed of the latest evidence-based practices and keenly aware of the needs of a diverse population. The variability of learners has increasingly changed to include a diverse range of abilities, cultural backgrounds, and family structures of varied socio-economic levels. Instructional planning for students' variability requires effective professional learning. Effective PD equips teachers with the understanding and skills to implement new practices and frameworks that can facilitate the supports required for the widest range of learners.

Additionally, effective PD expands teachers' abilities to successfully implement effective practices (Fixsen et al., 2009; Nugent et al., 2016; Lockwood et al., 2010). Research shows that

isolated PD (e.g., one-day trainings) creates limited learning and ineffectively shifts pedagogical practice (Darling-Hammond & Richardson, 2009). The body of PD literature reports that certain elements must be present in PD to be effective in the transfer and implementation of new practices. These elements include sustained duration, collaboration in job-embedded context, and ongoing support beyond the initial PD (Garet et al., 2001; Darling-Hammond et al., 2009; Darling-Hammond et al., 2017; Gillespie Rouse & Kiuahara et al., 2017). Research also indicates that students whose teachers participated in effective PD showed more academic improvement compared to students whose teachers did not participate in PD (Allen et al., 2011; Darling-Hammond et al., 2017)

### **Coaching as Professional Development**

Coaching acts as a sustained form of PD that provides ongoing and tailored attention to teachers' goals. Virtual coaching occurs by using various technology, but the more common, on-site coaching, relies on personal interactions that provide modeling, observations, and feedback to improve instructional practices. Coaching continues to be investigated as a potentially effective PD that supports the implementation of new practices. Numerous coaching models exist and have been shown to be effective (Johnson et al., 2018). However, coaching models are based on some common elements defined in earlier research (Showers & Joyce, 1996; McKenna & Walpole, 2010) that include observations, instruction/training, and feedback.

Results from PD that provided opportunities for teachers to collaborate with coaches found that students of teachers who participate in collaborative PD made greater gains through effective implementation of instructional practices (Roth et al., 2011). Coaching encourages collaboration, sustains the momentum of learning initially started with workshops or institutes,

increases knowledge that can lead to change, and improves teachers' instructional efficacy (Cantrell & Hughes, 2008).

Finding the most effective methods of training for teachers with demanding schedules leads the effort in teacher change (Garet et al., 2001; Guskey, 2002 ). Additionally, providing training in effective methods (e.g., evidence-based practices, frameworks) should be considered for subsequent student change to occur (Darling-Hammond et al., 2017). A number of educational frameworks (e.g., positive behavior interventions and supports) serve as ways to further plan for the growing needs of all learners. Frameworks serve a number of functions and can alter practices to the benefit of a variety of learners, particularly those with disabilities. The Universal Design for Learning (UDL) framework is gaining a significant amount of national and local attention. The UDL framework can serve as a support for teachers to include all students and the variability that they bring into the general education environment (Hitchcock et al., 2006; Meyer et al., 2014). UDL approaches teach all students, including those with disabilities, through intentional planning that allows a wide range of learners to experience appropriate levels of challenge (Meyer et al., 2014).

The UDL framework functions as a pedagogical road map to design goals, instruction, materials, assessments, and the physical environment with the least number of barriers. Thus, UDL can provide a more inclusive and equitable learning-rich experience (Hall et al., 2012; Cook & Rao, 2018). Researchers suggest teachers who design instruction using UDL will more likely broaden access to the curriculum for all students (Browder et al., 2008). A further introduction to the three principles and essential elements of UDL is offered below. The purpose is to illustrate how the framework, when applied, can further plan for and thus support the varied needs of the diverse learners who are increasingly served in our schools today. While the UDL

framework offers promise, a current challenge in its use is the limited level of implementation facing our schools today. Ways to facilitate changes in teacher practices and the inclusion of struggling students and their peers with disabilities are critical if teachers are to realize the application of UDL and realize its potential benefits in planning and designing for all learners.

### **An Overview of the UDL Framework**

UDL consists of three overarching principles that support learners by recognizing barriers to engagement, how information is presented, and how learners can show what they have learned. Identifying the barriers and addressing them with the use of the framework's guidelines and checkpoints, educators provide accessible and equitable learning for a wider range of learners. The principles take into account the differences or variability within and across learners (Meyer et al., 2014; Rose et al., 2013). Developed from findings in the cognitive neuroscience and learning sciences fields, UDL guides teachers in considering the evidence-based practices that will best support multi-dimensional learners in the general education classroom (Meyer et al., 2014). Also constructed with evidence that all learners learn albeit differently (Rose & Meyer, 2000; Rose et al., 2013), purposeful design and planning address multiple learners and their needs.

Although the field of neuroscience recognizes the complexity of the cognitive process, three broad networks have been identified to be activated when the cognitive process takes place (Rose & Strangman, 2007). First the recognition network assists learners in focusing on identifying patterns and understanding the world around them. Next the strategic network works to specialize planning and generating patterns to interact with what is perceived. Finally, the affective network determines what patterns are important as information is prioritized by the significance to the learner. The affective, recognition, and strategic networks share a

heterarchical relationship that provides top-to-bottom, bottom-to-top, and side-to-side order in the flow of information. This relationship carries through to the principles of UDL (i.e., multiple means of engagement, representation, action and expression) and the structure of the framework (Meyer et al, 2014). Understanding the nature of this relationship between principles and how they support learning affords teachers with the “why” of the implementation of this complex framework.

### ***Multiple Means of Engagement***

The principle of multiple means of engagement (<http://udlguidelines.cast.org/engagement>) supports the affective network during learning and focuses the teacher on meeting the emotional needs of their learners (e.g., coping skills). The principle provides three guidelines to lead teachers in implementing numerous ways to engage and motivate students. *Providing options to recruit interest* embeds multiple ways to engage students and create authentic and relevant lessons. *Providing options to sustain effort and persistence* assists learners in developing skills to nurture the drive to push through challenges. Finally, when *providing options to self-regulate*, teachers explicitly teach strategies and create opportunities for students to learn and use coping skills to better function in an inclusive learning environment. Designing with this principle strengthens the development of motivated and purposeful learners (CAST, 2018; Chita-Tegmark et al., 2012; Rose & Meyer, 2000).

### ***Multiple Means of Representation***

Another principle of UDL, multiple means of representation (<http://udlguidelines.cast.org/representation>), emphasizes the need to represent information in various ways to accommodate the various sensory and cognitive needs of learners. Information provided to learners needs to be flexible, clarified, and supported for individuals to appropriately

process and comprehend ideas and concepts. Teachers *providing options for perception* deliver methods and materials in different forms (e.g., visual, auditory, and tactile) and through multiple media. Teachers offering *options for language and symbols* give different ways to clarify vocabulary, mathematical expressions and symbols, and consider the understanding of languages with diverse students. Teachers considering the cultural diversity and/or limited background knowledge of their students *provide options for comprehension* and explicitly supply background information and tools to support the understanding of big ideas. Implementing this principle aids in the development of resourceful and knowledgeable learners (CAST, 2018; Chita-Tegmark et al., 2012; Rose & Meyer, 2000).

### ***Multiple Means of Action and Expression***

Teachers purposefully choose options for students to show their learning through the third principle of multiple means of action and expression (<http://udlguidelines.cast.org/action-expression>). This principle centers on the individual output of learning. Teachers provide learners with options to show evidence of understanding that includes offering multiple tools, choice of expression, and supporting executive functioning skills (e.g., organization, setting goals, sustained focused). Teachers guide learners in how to use multiple tools and respond in class in multiple ways by *providing options for physical action*. Teachers who *provide options for expression and communication* embed choices for students to show what they have learned in ways that are comfortable for the learner. Finally, teachers *providing options for executive functioning skills* implement strategies explicitly to assist learners in goal-setting, progress monitoring, and any required realignment to meet their goals. This principle promotes the development of strategic and goal-oriented learners (CAST, 2018; Chita-Tegmark et al., 2012; Rose & Meyer, 2000).

## **Professional Development and UDL Implementation**

The UDL framework requires a deep understanding for successful implementation. The list of school districts nationally implementing the framework continues to grow but at a slow pace (Ok et al., 2017). One explanation may be that the research on the framework's effectiveness with students with disabilities is too nascent to warrant the effort of its use for certain populations of students (e.g., significant support needs; Bateman et al., 2015). Although, the development of the framework is based on researched theory and practices (<http://udlguidelines.cast.org/more/research-evidence>) more exploration of the effects of UDL practices on the performance of students with low incidence disabilities needs to occur.

A limited number of studies have been conducted on PD and UDL implementation. Some evidence shows positive correlations between teachers trained on the UDL Framework and their ability to redesign instructional experiences. Smith Canter and colleagues (2017) studied a K–12 PD program targeting the increased use of the UDL framework with a focus on technology integration. Teachers participating in the treatment group of the study showed an increase in their understanding of UDL and integration of technology to implement the framework. Another K–12 study on the effects of a summer institute focused solely on increasing teachers' knowledge and aptitude with implementing UDL (Craig et al., 2019). Based on observations conducted during the school year, teachers attending the week-long PD showed significant improvement in their implementation of UDL in the classroom in a district where UDL is embedded in the culture.

Other studies provided descriptions of UDL implementation outside of the K–12 context. UDL training in undergraduate and graduate courses yielded improved lesson plans using the framework (Evmenova, 2018; Courey et al., 2013; Spooner et al., 2007). More options for

students were present in the UDL-aligned lesson plans in online and face-to-face environments. An increase in teaching strategies illustrated an increased understanding of the framework as teachers planned for a multiplicity of options to meet the needs of students.

These findings point to the potential UDL can have on teachers' use of inclusive practices for students with and without disabilities. Which methods most effectively train teachers in the use of the UDL framework? Traditional PD repeatedly has shown to have limited effects on teacher change. However, coaching as PD has emerged to provide teachers with the capacity to implement new practices. Coaching teachers in the use of the UDL framework has only appeared in one case study (Cunningham et al., 2017). Four UDL coaches worked with eight classroom teachers over the course of 18-months in a customized PD program of UDL coaching. Data showed that the use of UDL was commensurate with the teacher's willingness to use the framework. Interviews revealed that three of the teachers were resistant to using the framework. However, despite the resistance, the pre/post observation checklist showed an overall improvement in teachers' use of UDL. Additional research is warranted to determine the effects coaching has on the implementation of UDL.

### **Rationale and Research Questions**

UDL practices have the potential for ensuring the delivery of effective instruction in increasingly diverse classrooms, but many teachers remain unfamiliar with the UDL framework and practices. Studies of traditional professional development to promote UDL knowledge and practices show the potential of beneficial effects. Additionally, traditional PD (e.g., one-day workshops) that includes evidence-based components does not reliably change teacher practices (Darling-Hammond & Richardson, 2009). Coaching as a learning tool for teachers incorporates contextual factors and applied practice that is relevant to teachers' personal experience (Roth et

al., 2011). Therefore, this study investigated whether coaching improved teacher knowledge about and applications of UDL practices. The following research questions guided the study:

1. Do teachers who receive coaching have higher perceived knowledge about practices when compared to teachers who do not receive coaching?
2. Do teachers who receive coaching report using more practices when compared to teachers who do not receive coaching?
3. Do teachers who received coaching use more practices than teachers who did not receive coaching?
4. How do teachers who receive coaching about the UDL framework and practices describe their PD experiences?

These research questions will enable the researcher to discover the effectiveness of coaching as a means to further the implementation of UDL in K-12 classrooms.

## **Chapter II: An Overview of the Literature on Coaching**

Facilitating teacher development and pedagogical change is increasingly being supported through teacher coaching. Although a multitude of coaching models exist (e.g., instructional, peer, directive, content-focused), they all seek to support teacher development and expand on traditional professional development (e.g., workshops, trainings, institutes; Johnson et al., 2018). However, there appears to be no consensus on a single definition of coaching (Johnson et al., 2018; Pas et al., 2015). Instead, the literature includes various definitions ranging from specifically outlined steps in a process to an ambiguous description of one-to-one support. Earlier research defined coaching as “professional development (PD) conducted on site, using training, observations, and feedback to improve instructional training” (Showers & Joyce, 1996; McKenna & Walpole, 2010). Using this succinct definition of coaching allows for a common point of reference in examining literature on coaching practices in this review.

Growing in popularity over the last thirty years, coaching as training has increased in schools (Knight, 2009a). The No Child Left Behind Act of 2002 (NCLB) mandated PD and the development of highly qualified teachers. This brought traditional PD’s under scrutiny for its effectiveness. Educational programs mandated under NCLB (e.g., Reading First, Striving Readers) encouraged the use of coaching to further the effects of traditional PD for teacher improvement and student achievement (Nugent et al., 2016; Lockwood et al., 2010; Kraft et al., 2018). The Reading First Initiative through NCLB influenced the quality and amount of PD that elementary teachers received. Reading First suggested that coaching was a feasible way to provide sustained and effective PD to support teachers (Yoon et al., 2007; Denton & Hasbrouck, 2009; Carlisle & Berebitsky, 2011). When quality PD and coaching were combined, optimal changes in teacher instruction were shown to occur (Cotabish et al., 2013).

This chapter will examine coaching as a PD element to impact teachers' practices. The intent of this literature review is to better understand coaching as a means to facilitate changes in teachers' understanding of the proposed practice/intervention as well as their ability to integrate the practice/intervention within the confines of their classroom setting. This chapter will synthesize studies revealing what has been found in experimental and quasi-experimental designs on the effects of coaching on teachers' practices in general. Specific questions guiding this review of literature include: (a) what are common attributes of coaching across models in literature? (b) what effect does coaching have on teachers' practices when used alone or in conjunction with additional PD? and (c) what dosage of coaching emerged as the most effective for facilitating change in teachers' practices? This chapter has been structured into four sections in order to describe the procedures employed to search for and analyze the studies: (a) literature search procedures, (b) the selection of studies, (c) coaching reported, and (d) reported effects of teachers' practices after coaching.

### **Literature Search Procedures**

Electronic searches were conducted using ERIC, Academic Search Premier, PsychINFO, Google Scholar, and Professional Development Collection from 2002 to 2019. The following keyword combinations with Boolean operators (e.g., and, or) including truncated (\*) keywords for the purpose of narrowing the search results were used when searching the electronic databases: coach\*, coaching and teachers, coaching and frameworks, instructional coach\* and professional development, coach\* or professional learning and teacher improvement and K-12, coaching and teacher effectiveness and K-12, educational coach\* or coaching professional development, and coaching and implementation. Search limiters used included elementary and secondary education, English only, and the date range between 2002 and 2019.

## **Selection of Studies**

The purpose of this review was to discover studies that reported coaching interactions as the independent variable alone or with in-service PD (e.g., seminars, workshops, institutes). Studies needed to report the impact of coaching or focus on PD that included coaching as a key element; report the results of teachers' practices in the classroom based on the coaching; and use measurement tools that did not rely solely on teachers' self-reporting. Only experimental, quasi-experimental, qualitative, or single-subject design studies were included, because these designs allow for causal inference.

Studies needed to meet these additional criteria: (a) participants were classroom teachers who taught kindergarten through grade twelve, and (b) the study was conducted in the United States in the past ten years. Studies focusing on virtual coaching (e.g., Nugent et al., 2016; Vernon-Feagans et al., 2012) were excluded due to the working definition of coaching being used for this study limiting the practice to on-site PD. Other studies that were excluded focused on Pre-K, post-secondary education, and pre-service teachers. The author acknowledges the existence of grey literature (i.e., literature that is published outside of professional journals and is not subject to peer review) that has focused on UDL and professional development or coaching. However, the rigor of research methods in the grey literature varied greatly. Thus, only published peer-reviewed articles were included as they provide an assurance of academic rigor.

The initial searches resulted in over 200 studies. The author then conducted a thorough review of all abstracts, study designs, and result sections. This thorough analysis led to the conclusion that only 16 studies met the inclusionary and exclusionary criteria for this review. The 16 studies were coded to address the literature review questions and examine any additional themes that emerged (see Table 1). The areas coded for analysis included: (a) types of coaching,

**Table 1**  
**Review of Coaching Studies**

Article	Type	Training	Coaching Components			Teacher Results
			Observation	Training	Feedback	
Batt (2010)	Cognitive	—	√	—	—	Teacher self-reported an increase in knowledge and implementation. This increase was supported by observations.
Carlisle & Berebitsky (2011)	Literacy	—	√	√	—	Coached teachers spent significantly more time with small group phonics instruction than non-coached teachers.
Dudek, Reddy, Lekwa, Hua, & Fabiano (2019)	Classroom Strategies Model	1 full day workshop	√	√	√	Coached teachers did not show improvement with instructional strategies compared to the control group. However, they did significantly improve behavior management strategies.
Fabiano, Reddy, & Dudek (2018)	—	—	√	√	√	Coached teachers reported larger improvements in instructional practices than were observed. However, a large improvement for behavior management skills were reported and observed.
Garet et al. (2008)	—	8 seminar days, 5 onsite days	√	—	—	Teachers attending PD with coaching had higher overall scores than the control group. Coaching was not shown to have a significant effect beyond the PD.
Goodman, Brady, Duffy, Scott, & Pollard (2008)	“bug in ear”	—	√	√	√	Coached teacher showed improvement in learning units provided accurately per minute.
Johnson, Pas, Bradshaw, & Ialongo (2018)	Collaborative	—	√	√	√	Teachers who had coaches modeling the implementation of social-emotional games had a significant increase in the number and quality of games implemented.
Kretlow, Cooke, & Wood (2012)	Supervisory	—	√	√	√	All teachers use of Group Instructional Units (GIU) correctly increased after coaching.

Kretlow, Wood, & Cooke (2011)	Supervisory	—	✓	✓	✓	✓	30-45 min. session*	Graphical analysis showed post coaching improved GIU and was consistently high across teacher participants.
Matsumura, Garnier, Correnti, Junker, & DiPrima Bickel (2010)	Content-focused	3 days per month	✓	✓	—	—	Monthly sessions**	Coached teachers showed significant improvement in the quality of instruction.
Pas et al. (2015)	—	—	✓	✓	✓	Weekly all year**	—	A statistically significant difference existed in the number of minutes logged for coached teachers implementing social-emotional games with students.
Sailors & Price (2015)	Directive-Responsive Hybrid	3-day workshop	✓	✓	✓	2 sessions per month*	—	Coached teachers' number of intentional reading practices increased. They provided better explanations of reading strategies and offered more opportunities to engage than the control group.
Sailors & Price (2010)	Literacy	—	✓	✓	✓	5 hours	—	Teachers attending PD with coaching offered significantly more opportunities to provide intentional comprehension and reading strategies instruction.
Saraniero, Goldberg, & Hall (2014)	Content-focused	—	✓	✓	✓	25 hours	—	Teachers attending PD with coaching implemented more arts standards correctly and with greater frequency than the PD-only teachers.
Teemant (2014)	Instructional	—	✓	✓	✓	15 hours	—	Coached teachers scored significantly higher for each effective pedagogy standard and total score than the control group.
Teemant, Wink, & Tyra (2011)	Instructional	—	✓	✓	✓	7 sessions**	—	Overall use of five standards of effective pedagogy significantly increased during the coaching cycles.

NOTE: — = not reported or specified in the study, \* = number of sessions not reported, ✓ = component present in the coaching interaction, \*\* = number of minutes per session not reported.

(b) presence of coaching attributes as defined by Showers and Joyce (1996), (c) coaching dosage provided to teachers, (d) measurement tools, and (e) teacher results reported. In the section below, examination of each of these coded areas will be provided to further understand current coaching practices specific to change in teachers' practices.

### **Types of Coaching**

Numerous types of coaching were reported across the 16 studies. Although one particular model of coaching did not emerge from the literature as more prevalent, the four primary models included instructional (Teemant et al., 2011; Teemant, 2014), literacy (Carlisle & Berebitsky, 2011; Sailors & Price, 2010), supervisory (Kretlow et al., 2012; Kretlow et al., 2011) and content-focused coaching (Saraniero et al., 2014; Matsumura et al., 2010). Other types of coaching that appeared include cognitive, collaborative, a directive and responsive hybrid, and a classroom strategies model.

An examination of the models yielded some commonalities in how coaching was used across studies. First, literature defined instructional coaching as a partnership between the teacher and coach that focuses on classroom management, content, instruction, or assessment (Knight, 2009b; Teemant et al., 2011). For example, the four instructional coaches in two studies (Teemant et al., 2011; Teemant, 2014) assisted teachers on the use of a five-standards intervention and the fidelity of implementing the five standards during instruction. These coaches specialized in supporting the instructional needs of teachers. Literacy coaching (Sailors & Price, 2010; Carlisle & Berebitsky, 2011), on the other hand, centered on the improvement of teachers' instruction. Similar to the instructional coaches, literacy coaches sought to enhance teachers' practices in their classroom. The primary difference was that literacy coaches focused

only on aspects of literacy (e.g., phonics, comprehension) and did not broaden coaching support to include other instructional practices noted in the instructional coaching studies.

Similar to the literacy coach, content coaching offered teachers support in a specific area of instruction. For instance, Matsumura and colleagues (2010) identified the coaching in their study as content-focused. The content in their study included aspects of literacy as well as general classroom practices leading the authors to refer to *literacy coaching* and *content-focused coaching* interchangeably throughout the study. Further, Saraniero and colleagues (2014) described their coaching model as content-focused, and the coaching intervention focused on art integration into teachers' literacy instruction. While the terminology was again interchangeable, the primary focus of all the studies was to provide coaching to facilitate a change in teachers' classroom practices.

Another coaching model in literature that appears at the other end of the relational spectrum is supervisory coaching. While instructional coaching is collaborative, this model (Kretlow et al., 2011; Kretlow et al., 2012) has the coach in a more knowledgeable position as an expert in the coaching interaction. The supervisory coaches use modeling of instruction followed by observations to ensure teachers deliver the instruction correctly. This coaching type offers an imbalance of power in the coaching dynamic that is contrary to the goal of instructional, literacy, and content-based coaching. The constant in the supervisory approach is the coach as the expert and one that provides their expertise throughout the coaching cycle. An example of the supervisory approach is the "Bug in ear" (BIE) coaching model. Here, the coach takes on an expert role, giving teachers immediate feedback on instructional practices. This coaching type is often used with novice teachers who are developing their instructional skills.

## **Common Coaching Attributes**

The first question guiding this review asked what common attributes coaching models have. Despite the number of types, coaching models in the last decade revealed three common coaching components that reiterated earlier literature (Showers & Joyce, 1996; McKenna & Walpole, 2010). These components included observations, training, and feedback. Eleven of the studies reported coaches using all three components during the coaching interactions. All of the studies reported using observations. The numbers of observations varied across studies, but most served dual purposes. First, observations were used as a needs assessment (Teemant et al., 2011; Johnson et al., 2018) to gauge what level of implementation and skills teachers possessed before coaching interactions took place. The needs assessment observation served as the only observation to drive the coach's training and/or modeling. Secondly, coaches used multiple observations to measure the use of practices as part of the study to determine the fidelity of the implementation of tasks (Kretlow et al., 2011; Kretlow et al., 2012; Goodman et al., 2008).

Coaching interactions in 14 of the 16 studies featured a training component. Training often was in the form of modeling. Six studies reported coaches teaching a class to model a strategy or practice for the teacher. Coaches modeled literacy strategies in four studies (Matsumura et al., 2010; Sailors & Price, 2010; Carlisle & Berebitsky, 2011; Sailors & Price, 2015), social emotional strategies in two studies (Pas et al., 2015; Johnson et al., 2018), art standards in one study (Saraniero et al., 2014), and universal practices in one (Dudek et al., 2019). Training occurred in three studies and specifically targeted teachers' development of their expertise in instruction. Areas of training included recognizing units of learning (Goodman et al., 2008) and universal instructional strategies (Teemant et al., 2011; Teemant, 2014).

Feedback appeared as the third common component found in most of the coaching models. Goodman and colleagues (2008) reported immediate and delayed feedback as BIE coaching was used with teachers. Using earbuds and a two-way radio, coaches provided teachers with immediate prompts and feedback during instruction. Delayed feedback occurred as the coach and teacher conferenced after the lesson was completed. Reflective feedback occurred more frequently in four studies. This form of feedback allows the coach to guide the teacher in retrospection of areas of improvement and concerns. Sailors and Price (2010) used reflective feedback to assist teachers in increasing the use of reading comprehension strategies during instruction. Further, reflective feedback supported teachers coached in classroom organization (Teemant et al., 2011) and behavior management skills (Fabiano et al., 2018). Performance feedback provided instructional critiques or corrections to teachers in their ability to provide small group instruction (Kretlow et al., 2011), integrating the arts in reading instruction (Saraniero et al., 2014), and implementing social emotional programming (Pas et al., 2015). Finally, data-informed feedback supported teachers being coached in universal instructional and behavior management strategies. Student data collected informed the coach and teacher in the effectiveness of areas being coached and informed next steps in the coaching process. Overall, feedback provided teachers with important information from coaches aimed at improving practices.

### **Coaching Dosage**

Coaching dosage refers to the duration of a face-to-face meeting between the coach and teacher focusing on observations, training or modeling, and/or feedback (Norton et al., 2017). Dosage can be reported in individual units of meetings or the entire coaching intervention. Thirteen of the 16 studies reported the dosage of coaching in some form. However, reporting of

coaching dosage in this body of literature was inconsistent, reporting dosage in either number of total hours spent coaching or number of coaching sessions provided to a specific teacher.

When considering the amount of coaching or the dosage, research suggests that to produce effective change in teacher's practices and to produce a subsequent change in student outcomes, a minimum of 30 hours of coaching needs to be provided (Cotabish et al., 2013; Yoon et al., 2007). However, all 13 studies, regardless of the hours or sessions provided, reported significant change in teachers' practices at the end of the coaching intervention. For the studies that did report coaching dosage in hours, only two shared reported dosage hours above the 30-hour criteria. The remaining four studies, that reported hours ranging from only two total hours of coaching to up to 25 hours of coaching, found significant improvement in teachers' practices.

Five studies reported coaching dosage as the full intervention (e.g., observations, trainings). Fabiano and colleagues (2018) and Sailors and Price (2010) reported under ten hours of coaching, two and five respectively. Saraniero and colleagues (2014) reported 25 hours. Garet and colleagues (2008) reported 60 hours of coaching over the course of a year. However, some studies specifically reported on the critical elements of coaching and the timeframe in which those occurred. For example, Teemant and colleagues (2011) and Teemant (2014) defined a coaching cycle as a three-stage process including a 30-minute pre-conference, 45-minute observation, and 30-minute post-conference. The pre-conference focused on planning the lesson for the observation. After the observation the post-conference was held and focused on assessing the instruction. The full dosage reported was approximately 15 hours over seven coaching cycles.

Some studies did not include adequate information to determine the actual dosage of coaching. Batt (2010) and Kretlow and colleagues (2011) reported dosage by length of sessions

(e.g., 30-60 minutes), but the number of sessions were not reported. Additionally, dosage reports revealed that coaches met with teachers weekly or monthly but the number of weeks or months was not reported (Johnson et al., 2018; Matsumura et al., 2010; Sailors & Price, 2015). Three studies did not report coaching dosage. However, all studies showed improvement in teachers' skills and instructional practices.

Overall, dosage, in either hours or number of sessions, were reported in 13 of the 16 studies reviewed. While previous research indicates a minimum amount of coaching dosage (i.e., 30 hours) is needed to consistently produce change in teachers' practices, the studies reviewed all found significant gains in teacher practice as a result of the coaching intervention. A critical factor for coaching dosage appears to be the alignment to observation, training and feedback and providing suitable time to each element of the coaching process. However, there was not consensus on the dosage amount of coaching that effectively changed teacher practice.

## **Effects of Coaching on Teachers' Practices**

### ***Measuring Teacher Results***

Multiple tools were used to measure teacher results. Researchers collectively used these tools to allow researchers to fully measure and understand the impact that coaching interventions had on teachers' practices. The following tools were used: observations including interviews and focus groups, self-reporting surveys, and coaching logs. First, observations were used as a measurement tool in all 16 studies. Observations ranged from time sampling of phonics instruction (Carlisle & Berebitsky, 2011) to observations across phases of a study (Dudek et al., 2019; Pas et al., 2015). Additionally, audio recordings were utilized (Teemant et al., 2011; Teemant, 2014) to collect data in multiple baseline designed studies measuring number of learning units and small group instructional units per minute that teachers delivered accurately.

Surveys used as self-reporting tools gathered information on teachers' beliefs and perceptions on their changes in practices. For example, Carlisle and Berebitsky (2011) used a series of surveys to gather data to fully understand teachers' attitudes about the professional development program, school climate, and building administrator support. In addition, a reflective dialogue scale was administered for teachers to report the frequency of conversations they had that centered on instruction and curriculum. Data gleaned from these tools were valuable to obtain a full picture of the impact PD had on teachers' attitudes and beliefs. Equally important, surveys measuring teachers' evaluative reports on the quality of coaching (Fabiano et al., 2018) allowed teachers to report the perceived effectiveness of the coaching experience on their practices (Dudek et al., 2019; Johnson et al., 2018). Self-reporting teacher surveys were also coupled with observations, focus groups, or interviews (Batt, 2010; Carlisle & Berebitsky, 2011; Fabiano et al., 2018; Matsumura et al., 2010; Saraniero et al., 2014).

Coaching logs, interviews, and focus groups provided an in-depth account of coaching interactions and resulting changes. Coaching logs served to document the interaction between the coach and teacher. Four of the 16 articles utilized coaching logs as a measure to report coaching dosage and the process of coaching that took place (Garet et al., 2008; Johnson et al., 2018; Sailors & Price, 2015; Pas et al., 2015). In the case of Sailors and Price, the coaching log reported data in a descriptive narrative that included the date of the interaction, amount of time of the interaction (dosage), and the nature of the interaction.

### ***Effects of Coaching as Isolated Professional Development***

Four studies provided coaching as a stand-alone intervention for teachers (Goodman et al., 2008; Matsumura et al., 2010; Fabiano et al., 2018; Dudek et al., 2019). Three of the four studies reported overall improvement in instruction. First, three novice special educators of students with

significant support needs from self-contained classrooms showed increased use of learning units provided accurately per minute. Teachers in this multiple baseline study taught grades K-8 (Goodman et al., 2008). The second study included 193 teachers (fourth and fifth grade) showing significantly improved quality of reading comprehension instruction (Matsumura et al., 2010). Finally, 89 elementary teachers who were coached on tier one (universal) instructional and behavior management strategies (Fabiano et al., 2018) presented large improvement with behavior management strategies but only moderate improvement with instructional strategies. Teachers reported higher levels of improvement with instruction, however, reports did not align with observations. Dudek and colleagues' follow-up study to Fabiano and colleagues' study examined the effectiveness of coaching to improve universal instructional and behavior management strategies. However, the 32 teachers who taught grades K-5 did not improve their instructional practices, but behavior management strategies improved significantly.

### ***Effects of Coaching with Professional Development on Teacher Practices***

Coaching with other forms of PD (e.g., workshops, institutes, seminars) has been found to be effective in numerous areas. Teachers have increased and improved their instructional skills in multiple disciplines, and this review includes four areas in which coaching supplementing PD improved teachers' practices. It should be noted that what constitutes PD is quite varied. Studies indicate some PD encompassed an entire week while the minimum amount of PD was a day and a half of training. What was not stated, and difficult to understand in some cases, was the exact nature of the PD, the topics covered, measurement to determine what was learned based on the PD, and the impact of the subsequent coaching. Instead, data from some studies simply indicate that PD was present or it was not present as part of the learning supports to improve teachers' classroom practices.

Coaching in literacy as previously mentioned has been researched more than other content areas (e.g., mathematics, science). Sailors and Price (2010, 2015) found that teachers engaged in PD (i.e., 2-day workshop) plus coaching, two sessions per month and five hours respectively, engaged in more intentional cognitive reading instruction than the control group of teachers who just attended the 2-day workshop. Teachers reportedly offered better explanations of reading strategies to students. Additionally, students with teachers who had participated in coaching plus PD scored on average 11.27 points higher on the Group Reading Assessment and Diagnostic Evaluation (GRADE) than students of teachers who were not coached (Sailors & Price, 2010). Further 71% of students whose teachers provided more intentional instruction and more opportunities to use strategies had higher GRADE scores. Students below grade level showed the largest effect size ( $r=.86$ ; Sailors & Price, 2015).

Carlisle and Berebitsky (2011) investigated the amount of phonics instruction conducted over the course of a year. Teachers who participated in PD (27 hours) plus coaching (dosage not reported) remained consistent with phonics and small group instruction the entire year, whereas teachers who did not participate in PD or coaching dropped the amount of phonics instruction dramatically in the first semester of school. Students whose teacher received PD plus coaching identified over nine more nonsense words than their peers whose teacher had not received PD or coaching. This improvement in scores remained stable as students of coached teachers tended to score higher on the nonsense word measure at the end of the year.

In contrast, Garet and colleagues (2008) reported that coaching had no effects beyond the institute teachers attended on changing practices in the classroom. Treatment A teachers in this study attended a 48-hour institute. Treatment B teachers attended the institute, and, in addition, received 60 hours of coaching over the course of a year. The control group received no PD or

coaching. Treatment A and B teachers who attended a 48-hour institute plus 60-hours of coaching showed significantly better scores on instruction than the control group of teachers who did not receive any training. However, teachers receiving PD with coaching did not score higher at significant levels than teachers attending the institute alone. In addition, students of treatment teachers (PD and PD with coaching) did not score higher than the students of teachers in the control group. Coaching in this study showed no significant effects beyond attendance at the institute.

Coaching was also used as a supplemental PD training to increase teachers' knowledge and implementation of general instructional and cultural and linguistical pedagogy in grades K–6. Two multiple baseline studies (Kretlow et al., 2011; Kretlow et al., 2012) investigated teachers' use of group instructional units (GIU) per minute in Kindergarten and first grade classrooms. Three teachers in each study participated in 3-hour workshops that yielded teachers' improvement with the number and accuracy of GIUs per minute. The same teachers participated in 30-45 minutes sessions (number of sessions not reported) of coaching that showed high accuracy and consistent use across all of the teachers in the two studies. Batt (2010) reported on the results of teachers (n=15) use of a culturally linguistic model to meet the needs of diverse learners. A 3-day institute was conducted along with 30-60 minutes sessions (number of sessions not reported). Teachers reported higher levels of knowledge in how to teach diverse learners. Teachers' reports were supported by observations in the classroom. Teemant and colleagues (2011, 2014) investigated the implementation of the Standards for Effective Pedagogy on classroom organization and diverse learners. The standards included: (a) joint productive activity, (b) language and literacy development, (c) contextualization, (d) challenging activities,

and (e) instructional conversation. Coached teachers had a statistically significant increase in the use of each standards and the overall score of standards implemented.

Coaching has also been utilized to incorporate the arts and social emotional learning in the classroom. Attending a week-long institute, 116 elementary teachers then participated in 25 hours of coaching on the integration of art standards during literacy instruction (Johnson et al., 2018). Confidence levels increased for teachers using art standards, and overall, higher quality samples were created. Additionally, more art standards were taught by teachers who received coaching than teachers who did not. While coaching has typically been used to support teachers in content areas, studies have been conducted to examine the outcomes of behavioral interventions through social-emotional games (Johnson et al., 2018; Pas et al., 2015). Almost 350 teachers teaching K–5 were trained in a 3.5-day PD followed by weekly coaching held the entire year. Teachers who received the PD with coaching logged more games played than teachers who did not receive the coaching. Coached teachers logged a statistically significant minutes and quality of games implemented.

## **Conclusion**

In summary, 16 studies were examined to find the impact of coaching on changing teachers' classroom practices. While different types of coaching were identified, studies reinforced primary attributes that are essential to coaching. Three common attributes that emerged from this synthesis of literature and have the greatest impact on teacher change are observations, training, and feedback. While improvement was found across most studies, reported dosage or time spent being coached varied. The literature also reinforced that measurement of teacher change needs to move beyond perception. Observations and similar tools are needed to further consider the impact and results of coaching. Finally, implementing an

effective PD program that includes PD and coaching or coaching in isolation is important for schools or districts that are seeking to reinforce change with teachers or at a building or district-wide level.

### Chapter III: Method

This study investigated whether instructional coaching would improve teacher knowledge about and applications of the practices associated with the UDL framework. The following research questions guided the study:

1. Do teachers who receive coaching report higher levels of knowledge about practices when compared to teachers who do not receive coaching?
2. Do teachers who receive coaching report using more practices when compared to teachers who do not receive coaching?
3. Do teachers who received coaching use more practices than teachers who did not receive coaching?
4. How do teachers who receive coaching about the UDL framework and practices describe their PD experiences?

#### Participants

The study included 39 elementary, middle, or high school teachers. Two different methods of recruitment of teachers occurred. First, to identify comparison teachers, an email (see Appendix A) was sent to all district teachers inviting them to complete a questionnaire and consider participating in the study. This invitation was directed to teachers who did not plan to request instructional coaching during the fall of 2019. Thus, the comparison group ( $n=24$ ) was comprised of teachers who (a) completed the pre-questionnaire, (b) indicated they would *not* be seeking coaching, and (c) gave consent to participate. Secondly, to identify potential treatment participants, an email was sent to all district teachers introducing the study and inquiring on whether they planned to seek support from an instructional coach in the fall of 2019. If teachers were considering using an instructional coach to support their implementation of the UDL

framework, they were invited to complete the questionnaire and consider volunteering to participate in the study. During the first four weeks of the academic year, all teachers that sought instructional coaching were sent a direct invitation (via email) to consider participating in the study. By the end of the second week of September, 15 teachers agreed to participate in the study. Table 2 provides the demographics for participants in the study. It should be noted that the non-probability sampling method created self-selection biased sampling error. This bias was considered but the author deemed the number of participants large enough to proceed with the study.

**Table 2**

*Demographics of Study Participants*

Group	Level	(n)	Gender	Ethnicity	Years of teaching experience			
					0-1	2-5	6-10	>11
Treatment	Elementary	10	F <sup>a</sup> (n=10)	W <sup>c</sup> (n=8) H <sup>d</sup> (n=2)	30%	40%	10%	20%
	Middle School	3	F (n=3)	W (n=3)	33%	33%		34%
	High School	2	F (n=2)	W (n=1) H (n=1)	50%	50%		
Comparison	Elementary	13	F (n=13)	W (n=12) H (n=1)	8%	31%	15%	46%
	Middle School	3	F (n=2) M <sup>b</sup> (n=1)	W (n=2) PI <sup>e</sup> (n=1)		33%	67%	
	High School	8	F (n=5) M (n=3)	W (n=8)	37%	37%	13%	13%

a =Female, b = Male, c = white, d = Hispanic, e = Pacific Islander.

**Setting**

A district located in the Midwest served as the setting for this study. This district enrolls over 11,000 students across 18 buildings including one early education center for Pre-K students, 11 elementary schools (grades K-6), two middle schools (grades 7-8), three high schools (grades 9-12), and one alternative adult education center. The district provides special education services

to over 11% of students, and 85% of those students spend at least 80% of their day learning in a general education setting.

This study identified this district due to its adoption of the UDL principles and guidelines as a curriculum framework. Since 2006, the UDL framework has been a primary factor in all district and building level decision making processes (e.g., instruction, behavior, inclusion). The stated purpose in the employment of the UDL framework is to better meet the needs of all students and further the inclusion efforts to have more students included in the general education setting (Meyer et al., 2014). For example, the UDL framework acts as a filter for all curricular adoptions and initiatives at the district and building level. Therefore, this district was chosen as the research site due to the high level of UDL implementation. Because UDL is at the core of the district's decision-making process and instructional expectations, teachers are expected to set yearly professional goals on their continued implementation of UDL in their classroom. Teachers are measured yearly as part of the annual evaluation on their levels of UDL implementation (50% of evaluation). Therefore, the emphasis on UDL creates a culture that nurtures and motivates teachers to implement the UDL framework. Site selection was based on this optimal environment.

### **Research Design**

This study was designed as an embedded mixed methods study (Creswell, 2014) to compare the impact of instructional coaching (via district-level UDL coaches) versus peers maintaining a "business as usual" approach to UDL adoption and implementation. The quantitative data and qualitative data were gathered concurrently. The qualitative data were collected to assist in the interpretation of the quantitative findings through the coached participants' experience with the coaching cycle. The quantitative portion of the study consisted

of a quasi-experimental pretest-posttest comparison group design. The first of the two quantitative measures included a pre-post teacher questionnaire measuring teachers' perceived understanding and application of the UDL framework. All of the participants in the treatment group ( $n=15$ ) and comparison group ( $n=24$ ) completed the questionnaire within the first four weeks of the beginning of the academic year. The second quantitative measure was a pre-post observation. Similar to the questionnaire, initial classroom observations, for both treatment and comparison teachers, were completed within the first four weeks of the school year. While ten teachers were randomly selected from the comparison group, treatment teachers were observed within their first week of agreeing to the coaching intervention. As a result, the first ten teachers that agreed to coaching were selected for classroom observation. All classroom observations sought to measure the level of teacher implementation of the UDL framework.

The qualitative portion of the study included interviews with 10 teachers from the treatment group. The study used a purposeful sampling technique (Seidman, 2013) in choosing 10 of the 15 teachers to interview. The sufficiency of the interviewees was considered. Teachers who were interviewed reflected the range of levels (e.g., elementary, middle school, high school) that made up the population of treatment participants allowing for those outside the sample to connect with the experiences of the teachers within the sample. The interviews were conducted after the coaching intervention to discover how teachers felt. Embedding this qualitative method within the quantitative design allowed for greater depth to the research (Creswell & Plano Clark, 2007), and the responses of the teachers interviewed further enhanced the understanding of the quantitative findings.

## **Universal Design for Learning Coaches**

Four UDL coaches were recruited to conduct the intervention in this study. The coaches averaged 3.6 years in the position and 12.5 years teaching experience in the classroom. One of the coaches held a Master's degree in education, and two coaches held certification in project-based learning in addition to a Bachelor's degree. Training in the district for UDL coaches averaged 35.25 hours and included the instructional consultation problem-solving method, monthly trainings led by district UDL coordinators, and sessions on coaching during the annual UDL Summer Institute facilitated by leading trainers and authors in the field of UDL. Teachers were considered for this position by district leaders on the following criteria: teachers with experience within or outside the district; individuals with exceptional communication skill; and teachers that were recognized for their expertise in meeting the needs of all learners in their classroom instruction. Each UDL coach assisted multiple teachers through the coaching cycle (see Table 3).

## **Intervention**

Instructional coaching was the intervention in this study. The instructional coaching cycle consisted of eight unique coach/teacher interactions. The eight specific coaching interactions were based on current practices of coaches in the district and determined to be adequate time to complete critical elements shared in the instructional coaching literature (Showers & Joyce, 1996; McKenna & Walpole, 2010). While each coach was allowed professional flexibility to support the individual teacher they worked with, all coaching involved observations, specific training, and ongoing feedback that were deemed critical elements for the success of coaching. This number of interactions allowed coaches to meet with teachers face-to-face to (a) conduct

**Table 3***UDL Coaches Experience and Assigned Participants*

Coach ID	Years of coaching experience	Coach Training (hours)	Teacher Coached	Level
1	1	10	TG19	MS <sub>a</sub>
			TG13	MS
			TG4	MS
2	5	55	TG3	E <sub>b</sub>
			TG1	E
			TG12	E
3	3.5	36	TG8	E
			TG10	HS <sub>c</sub>
			TG7	E
			TG11	HS
4	5	40	TG6	E
			TG20	E
			TG14	E
			TG15	E
			TG18	E

*Note.* a = middle school, b = elementary, c = high school

three observations, (b) provide four specific trainings, and (c) provide ongoing feedback that was essential to each session with the teacher. An analysis of coaching literature differed in the number of sessions needed to alter teacher practice. With inconsistent information, the number of coach-teacher interactions for this study exceeded all minimum coaching sessions noted in the current literature (4-11 sessions). Table 4 describes the specific steps that occurred in each interaction for this study.

The instructional coaching cycle (intervention) began once a teacher requested coaching from the building coach by filling out Request for Educational Planning Form (see Figure 1). Teachers used this form to request any type of assistance from district coaches. Coaches responded to the teacher within seven days of receiving the form to schedule the first session with the teacher. UDL coaches delivered the intervention to the treatment group between

**Table 4***Guide for UDL Coaches to Follow During the Instructional Coaching Cycle*

Interaction	Action Taken within Each Interaction
<i>Prior to first interaction</i>	<ul style="list-style-type: none"> <li>• Coach responds to teacher’s request for coaching within 7 days of receiving request.</li> <li>• Coach schedules the first observation (needs assessment) with the teacher.</li> </ul>
1 - Observation 1 (needs assessment) with Feedback	<ul style="list-style-type: none"> <li>• Coach conducts the observation using the Learning Environmental Design (LED) form               <ul style="list-style-type: none"> <li>○ Coach sits in one area of the classroom to observe a lesson</li> <li>○ Coach may walk around the room after teacher’s instruction to observe environmental elements of UDL implementation (e.g., goal posted, flexible seating).</li> <li>○ Coach observes 30 minutes of teacher’s lesson and records each element of the lesson in the LED form.</li> <li>○ Coach provides the teacher feedback on the recommended areas to focus coaching.</li> </ul> </li> </ul>
2 - Feedback and Setting Goal(s)	<ul style="list-style-type: none"> <li>• Coach and teacher meet face-to-face to discuss the observation.</li> <li>• Coach provides feedback on each element of the lesson and what principles, guidelines, and checkpoints were addressed.</li> <li>• Based on the observation and coach’s recommendation, teacher determines the area of need within the UDL framework, and a goal is set. For example, the teacher sees that an area of need during lessons falls under the principle of Multiple Means of Engagement and specifically <i>Guideline 7: Options to Recruit Interest</i>. A goal is set for the teacher to learn and implement four new strategies that will recruit interest in her students during mathematics.</li> <li>• Coach and teacher determine the specific knowledge or skills teacher needs to acquire to meet the goal and the appropriate method of acquiring that knowledge or skills. For example, if the teacher needs to implement ways to <i>recruit interest</i>, the coach and teacher may determine that the teacher needs strategies modeled by the coach during an instructional period.</li> </ul>
3 - Training Session 1	<ul style="list-style-type: none"> <li>• Coach and teacher meet face-to-face for the first training session. Format of training is based on the teacher’s need and preference of meeting that need. For example, the coach may model a strategy for the teacher during a lesson.</li> <li>• The coach and teacher will plan next steps for the teacher in using the new knowledge or skill between training sessions. For example, what is the action plan before the next training session? What are required resources needed? Who will be responsible for acquiring these resources?</li> </ul>

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4 - Training Session 2 with feedback	<ul style="list-style-type: none"> <li>• Coach and teacher meet face-to-face for the second training session that extends the first training session. For example, the coach may share a new strategy around the targeted UDL component.</li> <li>• The coach and teacher will plan next steps for the teacher in extending the use of the new knowledge or skill. For example, what is the action plan before the next training session? What are required resources needed? Who will be responsible for acquiring these resources?</li> </ul>
5 - Observation 2 (progress monitoring) with Feedback	<ul style="list-style-type: none"> <li>• Coach conducts the second observation, updating the initial LED form, and recording feedback to share with the teacher on observed improvement and/or areas of concerns based on the teacher's goal with UDL implementation. For example, if the teacher's goal concentrates on a specific guideline, the coach will observe for changes in the teacher's practice around that guideline. Coach shares feedback with the teacher and determines the direction of training based on the progress monitoring (second observation).</li> </ul>
6 - Training Session 3 with Feedback	<ul style="list-style-type: none"> <li>• Coach and teacher meet face-to-face for the third training session. The updated LED form is discussed and coach shares feedback with the teacher on changes observed or any areas of concern.</li> <li>• The coach and teacher will plan next steps for the teacher in extending the use of the new knowledge or skill. For example, what is the action plan before the next training session? What are required resources needed? Who will be responsible for acquiring these resources?</li> </ul>
7 - Training Session 4 with Feedback	<ul style="list-style-type: none"> <li>• Coach and teacher meet face-to-face for the fourth training session.</li> <li>• The coach and teacher will plan next steps for the teacher in extending the use of the new knowledge or skill. For example, what is the action plan before the next training session? What are required resources needed? Who will be responsible for acquiring these resources?</li> </ul>
8 - Observation 3 (goal attainment)	<ul style="list-style-type: none"> <li>• Coach conducts the final observation to update the LED form and provide teacher with feedback on the implementation of UDL based on the teacher's use of the new knowledge or skill(s). Coach shares the updated LED with feedback with the teacher. Teacher determines the level of efficacy with the UDL implementation and whether the goal has been met.</li> </ul>

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September 3, 2019 and December 20, 2019, at which time district schools broke for the semester's end. The intervention did not span this entire period of time, but rather instructional coaching cycles started and ended at different times for treatment participants

**Figure 1***Request for Educational Planning Form*

Request for Educational Planning	
Date Submitted: <input type="text"/>	Date Reviewed: <input type="text"/>
Teacher name: <input type="text"/>	Grade: <input type="text"/> If Secondary Level, course name: <input type="text"/>
Reason For Request: <input type="text"/>	
Check all that apply (Learning Environment Design is required for all requests)	
<input type="checkbox"/> UDL	
<input type="checkbox"/> PBIS	
<input type="checkbox"/> ICT	
<input type="checkbox"/> High Ability	
<input type="checkbox"/> EL (English Language Learner)	
<input checked="" type="checkbox"/> Technology (specific to instructional use)	
<input type="checkbox"/> Literacy - Specify: <input type="checkbox"/> reading <input type="checkbox"/> writing	
<input type="checkbox"/> Math	
<input type="checkbox"/> Behavior	
<input type="checkbox"/> 504 (Student Information Form required)*	
<i>If this is a request for a Section 504 plan determination, *please submit to the building's 504 Coordinator.</i>	
<input type="checkbox"/> Special Education Evaluation (Student Information Form required)**	
<i>If this is a request for a Special Education Evaluation, **please submit to the building administrator.</i>	
<b><i>All other requests may be given to the UDL Facilitator or UDL Instructional Coach.</i></b>	

based on goal achievement which signified the end of a coaching cycle. The average length of time for a coaching cycle was 11 weeks.

Each coaching interaction specifically addressed one or more of the critical elements of effective coaching (observation, training, feedback). Coaches were directed to meet with each teacher for a minimum of 15 minutes, but coaches and teachers reported that each face-to-face interaction was 30 minutes or more. This time frame allowed coaches and teachers to successfully complete each interaction and move the teacher toward their UDL goal.

### ***Observations***

UDL coaches conducted three observations. The observations took place in the teacher's classroom during a 30 period that included teacher instruction. The first observation (interaction 2) served as a needs assessment to help coaches assist teachers in identifying the gaps in UDL implementation and set a measurable goal that could be attained within the instructional coaching cycle. Coaches used the learning environment design (LED) form (see Figure 2) for all observations they conducted. This district coaching tool is based on the UDL framework and used to gauge the number of principles and guidelines that are present in the environment. During the observations, the coach recorded different elements of the lesson on the LED form based on their training of identifying elements of UDL. The second observation (interaction 5) monitored progress towards meeting the goal set for UDL implementation. The third observation (interaction 8) was conducted at the end of the coaching cycle to gauge sustainability of the UDL practices implemented.

### ***Training***

In addition to coaching teachers on ways to further implement the UDL framework into the classroom instruction, the essential elements of the instructional coaching process helped to embed the UDL principles in the design of lessons. For example, coaches worked with teachers to individualize trainings to meet the teachers' needs, collaborated to create a plan of action, and set a schedule to carry out that plan. Each training interaction included an instructional element based on the UDL goal. For example, if a teacher's goal was to implement strategies that met the guideline, *provide options for executive function*, the coaching interactions focused on training the teacher on executive functioning skills and how to support the skills for students. The

training included options in how the information would be provided (e.g., work through a module, watch and discuss a video).

**Figure 2**

*Learning Environment Design Form*

<b>Learning Environment Design</b>		
<p>For each of the UDL guidelines below, please identify all the options that are available for every student in the learning environment (classroom) on a daily basis.</p> <p>This may be completed by the individual requesting assistance or with the assistance of the building administrator, department chair, UDL Facilitator, UDL Instructional Coach.</p>		
<b>Provide Multiple Means of Engagement</b> <i>Purposeful, motivated learners</i>	<b>Provide Multiple Means of Representation</b> <i>Resourceful, knowledgeable learners</i>	<b>Provide Multiple Means of Action &amp; Expression</b> <i>Strategic, goal-directed learners</i>
<b>7: Provide options for recruiting interest</b> 7.1 Optimize individual choice and autonomy 7.2 Optimize relevance, value, and authenticity 7.3 Minimize threats and distractions  <input type="checkbox"/>	<b>1: Provide options for perception</b> 1.1 Offer ways of customizing the display of information 1.2 Offer alternatives for auditory information 1.3 Offer alternatives for visual information  <input type="checkbox"/>	<b>4: Provide options for physical action</b> 4.1 Vary the methods for response and navigation 4.2 Optimize access to tools and assistive technologies  <input type="checkbox"/>
<b>8: Provide options for sustaining effort and persistence</b> 8.1 Heighten salience of goals and objectives 8.2 Vary demands and resources to optimize challenge 8.3 Foster collaboration and community 8.4 Increase mastery-oriented feedback  <input type="checkbox"/>	<b>2: Provide options for language, mathematical expressions, and symbols</b> 2.1 Clarify vocabulary and symbols 2.2 Clarify syntax and structure 2.3 Support decoding of text, mathematical notation, and symbols 2.4 Promote understanding across languages 2.5 Illustrate through multiple media  <input type="checkbox"/>	<b>5: Provide options for expression and communication</b> 5.1 Use multiple media for communication 5.2 Use multiple tools for construction and composition 5.3 Build fluencies with graduated levels of support for practice and performance  <input type="checkbox"/>
<b>9: Provide options for self-regulation</b> 9.1 Promote expectations and beliefs that optimize motivation 9.2 Facilitate personal coping skills and strategies 9.3 Develop self-assessment and reflection  <input type="checkbox"/>	<b>3: Provide options for comprehension</b> 3.1 Activate or supply background knowledge 3.2 Highlight patterns, critical features, big ideas, and relationships 3.3 Guide information processing, visualization, and manipulation 3.4 Maximize transfer and generalization  <input type="checkbox"/>	<b>6: Provide options for executive functions</b> 6.1 Guide appropriate goal-setting 6.2 Support planning and strategy development 6.3 Facilitate managing information and resources 6.4 Enhance capacity for monitoring progress  <input type="checkbox"/>

Coaches provided options that met the personal needs and preferences of the teacher for their professional learning.

The coach conducted training interactions as face-to-face meetings. Training occurred within as well as outside teacher classroom instruction. For instance, if a coach needed to model a new strategy for the teacher, they would do so with the teacher's students. Coaches focused trainings on the teacher's overall increasing knowledge of the UDL framework and its use in

designing instruction. Coaches and teachers used the LED form (updated after each observation) to inform the content of the trainings based on teacher goals.

### ***Feedback***

Finally, coaches engaged in mastery-oriented feedback with the teachers who received the intervention. Mastery-oriented feedback consisted of guiding teachers to be self-reflective and make adjustments to improve practice (Nelson, 2014). Feedback occurred in a minimum of four interactions of the coaching cycle to guide the teacher and ensure that the teacher moved toward their implementation goal. Feedback assisted teachers in reflecting on but did not limit them to the following:

- what teachers learned in training interactions with the coach
- action steps teachers took toward their goal
- new practices implemented in alignment with UDL
- teacher's improvement in the use of UDL-aligned instruction
- next steps for further improvement with implementing the framework.

This intervention aligned with the UDL principles and was based on the commonalities found in the coaching literature (e.g., observations, training, feedback) and effective PD (Yoon et al., 2007). The instructional coaching cycle occurred with consistency not having more than a 17-day lapse between interactions.

### **Fidelity of Instructional Coaching Cycles**

The researcher collected coaching logs (see Figure 3) from coaches and teachers to gather data on the progress of the coaching cycle. For every coaching interaction with each teacher, coaches were directed to complete a coaching log. Additionally, teachers were asked to complete a similar log for every coaching interaction as a fidelity check on whether coaching occurred as

**Figure 3***Coaching Log*

Coaching Log			
Teacher Name:	School:	Date:	
Goal set (only fill out for session that goal was set):			
<input type="checkbox"/> Student <input type="checkbox"/> Teacher <input type="checkbox"/> Both			
UDL Focus: (check all that apply)	<input type="checkbox"/> Goals	<input type="checkbox"/> Remove Barriers and provide scaffolding	
	<input type="checkbox"/> Representation	<input type="checkbox"/> Action and Expression	<input type="checkbox"/> Engagement
Guideline(s) _____			
Action of meeting: (check all that apply)			
<input type="checkbox"/> Model a skill <input type="checkbox"/> Training <input type="checkbox"/> Planning <input type="checkbox"/> Observation by coach <input type="checkbox"/> Other: _____			
Reflection done during meeting <input type="checkbox"/>			
Feedback done during meeting <input type="checkbox"/>			
Time meeting began: _____		Time meeting ended: _____	
Notes: _____			

reported by the coaches. Created to provide ease for coaches and teachers, the coaching log was a simple form that included boxes to check that aligned with the intervention. Coaching was measured by whether the cycle occurred or not. Therefore, narrative accounts of coaching were only used for clarification of why items did not occur during a coaching cycle. For example, the intervention stipulated that feedback would be part of all interactions of the cycle. If the feedback was present, the coach checked a box indicating that feedback was given. Coaches checked boxes under the following areas: (a) the UDL focus of the interaction, (b) action of the meeting (e.g., modeling), (c) if reflection was present, (d) amount of time (minutes) the interaction lasted, and (e) if feedback occurred. A notes section was available for coaches to clarify missing items

from interaction (e.g., feedback, reflection). Appendix B outlines the operational definitions of each reported element and the procedure that coaches followed to complete the coaching logs weekly and subsequently send to the researcher. The coaching logs completed by teachers revealed that 100% of the coaching cycles were completed as reported by the coaches and met all of the criteria of a coaching cycle as outlined above.

### **Measurement and Procedures**

The data that were collected for analyses included: (a) a pre and post- questionnaire that allowed teachers to report their perceived understanding and application of the framework and to record participants perceived barriers in implementing the framework, (b) pre and post- observations of teachers in the treatment (n=10) and comparison groups (n=10) to measure differences in UDL practice, (c) and interviews with 10 treatment teachers following the post observations to collect their thoughts on their coaching experience and its effect on their UDL implementation.

#### ***Questionnaire***

The Universal Design for Learning Understanding and Application (UDL-UA) questionnaire (Craig, 2018) was administered to all treatment and comparisons teachers in September of 2019 and then again in January of 2020. The instrument (see Appendix C) measured teachers' self-reported knowledge and application of the UDL framework in their lessons and learning environment planning. The UDL-UA used a Likert scale. Likert scales are a commonly used approach to measuring knowledge and belief. A sliding scale was utilized to offer the option of zero to 100 to provide flexibility and calculations that would be more sensitive to variability in responses. The UDL-UA contained two sections. The first section asked teachers to rate statements measuring their perceived knowledge of UDL from zero

(strongly disagree) to 100 (strongly agree). The second section of the UDL-UA asked teachers to rate statements concerning their perceived application of the guidelines of the UDL framework from zero (never) to 100 (always).

This tool was developed to measure all nine guidelines of the UDL framework and aligned to the district's UDL instructional domain of the Teacher Success Rubric (Rubric). Statements in the knowledge and application sections of the UDL-UA align to five elements of UDL design:

- *Goals*. Goals are posted and all methods and materials align with the goal.
- *Barriers and Scaffolding*. Potential barriers in the learning environment have been identified and addressed.
- *Multiple Means of Representation*. Content and skills are presented in multiple ways with options and scaffolding (e.g., support) available.
- *Multiple Means of Engagement*. Learners are engaged in authentic, relevant and meaningful learning opportunities.
- *Multiple Means of Action and Expression*. Learners consistently interact and demonstrate content and skill comprehension in multiple ways.

A panel of ten experts on UDL provided feedback as part of the content validation process for this tool. Three of the experts included faculty at institutions of higher education who have researched and published on the UDL framework. The remaining seven individuals included UDL Consultants, Trainers, Authors, or CAST Cadre. An internal reliability analysis on the UDL-UA tool found high reliability for the 51-item survey,  $\alpha = .95$  (Craig, 2018). The items in this tool aligned with the UDL specification of the UDL guidelines and components of the

district's evaluation tool (Rubric). Based on the expert feedback and the Cronbach's Alpha, this tool was found to be reliable and have content validity.

All district teachers were sent the questionnaire via email in the first four weeks of school to complete. Emails were sent to teachers periodically to increase the participation and completion of questionnaires. The treatment group was made up of teachers who identified their intention to seek out coaching to meet UDL goals in the first semester of school and who followed through with receiving coaching. The comparison group was made up of all teachers who indicated that they would not be seeking out coaching in the first semester. In mid-January, a post questionnaire was sent to all participants in treatment and comparison groups ( $n=39$ ) to collect data for analysis with the pre-questionnaire data. All interventions were completed by the end of December, 2019, and post questionnaires were completed by January 31, 2020.

### ***Observation***

A sub-group of 10 teachers from the treatment group and 10 teachers from the comparison group ( $N=20$ ) were observed in September of 2019. The teachers forming the comparison group were randomly selected from the sample of teachers completing the UDL-UA who indicated they would not seek coaching ( $n=24$ ). The teachers from the treatment group were the first of the 15 teachers indicating that they would seek out coaching from district coaches. However, one teacher from each group opted out of the study prior to the second set of observations leaving nine teachers from each group for post-observations ( $n=18$ ). The researcher conducted all pre- and post-observations that each lasted 30 minutes. Teachers were notified of the date and time of the observation prior to the researcher coming. The researcher was seated in the back of the room during all observations, and moved about the room to take further notes at the completion of the lesson and during class transition time to be less intrusive.

The Universal Design for Learning Implementation Fidelity Tool (UDL-IFT) was used as the observation instrument. This tool was developed to measure a teacher's instructional strategies based on one lesson including goals and the three principles of UDL (Johnson, 2018). Each principle with related guidelines and checkpoints were included within the possible instructional strategies/learning activities (indicators).

The UDL-IFT was completed during observations in the classrooms during a period of 30 minutes during which time direct instruction took place for a minimum of 10 minutes. The researcher conducted all of the observations using the UDL-IFT to check all indicators observed. An area of the tool offered the researcher a space to write down additional observed indicators. At the end of the observation, the teacher also filled out the UDL-IFT.

This tool measured the UDL principles and guidelines in a lesson. The author of the UDL-IFT defined a lesson as all instruction and learning activities related to a specific component of a unit or a series of lessons on the same topic. A lesson was defined as including a goal, instruction, all learning activities aligned to the goal, and the assessment aligned to the goal. Planning and intentionality are central to UDL and cannot be observed with this tool, therefore, the teacher also completed the UDL-IFT to complete the picture of the scope of the teacher's intentionality in using the UDL framework to plan and design the goal, instruction, activities, and assessment.

Johnson (2018) conducted a content validity study of the tool by going through a subject-matter expert validation process with multiple researchers of the Universal Design for Learning – Implementation and Research Network. Based on feedback from those researchers and experts in UDL who have published on the framework, this tool had content validity.

Observations of the treatment sub-group provided a clearer view of how instructional practice was shaped through the coaching cycle. The observations provided additional details to understand the changes that may have occur with all of the participants that was revealed through the questionnaire (Ravitch & Riggan, 2017). Pre-observations of the nine comparison group participants were conducted by the researcher during the four-week window at the beginning of the school year. The nine treatment group participants' pre-observations were conducted by the researcher as teachers requested assistance for coaching during the month of September prior to the second meeting with their coach. The post-observations of the treatment and comparison group participants ( $n=18$ ) were conducted by the researcher two weeks after teachers returned from the winter break between January 21–31.

### ***Interviews***

Ten of the total 15 participants from the treatment group were interviewed. These teachers were assigned pseudonyms to ensure anonymity and encourage candid responses. Interviews were used to determine the teachers' use of the UDL framework and the execution of inclusive practices. Using this qualitative approach to data collection allowed the researcher to collect treatment participants' interpretation of coaching. Semi-structured interviews (Lincoln & Guba, 1985; Seidman, 2013) included questions that sought to discover teachers' experience with coaching that they received and practice with the UDL framework to design goals, instruction, materials, and assessments (see Appendix D). Interview questions uncovered treatment participants' attitudes, beliefs, and the intentionality for practices used in the classroom.

Interview questions fell into four categories: (a) overall coaching experience, (b) practice prior to coaching cycle, (c) support of coaching during coaching cycle, and (d) change in practice

and beliefs post coaching cycle. The researcher asked teachers about the overall coaching experience. Specifically, teachers were asked to describe the effectiveness of the coaching in changing their understanding and application of UDL and indicate if they would use coaching as a means to further implement UDL. Questions developed to probe teachers' practices prior to their coaching experience assisted in data analysis of pre-post questionnaire results. For example, teachers were asked how they utilized the UDL framework prior to the coaching cycle in planning for a variety of learners. Next teachers were asked to describe the effectiveness of the support they received from coaches during the cycle. Finally, teachers were asked about the resulting changes in their beliefs and practices due to the coaching experience.

The interviews took place after all the coaching cycles were completed in January at the district site. Teachers being interviewed were given a consent form (Appendix E) at the beginning of the study outlining the use of interview contents and the secure handling of the audio recordings. One day prior to the interviews, treatment participants received the primary interview questions. Additional questions were used to explore the interviewees responses deeper. The 30-minute interviews were conducted by the researcher and audio-recorded for transcription purposes. All recording were kept in a secure location on an external hard drive at the researcher's university. After all interviews were conducted, the researcher conducted a member check by sending transcriptions to teachers. The researcher then coded and analyzed the qualitative data collected.

## **Data Analysis Procedures**

### ***Quantitative Analysis of UDL-IFT Observation and UDL-UA Questionnaire Data***

A repeated measures analyses of variance (ANOVA) was used to evaluate the relationship between coaching and observed implementation of UDL, teachers' perceived

implementation of UDL, and teachers' understanding and application of UDL. Data collected from the questionnaire were separated into two sections (i.e., understanding and application). Pre and post scores for each section was analyzed for those receiving coaching and those not receiving the treatment. Additionally, the teachers' observed and perceived implementation of UDL from the UDL-IFT were averaged to arrive at a pre-observation mean score and a post-observation mean score that were then analyzed through the ANOVA.

### ***Qualitative Data Analysis and Coding Process***

A qualitative analysis was used to determine the experience coaching had on teachers' increased knowledge and implementation of the UDL framework through semi-structured interviews of teachers who participated in a coaching cycle. Treatment teachers were asked open-ended questions that fit within four categories: (a) overall coaching experience, (b) practice prior to coaching, (c) support of coaching during the coaching cycle, and (d) change in practice and beliefs after the coaching experience. Interviews were audio recorded and later transcribed using *Transcribe* (<https://transcribe.wreally.com/>). The researcher took field notes as necessary to record body language during the interviews to add additional context to the later transcribed interviews. Transcribed interviews were shared with teachers to ensure accuracy and to conduct member checking on items that required clarification.

Interview transcripts were analyzed inductively as open coding occurred. Interview responses from treatment participants were unitized by hand. Units of data were categorized and sub-categorized in emerging themes that were labeled and defined (Rodwell, 1998). Unassigned units were kept below 5% (Lincoln & Guba, 1985). Using this method of qualitative analysis ensured a natural emergence of themes and respected the voice of the participants.

## **Hypotheses**

The researcher hypothesized that teachers receiving a coaching cycle would show higher self-reporting scores on their perceived understanding of UDL and implementation of the framework than teachers in the comparison group. Further, observation scores for teachers participating in a coaching interaction would show significant growth compared to teachers who did not participate in a coaching interaction and would support the self-reporting scores. The researcher speculated that the interview data would support these hypotheses.

## Chapter IV: Results

This study sought to answer four questions centered around the effectiveness of instructional coaching as a means to facilitate teacher change. Structured around knowledge acquisition and subsequent application of the Universal Design for Learning (UDL) framework, teacher participants were surveyed, observed, and interviewed to determine the impact of instructional coaching. Data collection occurred two times during the academic year (fall, winter). During the month of September, all study participants were surveyed on their level of knowledge of the various principles, guidelines, and checkpoints of the UDL framework. This same survey was administered again to all participants in January. Randomly selected teachers' instructional practices were also observed in September and then again in January. Finally, a sample of teachers who received instructional coaching were interviewed at the end of the study.

The questions were developed in order to discover the effectiveness of coaching on altering teacher knowledge acquisition and application of the UDL framework. A repeated-measures analysis of variance (ANOVA) was used to analyze the data collected from the observations and questionnaire. Teacher interviews were conducted to better understand teachers' experience with the coaching cycle. In this section, we will first explore findings from the questionnaire. Next, classroom observation will be examined to determine the impact of instructional coaching. This will be followed by analysis of teacher interviews to further understand teacher behaviors due to instructional coaching.

### **Quantitative Data Analysis**

#### ***Impact on Teacher Knowledge Acquisition***

The first question sought to discover if teachers gained more knowledge about the principles, guidelines, and various checkpoints of the UDL framework due to instructional

coaching. A repeated measures ANOVA was conducted on a sample of 39 participants (15 treatment, 24 comparison) to determine the impact of coaching on self-reported UDL understanding questionnaire scores (see Table 5). The analysis considered one between subjects variable, coached teachers versus non-coached teachers. The ANOVA also examined one within groups variable, the mean pre and post score teachers had on a self-reporting UDL understanding questionnaire ranging between 1 and 100. There was no significant interaction,  $F(1,37) = .231, p = .633$  (see Figure 4)

### ***Application of Universal Design for Learning***

A repeated measures ANOVA tested the expectation that there would be a difference between teacher self-reports on their level of UDL application within their classroom teaching. Results showed that most teachers in both groups improved their perception of UDL classroom application from September to December (see Table 5). While both groups reported an increase in use, analysis indicated there was not a significant interaction,  $F(1, 37) = .010, p = .921$  (see Figure 5).

### ***Observed Use of Universal Design for Learning***

A repeated measures ANOVA was also conducted to determine the effect of coaching on observed teacher practice of using the UDL framework (see Figure 6). Data indicated that both groups of teachers increased their implementation of the principles, guidelines, or checkpoints affiliated with the UDL framework. However, results showed that there was no statistically significant interaction  $F(1,16) = .3.137, p = .096$ , with an effect size of .164. Because not all statistical assumptions were met for the repeated measures ANOVA (variances for the two groups were not homogenous at the time of the post-test), a second method of identifying a significant interaction among two groups measured twice was applied. If an independent  $t$  test

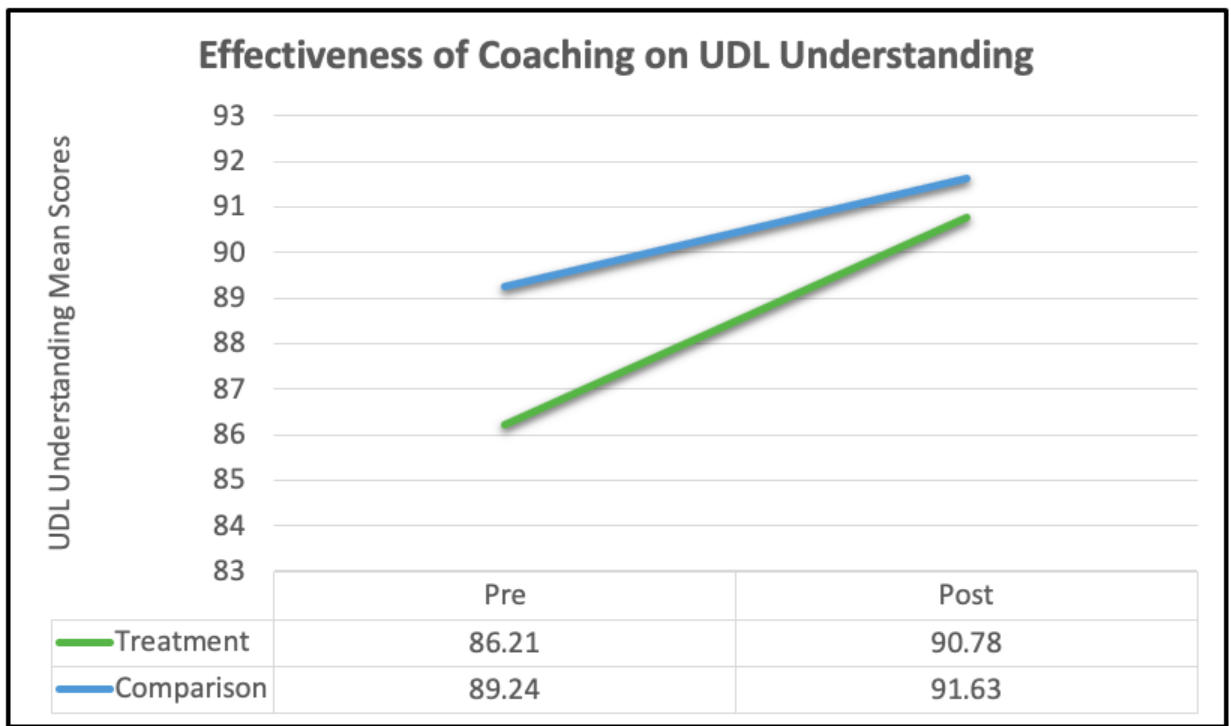
**Table 5***Universal Design for Learning – Understanding and Application Questionnaire Results*

	Teacher ID	UDL-U <sub>a</sub> Mean Pre-Score	UDL-U Mean Post-Score	UDL-A <sub>b</sub> Mean Pre-Score	UDL-A Mean Post-Score
Coached	3	76.71	100	66.75	96.11
	6	100	69.87	80.08	54.58
	15	92.79	100	83.39	100
	16	94.36	99.33	65.89	98.89
	17	78.93	95.27	72.25	79.75
	20	77.50	90.53	61.72	68.42
	23	90.43	97.20	82.61	73.83
	26	81.79	88.13	85.08	91.28
	29	92.71	89.93	85.72	85.72
	32	77.14	75.00	57.14	63.25
	34	100	93.87	68.97	91.86
	35	68.43	100	63.33	56.11
	39	84.64	81.53	73.31	83.67
	40	96.07	87.40	95.75	88.50
41	81.71	93.67	88.31	85.97	
Non-coached	1	95.14	95.00	90.56	90.78
	2	91.07	95.73	75.53	94.36
	4	96.43	93.20	97.19	89.00
	5	92.71	96.13	96.81	79.86
	7	81.64	80.40	64.83	86.14
	8	90.50	58.40	85.72	65.86
	9	94.36	82.40	91.72	59.44
	13	100	100	92.78	96.39
	14	95.07	98.53	89.00	86.67
	18	95.71	98.67	72.00	98.61
	19	99.93	80.67	75.14	71.67
	21	96.50	95.20	95.67	82.58
	22	66.21	98.00	57.61	95.06
	25	91.00	100	87.69	95.64
	27	100	86.87	60.83	95.11
	28	73.57	91.67	74.94	62.53
	30	87.86	99.13	77.89	97.03
	31	85.36	86.60	84.61	77.19
	33	91.07	98.67	91.25	94.50
	36	80.43	93.53	69.59	93.53
37	94.21	96.73	90.33	97.83	
38	94.79	91.60	88.25	87.56	
42	77.36	94.67	58.97	91.67	
43	70.93	87.33	71.89	78.36	

*Note:* a=Universal Design for Learning – Understanding section of questionnaire, b=Universal Design for Learning – Application section of questionnaire.

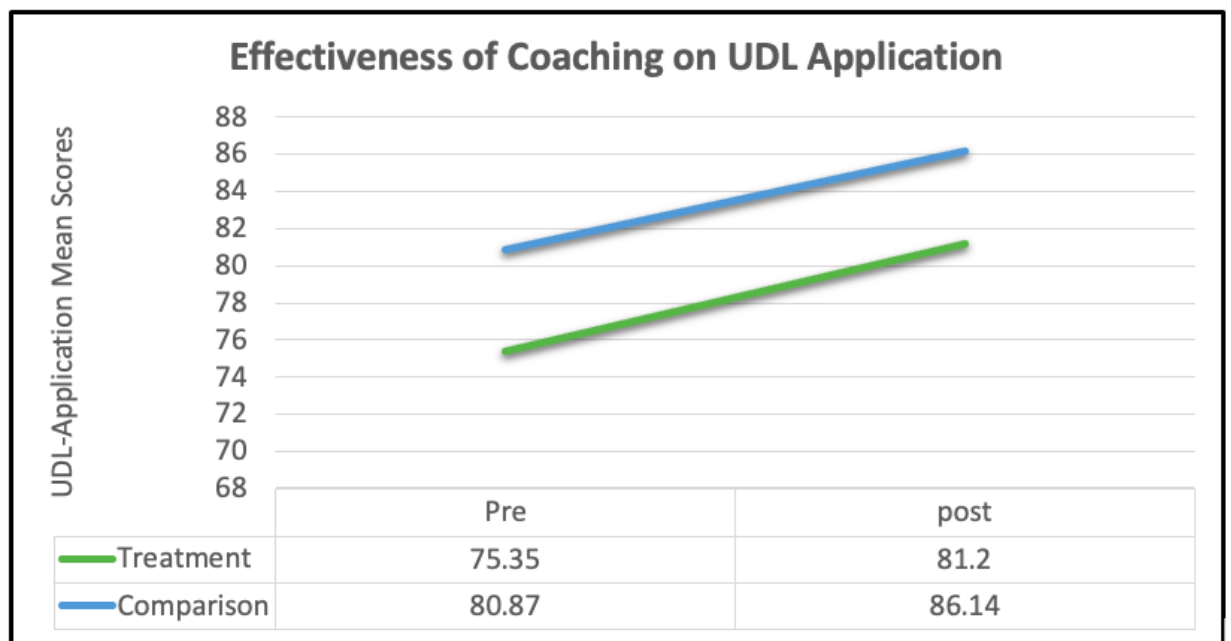
**Figure 4**

*Effectiveness of Coaching on Knowledge Acquisition of Universal Design for Learning*



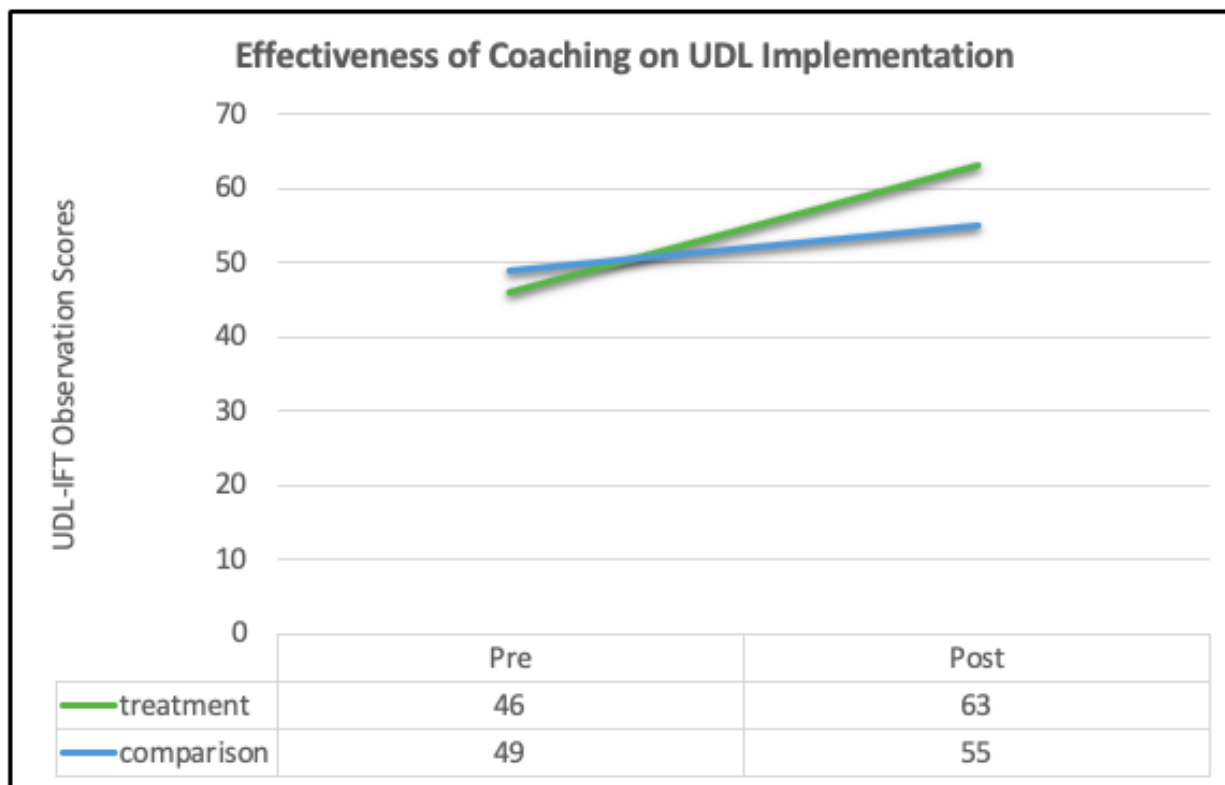
**Figure 5**

*Effectiveness of Coaching on the Application of Universal Design for Learning*



**Figure 6**

*Effectiveness of Coaching on Observed Implementation of Universal Design for Learning*



between the two groups at one time (time one or time two) is significant, but it is not significant at the other time, an interaction is suggested. Using two  $t$  tests is superior in this situation, because there are easy solutions for the violation of the homogeneity of variance assumption which is to adjust the degrees of freedom on the two  $t$  tests to correct for the unequal variances. Two  $t$  tests were conducted, but neither was significant, though the difference at the time of post-test neared significance ( $p = .15$ ). This confirmed the near significant results from the first analysis.

### **Teacher Interview Findings**

To respond to the research question specific to teacher adoption of the UDL framework in their classroom practice, interviews were conducted with ten treatment teachers. Teachers were assigned pseudonyms to ensure anonymity and encourage candid responses. The intent was

to better understand their knowledge and subsequent application of the UDL framework within their classroom practices. Findings identified four themes based on teacher responses: (a) change and/or improvement of practice, (b) coaches as a resource, (c) relational aspects of coaching, and (d) overall effectiveness of coaches.

### *Change and/or Improvement of Practice*

Teachers reported that instructional coaching had a significant influence on their ability to understand and then apply the framework to classroom practice. Access to an instructional coach appeared to offer the support teachers needed in their efforts to first understand the framework and then to implement it into their own practices. The impact of the coach appeared to specifically impact three areas of improvement: (a) increased intentionality in teachers' use of the UDL framework, (b) the ability to reflect on their instructional practice, and (c) teachers' awareness of their application of the UDL framework on student change.

Using the UDL framework initially during planning to strategically design for learners' needs requires intentionality, which is a dominant feature of UDL implementation (Meyer et al., 2014). The intentional use of the framework increased for many of the teachers interviewed. Teachers reported that coaching had helped them become more purposeful and intent with considering and meeting a wider range of students' needs, planning lessons, and using the UDL framework. Madelyn, a first-grade teacher, described her increase in intentionality as “[in the beginning of the year] I was in survival mode, and it [UDL implementation] wasn't as intentional as now. After coaching, you know, I'm thinking really more intentionally about each student.” Others agreed with Madelyn describing their intentionality as “more deliberate” and “focused on what is needed for kids.” Instead of planning as usual, teachers found themselves more deliberate in their planning, taking time to identify barriers in their instructional process as well as their

classroom. Teachers also began working on specific ways to develop materials and practices to ensure the removal or reduction of these barriers to student learning.

Other teachers shared how they began using the UDL framework more intentionally after the coaching cycle. Most teachers admitted that they found it difficult to reference the framework regularly before coaching. Although they were aware of the district initiative and reminded of the importance of the UDL framework to meet the need of all students, day-to-day challenges, and related responsibilities often prevented them from deliberately working to apply the principles of UDL. Victoria, a first-grade teacher, explained, “[in the past] I wouldn’t have connected the framework to my planning, but now it’s kind of always something that’s in the back of my mind.” Jane, a second-grade teacher, agreed that “through coaching, I have had to change how I plan.” Finally, third-grade teacher, Charlotte, shared:

Before it [UDL] was more something that I knew that I did in my lessons anyway and, hey, I’m doing UDL. Now I definitely feel more intentional about asking, is this UDL? Is this? Am I really trying to help them [my students] with this? Am I really trying to reach all my learners right now in what I’m doing? It’s [coaching] made me think more about it when I’m planning, when I’m teaching...in the moment of what I am doing. I want to start offering more options for my kids and really break down those barriers.

Instructional coaches also influenced teacher change by facilitating further teacher reflection. Knight (2009b) argues that teacher reflection is at the core of teacher learning and vital to teacher adoption of a new practice. Several teachers shared that working with an instructional coach enhanced their time to reflect. Working with a coach, they found themselves taking the time to reflect more on their teaching and student outcomes. They took the time to “stop and think” and “think in the moment.” While all teachers reported planning for student

learning, stepping back and reflecting on their own practices had not been central to their preparation. Charlotte described the reflection component, “It [coaching] helped even with just thinking. I thought more about taking time to find a topic that’s more interesting to them [students]...something that they really want to learn about.”

Charlotte further explained how critical the coach was in not only finding time for reflection, but also learning specific ways to reflect in order to alter her instructional practices. She explained:

Having someone else to talk through the lesson with really helped me with looking at the UDL aspect and that would help me think through. OK. What did I do? And what can I do next time and kind of go through all those different things? Like, it just really helped having someone to reflect with and encourage reflection.

Teacher reflection appeared to heighten the awareness of their change in their practices. Teachers who received instructional coaching agreed that seeing a change in student learning while reflecting with the instructional coach made them further appreciate the impact of the UDL framework on their instructional practice. For example, several teachers isolated this student change in a significant increase in the level of student engagement. Martha, a high school teacher, explained, “I find the students really like having choices available now.” Victoria, a high school colleague, echoed that observation, “they [students] can now choose the way [learning] that would be more comfortable for them.”

Finally, Margaret, a seventh-grade teacher, noted a similar change in the level of student engagement. One of her stated goals in working with the instructional coach was to improve her use of technology to facilitate student learning. She was particularly concerned about student access to content and their inability to use what she had designed within the district learning management system. Beyond organizing information, she was uncertain in how to further

facilitate student overall engagement with the instruction she had designed. Working with her instructional coach, Margaret reported an increase in student involvement in their own learning:

We started doing meditation...they [students] can now access the itsLearning™ [learning management system] page at any time, especially if it's something they really liked in school and in class. They [students] do meditations at home if they want to across settings. So, I think that was good.

Overall, the coaching experience assisted teachers in furthering their implementation efforts of the UDL framework. Teachers reported that coaches assisted them in becoming more intentional with their use of the framework. Additionally, coaches supported and encouraged teachers to become more reflective in evaluating their practices and aligning them with the framework. Finally, teachers found that they were making more intentional decisions based on the changes in students' engagement in their learning. In the instance of teachers who were coached in this study, the experience left them more confident in continuing with aligning their practices to the UDL framework.

### ***Coaches as a Resource***

Teachers also reported that coaches were a critical resource in their efforts to further understand and then implement the UDL framework into their classroom instruction. The coach as a resource actually took on two primary components. The first was the coach as a resource where they problem solved, modeled, and offered additional supports to facilitate UDL implementation. The second involved the coach providing different resources to assist in teacher implementation. Many teachers described how coaches assisted them in obtaining materials, technological resources, and new techniques to better use the UDL framework.

While materials and technological tools were helpful, teachers focused on coaching as a resource in providing timely feedback to problem-solve barriers and assist in overall planning and design of classroom instruction. Likewise, teachers reported relying on their coach to generate ideas and identify specific strategies that led to the further implementation of UDL.

Feedback was a central feature to all teacher-coach interaction. Logs completed by teachers and coaches showed coaching feedback was provided at all meetings and, many times, in between meetings. Teachers described feedback as “positive” and “helpful” as well as “timely.” Feedback by coaches included observations of what teacher did well specific to UDL implementation. For example, teachers reported that their coach pointed out areas of improvement. Charlotte explained, “she [coach] would point out what I did and what went where in the UDL framework.” Martha added, “I thought for the longest time that I wasn’t doing any UDL...that I was just failing...She’s [coach] like, ‘you did this and you did this’.” Martha and her peers noted that the feedback was not simply verbal but also written. Feedback was shared via email or written directions, and teachers noted how the feedback was explicit. Martha shared, “Her [coach] feedback was written...very detailed. She often wrote the feedback on the UDL framework so I could see exactly where things [strategies] fit.”

In addition to the explicit feedback, coaches also provided specific ideas. The ideas were often accompanied by specific strategies that fostered further teacher understanding of the framework and ways to implement it into their classroom practices. Teachers noted that coaches “help[ed] to spark new ideas” and “helped with thinking current.” In other words, the ideas and strategies allowed them to focus on a solution (e.g., UDL-based strategy) for a specific challenge. For instance, Mary, a fourth-grade teacher, reported that “she [coach] has all these really good ideas, and she’s very experienced. She [coach] gave me strategies that I could take

back and use the next day. That was helpful.” Another teacher, Victoria, whose goal included the use of more options at learning stations explained:

The most helpful elements were probably the suggestions I got for my teacher-led station. She [coach] gave me some really great ideas and strategies about how to make it [station] more interactive and engaging. It was valuable to have someone just to bounce things off of and give me new ideas. She [coach] would often send me links that I could look at and think through on my own time.

Overall, the coach as a resource was essential for teachers’ adoption of the UDL framework. The various resources and tools coaches provided to the teachers were essential in the change in their practice. These resources allowed them to operationalize the framework leading to the adoption of specific principles or guidelines. Coaches also acted as a resource in the capacity to support teachers in problem solving. Coaches assisted teachers in finding new practices that aligned with the UDL framework and implementing them in the classroom. Additionally, the modeling provided by coaches gave teachers additional support in the implementation of the new practices. Teachers felt that coaches as a resource was integral to the coaching experience’s success.

### ***Relational Aspects of Coaching***

Fundamental to the coaching model is relationship building. The coach is there to support the teacher. They need to establish a level of respect, trust, and illustrate a level of commitment in their efforts to support and facilitate change in teacher practices. The third theme to the teacher interviews recognized the importance of the coach-teacher relationship. Teachers identified this relationship as a key component in supporting their understanding of UDL and realizing their application of the principles in their classrooms. Each teacher described a strong

relationship emphasizing how it was supportive and motivating as well as non-threatening and safe.

Providing support and motivation proved to be a common thread of teachers' description of the relationship with the coach. Teachers identified coaches as "willing to help" and providing "guidance" throughout the coaching cycles. Margaret described the support from her coach, "She did exactly what I needed her to do. When something didn't work, she helped me fix it."

Teachers mentioned that coaching support included reminders of tasks to complete in order to reach goals and prompts for next steps in implementation efforts. Coaches were commended on their receptiveness to answer questions and act as emotional support for teachers. In addition, teachers described coaches as motivating to stay on task of moving toward the goals. Harriet, noted, "I love it [coaching], because it kind of made me stay on task. She's [coach] kind of like a cheerleader." Teachers agreed and added that the personal approach provided by coaches motivated teachers to continue the coaching cycle to completion.

Teachers also shared that the coaching process was non-threatening and safe. Teachers recognized this as a critical component to the relationship. Teachers emphasized that coaches were not "judgmental" and meetings were a "judgment-free zone." One teacher pointed out that coaching was effective "when you have that person that can coach you gently and guide you."

First-grade teacher, Madelyn, shared:

I think it makes a difference when the coach is open and receptive. And you know, it's just a non-threatening thing. And I think it's important who's in that role, because you need to feel safe with them. And I think that may be a big barrier for other teachers. Oh, you know, when this [UDL] was all rolled out years ago, I think that was an overwhelming feeling... that teachers were scared. They felt vulnerable, and so they felt

like they were going to be judged instead of supported. Anyway, that was not my experience.

In summary, establishing a relationship that was non-judgmental and supportive appeared to be central to effective coaching support. It should be noted, the nonthreatening aspect of the coach-teacher relationship is of particular importance. In this particular district, over half of the annual teacher evaluation measures a teacher's ability to implement the UDL framework within their instructional practices. Seeking district assistance (through a coach) to improve practice could easily be perceived as a teacher weakness. Instead, teachers reported the strength of the relationship fostered trust not judgement.

### *Overall Effectiveness of Coaches*

Central to the coach-teacher interaction was the level of experience the coach brought to the professional interaction. Teachers not only rated their coach's experience as highly effective, but reported this as vital to their ability to implement UDL into their classroom. For example, Victoria shared that the experience her coach brought to the classroom was essential to her learning. Whether it was a level of trust, the ability to empathize with her needs, or the coach's capacity to connect with the specific needs of her classroom, Victoria stressed experience was the common denominator. Victoria had such a positive experience she concluded her interview recommending coaching for all her peers. She explained:

It [coaching] was very effective and I learned a lot. I would definitely use it again to help me get further in using UDL in my classroom. I could use it every year, because the kids are different every year. And I would encourage other teachers to use it for UDL implementation.

Jane agreed adding that she “would encourage others to use it [coaching] for UDL implementation.” The experience of the professional coach empowered her as a teacher. Harriet added that “[coaching] was a great learning experience for me.”

Teachers reported feeling more confident in using UDL to reach their learners’ needs after coaching. Teachers gained new strategies and feedback that assisted them in reflecting on how they can change their practices. One caveat that many teachers felt made the coaching experience difficult and needed creative thinking to achieve was finding time in the day to interact with coaches. First-grade teacher, Madelyn, described the experience:

I think it [coaching] was highly effective in helping me use the framework. The only thing that I feel that could make it better. I mean, we're just under such a shortage of time, so trying to find a time to meet and when we're not rushed. I love the opportunity of sitting down with another professional and discussing, you know, this is what I'm doing. How could I make it better? These are the challenges? What are the barriers? How do we do that? I love that.

Despite the challenge of finding time in the day to meet, teachers expressed their satisfaction with the coaching and the desire to use their UDL coach in the future for assistance with implementing different components of the UDL framework. Coaches brought experience and resources to the coaching partnership. Their modeling of practices and ability to meet each teacher’s needs in regards to UDL implementation effectively supported the teacher’s learning and practice. Teachers endorsed coaching as an effective form of PD for understanding and applying UDL and making an impact on changing their practices.

## **Conclusion**

This chapter provides a description of the quantitative and qualitative data gathered through the UDL-UA questionnaire, the UDL-IFT observation, and interviews with teachers who received coaching scores respectively. A description of the findings from the analysis of the questionnaire and observation scores followed to answer the four research questions put forth at the beginning of this study. A narrative described the coaching experience from the teachers' points of view and uncovered four main themes: (a) change and/or improvement of practice, (b) coaches as a resource, (c) relational aspect of coaching, and (d) overall effectiveness of coaches. The quantitative and quantitative results both showed that coaching had a positive effect on teachers despite the lack of statistical significance. Chapter 5 will expand on these results.

## Chapter V: Discussion

Darling-Hammond, Hyler, and Gardner (2017) report that when teacher professional development (PD) is used to adopt change in classroom practice, it often falls short of the goal. Traditional PD generally treats teachers as passive learners featuring a "sage on the stage" or an expert consultant hired to teach a new instructional practice or corresponding framework. When the one-day event ends, the featured instructional expert often no longer offers ongoing support. Similarly, traditional PD doesn't create space for the teacher to reflect on their practice, measure the impact of their efforts on their students, and overall, is not designed to solve individual problems of practice (Yoon et al., 2007).

Instructional coaching has been shown to further the effects of traditional PD for teacher improvement and student achievement (Nugent et al., 2016; Lockwood et al., 2010; Kraft et al., 2018). Coaching has been suggested as a feasible way to provide on-going and effective PD to support teachers (Yoon et al., 2007; Denton & Hasbrouck, 2009; Carlisle & Berebitsky, 2011). In fact, current research on the impact of instructional coaching is primarily coupled with traditional teacher PD. This is an important potential limitation, in that the impact of instructional coaching may be established by first gaining access to teacher PD. In this instance, instructional coaching may simply be an extension of effective PD.

In this study, instructional coaches provided professional learning in order to alter teacher knowledge and classroom practice in the application of the Universal Design for Learning (UDL) framework. Instructional coaching has been shown in literature to be an effective catalyst to facilitate teacher change (Cantrell & Hughes, 2008). Combined with teacher PD, coaching has shown to be effective in knowledge acquisition (Batt, 2010; Garet et al., 2008) or ongoing application (Teemant et al., 2011, 2014; Sailor & Price, 2010, 2015; Carlisle & Berebitsky, 2011;

Johnson, 2018; Kretlow et al., 2011, 2012; Saraniero et al., 2014) of new practices. The current study examined coaching uncoupled from traditional PD to determine the impact coaching alone had on teachers' reports of their knowledge acquisition and application of the UDL framework as well as their observed implementation of the framework. The intent was to support teachers in their classroom, address specific needs across a period time to address teachers' need to understand and apply new practices (i.e., UDL). Expectations included increased teacher knowledge and implementation of the UDL principles and guidelines in their classrooms. Aligning teacher practice to this framework has the potential for ensuring the delivery of effective instruction in increasingly diverse classrooms (Pilgrim & Ward, 2017; Ralabate & Nelson, 2017; Meyer et al., 2014).

### **Implications**

The purpose of this study was to answer questions about the effectiveness of coaching on the knowledge and application of teachers' implementation of new practices (i.e., UDL) and discover how teachers described the coaching experience. First, teachers reported on their understanding of the framework. Results indicated that no significant difference was found between the teachers receiving coaching and the those who did not. Results showed that both treatment and comparison group teachers increased their understanding of the UDL framework over the course of the four-month period. The treatment group began the study with a mean score of 86% and increased their score to 91%. The comparison group began the study with a mean score of 89%, yet their mean score only raised to 92%. Teachers receiving coaching experienced a sharper increase in their mean UDL understanding score, whereas the comparison group teachers made a slight improvement.

The lack of significant findings could not support that IC was effective in increasing teachers' understanding of the UDL framework, yet a number of variables should be considered. For example, the lack of random assignment of teachers to receive the intervention in this study allows for a saturation of novice teachers needing assistance with UDL implementation in the treatment group. Over 73% of the treatment teachers were novice teachers (five or less years of experience), whereas 50% of the comparison group consisted of teachers considered to be experienced teachers with over six years of experience. Of those teachers, over 66% had taught 15 years or more. The trends of the treatment group with limited experience with the UDL framework equaled or out-paced the experience of teachers with longer exposure to the UDL framework. Additionally, all teachers in this district have the motivation to increase their understanding of the framework due to annual evaluations that includes UDL implementation levels. Teachers must be evaluated to be 'effective' or 'highly effective' to receive salary increases.

Teachers reporting on their level of UDL application in the study also yielded insignificant findings. Consistent with earlier results on teachers' understanding of the UDL framework, results showed that both treatment and comparison group teachers increased their application of the UDL framework over the course of the four-month period. Both groups showed relatively equal improvement on their overall application of UDL, although treatment teachers began at a lower level than comparison group teachers. Coached teachers experienced an increase from 75% to an average of 81% while comparison teachers began at 81% and experienced an increase to an average of 86% at the conclusion of the study.

Variables to consider with these findings are consistent with the above-mentioned results on teachers' understanding of UDL. The majority of the treatment group were novice teachers

who did not have the experience or practice in using the framework to design instruction that the comparison group possessed. Novice teachers acquiring new skills require more time to embed new practices in their classrooms, whereas veteran teachers can acquire new skills at a faster rate. Furthermore, this comparison group was not controlled for all UDL exposure. The expectation for all teachers to grow in their use of the UDL framework points to the high probability that comparison group teachers had received information that increased their application of the framework. For example, responding to the UDL-UA questionnaire at the beginning of the study (pretest) may have served as a reminder to comparison group teachers of the implementation of the framework in specific ways that possibly led to their growth. Another consideration taking into account the high levels of scores reported by many teachers in both groups left little room for growth resulting in a ceiling effect. The measurement tool, in fact, may not have had the sensitivity to measure the differences at a significant level at such high levels.

Teachers were observed and measured on the level of implementation of the UDL framework with the UDL-IFT instrument. The findings from the data yielded no statistical significance to suggest coaching improved teachers use of the UDL framework in their classrooms. While the findings were insignificant, it neared significant levels ( $p=.096$ ). This instrument allowed for teachers' input on their use of the framework while also considering the observed use of the framework by the researcher. The interaction that occurred showed that treatment teachers began at near levels to the comparison group (46% and 49% respectively). However, the treatment teachers increased in their use of UDL 11% higher than the comparison group. Based on the trajectory of growth, it might be hypothesized that if the study continued until the end of the academic year, treatment teachers may have continued to outpace their

comparison counterparts leading to results that would have reached a statistically significant level.

Only 18 teachers were observed which leads to the possibility that if all participants had been observed there may have been different results. Too few participants in a group design study often affect the outcomes. However, although a significant result did not occur that showed coaching had effects on teacher change (i.e., UDL implementation), the treatment group did surpass the comparison group in observed use of the framework.

Finally, differences between the treatment and comparison groups are illustrated through teacher interviews with treatment teachers conducted to discover how they described their coaching experience. Teachers overwhelmingly reported that the coaching experience supported them in changing their practice, increasing their comfort level with the framework, and increasing their awareness of the framework. The results of the quantitative data analyses and the qualitative analysis appears to contradict one another. However, the treatment teachers determined IC to be the reason for their growth in UDL knowledge and their subsequent ability to improve practice in their classroom. Teachers described the impact on their professional growth from the level of support, guidance, critical feedback, and cultivation of professional reflection. Teachers reported using the framework more intentionally and being more pro-active in planning for the diverse learning needs of their students. These reports of the coaching experience coupled with the levels of increase for treatment teachers indicate that coaching may have had some effect on the teachers despite the non-significant findings.

### **Limitations**

Despite the findings of growth in teacher knowledge and application, there are limitations to be noted. The district site was selected specifically for its high level of the UDL framework at

all levels of practice. Teachers in this district create yearly professional goals surrounding UDL. The district creates numerous opportunities and provides resources for teachers to ensure that they increase their knowledge and use of the framework and meet their professional goals. A summer institute focusing on UDL implementation as well as professional development opportunities throughout the school year support all district teachers with the use of the framework. Teachers who participated in this study all had equal opportunity to receive multiple trainings on UDL. In a district that has UDL ingrained into its culture, the possibility that all teachers were receiving an “intervention” potentially made it difficult for teachers not to show marked improvement. Both groups, comparison and treatment, showed improvement over time on all scales. Therefore, indications show that the comparison group did not function as a “business as usual” group having all exposure to UDL training controlled. Rather the comparison group was impacted by ongoing PD opportunities offered throughout the district. Therefore, the uniqueness of the comparison group and growth they showed could reinforce the value of the outcomes for the treatment group.

The questionnaire used as a measurement tool introduced a few limitations. First the questionnaire could be viewed as part of an intervention that all teachers in the study received. One teacher in the comparison group shared with the researcher that the questionnaire had helped her reflect on how she could utilize the framework more and make changes to her practice. This was not the purpose of the questionnaire, but this anecdotal data points to the possibility of this unintended use for additional teachers. The questionnaire in effect acted as a reminder to the comparison group teachers in regards to the UDL implementation that should be occurring in their classrooms.

Secondly, the pre and post nature of the questionnaire could also pose an issue with teachers inflating pre scores and lowering post scores after reflecting on the actual level of knowledge and application that occurred over the course of time. This phenomenon is referred to as Response Shift Bias (Drennan & Hyde, 2008; Lam & Bengo, 2003). Teachers completing a posttest realize that their perceived knowledge or skill level prior to an intervention was in fact less than they thought at the completion of the pretest. Sixty percent of treatment teachers in this study reported lower understanding and/or application post scores compared to 50% of comparison teachers who reported lower understanding and/or application post scores. This could indicate pre score inflation.

Third, teachers reporting high levels of their understanding and application of UDL in their classrooms could be indicative of the high expectations placed on teachers to share high levels of implementation. The expectations and probable high levels of implementation for teachers with extensive experience with the framework coupled with the nature of the instrument could explain the high levels reported in the pretest phase. These initial high levels left teachers with little room for growth indicating a ceiling effect in regards to the amount of growth the teachers could experience. The questionnaire may not have been sensitive enough to measure the small distinctions between the pretest levels and the posttest levels. These limitations surrounding the questionnaire indicate that other methods of teacher reports should be explored.

Finally, the sample size of teachers in this study was problematic. Two different recruitment methods took place. Comparison teachers were recruited from the circulated questionnaire in September, 2019. Teachers who completed the questionnaire, indicated they would not be requesting coaching, and gave consent to become part of the comparison group. Treatment teachers were initially invited to participate if they were going to seek coaching. Then

they were approached once they had voluntarily requested coaching from their building UDL coach and asked to complete the pre questionnaire. The intended purpose of this method of recruiting the treatment group allowed for teachers to participate who sought coaching for genuine assistance from the UDL coach as opposed to randomly assigning teachers to receive an intervention they may be resistant to. However, due to the design of the study, teachers who requested coaching were limited to the four UDL coaches taking part in the study and the time frame for teachers to request assistance. Furthermore, teachers in this district request coaching throughout the entire school year. The recruitment for this study occurred during a four-week window in September at the beginning of the academic year. A small sample size makes finding significant differences more difficult overall.

### **Recommendations for Future Research**

Based on the limitations of this study, four recommendations can be made for researchers replicating this study or conducting a study around coaching and UDL. Research in a different school district, an alternative method of collecting self-reporting data, larger treatment and comparison groups, and interventions conducted over the course of a longer period of time may produce findings that more accurately convey the impact of coaching on the UDL framework.

First, additional research should be conducted in districts that are introducing UDL implementation or less saturated with UDL practices to ascertain the growth provided through coaching. This would allow for a traditional “business as usual” comparison group that is not receiving information or training in a format other than coaching. The district site for this study has a primary focus on the implementation on UDL. Teachers are reinforced to use the framework through the infrastructure that is in place including yearly evaluations of UDL implementation. Thus, conducting research in a setting that does not have UDL embedded into

its infrastructure might provide additional insight as to the effectiveness of instruction coaching to further UDL implementation in the classroom.

Secondly, questionnaires serve as a common measure tool, however a possible limitation surrounding this questionnaire suggests an alternative method may be in order. The potential for the questionnaire to serve as an intervention was reported by a comparison group teacher as she shared its usefulness for her reflection of her UDL implementation. Therefore, using a difference pre/posttest method could yield different results. For example, the post and retrospective pretest method (Lam & Bengo, 2003; Hill, 2019) with the questionnaire could possibly address the inflated pre-test scores. This method measures the change with a posttest tool that asks participants' to report their perceived growth in knowledge or skill level at the end of the intervention and to retrospectively report their prior knowledge and skill levels at the same time at the end of the intervention period.

Examining a larger number of participants and/or a different method of distribution of participants is recommended. Having a larger treatment and comparison group of teachers would solve the difficulty that smaller sample sizes create in data analysis in a group comparison design. In this study, treatment participants voluntarily request coaching which would presuppose that treatment teachers would be more motivated to improve and more apt to report a positive experience with coaching. On the other hand, random assignment of participants into either the treatment or comparison group might offer an added layer of insight into the impact of instructional coaching on teacher change.

Finally, conducting the treatment over a longer period of time may enhance teachers' capacity to further their efforts in implementing a framework with the complexities of UDL. Effective PD includes sustain duration of training for teacher change to occur (Desimone & Pak,

2017; Darling-Hammond et al., 2017). The coaching cycle in this particular study was based on the lower amount of coaching interaction reported in literature. However, extending the intervention over the course of the entire school year may produce a statistically significant difference between the treatment and comparison groups.

### **Conclusion**

Teachers improving their practices require PD that effectively supports knowledge and skill acquisition for subsequent application to occur. The results of this study indicate that more research needs to take place to provide evidence of the effectiveness of IC on teacher change specifically with respect to increased implementation of the UDL framework. The growth of knowledge acquisition and subsequent application of UDL based on observations and teacher's interviews, shows that coaching uncoupled from initial PD has potential to support professional learning. The results and responses from teachers implies a positive impact on teachers' capacity for change and their increased implementation of the UDL framework. IC appears to have the potential to provide this support for changes to improve instruction that will meet the needs and result in higher outcomes for more diverse students.

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## Appendix A

## Recruitment Email Flyer



Universal Design for Learning  
Implementation and Professional Development  
**Research Participants Needed!**

Do you implement the UDL principles and guidelines  
in your classroom to include all learners?

Are you willing to share your UDL experience?

- Participant Criteria**
- Classroom teachers
  - Implementing UDL
  - Any level (K-12)
  - Any content area

**What will I  
need to do?**

- Complete Pre- and Post-survey to self-report on understanding and application of UDL
- Pre- and Post-observations conducted between August and January
- Participate in an interview\*

***To sign up just reply "YES" in the subject area of this email!***

\*Only 10 randomly selected participants from the treatment group will be interviewed. Treatment group will be teachers planning on utilizing their building UDL Facilitator for coaching between August and October of 2019. Control group will be teachers unlikely to seek UDL coaching from their building UDL Facilitator between August and December of 2019.



For more information contact:  
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## Appendix B

## Coaching Log Sample and Protocol

Coaching Log		
Teacher Name: <input style="width: 50px;" type="text"/>	School: <input style="width: 50px;" type="text"/>	Date: <input style="width: 50px;" type="text"/>
Goal set (only fill out for session that goal was set): <input type="checkbox"/> Student <input type="checkbox"/> Teacher <input type="checkbox"/> Both		
<b>UDL Focus:</b> (check all that apply)	<input type="checkbox"/> Goals <input type="checkbox"/> Representation Guideline(s) <input style="width: 50px;" type="text"/>	<input type="checkbox"/> Remove Barriers and provide scaffolding <input type="checkbox"/> Action and Expression <input type="checkbox"/> Engagement
<b>Action of meeting:</b> (check all that apply)		
<input type="checkbox"/> Model a skill <input type="checkbox"/> Training <input type="checkbox"/> Planning <input type="checkbox"/> Observation by coach <input type="checkbox"/> Other: <input style="width: 50px;" type="text"/>		
<b>Reflection done during meeting</b> <input type="checkbox"/>		
<b>Feedback done during meeting</b> <input type="checkbox"/>		
Time meeting began: <input style="width: 50px;" type="text"/> Time meeting ended: <input style="width: 50px;" type="text"/>		
Notes: <input style="width: 100px;" type="text"/>		

*Fill in the Coaching Cycle Report according to the definitions in the table below.*

Element of Coaching Cycle	Participants	Definition
Goal	Teacher & Coach together	Coach supports the teacher in setting a goal for the coaching cycle. Specific to student outcomes, teacher outcomes, or both. Removing embedded tasks, plan for posting options, and plan for vocabulary instruction.
UDL Focus	Teacher & Coach	Areas that align with the teacher success rubric. Areas are part of goal set by teacher and coach to plan, train, and execute strategies that align with the UDL

		principles and guidelines. Specific guidelines focus should be included.
Action of meeting	Teacher & Coach	<i>Model a skill</i> – coach models a strategy for the teacher in class. <i>Training</i> – coach instructs the teacher on a skill or strategy. <i>Planning</i> – teacher and coach meet to set goal or meet to determine plan of action for coaching. <i>Observation</i> – coach observes the teacher instructing, students participating, or the classroom environment (LED). Other is available for other actions that do not fit within the other categories but align with the UDL focus.
Reflection	Teacher & Coach	Coach supports the teacher with reflecting on the current state of learning environment using reflective communication skills (see ICT skills). Reflection can occur in writing (e.g., email, log) or in person.
Total number of minutes per session	Teacher and Coach together	Report to the nearest time offered (i.e., 15, 30, 45) in minutes
Feedback	Teacher & Coach together	Coach provides the teacher with mastery-oriented feedback that offers options to the teacher for (a) reflection, (b) action, or (c) change in their use of the UDL framework in their lesson/learning environment planning.
Notes	Coach	Any relevant information that should be noted coming from the session being logged.

## Procedure

1. Teacher name:
  - a. Fill in the teacher's full name.
  - b. Teachers are volunteering, but they will be de-identified.
  - c. Teachers will be assigned a pseudonym for interviews.
2. School number

- a. Each school has a code
  - b. You will be provided with the code to include on the form
3. Goal
  - a. Check the appropriate box for whom the goal has been set
4. UDL Focus
  - a. Check all that apply
  - b. Note the specific guidelines. You can write in the number (e.g., 4.1) or write each out.
5. Reflection
  - a. Check if the teacher reflected alone in writing or with the coach verbally
  - b. Check if the coach gives the teacher a focus to reflect upon after meeting
  - c. Check if the coach used ICT reflective communication skills to guide the teacher's reflection in a session
6. Total number of minutes per session
  - a. Options are in 15-minute increments
  - b. Choose the minutes closest to actual minutes of the session
  - c. If coaching meeting exceeds 60 minutes, please make a note on form.
7. Feedback
  - a. Check if coach has provided mastery-oriented feedback
  - b. Check if feedback was discussed in the session
8. Notes
  - a. Make notes of any relevant information coming from the logged meeting
  - b. Leave blank if there are no additional notes to log.

## Appendix C

## Universal Design for Learning – Understanding and Application (UDL-UA) Questionnaire

Demographic Questions	Answer type	Reason for question
What is assigned employee number?	Fill in blank	Matching pre and post questionnaire data
What best describes the level you teach this year?	Drop down box	Sub-group for analysis
What best describes the content area you teach this year?	Drop down box	Sub-group for analysis
How many years of teaching have you completed at your district?	Drop down box	Sub-group for analysis
Which gender do you identify with most?	Drop down box	Sub-group for analysis
What race do you identify with most?	Drop down box	Sub-group for analysis
Did you attend the 2019 Summer UDL Institute at BCSC?	Yes or No	Sub-group for analysis
Choose all of the ways you will use your building's UDL coach.	Drop down box	Recruitment purposes for treatment and comparison groups

**Part 1: Self-Reported Understanding of the UDL Framework**

Understanding Statement	Sliding Scale (0-100)			UDL Specifications
Q1 I think knowing my learner variability helps to inform my instruction.	Strongly Disagree	I'm not sure	Strongly Agree	Learner variability
Q2 I think that barriers can be multi-dimension (i.e., physical, emotional, cognitive) for students.	Strongly Disagree	I'm not sure	Strongly Agree	Barriers
Q3 I think that considering emotional/social skills is part of implementing UDL.	Strongly Disagree	I'm not sure	Strongly Agree	Cultural/Internalized Skills
Q4 I think that scaffolding describes the support that teachers use to assist students until the support is no longer needed in learning a skill.	Strongly Disagree	I'm not sure	Strongly Agree	Scaffolding
Q5 I think that part of my role as teacher is developing expert learners.	Strongly Disagree	I'm not sure	Strongly Agree	Expert learner qualities
Q6 I think that UDL focuses on proactively designing instruction to meet the needs of varied learners.	Strongly Disagree	I'm not sure	Strongly Agree	Design
Q7 I think barriers can be anything in the learning environment that prevent a student from learning.	Strongly Disagree	I'm not sure	Strongly Agree	Barriers
Q8 I think that implementing UDL is a process that develops over time.	Strongly Disagree	I'm not sure	Strongly Agree	UDL framework (general)
Q9 I think that the guidelines of UDL have a relationship across the principles.	Strongly Disagree	I'm not sure	Strongly Agree	UDL framework (general)

Q10	I think that teachers should strategically design what options they provide students.	Strongly Disagree	I'm not sure	Strongly Agree	UDL framework (general)
Q11	I think that when a teacher designs lessons they need to begin with the goal(s).	Strongly Disagree	I'm not sure	Strongly Agree	UDL framework (general)
Q12	I think that the UDL framework is a checklist of things to do to meet the needs of learners.	Strongly Disagree	I'm not sure	Strongly Agree	Goals
Q13	I think that even implementing a few guidelines can create a more accessible learning experience.	Strongly Disagree	I'm not sure	Strongly Agree	UDL framework (general)
Q14	I think that the curriculum is disabled and needs to be fixed, not the students.	Strongly Disagree	I'm not sure	Strongly Agree	Learner Variability

### Part 2: Self-reported Application of the UDL Framework

	Application Statement	Sliding Scale (0-100)			UDL Specifications
Q15	I deliberately use strategies to build relationships with my students.	Never	About half the time	Always	GL7: Recruiting Interest
Q16	I consider the different needs of my learners when I plan my instruction.	Never	About half the time	Always	Learner variability
Q17	I plan using the UDL guidelines when designing my learning environment.	Never	About half the time	Always	UDL framework (general)
Q18	I post learning goals in a visible area in my classroom.	Never	About half the time	Always	GL8: Sustain Effort
Q19	I discuss the learning goal(s) with students in ways that make the goal(s) understandable to each learner	Never	About half the time	Always	GL8: Sustain Effort
Q20	allow students to set their own personal academic goals.	Never	About half the time	Always	GL8: Sustain Effort
Q21	I guide my students in monitoring their progress toward goals.	Never	About half the time	Always	GL6: Executive Function
Q22	I intentionally make sure that the instructional materials are appropriate to meet the goal(s) <i>prior</i> to instruction.	Never	About half the time	Always	Design
Q23	I allow students to have access to any materials/tools they need to complete a task.	Never	About half the time	Always	GL4: Physical Action
Q24	I am aware of emotional threats in my learning environment (including my body language or tone of voice).	Never	About half the time	Always	GL7: Recruiting Interest
Q25	I balance the challenge of tasks with appropriate resources to encourage students to persist through challenges.	Never	About half the time	Always	GL8: Sustain Effort
Q26	I use strategies to create an atmosphere of community in my classroom.	Never	About half the time	Always	L8: Sustain Effort

Q27	I give my students immediate feedback (i.e., during class, within 48 hours) that gives them suggestions on how to improve.	Never	About half the time	Always	GL8: Sustain Effort
Q28	I build in daily time for my students to be reflective on their learning.	Never	About half the time	Always	GL9: Self-Regulation
Q29	I teach strategies to students to help them self-regulate when they are struggling with learning.	Never	About half the time	Always	GL9: Self-Regulation
Q30	I provide my students a positive outlet for their emotional needs (e.g., cool-off area, teach strategies, mood meter).	Never	About half the time	Always	GL9: Self-Regulation
Q31	I plan my instruction by aligning it with the goal(s) <i>prior</i> to teaching.	Never	About half the time	Always	Design
Q32	My instruction includes multiple sensory components (e.g., video, images, audio, manipulatives).	Never	About half the time	Always	GL1: Perception
Q33	I give students options in how they want to <i>receive</i> content.	Never	About half the time	Always	GL1: Perception
Q34	I provide the option to students to have materials in their first language.	Never	About half the time	Always	GL2: Language
Q35	I give my students a <i>voice</i> in the options available to show their understanding of content.	Never	About half the time	Always	GL4: Physical Action
Q36	I give my students a <i>choice</i> in how they can show their understanding of content in multiple ways.	Never	About half the time	Always	GL5: Expression Communication
Q37	I allow all students to use the scaffolding that is provided in my instructional activities.	Never	About half the time	Always	Scaffolding
Q38	I reflect on my instructional practices for barriers throughout the year.	Never	About half the time	Always	Design
Q39	I provide options for materials in multiple media (e.g., paper, electronic, manipulatives, interactive tools) to allow my students to show their learning.	Never	About half the time	Always	GL4: Physical Action
Q40	I explicitly teach organizational strategies to my students.	Never	About half the time	Always	GL6: Executive Function
Q41	I offer varied ways for students to respond in class.	Never	About half the time	Always	GL5: Expression and communication
Q42	I align goals to the assessments <i>prior</i> to instruction.	Never	About half the time	Always	Design
Q43	I provide background knowledge in lessons to support students' comprehension.	Never	About half the time	Always	GL3: Comprehension
Q44	I offer students options in how to be assessed.	Never	About half the time	Always	GL5: Expression and communication
Q45	I build in levels of challenge with support for all of my students.	Never	About half the time	Always	GL7: Recruiting Interest
Q46	I integrate technology into instructional tasks in ways that align with UDL guidelines.	Never	About half the time	Always	GL4: Physical Action

Q47	I discuss the qualities of being an expert learner with my students throughout the year.	Never	About half the time	Always	Expert learners
Q48	I plan instruction to provide opportunity to support students transferring skills to other contexts.	Never	About half the time	Always	GL3: Comprehension
Q49	I consider the language support needs of my learners when planning my content.	Never	About half the time	Always	GL2: Language
Q50	I reflect on my growth in applying the UDL framework to my learning environment.	Never	About half the time	Always	UDL framework (general)
Q51	What are the barriers you have encountered in the implementation of the UDL framework?	Open ended question			Qualitative data

## Appendix D

### Teacher Interview Protocol and Questions

Interviews will be conducted face-to-face and last between 30 to 45 minutes. Follow the steps outlined below. Scripted items that must be included appear in red.

- Introduce yourself and thank the interviewee for participating in the study and providing the valuable insight into the coaching experience.
- Read the instructions below to the interviewee.
- Asterisked questions are primary questions that should be asked first. You can return to other questions to further probe for more in-depth answers.

Read instructions to all interviewees:

The purpose of this interview is to gain a better understanding of your experience with coaching as a resource for UDL implementation and your understanding and application of the framework as a result of that coaching experience. The answers you give to the questions in this interview will be confidential and your identity will be masked with a pseudonym in the transcription and reporting of your answers.

*(Category 1: Overall coaching experience)*

1. How effective would you describe your coaching experience in supporting you with implementing UDL?
2. Would you use coaching again for UDL implementation? Why or why not?

*(Category 2: Practice prior to coaching experience)*

1. Please describe to me how you planned for the variability in your classroom at the beginning of the year before you used coaching.
2. How frequently did you reference the framework in planning for the variability?

*(Category 3: Support of coaching during coaching cycle)*

1. Over the period of receiving coaching, what were the most helpful elements for you?
2. How were observations helpful to you during your coaching experience?
3. Describe the type(s) of feedback you received and how helpful it was in meeting your goal.
4. How did coaching support you using the UDL framework to address barriers?
5. How did the coaching interaction help you use the UDL framework to scaffold assignments/tasks for your students?

*(Category 4: Change in practice and belief post coaching experience)*

1. What specific changes have you made using UDL to improve students' access and participation?
2. How has your knowledge and/or application about UDL changed through the coaching cycle?
3. What are your next steps to implementing UDL in your classroom?

## Appendix E

## Letter of Consent

The Department of Special Education at the University of Kansas supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish to participate in the present study. You should be aware that even if you agree to participate, you are free to withdraw at any time without penalty.

We are conducting this study to better understand teachers' understanding and application of the Universal Design for Learning (UDL) framework. As a participant, you will be asked to complete the UDL understanding and application questionnaire. Your participation in the questionnaire is expected to take approximately 20-25 minutes to complete. The content of the questionnaire should cause no more discomfort than you would experience in your everyday life. Secondly, you will be asked to allow the researcher to conduct a pre and post 45-minute observation that will be video recorded for further analysis. Participation in the two classroom observations will not entail any prior preparation from you. Finally, you will be asked to participate in an interview that will be conducted after the observations. The interview will 30-45 minutes of your time.

Although participation may not benefit you directly, we believe that the information obtained from this study will help us gain a better understanding of the level of understanding and implementation of different aspects of the UDL framework in BCSC. Your participation is solicited, although strictly voluntary. As a participant of this study, several steps will be taken to protect your identity. Video and audio recordings will have all identifiers (e.g., name) removed and will be kept housed on external storage (e.g., thumb-drive) that will be kept in a locked office in Joseph R. Pearson Hall on the University of Kansas campus. All recordings will be deleted no longer than one year after the completion of the study. Your name will not be associated in any way with the research findings. Your identifiable information will not be shared unless (a) it is required by law or university policy, or (b) you give written permission. *Any identifiable information will be coded within the district before sharing with researchers at the University of Kansas. It is possible, however, with internet communications, that through intent or accident someone other than the intended recipient may see your response.*

If you would like additional information concerning this study before or after it is completed, please feel free to contact us by phone or mail. Completion of the questionnaire and consent to participate in observations and interviews indicates your willingness to take part in this study and that you are at least 18 years old. If you have any additional questions about your rights as a research participant, you may write the Human Research Protection Program (HRPP), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7563, email [irb@ku.edu](mailto:irb@ku.edu).

Sincerely,

Stephanie L. Craig, M.Ed.  
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[seanj@ku.edu](mailto:seanj@ku.edu)

**PARTICIPANT CERTIFICATION:**

I have read this Consent and Authorization form. I have had the opportunity to ask, and I have received answers to, any questions I had regarding the study. I understand that if I have any additional questions about my rights as a research participant, I may call (785) 864-7429 or (785) 864-7385, write the Human Research Protection Program (HRPP), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7568, or email [irb@ku.edu](mailto:irb@ku.edu).

I agree to take part in this study as a research participant. By my signature I affirm that I am at least 18 years old and that I have received a copy of this Consent and Authorization form.

Type/Print Participant's Name:

Date:

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Participant's Signature