Teacher Perception of Tasks That Enhance Data Interpretation

By

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Abstract

The purpose of this study is to provide an account of teacher perception of core practice tasks in data use, particularly data interpretation. Data interpretation is critical to professional practice in planning instructional adjustments for student learning. This is a case study of four elementary teachers who provide numerous task-specific examples of data use. The findings yield a 3-phase model of tasks that support data interpretation. Phase 1 (Observation) entails collecting critical skill data from various sources and analyzing data using familiar frameworks such as standards-based criteria for core subjects. Phase 2 (Interpretation) is comprised of three core tasks: comparing scores to predetermined target ranges, contemplating student connections to curriculum, and integrating student-based information if/when students fall short of achievement targets. Phase 3 (Adjustment) involves reinforcing student learning and referring students for specialized services when warranted. Variable practices in this data use model are attributed to teacher perceptions of successful or unsuccessful students. Discussion encompasses study implications, connections to existing literature, study limitations, and extended research recommendations.
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Chapter 1: Introduction

Overview

With accountability expectations leveled at schools to report measurable improvements in student achievement, educators in school settings seek deeper understanding and expertise in working with achievement data. Setbacks occur when there is uncertainty about the tasks that teachers embrace or reject when diagnosing instructional problems and refining educational practice (Armstrong & Anthes, 2001; Datnow, Park & Wohlstetter, 2007; Knapp, Swinnterton, Copland & Monpas-Huber, 2006). Although the literature is replete with speculation about what teacher data use should ideally encompass (Hamilton et al., 2009) skeptics argue that more research is needed that is representative of the legitimate voices of teacher practitioners about this aspect of their work. Since instructional strategies are entwined with teacher perceptions and data interpretation, advocates for improving school data systems seek a concrete understanding of teaching tasks critical to data interpretation.

To approach the problem of understanding the tasks of teacher practice that enhances or militates data interpretation, analyzing key tasks of practice is necessary. The literature affirms that the variety of data-specific tasks is extensive. Implications for teacher expertise in data-related teaching tasks might vary depending on the culture of schools with regard to its approach to data use. Some schools might have teaching staff share the responsibility of data use (Copland, 2003), whereas other schools might establish a team of teacher specialists with data-related duties (Anderson et al., 2006;
Feldman & Tung, 2001; Wayman, Cho & Johnston, 2007). Therefore, the data use structures that schools design will no doubt determine the extent that all teachers within that system may experience changes in practice. Some schools adopt structures of shared tasks of data analysis, as in situations of grade level assessments where teachers actively analyze and discuss patterns of success, stagnation, or failure. Other schools may delegate data-related tasks to other “expert” personnel (resource staff, building principals, data or curriculum specialists), which potentially marginalizes a classrooms teacher from direct interaction and interpretation of achievement scores.

This study assumes that the teacher workforce will be met with increasing expectations to be the direct handlers of achievement data (Armstrong & Anthes, 2001; Datnow, Park, & Wohlstetter, 2007; Hamilton et al., 2009; Knapp et al., 2006). As teachers assume tasks of data collection, they interpret data (collaboratively or independently) to make necessary adjustments in instruction (Hamilton et al., 2009). As schools explore structures to support data use and practice, it presses the need to understand what teaching professionals perceive to be significant tasks that enhance successful data interpretation. This contribution to the knowledge base of data use informs stakeholders in education to support core tenants of practice from the authentic perspective of teacher practitioners.
Mandates and Teacher Perceptions

A teacher’s perspective of his or her data use presents critical information about tasks (or teaching skill sets) they value as relevant to successful data interpretation and adjusted instructional approaches. When teachers hold variable opinions about the importance of data use or their own expertise with data, it stands to reason that this niche of practice will remain in a tension of confused opinions about data use expectations for teaching professionals now or in the future. Consequently, this tension poses complications when schools work toward mandate compliance and plan professional learning forums to raise teacher expertise in data use.

In the wake of mandates such as No Child Left Behind (NCLB, 2001) and the Individuals With Disabilities Education Improvement Act (IDEA, 2004), school personnel incurred shared responsibility for reporting measurable achievement gains their school reports each year. Consequently, intensive work in gathering and interpreting student achievement data has pressed teaching professionals to increase their knowledge base about what defines data (Cromley & Hanson, 2000) and what responsive instructional practices their schools must integrate into existing work environments (Brunner et al., 2005; Forman, 2007; Wayman & Stringfield, 2006). Therefore, in the growing body of literature of studies focused in data-related implications for teacher practices, school personnel would benefit from knowing the costs and benefits that colleagues are discovering when implementing decisions to assign school-wide or team responsibilities for duties related to data use.
For school leaders and other authority figures who support teacher data use, developing quality professional development relies on the input of teaching professionals whose teaching roles are positioned to change. Darling-Hammond (2009) posits that teachers play an active role in the implementation of reform efforts, whether they experience voluntary or involuntary participation. For those who acknowledge the importance of ownership of reform initiatives, it is concerning that “teacher perceptions are seldom presented and sparingly considered when discussing the effectiveness of a reform and school change” (Darling-Hammond, 2009, p. 117). The absence or inadvertent marginalization of teacher voices is a valid concern when schools are challenged to report student achievement gains. Wayman (2005) found advantages of teacher involvement in data decisions to support teacher inquiry and reflection.

The findings of some researchers imply that a trend of lack of engagement in reform expectations for educators has been a pressing concern in the past decade, despite growing expectations for teachers to assume data-related responsibilities. Dixon and Haigh (2008) refer to “the problem of enactment” (Kennedy, 1999) when teachers disengage from implementation of reform efforts in schools. Professional journals, position papers, and research studies on school data use, present a complex web of perceptions and beliefs about data use reforms. Understanding the key aspects of what teachers consider to be the highest priorities and skill set expectations will help educational advocates plan meaningful and respectful professional development and structural adjustments to support professional practice.
How do educators resolve occasional or frequent disconnects between their routines of formal and informal data-related practices when it comes to school compliance with achievement mandates? When a data collection system doesn’t encompass teacher’s traditional methods of operation, teachers often develop their own strategies to accommodate expectations for data collection and interpretation (Greenfield, Rinaldi, Proctor, Cardelli, 2010). When educators give voice to problems implementing data driven instructional systems, it provokes debates about what ultimately drives teacher practice, student achievement, and successful implementation of school reform initiatives.

The findings of this study on core tenants of practice will ultimately work to enhance teacher expertise in data interpretation, whether teachers share responsibility or delegate data-related responsibilities to select teachers in the collective whole. The problems inherent in educational reforms posed by Kennedy (1999) and Darling-Hammond (2009) reiterate it is imperative to focus studies on the authentic voices of teacher practitioners if problems of enactment and/or inconsistencies in teacher involvement in reform are to be addressed.

Teacher Data Use

Teachers are the primary data when it comes to student learning. Educational systems rely on classroom teachers to perform perfunctory tasks such as collecting daily work, assessing understanding, and registering grades. The data that teachers submit to electronic repositories are regularly retrieved to generate quarterly report cards and
annual reports. However, a pressing concern arises when teachers are called to interpret the data from repositories and make decisions for alternative methods of instruction to positively impact student learning.

For teachers who report they have little interaction or responsibility for data, they often rely on structural support of data reflection sessions via data retreats or inservice structures (Halverson, Grigg, Prichett, & Thomas, 2005). Their lack of direct responsibility or expertise with data interpretation often means the referral of data to the efforts of collaborative teams or administrators. This is problematic if an underlying expectation of educational mandates is to promote systematic and professional reform for teacher data use responsibilities. It is conceivable that patterns of teacher expertise or lack of expertise in data use will remain dependent on whether teachers agree or disagree about what core teaching practices are expected or optional.

What is undisputed in the literature is that data use is a key responsibility of an educational professional (Datnow et al., 2007; Williams, 2006; Rossmiller & Holcomb, 1993; Wayman et al., 2007). In the wave of reform pressing teacher practice and data use expectations, school leaders and teachers are challenged to ramp up efficiency in using school data as evidence of policy compliance and school improvement goals. For schools to establish a strong culture of data use, they incorporate collaboration across and within subject areas (Armstrong & Anthes 2001; Datnow et al., 2007; Knapp et al., 2006) to refine educational practices when problems in achievement are detected (Datnow et al., 2007).
Approach to Inquiry: Positioned Subjects

This study relies on a positioned subject approach to inquiry (Conrad, Haworth, & Millar, 1993). Assuming that teachers are positioned subjects situated in working environments with data use expectations, their perspectives on this niche of professional practice is critical to the authenticity of this study. Conrad, Haworth, & Millar (1993) observe that teachers, as positioned subjects, have “particular needs, perceptions, and capabilities of action” (p. 29) as they pertain to workplace and personal influences. As teachers give voice to tasks associated with data from their workplace experiences, they may apply varied understandings of what comprises “data” from the perspective applied to a particular school environment, their classroom setting, and/or their interactions and sense-making with other colleagues.

Schools afford complex environments of learning tasks situated in social interactions. School personnel (administrators, classroom teachers, and learning specialists) bring unique perspectives and a host of skill sets at varied levels of expertise. As positioned subjects who engage in individual or collaborative data use processes, educators bring an overwhelming collection of perspectives as diverse practitioners in the field.

When conducting a preliminary study on teacher practice in a data use reform (detailed in Chapter Two), the abundant list of tasks that teachers attributed to data use was somewhat overwhelming. Teachers provided detailed anecdotal data that was clearly situated from their own perspective of teaching tasks that represented work
expectations at a particular point in time. Taken altogether, the collective understanding of data use decisions imply a host of viewpoints that merge into a generalized account of data use practices that subjects consider to be routine expectations for teachers in today’s schools.

The premise of applying a positioned subject approach to inquiry holds the researcher accountable to relating teacher perceptions “as is” in the findings of this study. As the conceptual model for teacher data use practice is presented, it is supported by quoted text from teacher interview transcripts that best exemplifies each respondent’s positioned perspective on data use processes.

**Research Question**

This study proposes using the empirical data collected from teacher research subjects regarding their perceptions of data use and instructional practice. The benefit of this study is to yield understanding about decisions and the importance that teachers place on tasks related to professional practice. Although literature and policies imply that data use skills are important, the manner that teachers actually respond to or reject data-related skills has been uncertain. One would be remiss not to study teacher perceptions of tasks of practice relevant to processing student achievement data in their day-to-day experiences.

This study seeks to understand the guiding question regarding teacher perceptions and actions: “From a teacher’s perspective, what are core tasks of data use,
and which tasks do teachers perceive significantly enhance their own data interpretation?”

**Glossary of Terms**

To establish common language for framing teacher perceptions of their work in data use I offer definitions for key terms from *Merriam-Webster’s Collegiate Dictionary (2001)* as well as applications of word meaning when applied in the specific context of data use research subjects and the researcher.

*Core* – a central and often foundational part; an arrangement of a course of studies that combines under basic topic material from subjects conventionally separated and aims to provide a common background for all students. (curriculum) (p. 257). In the context of this study, *core curriculum* or *core tasks* of teaching practice imply prioritization of foundational parts perceived to be of common consensus.

*Critical skills* – crucial, decisive, indispensable, vital (p. 275) In the context of this study, this term is sometimes referred to as “skills-based” concepts that are generally accepted as foundational to learning. Critical skills comprise a knowledge base needed to apply skills in new situations. Critical skills in curriculum materials are evident in mathematics computation, spelling accuracy, and reading fluency.

*Data* – factual information used as a basis for reasoning, discussion, or calculation (p. 293). In the context of this study, educators perceive data to
encompass their formal or informational observations (anecdotal data), as well as quantitative test scores as examples of data used for their decision-making, discussion, or evaluation procedures.

*Holistic* – relating to or concerned with wholes or with complete systems rather than with the analysis of, treatment of or dissection into parts (p. 552). In the context of this study, holistic student data is an assembly of information that reveals the interconnection between all parts and takes into account mental and social factors such as depression, test anxiety, absenteeism, language barriers, homelessness, etc.

*Standard* – something established by authority, custom, or general consent as a model or example: criterion; a rule for the measure of quantity, weight, extent, value, or quality. (p. 1142).

*Student-centered* – In the context of this study, student-centered information applies a holistic perspective in taking the whole person into account with regard to intellectual strengths and weaknesses and mental and social factors that afford or constrain student performance. Student-based data exists in student cumulative records of attendance, intellectual or psychological assessments, and/or individualized educational plans (IEPs).

*Tasks* – assigned piece of work often to be finished within a certain time; duty, function, job, chore, stint, assignment; a piece of work to be done. Task implies
work imposed by a person in authority or an employer, or by circumstance. (p. 1203). In the context of this study, core tasks of educational practice may include collecting data, analyzing data, and contemplating curriculum connections.
CHAPTER 2 – PRELIMINARY STUDIES

Preliminary Studies and Research Question

The rationale for this study evolved from a previous study on data system operations (Halverson et al., 2005), and a pilot study of teacher transcript data regarding use of data in the workplace. The comparative approach that I applied to both studies surfaced compelling questions about what is working and what is not working in school systems replete with data (loosely defined). Because teachers make important contributions to school-wide efforts to collect and make sense of data, their perceptions of typical work tasks provide critical information to school leaders and stakeholders who are responsible for structuring successful data use operations in schools.

This chapter is dedicated to summarizing the methodologies, key findings, and implications from preliminary studies of teacher practice in data use. The comparative process applied between both studies yielded the rational for the guiding question for this formal study: “From a teacher’s perspective, what are core tasks of data use, and which tasks do teachers perceive significantly enhance their own data interpretation?”

Study One: Data Driven Instructional Systems

A team of researchers from a Midwestern college conducted an extensive study to discern the specific tasks that school leaders rely upon to lead reform. During the two years of study (2005 – 2007) the school sites selected for the study involved personnel from eight separate school sites in Wisconsin that spanned a representation of rural,
suburban, medium urban to large urban community school systems. The Data Driven Instructional System study (Halverson et al., 2005) received monetary support from the National Science Foundation to support a two year team commitment necessary to gather and compile an impressive repository of data gathered from school personnel. The electronic archives contain over a 1000 pages of field notes, research team meetings, teacher/administrator interview transcripts, and evolving conceptualizations of practice in data driven instructional systems. The Data Driven Instructional System study involved a team approach, an instructional leadership focus, and yielded and analytical model of systematic operation of school data systems.

**Study One: Methodology**

The DDIS research team visited school sites at various intervals during the school year to observe and document data system implementation in the first year of a data reform endeavor. Through staff meetings, data retreats, and grade level meetings, researchers actively engaged administrators, teachers and resource staff in discourse regarding their ongoing experiences in developing a systematic information flow through a school.

Because there were multiple school sites and multiple data repositories being tapped at each site, the researchers did not seek to compare or evaluate the effectiveness of any specific data programs that schools selected to improve upon. Instead, schools selected their own data source as the focus for implementation when creating their own data driven instructional system. As school leaders choose their
program of choice, the researchers tracked the structures of practice that emerged as each program became part of the school’s data flow.

In Study One I analyzed interview data that followed a semi-structured questioning protocol regarding professional practice during a DDIS (Data Driven Instructional System) reform. Interview questions invited candid responses about core teaching practice tasks and perceptions. In addition to soliciting specific examples of professional practice, teachers shared their perspective about successes and setbacks they experience in daily work as classroom teachers. Because teachers perceived no evaluative consequences for speaking frankly, their open-ended responses yielded a rich source of authentic data for crucial, highly-valued aspects of professional practice.

The protocol for teacher interviews followed this general line of questioning:

1) What makes a successful lesson?

2) What programs or experiences have shaped your ideas of good instruction?

3) Tell about experience of great success with student(s) in your classroom.

4) What kind of observations do you typically make and/or what kind of data do you collect or rely on to identify that progress?

5) Why do students struggle and what helps them succeed?

6) To whom do you feel accountable for meeting student needs?

7) What problems present the most difficulty in the day-to-day work you do?
What mediates the space between your instruction and the student, or how do you think about your own reform as a teacher, or change?

The DDIS research team applied the rigorous and contextualized methods consistent with postpostivist, constructivist, and critical paradigms (Creswell & Miller, 2000) as they collected interview data during the first year of DDIS implementation. Housed electronically were multiple and different sources of information: individual teacher and administrator interviews, group meetings of data reflection, thick description field notes, and notes from research team meetings. The culmination of all data sources supported practices in triangulating the multiple data sources and conducting member checks at the conclusion of the study.

Applying a constant comparative method, researchers grouped and coded units of meaning according to perceived similarities and differences as themes related to the central questions of the study (Gall, Borg, & Gall, 1996). The use of triangulation provided a complex web of cross-checking practices necessary for credible results. Ultimately, the resultant model for a DDIS provided an analytical model of strategic practice that school leaders employed when engaging staff in data flow operations. To elevate the trustworthiness of the findings, the team notes documented member checking practices that enabled the researchers and school leaders to convene at the close of the study. Lincoln and Guba (1985) consider member checking as “the most crucial technique for establishing credibility” (p. 314) in a study. In the member checking process, participants in the study are provided the opportunity to give feedback to
researchers on information in the narrative account, and to verify the data reported by the research team.

**Study One: Findings and Implications**

A subsequent publication that followed the study presented the analytical model for school leadership engaged in data use reform. In “The New Instructional Leadership: Creating Data Driven Instructional Systems in Schools” the authors (Halverson et al., 2005) explain that school leaders rely on multiple vantage points to leverage a data-driven instructional approach in their schools. The six facets of the Data Driven Instructional Model (DDIS) encompassed flexible operations in separate school settings, but considered core principles that were common to all school sites: 1) data acquisition, 2) data reflection, 3) program alignment, 4) instructional design, 5) formative feedback, and 6) test preparation.

Data Acquisition refers to the process schools implement to seek, collect, and prepare information for instruction. School leaders provided examples of data collection that extended beyond test score results. One school mentioned daily “check-outs” to monitor reading progress. Another school logged attendance and used a spreadsheet to track behavioral data. The incentive to collect multiple forms of data presented opportunity to reflect on a broader perspective of teaching from the feedback of teaching personnel engaged in data use and student learning (Halverson et al., 2005).

Data Reflection acknowledges processes schools utilize to make sense of student learning data. The study described two types of data reflection: data retreats and faculty
meetings. Schools typically engaged in one or two data retreats in the course of a school year. After assembling data, teacher participants discerned patterns of achievement and generated hypotheses and action plans to address concerns. Faculty meetings provided the forum for ongoing data reflection. Researchers noted an average of four data reflection sessions during the year. Reflection sessions involved “data disaggregation, item analysis, and charting individual student progress” (Halverson et al., 2005, p. 21) and found the overwhelming majority of discussions about achievement data focused on helping struggling students achieve proficiency.

Program Alignment involves the approach the school leverages to make the instructional program congruent with such things as content and performance standards, what is taught in the classroom, and connections to non-curricular initiatives such as guidance support programs, professional development, and community outreach (Halverson et al., 2005). In the schools studied, researchers noted the alignment function serving two key functions were 1) finding problem areas where current instructional program did not address student needs, 2) understanding degree to which current programs fit together and addressed relevant content and curriculum standards. In addition to aligning curricula and classroom materials, school leaders also aligned student services, budgeting, personnel, and assessment practices under this function.

Program Design involves the school perception of instructional needs through creation or adaptation of curricula, student service programs, and instructional strategies geared toward improving achievement while addressing instructional issues.
Researchers found two distinct categories of programs used to shape instructional programs: 1) curriculum based programs which instruct students in conventional classroom settings, 2) student-based programs which are designed to customize school resources to the needs of individual students. Noting the willingness in staff to change core instructional programs based on data interpretation led researchers to theorize that “exclusive attention to either curriculum-based or student-based interventions can create dysfunctional DDISs in which information does not flow across functions” (Halverson et al., 2005, p. 32). Balanced approaches to program design can benefit the needs of most students.

Formative Feedback describes the ongoing flow of information to improve student instruction and instructional program quality in a timely manner. Described as the most critical and most difficult to implement in a successful DDIS, schools often find systematic feedback on current programs too expensive to develop and rely on occasional, anecdotal assessments. In this study, researchers found that none of the schools provided systematic feedback in terms of student learning across their instructional programs. Researchers cited examples of several schools using data to measure program quality; however, the “data themselves would not provide formative feedback unless teachers would use the information in their instruction” (Halverson et al., 2005, p. 33).

Test preparation includes activities designed to motivate students for improved performance on district and state assessments. Researchers observed curriculum-
embedded approaches to test preparation to integrate the concept of standardized tests into the regular instructional program (Halverson et al., 2005).

In the concluding remarks of the DDIS study, the authors noted a need for more understanding about the contribution of teacher participation within the larger system, especially with regard to their use of data. The study focused on administrative implementation of data-driven instructional systems where teacher practice was one of many contributing considerations mentioned in the findings.

To address this recommendation, I planned a preliminary study of a particular school site to analyze what tasks teachers perceived as most relevant to data use. A preliminary read of multiple interview transcripts from the DDIS study suggested that teachers relied on their own perceptions of data (loosely defined) to support their instructional decisions.

Additionally, teachers seemed to have their own manner of gathering and reflecting on data and iterations of formative feedback tasks using multiple data sources (including classroom specific observations) that researchers did not mention as meeting the criteria for *systematic* data reflection in large-scale instructional practice. To discern how teachers perceived their role in the DDIS model, it made sense to initiate a site-based study focused on what tasks, if any, teachers engaged in most consistently in data driven instructional systems.
Study Two: Teacher Perceptions of Data Use

From the numerous teacher interviews that comprised the DDIS study, I selected interview transcripts from six teachers at one rural school site who represented a range of experience in teaching (7 – 25 years) and offered perspective of teaching at various grade levels (Kindergarten – 5th grade). The teachers were colleagues in a K-6 school in the mid-western region of United States who were voluntary participants in a data-related reform initiated by their school leader during the 2006-2007 school year.

In a private setting, teachers were afforded the reflective space to speak candidly about work tasks that comprised the basics of their practice in the midst of the data reform initiative: successful lesson design, implementation of a particular program or curriculum, student success or failure, data use, teacher accountability, and bridging the gap between student achievement and instructional practice.

For interview analysis, I assigned a numerical code to each teacher subject and noted his/her grade level teaching assignment and total years teaching experience.

Teacher 1 - 1st grade, formerly Title 1, 25 years experience

Teacher 2 - K4-5, 7 years experience

Teacher 3 - 2nd grade, 32 years experience

Teacher 4 - 2nd grade, 7 years experience

Teacher 5 - 5th grade, formerly special education, 19 years experience
Teacher 6 - Kindergarten, 13 years experience

I noted that all teacher interview subjects revealed a tendency to retell specific experiences or scenarios that supported teacher theories about how they did or did not make connections about data use to teacher practice. Because of the non-evaluative rapport that researchers established, participants were supported with time to reflect and discuss their own approaches within the emerging data-driven instructional context emerging in their school community. Hence, their voices formed a rich pool of empirical data from which anchors of understanding might emerge for consideration of significance.

Study Two: Methodology

I conducted line-by-line open coding analysis of teacher interview transcripts that contained thick description of many aspects of teaching practice. According to Glaser (1978), it is during the open coding process that a researcher works within the confines of the significant questions in the substantive field. Clusters emerge when key questions for analytical consistency seeks answers to “What is this data a study of?” “What category does this incident indicate?” and “What is actually happening to the data?” (Glaser, 1978) This study on teacher perceptions about data use is a comparatively small-scale endeavor in comparison to Study One. It is keenly targeted on teacher voices describing data-related interpretations that teachers do or do not consider when making instructional decisions.
I implemented a two-step coding process to ensure a solid context to understand how data use fits into a larger schema of teacher practice. In the first phase I coded the interview in its entirety to look for data saturation of tasks that teachers considered core practice. When that proved to be an overwhelming array of tasks, I concluded that tasks of general practice were reliant on teacher perceptions as positioned subjects (Conrad, Haworth, & Millar, 1993) with unique perspectives of what comprises data and what autonomy they may or may not possess when working with achievement data. To make task analysis more manageable, I honed in on the two interview questions that represented teacher practice specific to data use: “What data do you use to identify success or needs?” and “How do you connect (or close the gap between) achievement with instruction?” As I moved beyond open coding these data-specific questions from Study One, the selective coding process allowed constant comparisons between indicators (open codes) and how they relate to each other and the emerging themes of core practice.

Consistent with grounded theory data analysis procedures, I applied the memos of the data to literature in the substantive field of teacher data use (Glaser, 1978). I applied a constant comparative method of the emerging themes from open coding with the collection of memos pertinent to data use tasks.

As a researcher assuming an investigate lens to the DDIS study, I applied a constructivist approach to confirm or disconfirm the findings of Study One (Data Driven Instructional System study) to test whether a grounded theory approach of teacher
The first study coded teacher interview transcripts in a manner consistent with the six facets of the DDIS model. However, I elected not to consult pre-coded interviews from the data archives of the first study. Therefore, the results of the NVIVO coding process that the initial team administered to my selection of teacher participants for my study were not retrieved from the archive so that I remained open to developing an independent model of data use tasks that emerged from the empirical evidence in teacher interviews.

**Study Two: Findings and Implications**

Observation emerged as a unifying aspect of core practice that teachers concurred to be an important aspect of data use. Teachers gave detailed examples of data collection and interpretation opportunities that were formally or informally constructed. The formally-structured data use tasks were often accomplished during staff meetings when teachers met with grade-level peers and building resource staff to look at achievement scores for students on state tests and local assessments (such as reading benchmark scores).

Response codes applied to teacher talk about data yielded the most activity in six data use tasks within the theme of Observation: analyzing, dissecting, dotting/jotting, noting, reflecting, and focusing. Within the operation of Observation, teachers perceived their work to involve periods of formal observation and informal observation. Formal observation occurs in situations when teachers observe student
behavior while engaged in a summative assessment of their own or district design. While collecting and using data reflectively to process student test results, teachers’ anecdotal detail of tasks showed that priority was given to analyzing, dissecting, and reflecting as core practice.

Informal observation tasks occur when teachers engage in responsive actions or more data collection tasks such as assigning and coaching daily work completion, circulating to check for understanding, and/or making decisions to group students or work with them independently. Teachers perceived these varied tasks as informal observations because they acknowledged that the results (a.k.a. observational data) required them to hold the collection of data in memory. Tasks such as dotting/jotting, or noting were enacted if/when time permitted formalizing their data collection attempts for reflection and action decisions.

Informal data collection and interpretation were interdependent tasks that teachers described as a flow of analyzing and thinking about next steps of instructions. The most prevalent tasks evident in classroom settings were described in routine instructional practices such as collecting and analyzing daily work, reading and charting classroom or grade level assessments, and circulating the classroom environment while students were engaged (or not) in learning activities such as completing daily work and testing situations.

A second theme of practice that teachers perceived as highly interactive with Observation is Adjustment. Adjustment surfaced as a broad theme of consensus when
organizing the host of details teachers listed as prioritized tasks inherent to data collection and interpretation. Typical actions teachers in this study cited were grounded in a common desire to support student engagement in the task at hand. Because student learning tasks were varied, teachers considered multiple instructional adjustments that included (but were not limited to) adjusting lesson plan learning activities, grouping students or working one-on-one on the learning tasks, or involving support staff (special education or learning resource staff) to ensure teacher’s action plans were accommodating special needs.

Adjustment was supported by codes that appeared frequently in teacher accounts of instructional tasks: planning, prescribing, relating, grouping, creating, improvising, and targeting. To arrive at an action plan for instructional adjustment, teachers perceived Observation to be an integral part of their work when processing data they gather in formal or informal ways.

**Observation/Interpretation/Adjustment Data Use Model**

The model for data use suggested a cyclic loop of practice with an undefined number of iterations between Observation and Adjustment. While operating in these broad themes of data use, a scattering of tasks describe the details of their instructional practice. The entanglement of the cognitive functions of Observation, Interpretation, and Adjustment indicated a need to adjust the interview protocol to focus on each function to determine which tasks are of highest priority and directly enhance data interpretation.
To determine dominant tasks from the sea of microtasks that each research subject described, I used an excel spreadsheet to document and sort all responses to determine patterns of priority under each theme (Appendix 1).

Constant comparative analysis between interview texts and open coding verbiage revealed six core tasks for Observation, and seven core tasks for Adjustment. Teacher perceptions of interpretation tasks were still entangled within the broad themes (Observation and Adjustment) and would require another analytic process to tease them out.

In the first attempt in drafting a model for teacher perception of data use, Observation and Adjustment are depicted as themes (see Figure 1) that work in a cyclic loop to inform instructional adjustments to better engage learners in curriculum concepts. However, it was difficult to discern which tasks teachers perceived as most useful to data interpretation from the data set for this study.
In the cyclic data use model, observational data becomes a mix of fragmented input that teachers collect, make sense of, and apply to an action plan to improve student learning in any given learning task. Adjustment might entail ongoing, alternate approaches in teacher instruction to make strong connections between baseline data (what students know) and the goal for the next data check (what students have mastered or still need to know). Because the interconnection between Observation, Interpretation, and Adjustment were replete with related tasks, it was still unclear which tasks teachers perceived to be specifically related to data interpretation.

**Observation Perceptions**

In a classroom environment teeming with data (loosely defined) the research
subjects in Study Two gave voice to methods of gathering and interpreting data. When asked how teacher used data to identify success or needs, five of the six subjects specifically named observation and analysis as key tasks in scenarios that called them to observe student behavior and work samples. Several teachers agreed that observation requires a mental capacity for holding observational data. Teacher 6 stated “I probably do observation every day... where I see kids lacking” (Interview Transcript #6, Lines 70-71). Teacher 5 noted she also did “A lot of observation. That’s my special ed background: a lot of observing” (Interview Transcript #5, line 121). When elaborating on reliance on a mental storage of data, Teacher 5 explained, “I used to keep a lot of logs on kids, which I don’t do now, just because there are such numbers” (Interview Transcript #5, Lines 121-122).

Similarly, Teacher 1 described observation as a way of taking mental inventory of skills:

So I kind of go around and say, “So and so still needs,” I can see ... boom, right away they’re done, and they know what they’re doing, they’re pretty secure in this. I can see letter reversals, all sorts of things come up when you’re doing this. So those are informal observations (Interview Transcript #1, Lines 125-129).

Four of the teachers described alternating informal and formal observation to get better understanding of what students know and are able to do. They agreed that formal observations opportunities were less frequent than the opportunity to do informal observations. Teacher 3 described a formal observation process of checking weekly running records (as in reading) combined with student performance in activities.
“So you keep that number ... and then you try to interact with those kids. And then do running records... but then in activities, you know... So I would say it’s not daily, but weekly” (Interview Transcript #3, Lines 159 – 162). Similarly, Teacher 2 described sorting informal, mental cumulative data into a formal, structured assessment tool (a checklist) list when he described end of the day reflection time that allowed him to make marks on the math checklist:

If I remember seeing student doing it, just putting a little dot to make sure, so that when it comes back through I know that, you know, these being our goals for the quarter that I can see, well this person was doing pretty well, this person wasn’t... this kind of gives you a little bit more... (Interview Transcript #2, Lines 88 – 91).

When teachers shifted from keeping mental track to keeping written track of data (a short-hand they called “jotting”) they considered their own observational data to be informal data, even if they engaged in structured practices to quantify their observations using written checklists or rubrics. Teacher 1 did not adhere to a checklist approach of anticipated skills. Instead when shifting from mental observation to written documentation, she employed a short-hand of data she considered to be relevant to document success or need:

I keep a log, kind of like running records, but informally... I just jot down things that I’m seeing... certain words... site words... is she having trouble decoding, does she seems shy, anything that I can observe that she’s doing while she’s reading to me (Interview Transcript #1, Lines 109-114).

When tracking teacher talk about failed learning situations, tension existed when teachers perceived they didn’t have enough of the right sort of data to make instructional adjustments work. When this occurred, teachers used an undefined
reflection process to think about other data that mattered to them. This “other data” included a desire to understand students in a holistic manner when teachers mentioned evidence they gathered related to student personality, learning issues, family situations, and patterns of absence from school.

All teacher subjects placed value in having a combination of academic or quantitative scores to compare to holistic, student-centered observations, such as personality traits and personal interests. The student-centered data is a conglomerate of personal details that provide a holistic understanding of each individual student. Teachers perceive having a holistic understanding of their students is necessary to plan effective instructional adjustments so that students might make learning gains.

The observational tasks that teachers use to identify learning struggles connect to a desire to collect other data to explain why learning has failed. According to Teacher 1 reasons for struggle “is their home life... medication isn’t always regulated... a lot of baggage that they came in with” (Interview Transcript #1, Lines 141-144). Teacher 4 adds other considerations:

... children with processing issues, ADHD issues, autism issues, issues of a parent dying the past year, illness in the family... all kinds of things that affect kids... to keep them focused on learning is really difficult, and that’s why we pull them into a small group (Interview Transcript #4, Lines 144 – 147).

When teachers contemplate instructional adjustments to accommodate student-centered considerations, they experiment with individualizing or grouping students. Teacher 2 mentions adjustments that are “individualized, to get them going” (Interview
Transcript #2, Lines 112-113) were based on student-centered information that influenced that decision such as: “external factors... kids coming from homes that aren’t necessarily the best, when they’re in survival mode” (Lines 121-122).

**Adjustment Perceptions**

While making formal and informal observations, teachers gave examples of many data types that they sorted to make decisions about next steps of instruction. When asked how they closed the gap of data knowledge to improve instructional practice, the theme of Adjustment was a prevalent consideration. Teachers perceived data collection tasks gave them clues to plan alternate engagement strategies. Data interpretation determined whether they needed more data (and what type) that would better inform a reliable action plan for alternate ways to boost learning achievement.

These varied perceptions of combining achievement data with holistic student information implies a phenomenon occurring during data interpretation that impacts decisions teachers make for strategizing instructional adjustments. Whereas Teacher 1 and Teacher 2 referenced action plans to adjust grouping arrangements, Teacher 1 also mentioned accessing supplementary programs that are self-paced. The computer-based programs she described indicated decisions to use technology curriculum supports to replicate one-on-one instructional strategies that would otherwise be delivered by a teacher or other special instruction staff. Teacher 1 explains that her interpretation of “student struggle” data leads her to enact an action plan where
Instruction is close proximity, more one-on-one with these kids. Different programs, if they’re on the computer might be, if it’s not Open Book, they’re Hooked on Phonics to help them along; sometimes they go between the two. We have Fast Forward now, they’ll be on that too (Interview Transcript #1, Lines 140 – 154).

It was evident that teachers often alternate between ongoing Observation with alternate successions of Adjustment. Some teachers described decision-making as immediate and others described delayed responses. For example, Teacher 2 mentioned a rapid turnaround of Observation and Adjustment because he perceived it to be more practical and prudent to vacillate between both aspects of practice as a means of “adapting right there... hitting them where they’re at” (Interview Transcript #2, Lines 96 - 97). When teaching students with multifaceted needs, adjustment decisions can be made quickly and applied with immediacy.

Teacher 3 described a delayed response to Adjustment action as something she moves into, based on observations and decisions about what is working and what is not. Formal and informal data is combined. “...when you write plans, or you do week reports, you’re making your plan, there are those utopia plans that you create with in mind all those things we talked about before...” (Interview Transcript #3, Lines 217-219).

Teacher 3 references numerous observational tasks of gathering formal and informal data. After integrating informal holistic observation of students, she makes decisions to adjust instruction to match the data she has taken in and interpreted. She implies flexibility is part of the ongoing cycle of observing and making instructional adjustments based on student response:
I think as a teacher, when you see things aren’t working, or even it’s all well-laid plans, and when you see you do need to then improvise. Then you need to move away from those plans and go to plan B or plan C... you can’t be locked into “this is the way I do it, we know this is the right way.” And it could be the right way, but you also have to continually look... (Interview Transcript #3, Lines 217-225).

Whether immediate or delayed in making decisions to maximize learning, teachers cognitively sort what observational data (as evidenced by formal or informal data collection) is relevant to instructional plans to support learning gains.

A common perception for all teachers is that changing grouping arrangements would strengthen student engagement in learning. Teacher 1 applied a mental grouping process that she considered for possible physical regrouping of students to work on deficit skills. While circulating among students engaged in completing assigned work, she gathered data to support potential grouping decisions “so and so still needs... (Interview Transcript #1, line 126) while cognitively sorting who is “pretty secure in this” (Interview Transcript #1, Line 128).

Teacher 6 affirmed a grouping approach is usually applied to re-teach skills or concepts where support comes from peers or the teacher. She strategically assigns groups based on achievement data “Where I see kids are lacking... During center time I can pull them out and work individually, or I can see a small group of kids... or sometimes I’ll buddy them up and they can help each other too” (Interview Transcript #6, Lines 71 – 75).
In addition to grouping decisions, a second tactic teachers apply is questioning whether they had the right type of data for whatever intervention they needed to plan. Questioning and collecting more data puts teachers in an operational process of vacillating between observation and engagement in an infinity loop of practice. The data they collect initially tends to be academic or quantitative in nature: test scores, running records, or pass/fail experiences when students are given daily work that they are unable to do or complete easily. For students who are stalled in learning tasks, teachers cycle back from engagement to observation in search of a broader context of data.

Teacher 2 perceived holistic data collection process is necessary if he is to improve engagement practices. He considers multiple data sources and contemplates what curriculum concepts might be better supported with alternate instructional approaches:

> Whether it is looking through the checklist, to see if no one was getting it, is there another way that you can present it... in a different way? And just kind of thinking... overall... how the students were during the lesson; you know, did they seem excited? Did it seem boring to them? (Interview Transcript #2, Lines 242 – 245).

**Study Two: Implications**

The emergence of Observation and Adjustment as core themes was supported by multiple data use tasks that are related to these general domains of professional practice. Breaking down the rich descriptions of anecdotal teaching experiences made it possible to construct a tentative model of professional practice grounded in the details of research subjects’ interview transcript data. The core tasks of Observation evidenced
in the empirical data were analyzing, dissecting, dotting/jotting, noting, reflecting, and focusing. The core tasks which comprise Adjustment are planning, prescribing, relating, grouping, creating, improvising, and targeting. The tasks specifically committed to data interpretation were not distinguishable. To get a better understanding of tasks that enhance data interpretation, adjustments to the interview protocol are necessary to apply in an independent study to better understand the phenomenon of data interpretation tasks.

Findings in Study Two imply that teachers apparently put value in their own data acquisition and data reflection tasks in the immediate setting of their classrooms. Teacher also mentioned structured data reflection opportunities with teaching peers. It is clear that teachers rely on student-specific scenarios to describe professional practice with data use. But the gray area of how teachers use data to modify practice presses questions of what holistic data do teachers gather and use when interpreting achievement data? The findings in this study noted numerous examples of gathering holistic data in situations when students do not succeed.

For example, when Teacher 4 attributed absenteeism as a problem for student academic struggle, she acknowledges that such student-centered situations are

...totally out of our control... Because the kids that are absent are usually the ones that are always just trailing behind a little bit, because it’s really important to be here. All of the lessons are based on direct student instruction, and when they miss that... it’s not the same as being present for the introduction of the teaching of the skill (Interview Transcript #4, Lines 246- 251).
Given absenteeism data, Teacher 4’s comments suggest a perception that some instructional adjustments are not within her power to close the achievement gap. Rather than question the design of the curriculum program that assumes consistent attendance for first-hand instruction, she perceives that student absence works against learning, not program design. The school’s investment implementing the reading program consistently passes responsibility to teachers to trouble-shoot recurring problems for students who are chronically absent.

In the findings for Study Two, this was one of many instances that teachers spoke candidly about their perceptions for student failure. Teachers attributed failure to various affects: student behavior patterns, personality, disposition for learning, and/or unstable family situations. This implies teachers perceive student holistic data as necessary for them to investigate failure cycles from many vantage points. Knowing contributing factors to failure informs their instructional planning and/or how they interpret achievement data.
CHAPTER 3 – LITERATURE REVIEW

Overview

Given the abundance of literature in the substantive field of teacher practice, this chapter summarizes the general consensus and alternate views regarding teacher data use. Using the research question as the lens for literature analysis, I began with a broad base inquiry to discover what is known and what is not known about teacher interpretation of data. I also integrated findings from the preliminary studies (Chapter 2) to expand the search to teacher perspectives about the key themes, tasks, or questions that emerged from Study One (Data Driven Instructional Systems) and Study Two (Teacher Perceptions of Data Use). Although these studies showed general consensus on teaching tasks such as progress monitoring, types and uses of assessments, and data interpretation, there was notable variation in how teachers define data, collect data, and integrate data into their professional practice. Because teachers frequently mentioned testing accountability, I included a search for teacher’s roles or perception of prominent instructional models such as Response to Intervention and use of standards-based assessments that have emerged as byproducts of educational mandates.

The majority of literature reviewed in this chapter is organized to represent the key tasks that teaching professionals encounter in data use cycles such as data collection, interpretation, and planning instructional adjustments. When writing up study findings, new questions surfaced with regard to teacher perceptions of successful
and unsuccessful learners. Because teachers gave voice to frustrations when students remained disconnected from the curricular programs (despite many instructional adjustments), I consulted the literature on theories for student failure in data use systems. Therefore, I conclude this review with a brief summary of alternate views of learning, achievement, and human intelligence that run counter to the abundance of literature on critical skills instruction and testing.

**Data Repositories in Schools**

In the past 20 years, legislation that mandates accountability for student achievement has had the residual effect of passing data use and reporting responsibilities to school personnel. With recent adaptation of the American Recovery and Reinvestment Act (U.S. Department of Education, 2009), schools are called to use assessment data to inform instructional practice and to measurable gains in achievement. Although policies provide guidelines for meeting achievement objectives, the details of how school personnel respond to expectations of effective use of data systems are variable. Assuming schools are given some flexibility to use assessment data in ways that work for them, it is presses the need to know more about the specific tasks that teachers perceive to be most useful in meeting mandate expectations.

With federal funding for legislation, states and districts have focused efforts on building longitudinal data systems (Aarons, 2009). Consequently, the use of data has become more central to how educators evaluate their practices and monitor student achievement (Knapp et al., 2006). What remains a question when teachers interact with
data systems is how educators use data to make instructional decisions. Prominent voices in the field of teacher data use concur that making sense of data requires concepts, theories, and interpretative frames of reference (Aarons, 2009; Knapp et al., 2006; Hamilton et al., 2009). Studies committed to understanding teacher data use present findings that suggest professional development needs and the potential restructuring of school operations (Forman, 2007; Herman & Gibbons, 2001; Greenfield et al., 2010). As it stands, the general consensus about teacher data use is that tensions exist when educators attempt to integrate routines of data use with traditional methods of teaching practice.

In a practical guide for merging achievement with instructional decisions published by the Institute of Education Sciences (IES), the authors (Hamilton et al., 2009) present practical frameworks that schools might use to support the interaction of school personnel with data repositories. In this publication, aspects of practice for research sites were analyzed to chart connections schools have made between student achievement data and instructional practice. As various data use scenarios are described, the authors offer solutions to offset the instructional problems that hinder teacher practice. Coupling successful practice observations with concurrent literature, many constraints were addressed: prioritizing instructional time (Brunner et al., 2005); targeting additional individual instruction for struggling students (Brunner et al., 2005; Supovitz & Klein, 2003; Wayman & Stringfield, 2006); identifying individual strengths and instructional interventions that can support student progress (Brunner et al., 2005;
Forman, 2007; Wayman, Brewer, & Stringfield, 2006); gauging instructional effectiveness of classroom lessons (Halverson, Prichett, & Watson, 2007; Supovitz & Klein, 2003); refining instructional lessons (Halverson, Prichett, & Watson, 2007; Fiarman, 2007); and examining school wide data to make curriculum changes based on understanding student strengths and weaknesses (Marsh, Pane, & Hamilton, 2006; Kerr, Marsh, Ikemoto, Darilek, & Barney, 2006).

Although Hamilton et al. (2009) propose educators can make instructional changes and that there are alternatives teachers can apply for set-backs in data use attempts, researchers offer theories of what accounts for the notable variation in data use tasks. Analysis of literature summarized thus far raises questions whether teachers agree or disagree with what experts tout as possibilities for instructional change. What is known is that teacher practice is comprised of countless decisions and actions that teachers apply in data use operations.

**Data-related Teaching Tasks**

The literature on teacher participation in data reform generates numerous tasks that policymakers and researchers agree are fundamental aspects of teacher practice such as conducting assessments, developing interventions, and evaluating curriculum for relevancy to diverse student populations (Aarons, 2009; Knapp et al., 2006; Hamilton et al., 2009). If schools are to restructure and reorganize toward improvements in data use in response to policies and mandates (U.S. Department of Education, 2009), the attention given to understanding the variations of teaching tasks becomes increasingly
important. A preliminary survey of the literature pertaining to teacher use of data yielded multifaceted categories of practice. Therefore, I present an eclectic overview of the teaching tasks that hold the most prominence in scholarly articles, position papers, and research studies focused in teacher data use practices.

**Progress Monitoring**

Summaries of research supporting the efficacy of progress monitoring (Elliot & Fuchs, 1997; Fuchs & Fuchs, 2006) suggest that progress monitoring results in more efficient and appropriately targeted instructional techniques and goals, which move students to faster attainment of important state standards of achievement. Progress monitoring has been defined as the “frequent and ongoing measurement of student knowledge and skills and the examination of student data to evaluate instruction” (Vaughn, Bos, & Schumm, 2007, p. 74). Progress monitoring tends to focus on students’ performance on a few critical skills (i.e., word identification fluency, mathematics computation, passage reading fluency, spelling) using repeatable (i.e., weekly, monthly, quarterly) and brief (i.e., 1–3 minutes) probes. By comparing periodical results, progress monitoring measures incremental gains or signals stagnation in learning.

As an alternate to traditional intelligence and achievement tests, teacher engagement in progress monitoring requires assessing student studies situated performance in content-specific subjects such as reading, mathematics, writing, and spelling (Elliott & Fuchs, 1997). For progress monitoring to be implemented, the students’ current levels of performance on specific skills are determined and goals are
identified for learning that will take place over time. This involves data collection tasks for comparison to graph increments of academic gains that learners make from a designated starting point to assigned check points throughout the year.

Elliott and Fuchs (1997) break down the tasks of progress monitoring to fall under operations heavily focused in evaluation. They suggest that measures to evaluate a students’ progress needs to have the following characteristics: a) be quick to administer, b) have adequate reliability and validity, c) be representative of what student is learning, d) aid in intervention development, e) be sensitive to gains in academic performance so intervention effectiveness can be measured. Each of the five aspects of progress monitoring suggests a complex web of approaches that teachers might utilize to attain each aspect. Given the range of teacher expertise and experience in any or all aspects of progress monitoring, there are countless approaches that professionals might employ in the substantive field of teacher practice in data use systems.

Assessment Considerations

Researchers and educational practitioners have yet to come to agreement about definitions of commonly used terms in assessment practices that provide a vast array of potential approaches that teachers might use in measuring learning. Frey and Schmitt (2007) observe that it is hard to compare theoretical benefits of studies on educational practices to explore the nature of teachers’ modern assessment practices. They argue that “…this difficulty arises because researchers, advocates, and practitioners have not
arrived at a consistent definition of what these (assessment) terms mean or what these practices look like” (p. 402). In the absence of consensus on assessment terminology, efforts to research curricular tools and teacher practices are consequently impacted. Therefore, it remains difficult to engage in meaningful discourse and advance research that might promote deeper understanding about best assessment practices.

Through analysis of scholarly literature on assessment approaches, Frey and Schmitt (2007) call for consensus on clarifying definitions for common terms such as performance assessment, authentic assessment, and formative assessment. These clarifying definitions provide a useful framework to sorting teacher perceptions when describing teaching tasks they rely upon when working in the complex environment of classrooms and school systems committed to data use.

Formative Assessment, Feedback, and Evaluation

The literature documenting teacher data use reveals innumerable publications dedicated to assessment data. Speculation of what data interpretation runs parallel to the type and purpose of formative feedback and/or evaluations. Historically, the term formative assessment was derived to distinguish formative from summative assessment (Scriven, 1967). Formative assessments are applied when learning is still occurring or forming. Summative assessments are intended to capture the end results of learning experiences. Scriven made practical use of the term formative to apply to a program evaluation approach that contrasted with summative evaluation. The concept of
formative learning was later attached to Bloom’s (1968) assessment practices as Bloom recognized a relationship between formative assessment and mastery learning.

Formative assessment has varied descriptions. Frey and Schmitt’s (2007) comprehensive analysis of formative assessment definitions and uses noted discrepancies with regard to purpose in the textbooks and scholarly writing used to prepare classroom teachers. The most concerning conclusion of their study points to disagreement whether there is a distinction of the formation of learning and the formation of behaviors and strategies that promote learning. Although researchers found the most current use of the term formative assessment in reference to formation of behaviors and strategies to promote learning, this opinion is extended by authors who suggest the feedback from formative assessments have the potential to help form teacher or student behavior (Airasian, 2001; Black & William, 1998). Hence, formative feedback is a term that is used prevalently with current use of formative assessment terminology.

In current scholarly journals and publication, the popularity of studies on formative assessment and formative feedback is a recurring trend. As teachers administer formative assessments to monitor student progress, the expectation is that they use the data to make adjustments to their instructional approaches. When it comes to defining what constitutes formative assessment, the fragmentation of definitions in the literature shows little consensus among researchers, educators, and policymakers.
Despite a lack of consensus in defining formative assessments, there is a general agreement with regard to the processes that comprise formative instructional cycles. Graney and Shinn (2005) offer a practical explanation for teaching tasks inherent in formative evaluation. They propose that formative evaluation involves ongoing tasks of collecting student performance data so that timely program changes can be made while instruction is taking place. This intervention approach differs from summative evaluation practices which typically reserve student evaluations until the end of an instructional period, as in the end of a school year.

Although a popular concept in the literature, it remains unclear whether formative assessment practices correlates to measurable gains in student learning. In their qualitative study of 44 second grade teachers from multiple school districts, Graney and Shinn (2005) did not find enough evidence to support the hypothesis that students whose teachers have access to formative data make greater academic gains compared to the control groups of students whose teachers did not engage in formative evaluative processes. When comparing the growth increment for reading gains for all students in the study (individually and in cohort groups) no significant correlation was found between data results for students whose teachers applied formative assessments compared to students whose teachers did not apply formative assessment and evaluation. However, this study did find evidence to support that progress monitoring practices, common practice for all teachers in the group, is correlated to student learning. Researchers concluded reactive benefits of progress monitoring when student
progress in all three reading groups improved readily during the second half of the study.

In the concluding recommendations, the authors noted that to better understand formative feedback practice implementation, it would be necessary to pay closer attention to the smaller tasks that comprise formative feedback to enhance school implementation of formative evaluation. In naming the teaching tasks for closer study, the researchers hypothesized the answers might be found in three key tasks when stating “… we need to know how information is organized, reported, and interpreted such that appropriate changes in instruction are facilitated (p. 187)” in formative feedback operations.

**Teacher-created Tests**

Historically, teachers have monitored student progress through observations, assignments, and assessments. Literature pertaining to teacher expertise in creating tests implies a discrepancy between teacher perceptions and the actual quality when tests are evaluated (Oescher & Kirby, 1990; Wise, Lukin, & Roos, 1991). Researchers agree that teacher test construction is a significant aspect of teacher practice with regard to time and knowledge investment (Boothroyd, McMorris, & Pruzek, 1992; Fennessey, 1982; Williams Rose, 1991). Subsequently, teachers place more weight on their own tests in determining grades and student progress than they do on assessment designed by other sources (Dixon & Haigh, 2009).
However, Boothroyd et al. (1992) contend that teachers are not particularly good judges of their own abilities or in knowledge in test construction, comparing the outcome of their own work to be congruent with the findings of Marso & Pigge (1988) and Oescher & Kirby (1990). In all cases, researchers found the actual ability of teachers in test construction to be negatively correlated with actual performance. Considering the body of literature that affirms how test construction is core to teacher practice, the findings that suggest lack of teacher expertise is troubling and presses questions about how to support teacher execution of the tasks relevant to quality assessment design.

A notable study of teacher-created tests observed the evolution of test quality when teachers integrated aspects of classroom discourse. Anderson, Zuikera, Taasoobshirazib, & Hikeya (2007) claim their contribution to the literature of teacher-created assessment provided an approach to assessment that “transcends the traditional dichotomy of ‘formative’ classroom assessment and ‘summative’ external assessment.” (p. 1725). The authors attribute teacher improvements to formative processes when teachers make connections between ongoing discourse as an assessment “with both formative and summative functions” (p. 1725).

Although Graney and Shinn (2005) had failed to find a positive correlation between formative assessment practices and student achievement, Anderson et al. (2007) incorporated what the prior study found to be limitations, a focus on how teachers organized, interpreted, and reported results through ongoing cycles of discourse with students. In measuring student performance on assessments in
conjunction with classroom discussion (of scientific curricula), Anderson et al. (2007) affirmed the approach that shaped both students’ and teachers’ engagement was of an interdependent nature (Gutierrez & Rogoff, 2003; Holland, Lachiotte, Skinner, & Cain, 1998). As teachers engaged students in discourse about scientific terminology and applications, these discursive feedback activities either supported or constrained student learning, as measured by classroom assessment practices. With firm teacher knowledge and competence, students excelled. As teacher knowledge fell short, students realized errors. This study not only underscores a correlation between teacher knowledge and expertise with quality assessment design, it offers finding supporting theories that formative assessments impacts teacher practice and student achievement.

**Authentic and Performance Assessments**

Concerns about reliable and authentic assessment are key to adhering to respectful ways of monitoring student learning. With varied options for responding with interventions, the concept of knowing what assessments are the best match for determining interventions becomes a critical question for the professional development of teachers. Frey and Schmitt (2007) believe it critical that clarification of the term *performance* assessment, as it relates to *authentic* assessment, is needed. Proposing that two schemas exist as representative of the relationship between authentic assessment and performance assessment, the authors propose authentic assessment be conceptualized as assessments that specifically address real world applications (Mertler, 2003). The alternate view is that, by its nature, performance assessment is authentic
(Airasian, 2001; Mueller, 2005; Taylor & Bobbit-Nolen, 2005) because it requires the construction or supply of answers or to perform or produce something for evaluation. Some researchers extend the merits of authentic or performance assessment as a means to improve teaching and learning (Borko, Flory, & Cumbo, 1993; Falk & Darling-Hammond, 1993).

Kahttri, Kane, and Reeve (1995) investigated and found correlation between performance assessment implementation and teacher acquisition of knowledge and skills. The authors theorized that performance-based development is influenced by assessment expectations at many levels of accountability (national assessments, state assessments, district assessments, or school-level assessment initiatives). When conducting their own investigation of schools developing and implementing performance-based assessments, researchers found the content and sequencing of subject matter largely unchanged. However, teachers did employ a wide range of instructional practices despite poorly defined content and performance standards. In concluding remarks, the researchers expressed the desire to know more about the teaching tasks that teachers employ without access to adequate professional development or time to reflect upon and adjust instructional practice.

Data Interpretation and Intervention

Another prevalent niche of literature involves tasks of organizing and interpreting data so that teachers might execute more effective interventions. Bailey and Drummond’s study (2006) of data interpretation echoed the general concern that
teachers are seldom given opportunities to observe new or evidenced-based practices. Therefore, existing practices remain stubbornly resistant to change. Hoping to gain understanding about teacher data interpretation and use, the researchers took note of the results in achievement when teachers transitioned from relying on their informal perceptions of student reading skills and began applying language and literacy skills checklists. Study findings revealed that prior to checklist use, teachers have a wide array of initial concerns for students. While using checklists, teachers become more cognizant of student performance in each skill area prior to administering formal assessments. However, after assessing student performance on standardized measures, some reading skills improved and others did not. Hence, the researchers offered recommendations to investigate possible reasons for the discordance in reading skill attainment by concluding: “there is a necessity for further study of the linkage and interpretation of the different types of evidence and student performance” (p. 174).

**Instructional Models**

Situated in the literature of teacher data use are instructional models speculated to impact teacher practice as school implement the data-related tasks inherent in mandates such as No Child Left Behind Act (NCLB, 2001) and Individuals With Disabilities Education Improvement Act (IDEA, 2004). Hale, Kaufman, Naglieri, & Kavale (2006) acknowledge that the intersection of IDEA with NCLB mandates “set the stage for reformed instructional practices for classroom teachers and special education staff and services” (p. 753). Both pieces of legislation call for improving the outcomes for all
students by using scientifically-based instructional practices. Because teachers are the first line of data collection and interpretation in Response to Intervention (RtI) models, the literature provides a framework of data interpretation tasks that have implications for reformed practice with data use for classroom teachers and resource personnel.

**Response to Intervention**

Response to Intervention requires documentation of appropriate use of evidence-based interventions before a child is referred for a traditional special education evaluation. According to the Response to Intervention Action Network, the goal of a Response to Intervention instructional model is to deliver evidence-based teaching intervention and to monitor student response to those interventions. The implications for teacher practice is to plan and deliver instructional strategies in an ascending pyramid of increasingly individualized intervention, based on student profile and achievement data.

When schools received the parameters of the IDEA legislation, teachers and administrators sought clarification for details of the mandate they were accountable for implementing, such as what instructional options are acceptable as “scientifically-based” instructional practices. Comparison of publications that followed IDEA of 2004 shows attention to clarifying the specifics of instructional practice and describing various instructional models for efficient use of achievement data.

In 2005, The National Association of State Directors of Special Education (NASDSE) convened a panel of professionals to provide guidance for reforms that
crossed general education, remedial, and special education. Grounded in “nearly 30 years of extensive data from both research and practice on the topic of RtI” (Cummings, Atkins, Allison, & Cole, 2008, p. 25) the panel outlined several key principles for instructional practice:

- School systems must reorganize to provide multiple tiers of generally effective instructional practices with a core curriculum that meets the needs of most (e.g., 80%) students
- Across multiple tiers, all students are provided with access to high quality instruction matching student needs
- Formative assessment data are gathered to document the match between students’ needs and their instruction
- RtI is evaluated across tiers using a problem-solving method of data-based decision making

For students who demonstrate educational needs that exceed interventions that have been applied at the classroom level, referrals for special education services are integrated into Tier III (more intensive) educational services for learning intervention approaches. Hence, special education eligibility can be a product of this model of services, but is not the primary goal. To make a decision for special education qualification, factors such as the student’s rate of response to intervention and the size of the gap that exists between that student and the benchmark. Therefore, this model aids educators in determining what interventions are most helpful in closing the
achievement gap in a timely manner. The major issues in RtI involve the needs to
enhance the range and diversity of academic and behavioral interventions in general
education (Tier I) and to increase the impact of supplemental interventions in Tiers II
and III.

In their study of participants engaged in a school-wide reform to adapt Response
to Intervention approaches, Cummings et al. (2008) observed the contributions that
special education teachers afford in this service delivery model. Special education
teachers offer collaborative support in school-wide reform in planning, implementation,
and evaluation of interventions across the continuum of education. They are also
increasingly involved with general education and Title I staff by way of early screening
activities, collaborative instructional processes for groups of students with similar skills,
and interpreting RtI data within the context of the problem-solving process. Considering
the expertise necessary for special education teachers to move into nontraditional roles,
Cummings cites the 2007 publication from the National Association of State Directors as
congruent with her study that it is not the role of special education professionals that
need to change, but that “skills set of special education staff need to broaden” (p. 25).
She concludes that schools will continue to encounter questions for appropriate
structures to facilitate such extensions in teaching skills to occur.

In a study of scholarly journals and teacher perceptions of RTI, Greenfield et al.
(2010) offered five frames of teacher perceptions that expanded the aspects of this
preliminary review of literature accordingly. The five categories of response proposed
by researchers are clustered into teacher perceptions that varied with regard to 1) assessment and progress monitoring, 2) the link between intervention and instruction, 3) impact on teacher practice, 4) culture and reform, and 5) special education referral process for ELL students (p. 51).

In the summary of the study’s conclusions, Greenfield et al. (2010) acknowledge that RtI allows teacher and school interpretation and professional judgment about best practices. However, problems were evident in teacher responses showed varying interpretations of what constitutes data, and the need for professional development to select the most relevant data to link to the intervention practices they are expected to know and execute with proficiency. Teachers considered adequate frequency of meetings to be once a month and comprised of general educators and special educators to interpret data and identify intervention needs. What teachers perceived lacking in the Response to Intervention meetings were the specifics that would shape actual lesson plans. Teachers observed that meeting structures did not support the next steps in their practice: design of the lessons and interventions that the data suggested that students would require. “We always feel like we run out of time,” “It’s the only time... and it’s not enough” and “We don’t have a lot of time” (p. 54).

Greenfield et al. (2010) argue that the data collected regarding current allocation of teacher time underscores the need for schools to reorganize school time structures. Teachers made the connection between professional development as an integrated part of the RtI process, but did not perceive their existing work conditions to allow for all the
tasks to be completed to expectations in the mandate. Greenfield concluded that “teachers found professional development effective and needed” and argues that teachers desired “more time to process and understand the data, intervention practices, and the reform effort itself” (p. 54) to successfully accomplish all facets of the Response to Intervention model.

In sum, the implications for data use in an RtI model alternates consensus in the literature about the ideology, but concerns for realizing the vision. Advocates of RtI believe that a) all children’s needs should be met regardless of disability status, b) increased preventative services can reduce unnecessary student failure, labeling, segregation and remediation in special education, c) artificial general and special education barriers should be eliminated (Hale et al., 2006). The concerns that surface in the literature revolve around how professional practice might change for general education teachers and special education teachers with the evolution of collaborative approaches that are inherent in this service delivery model for data use.

**Standards-based Practice**

What frameworks exist in teacher licensure and evaluation structures that address teacher proficiency in data use, particularly data interpretation? Teaching standards for teacher licensure and/or performance evaluation were designed to capture the essence of what matters most in the teaching profession. In many states, teaching standards are the framework for attaining and retaining a teaching license. In school district communities, the teaching standards provide a framework for evaluation.
At face value, the teaching standards provide a list of teaching tasks that teachers enact when addressing various situations and expectations on the job. However, with the growing expectation for data use by the nation’s teaching workforce, the teaching standards do not specifically reference data use as a requirement for practice or evaluation. Rather, there are broad conceptualizations of basic requirements for successful teacher practice that place the responsibility of data-use applications on teacher interpretations of teaching standards.

Analysis of the Wisconsin Teaching Standards (2008) reveals that several standards imply data use as a means of measuring growth, evaluation, progress from the following list of standards: 1) Teachers know the subject they are teaching, 2) Teachers know how students grow, 3) Teachers understand that children learn differently, 4) Teachers know how to teach, 5) Teachers know how to manage a classroom, 6) Teachers communicate well, 7) Teachers are able to plan different kinds of lessons, 8) Teachers know how to test for student progress, 9) Teachers are able to evaluate themselves, 10) Teachers are connected with other teachers and the community. With so much flexibility to meet large-scale goals, the way that schools organize a wide array of teaching tasks occurs at the discretion of the teacher, existing school structures, and/or the figures of authority, such as school administrators. Although these frameworks for standardized professional practice for educators, it is unclear how teachers make connections between these general competencies when it comes to their data use responsibilities.
Standards-based Assessments

The literature in standards-based assessment for student learning is as prevalent as the notion of standards-based teacher practice. Advocates for standards-based instruction contend that educators raise standards by focusing on formative assessment and providing timely feedback on student’s progress in learning. Conceptually, teacher feedback is not in the form of a grade nor a summative test score. Standards-based feedback provides information on accuracy and how to improve (Lalley & Gentile, 2009).

As with other assessment considerations reviewed in the literature so far, standards-based assessments practices have received varied reports of advocacy or criticism. Lalley and Gentile (2009) affirm that standards have “nearly universal agreement in principle, but practical implementation is another matter” (p. 28). In contemplating the barriers in standards-based assessment, they explain that the concept of mastery-learning requires each student to achieve a pre-established standard set on a specific set of instructional objectives in a criterion-referenced manner. A criterion-referenced approach means each student’s performance is interpreted “relative to established goals and standards, independent of other student’s performances” (p. 31). This makes the evaluation process individualized, without regard to how well others are doing. Teacher professional judgment comes into play in determining whether the mastery level is rated as mastery or enrichment (a higher rating). When teachers did not apply a performance comparison to how well other
learners were doing, Lalley and Gentile (2009) found variable ratings of mastery exist from one teacher to another.

**Alternate Views of Intelligence**

As findings for this study showed an abundance of literature for teacher data use and interpretation of skills or criterion-referenced assessments, it piqued my curiosity to learn what other theories of intelligence might teachers perceive as relevant when they interpret achievement data? Assuming that educators perceive schools as places to acquire life skills and knowledge, I conducted a search for “data interpretation” and “alternate intelligence theories” to see what other schools of thought might contribute to this study.

The search results presented abundant literature on critical skills and instructional programs that are consistent with previous sections of this chapter. However, when I narrowed the search limits to “intelligence” and “assessments” my search yielded theories of hierarchical thinking, creativity, and more holistic conceptualizations of what comprises “human nature” and intelligence (Bloom, 1956). Presented here are brief summaries of each theoretical premise as a precursor to study implications discussed in Chapter 6.

Benjamin Bloom’s (1956) taxonomy of hierarchical thinking, published over five decades ago, has served as a long-standing framework for educators to conceptualize student achievement and learning. Teachers perceive the six levels of thinking as building blocks for lesson and assessment design. *Knowledge* is mere recall of rote
learning that extends into comprehension which is making sense of material at the lowest level of understanding. Application and Analysis involve using information in new situations, understanding relationships, and breaking material into its component parts to understand relationships between parts. In this way, the learner understands both the content and the structure of material. Synthesis refers to production or assembly of a new plan that reconfigures essential skills. Evaluation describes the ability to estimate the value or merit of material based on specific criteria (Bloom, 1956).

Gardner’s theory of intelligence (1983) differs from Bloom’s taxonomy in that intelligences are not the same as thinking style. Gardner suggests intelligence is not a unitary concept and development of each intelligence results in different levels of competence. Gardner proposes eight (8) distinguishable intelligences that remain a popular framework for educators to adapt instructional plans to engage students of diverse interests and approaches to learning. Working definitions of Gardner’s eight (8) intelligences from and educational resource book (Sousa, 2003, p. 35) are succinctly summarized:

1. Bodily/Kinesthetic – the capacity to use one’s body to solve a problem, make something, or put on a production

2. Naturalist – The ability to discriminate among living things and sensitivity to other features of the natural world
3. Logical/Mathematical – The ability to understand logical systems and to manipulate numbers and quantities

4. Musical/Rhythmic – The capacity to think in music and hear, remember, recognize, and manipulate patterns

5. Verbal/Linguistic – The capacity to use one’s language (and other languages) to express oneself and understand others

6. Visual/Spatial – The ability to represent the spatial world internally in one’s mind

7. Interpersonal – The ability to understand other people

8. Intrapersonal – The capacity to understand oneself

Two years after Gardner’s work, Sternberg (1985) proposed a triarchic theory of intelligence that distinguishes three types of intelligence: analytical, creative, and practical. Indicators of analytic intelligence are seen in the ability to analyze, critique, and evaluate. Creatively intelligent persons are good at discovery, invention, and creation. Practical intelligence is recognized by aptitude in applying, utilizing and implementing. In research conducted in the field of education, students were assessed for their memory as well as their analytical, creative, and practical achievement. Results showed students who were taught in ways that best matched their achievement patterns outperformed students whose instruction methods did not fit for their ability patterns (Sternberg, Ferrari, Clinkenbeard, & Grigorenko, 1996; Sternberg et al., 2000).
Another view of intelligence which affords assessment and data interpretation considerations is Torrance’s (1970) conceptualization of creativity. Torrance views creativity as a multifaceted intelligence that can be assessed and developed (Torrance, 1980). Analysis of the scoring manual for Torrance’ creativity assessment, Thinking Creatively With Pictures (Scholastic Testing Services, 2000), there are five norm-referenced creative attributes: originality, fluency, elaboration, resistance to closure, and abstractness of titles. The thirteen criterion-referenced creative strengths are listed as emotional expressiveness, storytelling articulateness, movement or action, expressiveness of titles, synthesis of incomplete figures, synthesis of lines (or circles), unusual visualization, internal visualization, extending or breaking boundaries, humor, richness of imagery, colorfulness of imagery, and fantasy.

**Importance**

Whether a school is making dramatic or minimal achievement gains, there is an underlying expectation for teachers to be making use of data to inform and modify their practice (Bailey & Drummond, 2006). Predictably, questions about data interpretation gives rise to varied definitions of data that teachers use to make instructional decisions each day in the classroom. When taking the data-related practices of an entire school into consideration, reformers acknowledge there are more questions than answers when it comes to theorized methods to modify instruction in a way that is respectful of each learner’s identity with such considerations as demographic and administrative data (Mieles & Foley, 2005).
What presses this knowledge for teacher perceptions of data interpretation is ongoing speculation of what teachers view as most important to learning achievement and instructional practice. Given mandates that call for teachers to extend current skill sets, it is an opportune time to gather current, qualitative data from various teachers to analyze the skill sets that enhances data use. In the collective of anecdotal experiences with data use are core tasks of practice that teachers claim are integral considerations in their daily work. This study is committed to revealing what teachers perceive to be core tenets of data use and to discern which of these practices, if any, enhance their ability to interpret student data.
CHAPTER 4 – METHODOLOGY

If schools are to close the gap between student achievement and teacher instructional practices, it is important to listen to the teacher voices that are situated in ongoing data use and interpretation. This research applied a case study methodology to understand the phenomenon of teacher data use as it is situated in the substantive field of teacher practice. To clarify the phenomenon for intensive study, the guiding research question is posed: “What do teachers perceive are core tasks of data use, and which tasks enhance data interpretation?” Selecting data interpretation as a focal point of this study is important to understanding the gray areas of data use processes as detailed in Chapter Two. Because there is common consensus in data use literature that data interpretation is a critical component of driving instructional practice, it stands as the centerpiece for the resultant model of data use practice that this study presents in subsequent chapters of research findings and discussion.

Teacher Subjects

Selection of teacher subjects followed the recommendation from Gall, Borg, and Gall (1996) that if a researcher cannot study all individuals related to the phenomenon of data interpretation, the researcher will “need to consider which of them have experience or perceptions that give them special value as data sources” (p. 553). Recruitment of teacher participants proved to be the most difficult aspect in launching this study. Concerns about time commitments or availability for interviews promptly
narrowed the representative group of teacher subjects to those who were willing and available to talk about data use practices. Other potential subjects declined because of uncertainty of their expertise with data use. Therefore, a valuable aspect of the four recruits for this study is that they all perceived themselves as having some confidence and expertise in data use discussion. Each subject also had over a decade of teaching experiences that worked as a limited historical perspective of trends in education they found comparable or different from past practice with data use expectations. As data interpretation is considered a developing reform in educational practice, the inherent value of research subjects who integrate a transitional perspective offers candid insights.

The four teacher subjects who participated in this study offered data for analysis from a case-by-case perspective, as they were recruited from a general social network of the teaching profession instead of one particular school setting. The range of teaching experience represented is 17 – 27 years in the teaching profession. As positioned subjects (Conrad, Haworth & Millar, 1993), each teacher brought an individual perspective regarding her data use as it exists at this time. All teachers taught multiple content areas at the elementary level for their entire career. Pseudonyms for research subject names, grade level, and number of years teaching experience are summarized as

Kathleen – 5th grade, 25 years teaching experience

Shelley – 5th grade, 24 years teaching experience
Dorothy – 1st grade, 17 years teaching experience

Marilyn – 1st grade, 27 years teaching experience

Selecting teacher subjects from a variety of school settings assumes affords the opportunity to collect random samples of professional practice when gathering data. Because teachers provided thick descriptions of data use tasks situated in the workplace, culmination of tasks could be mapped out as phenomenon occurring in two southern counties of the state (one rural and one semi-urban), one rural school in the central region of the state, and one rural northwestern school. As teachers detailed routines of data use that were typical expectations in their school system operations, the combined data from four separate perspectives (and environmental settings) yielded a variety of data for interpretation using a general practice assumption.

Units of Analysis

Gall, Borg, and Gall (1996) posit that a unit of analysis in case study is a particular aspect of a phenomenon that “can be sampled with each member of the sample being studied as a separate case” (p. 546). Because data use is perceived as a complex interaction of many aspects of practice, selecting data interpretation as a focal point in teacher data use made subsequent data collection and interpretation more manageable. The focus on data interpretation established a starting point of where to go next with the data. Applying a grounded theory approach to collect and code data, the discovery specific to data interpretation would guide next steps. At the onset of data collection and coding, I applied the inductive model specific to grounded theory when
noting interactive patterns specific to data interpretation in teacher data use. Glaser (2005) posits the advantage of a grounded theory approach in that “Grounded Theory is simply an inductive model for research. It is a paradigm for discovery what is going on in any particular arena. It provides a global view by providing a method of solving the puzzle of viewing human experience and structuring reality” (p. 145).

**Case Study Data Analysis**

Interview questions encouraged open-ended responses from research subjects to capture teacher perceptions about data use. To support a task-specific account, formal questions and alternate prompts like “What would that look like?” or “Any other details connected to that example?” were interspersed with questioning protocol.

**Interview Questions**

1. What types of data (loosely defined) comes to mind in planning lessons, assessments, activities, or interventions for student learning?

2. Describe typical places to get to get the data you need for planning your work with students.

3. Which tasks might I see you doing when you are actively collecting data?

4. Which tasks might I see you doing when you are actively interpreting data?

5. What role, if any, do teacher observations play in data collection/interpretation?

6. When engaged in any teaching task, how do you know you’ve hit the mark?
7. Based on data findings, what have you decided to make your learning priorities?

8. What system in the school (or who) helps you make sense of data you use?

9. Of all the (data) tasks you’ve mentioned, which are most valuable for improving your teaching?

10. Do you ever find the data lacking for planning work you need to do with students? In what instances?

11. How does data you collect/analyze get fed back into the school-system process for reflection, analysis, or decisions to improve instructional practices?

12. Does your school use data in an evaluative way to modify or alter curriculum programs you’ve chosen to implement?

At the conclusion of each interview, participants provided an open-end response to add any professional insights or perceptions of data that the questions may not have provided for them. Concluding remarks were useful to surface teacher perceptions of generalizable or highest priority task perceptions.

Teacher interviews were audio-tape recorded and transcripts prepared and returned to subjects to verify dialogue accuracy. At the time that teachers received interview transcripts, they had the opportunity to add to the original transcript if they had additional input or feedback to contribute. One research subject accepted this option.
Coding and Comparative Analyses.

I coded interview data using the same open coding procedures applied to archived teacher data in Study Two. Glaser (1978) describes open coding as “coding data in every way possible... fracturing data into analytical pieces which can be raised to a conceptual level” (p.56). Glaser observes the advantage of coding someone else’s data “because of the de facto distance from it” (p. 56). It forces the researcher to “think and transcend his involved empirical view” (p. 56). In coding my own interview data, I reverted back to a key word approach that I applied in Study Two to generate a plethora of codes for each line of questioning.

While conducting open coding, memoing processes afforded a creative flow of conceptualizations and interpretations I applied to interview segments. The memos helped track ideas when comparing teacher anecdotal incidents around common questions specific to data collection, interpretation, definitions of data types, prioritized data to ensure saturation of evidence for the focal point of this study: teacher perception of data interpretation tasks. The data revealed three broad categories of data tasks that emerged from word choice teachers used to describe data use and data interpretation: Observation, Interpretation, and Adjustment. Using excel spreadsheets, I sorted an extensive list of tasks that fell under these broad categories (Appendix 1). In this way, I could determine congruence or isolated perceptions of core data use tasks for each research subject.
Applying a constant comparative method, I checked for frequency of each code and connections to memos with matching codes. Memos were summarized on index cards which I clustered into patterns to confirm the emergence of broad themes that were comprised of supporting tasks. While sorting emerging tasks, I wrote additional memos as to how each core task intersected, supported, or mitigated other tasks. These memos gradually shaped a first draft of a conceptual map of teacher data use practices that revolve around data interpretation.

In this comparison phase of the coding and memoing process, I applied the DDIS coding scheme (Data Driven Instructional System) from Study One which conceptualized school leadership as a multifaceted operation comprised of six aspects of operational function: data acquisition, data reflection, program alignment, program design, formative feedback, and test preparation (Appendix 3). By looking for crossovers or gaps between both coding schemes, I determined the codes specific to Observation and Adjustment tasks were not only respectful of the teacher verbiage for data tasks and teacher perceptions of data use, but also consistently applicable to either data set: Interview Transcripts 1-6 from Study Two, or Interview Transcripts 7 – 10 for new research subjects. This secondary coding process confirmed the tasks that would be tested in the next phase of analytical methods.

Saturation of categories became evident during the comparative analysis process of coding schemes that emerged from this study and the preliminary study. When constructing a coding comparison chart for both studies (Appendix 1), I tracked the
patterns of responses for coding scheme from Study Two. Columns 1 and 2 tracked the frequency of code activity for themes in Study Two: Observation, Interpretation, and Adjustment. Columns 1 and 3 confirmed themes going into the current study and tracked research subject discussion activity (Column 5) for tasks situated within the each theme. The results revealed seven tasks that teachers perceived to enhance data interpretation: Collecting, Analyzing, Comparing, Contemplating, Integrating, Reinforcing, and Referring (detailed in Chapter 5, Findings).

**Saturation of Evidence**

For the new data in this study, I prepared a contact summary sheet for all research subjects to summarize what was learned in each interview. In an example framework for a contact summary sheet, Gall, Borg, and Gall (1996) recommend summarizing the salient points from the contact as “themes aspects” (p. 560). Recording these points in the right column (Appendix 2) afforded a space to contemplate the inter-relationship between salient points and how they contributed to answering the guiding research question. As theme aspects emerged, I compared them to concepts that surfaced from the open coding/memoing analysis and factored in memos noting teacher perceptions for each theme aspect.

The contact summary sheet not only confirmed the regular happening of each core task but also confirmed there were no new factors emerging, per Lincoln & Guba’s (1985) test for overextension in data analysis. Using the Coding Comparison Chart (Appendix 1) and the Contact Summary Sheet (Appendix 2), I conducted another
constant comparison process by transferring teacher anecdotal data (taken from interview transcripts 7 – 10) that supported each theme aspect to search for gaps in the Coding Comparison Chart. Finding none, I confirmed saturation of evidence for this study.

Ending Data Collection

Lincoln and Guba (1985) identify four criteria for determining when concluding data collection is appropriate: 1) exhaustion of sources, 2) saturation of categories, 3) emergence of regularities, 4) overextension. After completion of various analytical methods, I turned to the task of organizing data to solidify a conceptual map of tasks that teachers perceive to enhance data interpretation.

Using over 150 index cards replete with teacher anecdotal data and memos, I grouped the evidence to show causal relationship between core tasks. Tracking how core tasks impacted each other, patterns of professional practice emerged. For example, I noted that *contemplating* curriculum tasks never proceeded Observational tasks (*collecting, analyzing*) or the first Interpretation task (*comparing* scores). I also noted incidental exceptions in practice that occurred in data interpretation based on teacher perception of scores belonging to “successful” or “unsuccessful” learners.

As the inter-relationships of tasks solidified, I termed each theme of data use as Phase 1 (Observation), Phase 2 (Interpretation), or Phase 3 (Adjustment) in the final write up (Chapter 5, Findings).
Qualitative Research Methods: Positioning Ourselves

As a researcher I offer a viewpoint of teacher, administrator, and professional development specialist to the task of contributing credible findings at the close of this study. As a curriculum specialist and facilitator of professional development for educators, my estimation of theories related to human intellect and learning capacity is quite eclectic. Assuming a perspective that the human condition thrives on diverse social and intellectual perspectives, I acknowledge the inherent challenge for educators to create culturally-respectful teaching strategies to maximize student learning for all students. My desire to learn from teachers positioned in the reflection of data use was the impetus for this study. I bring an open mind and genuine curiosity to gather prevalent teacher perception of what type of data matters most in planning instruction? What do teachers do with data in structured repositories in the workplace? How do school data systems support storage of data that is truly useful for instructional planning?

My research methods integrate a variety of validity standards that Creswell and Miller (2000) attribute to postpostivist and critical paradigm assumptions. I incorporated postpostivist procedures such as triangulation and member checking by seeking convergence among multiple sources of data, such as interviews conducted in the DDIS study (described as Study One in Chapter 2), and new interview data (detailed in the findings for this study in Chapter 5). In a manner consistent with the research team in Study One, I administered ongoing member checking practices when I presented
interview transcript copies and task code grids to interview subjects. Teachers had the opportunity to offer feedback on narrative drafts or supporting charts or diagrams while in design stages. Additionally, when in the editing phase of dissertation completion, interview subjects reviewed a draft version of Chapter 5 (Findings) to confirm the credibility of the information in the final narrative account submitted for publication.

The important contribution of this study is the concept map (Appendix 4) that represents the core tasks that teachers perceive to be foundational expectations for data use. Thorough analysis of the empirical data tracked the interrelationship between core tasks to show the cognitive flow of data interpretation. Understanding teacher perception at each phase suggests implications for teacher practice dedicated to planning appropriate and engaging learning experiences for students. By breaking down the tasks that teachers apply to their work and conceptualizing the interrelations of prevailing tasks, the resultant knowledge aspires to inform and improve existing frameworks of practice for diverse student populations and learning achievement.
CHAPTER 5 – FINDINGS

This chapter provides an analysis of core tasks teachers perceive as priorities for data use. Teacher perceptions of tasks that enhance data interpretation is the focal point of the guiding research question. The core skill sets that teachers apply to data use can be generalized as three themes or phases: Operation, Interpretation, and Adjustment. As teachers make observations about student performance via daily work or classroom assessments, teacher observations become formalized into data systems by means of data repositories such as grade books and computer-assisted programs (Skyward or SIMS, Student Intervention Monitoring System). Teachers perceive that formal achievement data consists of information they are responsible for collecting from daily, weekly, quarterly, or annual assessments. Running concurrent with formal observations are informal observations in which teachers monitor learning gains (or not) after intentional instructional adjustments are made to accommodate student learning styles or barriers (such as absenteeism or cognitive disabilities).

Adjustments are loosely defined as interventions or learning engagements that are planned based on teacher interpretation of data. Therefore, understanding teacher perceptions about data interpretation tasks becomes critically important since it drives what students will experience next in the instructional trajectory of strategies that teachers have planned as part of instructional routines. This chapter provides data in support of the findings that there are two tasks that teachers perceive are most critical
to Observation: collecting and analyzing multiple forms of data. The core tasks teachers apply to data Interpretation tasks are comparing scores to achievement ranges, conceptualizing student connections to curriculum, and integrating student-based information if/when students fall short of achievement targets. There are two prominent Adjustment strategies that teachers perceive to be core practice and informed by their data interpretation: reinforcing skill attainment and referring students for more individualized instruction when necessary.

**Figure 2: Core Tasks That Enhance Data Interpretation**
Phase One: Observation Tasks (Collecting and Analyzing Data)

Analysis of teacher talk committed to the “big picture” of student achievement data generated by state, district/local assessments, or curriculum-specific assessments showed consistent preference for local data that is curriculum or program specific. Teachers offered no commentary in making connections between state test results with classroom-specific instructional plans or intervention plans for students. Instead, they extended detailed effort discussing connections between classroom curriculum materials (including assessment provisions) and conducting routine benchmark assessments.

The assessments that teachers perceived to be most useful to directing instructional decisions were either web-based programs (in reading and math) or computer shared-drive locations. Web-based programs (Read-About or AIMS, Assessments in Math Skills) not only provided a battery of skills-based tests and archived students results, they also generate comparative data that teachers perceived to be useful in monitoring progress or stagnation. A shared-drive location afforded ongoing access for depositing running records results. Teachers are primarily responsible for collecting or entering running record scores into computerized data repositories for interpretation at regular intervals (semester or trimester) during the school year.

As for collection and subsequent interpretation of skills-based or criterion-referenced data, teacher made only incidental reference to WKCE scores (Wisconsin
Knowledge and Concepts Exam) as annual foci data for data retreats, faculty meetings, or grade level discussion. When reflecting on their role in these data reflection sessions, teachers generalized their role as recipients of achievement data focused in core content areas (language/reading, math, science, social studies). Because of gaps in time between test administration and subsequent data analysis and reflection at the local level, teachers perceived the use of state tests to provide a non-negotiable “comparative range” which lends influential considerations in how teachers perceive student success or failure. State achievement ranges also influence local decisions of types of data to collect and compare with state assessment results at various intervals in the school year.

**Collecting Core Subject Data**

Teachers consider core subjects (particularly language/reading and math) data to be the priority content areas for data collection at the local level. Although research subjects teach several content areas in their daily routine, their talk about data use practices were noticeably confined to language arts skill sets (mostly reading and writing) and math assessments.

Collecting tasks for teachers at the first grade level involved keeping a grade book or assessment binder for reading and math results. Research subject Dorothy places importance on her assessment binder and the district computer shared drive as primary tools for tasks specific to collecting and analyzing data:
I can look at the whole reading assessment I gave and look at what kind of errors they made... and we also store it on our O-Drive (computer network) so I can get a number. That’s the best place for me, the actual data form, where I collect the information (Interview Transcript#9, Lines 38-41).

Dorothy describes routine data collection tasks to look like “working one-on-one with a student ... listening for a very specific skill. Like in math, can they count by 2s to a certain number” (Interview Transcript #9, Lines 68-70). Research subject Marilyn describes similar observations she makes when collecting running records in math, reading readiness, and spelling. She explained her data collection tasks are varied:

...a fluency timing. I could be doing a math timing, I could be looking at student answers (for accuracy) as they are looking at the Smart board... and I want to see if they can spell the word... did they remember to put a silent e on the end even though there is not a picture up there for it?” (Interview Transcript #10, Lines 120-125).

Details given about core subject data sources show that teachers rely heavily on skills-based assessments designed by the curricular program vendors who provide the materials and manuals for classroom instruction. Research subject Shelley offered an extensive list of curriculum-specific or program-specific assessments to which her school subscribes:

Number 1 for our reading assessment we use the Fontas Pinnell running record series. And that data helps me in what I’m looking for is the skills, the reading skills, of fluency, comprehension... we use SRI which is Scholastic Reading Inventories.... The information we’re trying to gain from there is comprehension and vocabulary skills. And then ... the Read About program, which is another computerized-based universal assessment we’re able to do. It’s a reading program on the computer... we’re able to use those 8 reading skills that... help our steer our instruction. So we are able to take those assessments, take the information gained from those assessments, being the scores, and then use those scores to do our guided reading groups and also to plan our assessments.
So that’s reading area for one thing. Writing we do a lot with 6 Traits writing and Step-Up to Writing, those are the two programs I tend to use as the framework for my writing curriculum…. students know what skill I’m assessing for that particular writing. Then once the data is collected from that I use that to help steer my next instructional focus or my next day’s lesson or next week’s unit type thing…. based on the success or the failures of the students (Interview Transcript #8, Lines 12 – 32).

**Analyzing Data: Skills-based, Student-based**

Teachers rely on two analytical perspectives when analyzing data: skills-based information and student-based information. What Elliott and Fuchs (1997) and Fuchs and Fuchs (2006) refer to as critical skills, are referenced as skills-based data in this write up. Information that supports skills attainment is deeply embedded in the curricular materials and programs to which schools subscribe. The array of critical skills generally relate to basic knowledge and comprehension applications to subject matter concepts. Because teachers perceive this data to be of fundamental importance to instructional decisions, their talk of collecting skills-based or criterion-referenced data dominates data use discussion.

Teachers perceive data collection to focus on predetermined skill categories in prioritized subjects (reading, writing, and math). Consequently, their approach to data analysis often stays within a skills-based framework inherent to the curricula program of choice. This solidifies a general acceptance that skills-based instruction is a learning priority in the workplace. Although teacher research subjects made incidental mention of project-based, creative or exploratory instructional approaches as other aspects of
their instruction, each instructional scenario they described as pertinent to data use were limited to teaching examples of skills teaching, skills practice, or skills assessments.

One teacher detailed a formative assessment she relies upon as a way to do an efficient skills-based “spot-check.” Her entry/exit cards are termed as such because she applies the assessment as/before students enter the concept instruction or exit a particular unit of study. Research subject Kathleen explains

I use a lot of entry/exit cards for informal information... those are the things... from the differentiation class which I use almost daily, maybe 3-4 times a week usually. I use them maybe twice a week in math and once or twice a week in language, science, or social studies. And it’s just 3 or 4 questions ... I give them questions to answer and I have it corrected in like 2 minutes. And then I know whether I need to re-teach something of if I need to pull a small group that didn’t get something, and then I know what I’m going to do the next day (Interview Transcript #7, Lines 26 -34).

In selecting questions to gauge skills-knowledge, Kathleen relies on the general framework of skill categories inherent in the reading and math programs to which her school subscribes. To expedite actual placement of students for re-teaching, she makes representations of student groups by “sorting the little exit cards into piles... “ (Interview Transcript #7, Line 42) to keep track of which students go into which groups for skills reinforcement as demonstrated by the entry/exit cards with student names on them.

Skills-based Data Perceptions

How do teachers perceive the types of data that ultimately enhances data interpretation? When teachers generated lists of data types they perceived as foremost
to their own lesson and assessment design, the underlying commonality for all data types listed was a focus on skills-based or criterion-referenced information. Teaching priorities for critical skills encompasses not only student knowledge of basic concepts, but also student ability to apply skills in various situations. Their successful application (or not) is measured by performance criteria inherent in the assessment scoring range (or benchmarks) that gauges level of understanding and application.

Of all assessments listed as most useful and integral to ongoing data use, teachers often began to list multiple assessments that were either curriculum or program-specific assessments included in the teaching materials for curricular programs in their school (Everyday Math, 6 Traits of Writing, running records series, etc.). A few of these assessments could be customized by teachers, but oftentimes were administered “as is” from the publisher of the curriculum material.

Teacher talk on skills attainment is woven into rich description of data collection tasks for core content areas. Citing examples from her first grade classroom, Marilyn made several references to a web-based math assessment called AIMS (Assessment In Math Skills) as a foundational starting point for data collection. “We start out with AIMS assessments in the fall... we use number counting, number identification, quantity discrimination, and rote counting by 100s” (Interview Transcript #10, Lines 7-9).

Although teachers describe useful data collection practices going on in classrooms daily or bi-weekly, the formal or official data for school personnel data collection and analysis is usually limited to quarterly or trimester scores in core subjects.
There is more data that exists in language/reading and math subjects than skills-data in other core subject areas (social studies, science). When teachers report quarterly math skill levels for students, it is the summative scores that the school uses for data analysis. When summative scores are reported, patterns of progression become harder to detect. Because teachers perceive immediate feedback a necessity, all research subjects gave examples of formative assessment practices they have in common with teaching peers at their grade level and subject area. Marilyn describes giving paper/pencil 1-minute math tests regularly, as they are quick to administer. They immediately reveal not only individualized skill attainment, but also which students show patterns of acquiring skills at faster/slower pace than the same-age peers. Marilyn explains that skill accuracy and fluency are measured progressively:

They (students) start out with level A... like one plus one, two plus one... and in level A you have to get 15 right to pass to level B... and there’s like 40 problems to solve in a minute. Then by the end of the alphabet you’re up to Z where you’ve gotten your math facts ... and when you get to Z it’s facts that equal 20. They never go higher than 20 (Interview Transcript #10, Lines 32 - 37).

Whether a student progresses at an unexpectedly rapid rate or remain in a holding pattern for skills attainment, informal observations that teachers make about learning pace are usually stored as anecdotal, informal observations that may or may not be used later in data use cycles.

The summative scores formalized at each benchmark period becomes the foci for teacher talk with teaching peers in data analysis and data interpretation tasks as part of Response to Intervention (RTI) or Professional Learning Community (PLC) meetings.
(described in data analysis tasks in the next section). Teachers perceive they have the opportunity to share incidental or unique data collection strategies - such as Kathleen’s use of entry/exit cards or Marilyn’s observations about pace of skills attainment for individual students. All research subjects mentioned structured time for data reflection at faculty meetings, teacher in-service, or grade level meetings.

Teachers perceived themselves highly accountable for student skill attainment and documenting adequate progress at each academic check point their school establishes. Their grade books or computerized grade systems note which students are making adequate progress in the curriculum and which students are lagging behind in curriculum or program-specific skill attainment. Therefore, when teachers analyze data, they do not offer opposing measures for checking progress. They use the measures that their curriculum and/or the state standards provide as ranges for proficiency for each grade level. Teachers reliably apply measures established by their school or the state when conducting data analysis tasks.

When asked for her perception for student learning priorities, research subject Kathleen countered that learning priorities are predetermined by policies at the state level. She does not believe that learning priorities are local decisions for which her input matters: “It’s common core curriculum. I mean, it’s pretty directed to what we have to teach and what they have to learn... It’s pretty prescriptive” (Interview Transcript #7, Lines 81-85).
Teachers describe benchmark assessments as the most integral part of the school-wide system of data collection and analysis. Collecting data is often done in formal ways at set times during a school year. All teachers outline examples of data they elected or were required to collect daily, weekly, or quarterly. A common perception among teaching professionals is that data collection is intended for timely data analysis. Data interpretation is an outcome of data analysis and guides decisions for instructional adjustments they will make to support student success.

Marilyn agrees that predetermined learning priorities drive skills-based data collection, and setting learning priorities for students. She adds that ranking students on the mastery level of the scales are an important part of data analysis.

The 2nd grade teachers ... will ask us to rank the children... we do leveled readers... so the sheet (of students at each level) goes on so 2nd grade knows where those children have been and what levels they’ve covered” (Interview Transcript #10, Lines 255-262).

Concurring that routine skills checks are core tasks of data collection and analysis, one teacher integrates her perception why skills knowledge is a priority in her instructional planning. Dorothy reflects

As I’ve gained experience, I think partly because the data I see, I have a belief the basics are super important... I make more of an effort... that there is a very firm understanding of basic math skills like place value, understanding coin recognition, coin value... those very basic building block areas. As for reading... not only do they recognize letters and the sounds they make, but can they (students) recognize chunk words? Can they read sight word so they don’t have to sound out “was”?... I feel I probably spend more time on that” (Interview Transcript #9, Lines 98-103).
**Student-based Data Perceptions**

Notably absent from teacher descriptions of data collection and analysis tasks was mention of collecting student-based data (such as learning style, learning difficulties, or other holistic information). Student-based information was rarely sought during data collection until teachers engaged in data interpretation. However, because teachers perceive the collection of student-based data to be extremely important to data interpretation tasks, it is described in Phase 2 which suggests data interpretation tasks to be reliant on integration of student-based data that is often confined to specific student populations.

In Phase 1, teachers are accustomed to getting student-based data (holistic data) with skills-based data, especially if there is a history of learning struggles. There is no mention of needing or receiving student-based information for students who meet or exceed learning goals.

The core tasks in Phase 1 (Observation) show an absence of concern that data collection felt concentrated in any particular subject areas or on skills attainment as a priority. Further, research subjects did not speak to any perceived discrepancies between time invested in collecting skills-based data compared to student-based data. Core tasks that merited significant discussion activity came from anecdotal descriptions of collecting and analyzing skills-based assessments extracted from curricular programs. There was little or no teacher talk regarding tasks invested in collecting or analyzing student-based data until the Phase 2 in the data use cycle: Interpretation.
Phase 2: Interpretation Tasks (Comparing, Contemplating, Integrating)

The findings detailed in Phase 1 reveal a cycle of inter-dependent themes that begin with Observation which leads to Interpretation which guides Adjustment planning. As these tasks operate in an ongoing cycle of data use, the tasks are linked to teacher perceptions of which students are or aren’t making measurable gains in learning. Teachers perceive interpretation tasks to be alternations of comparing skill accuracy data to benchmark goals, contemplating what connections students have or have not made to curriculum concepts, and integrating student-based data to make sense of connections students may or may not have yet made to curriculum concepts.

Comparing Scores to Success Ranges

Local assessments provide a range of scores (or performance criteria) to gauge minimal, basic, proficient, or advanced performance. Research subject Shelley perceives data interpretation tasks be a comparison of student results that she is responsible for collecting at various intervals during the school year. Shelley’s role in interpreting data means making general comparisons between her student performance results and the range of acceptable performance results inherent in the curricular program, learning standard, or benchmark. Using the comparative data, teachers make an evaluation which students have progressed (or not) during the same time allocation equal for all students. Shelley describes the comparative aspect of interpretation in any subject area:

Once I’ve taken the running record from the student and I’m looking at that assessment, I’m then going to check my running record benchmarks that we have set up for our trimester, and I would see where that student is based on
expectations that we have for the students... so I would definitely be comparing it (the score or data) to the benchmarks or criteria that have been presented previously (Interview Transcript #8, Lines 104 – 112).

In these data interpretation scenarios, all research subjects agree that having predetermined score ranges for success is typical for all curricular programs. Comparing performance data with target achievement ranges, teachers contemplate whether students who struggle are lacking prerequisite skills or whether there are other factors working against a student’s ability to connect to the skill at that point in time. When teachers see patterns of substandard scores, they invest time contemplating what causes the disconnect between student skill attainment and the curriculum or program features that a student is experiencing.

There was one voice of dissention about the target score ranges that teachers process during comparison tasks. After confirming that standards-based benchmark scores are fixtures for reporting achievement gains, Marilyn interjected skepticism of the validity of the range for the diverse needs she perceives in her classroom. She confides

The common core is coming from the administration, which is coming from the state, and it’s just what we need to implement.... And I will say, sadly, it’s based on the majority of children (Interview Transcript #10, Lines 334 – 340).

This perception offers a segue into the second core task of Interpretation when comparing scores transitions teachers into actively contemplating connections between existing skills and the curriculum/programs that guide instructional practice decisions.
Contemplating Connections to Curriculum

A second task that is common to data interpretation is the teacher’s cognitive functions when contemplating student confidence in critical skill knowledge in core content areas. Contemplations are a complex mixture of comparing the quantitative data or scores with student-based, qualitative data related to student performance. The way that teachers conceptualize connection to curriculum concepts is making sense of what students know and what they don’t know for identifiable critical skills. Kathleen states that interpretation tasks are cognitive operations that usually happen

...in your head... I would be looking at the breakdown of the skill... what piece of it didn’t they get? Let’s say it’s two digit multiplication. Is the problem that they (students) didn’t put that zero in, or is the problem that when they carried... they didn’t erase it (number), or they didn’t cross it out, and re-reused it again when they multiplied by the number in the tens column. So those are two separate errors... maybe regardless of how many they missed... I’m going to look at what they missed and what I need to explain to them (Interview Transcript #7, Lines 55-67).

Both first grade teachers describe interpretation tasks that combine score comparison tasks with contemplating how students are (or aren’t) making connections to curriculum concepts. Their perceptions of interpreting student progress involves knowing the expected pace and contemplating how their choices in adjusting instructional strategies helps or hinders students from making notable progressions in learning. Dorothy explains her interpretation of reading data:

You would see me scoring things, you know, to determine how many words they were accurate with. The list of high frequency words or what was their words-per-minute for a fluency score. ... You would also see me thinking... about what
that means... if they can explain their thinking or if they can explain it (the concept from the curriculum) to a peer (Interview Transcript #9, Lines 76-88).

Marilyn uses a slightly different approach when contemplating student connections to curricular skills. When comparing scores to a mark, her conceptualization suggests testing whether the proficiency range is appropriate for students who have presented patterns of struggling with the curriculum materials. When students remain at the substandard levels, they may lose motivation to apply effort to testing situations.

Marilyn provides an itinerary of routine tasks when transitioning from Phase 1 to Phase 2:

I’m recording data, usually in a grade book or on another sheet of paper. I’m looking to see if the child has improved or if the child... has not improved. I’m deciding if they should stay at the level they’re at or go back to make it easier so they can have some success so they have a little more will power to move forward (Interview Transcript #10, Lines 128-131).

In all situations involving struggling learners, all research subjects described contemplating reasons for substandard achievement with intense focus on what they knew about the learner (holistic, student-based data). Teachers verbalized these contemplations as studying skills data and asking “What does that mean?” (Dorothy, Interview Transcript #9, Line 87) or noting what was missed and still needed explanation (Kathleen, Interview Transcript #7, Line 67).

I found little evidence of contemplating curriculum connections in situations when learners met or exceeded proficient score ranges. Teachers engaged in an extremely abbreviated form of contemplation that entailed a comparison of score, confirming satisfactory performance, and then moving into Phase 3 (Adjustment).
To illustrate how teacher perceptions of student success becomes a pivotal factor in determining next steps in data interpretation, it is helpful to map the deviation in a column division in Phase 2 that separates intensive contemplation of curriculum connections with abbreviated contemplation of curriculum connection (See Table 1).

Table 1: Core Tasks in Phase 1 and Phase 2

<table>
<thead>
<tr>
<th>Data Use</th>
<th>PHASE 1</th>
<th>PHASE 2</th>
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<tbody>
<tr>
<td>THEMES</td>
<td>OBSERVATION</td>
<td>INTERPRETATION</td>
</tr>
<tr>
<td>Task 1</td>
<td>Collecting critical skills data</td>
<td>Comparing scores forms a perception of learner type as</td>
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<tr>
<td></td>
<td></td>
<td>- Successful</td>
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<td></td>
<td></td>
<td>- Unsuccessful</td>
</tr>
<tr>
<td>Task 2</td>
<td>Analyzing data</td>
<td>Unsuccessful Perception</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Successful Perception</td>
</tr>
<tr>
<td>Task 3</td>
<td>Collect additional, multiple data sources based on learner type as</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Unsuccessful (Intensive)</td>
<td>- Unsuccessful Perception (Intensive integration of holistic data)</td>
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<tr>
<td></td>
<td>- Successful (Abbreviated)</td>
<td>- Successful Perception (Little/No integration of holistic data)</td>
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Contemplating student connections to curriculum concepts based on learner type:
- Unsuccessful learner (Intensive Contemplation)
- Successful learner (Abbreviated Contemplation)
Table 1 offers a row-by-row representation of tasks that remain consistent or deviate when influenced by teacher perceptions for themes Observation and Interpretation. Variation in data use practice occurs based on teacher perception of which students are currently successful or unsuccessful in the data teachers are interpreting. Teachers perceptive students from two vantage points specific to achievement: successful students make expected gains, unsuccessful students are not making gains. At the point when teachers begin to categorize students as successful or unsuccessful, variations in practice result.

**Integrating Student-based Data**

Student-based data is a collection of personal or performance information that provides a holistic understanding of each individual student. Teachers perceive that having a holistic understanding of their students is necessary to plan effective learning engagement strategies for making gains in skill attainment. By collecting student-based data from varied sources (informal observation, student records, family conferences, teacher peers) teachers perceive they have more success when contemplating factors that contribute to curriculum disconnect. Research subjects concur that their time engaged in collecting student-based-information pales in comparison to the importance placed on skills-based data collection. *Integrating* data is a cognitive task of merging quantitative skill scores with qualitative, student-based performance data to drive instructional adjustment decisions.
This study showed a consistent reaction in subjects to loop back into the Observation tasks *collecting* and *analyzing* student-based data when a score comparison showed substandard achievement. When students did not realize success, all subjects gave priority to collecting alternative forms of data (student-based, holistic) to integrate with their thinking about student connections to skill attainment and curriculum connections.

One teacher emphasized the importance of conveying student-based data to other teachers to avoid pitfalls implementing more intensive or permanent interventions than may be necessary. Creating a professional means of communicating student-based data becomes a priority when teachers experience success making instructional adjustments. Marilyn articulates her concerns when she perceives no structure exits to pass student-based information between school settings or teachers:

I had a student this year who just moved to another district… when his teacher gets him, his teacher will think he belongs in special education. But when you have him in the room, all of a sudden he’ll open up and he will make connections and link faster than anybody in the room. But you put a pencil in his hand and his hand won’t move (laughs) without tons of prodding! So I mean, his data on the AIMS web was always at the very bottom… so data doesn’t tell if you have a processing error (Interview Transcript #10, Lines 410-416).

In this instance, integrating student-based data she perceives as a “processing error” resulted in making instructional adjustments that extended beyond her usual routine of instruction. However, when implementing this instructional change and observing positive results, the resultant student-based data was useful for comparing
scores, contemplating curriculum connections, and planning less-intensive learning interventions.

**Student-based Perceptions**

Teacher perceptions about student-based data involve both achievement and holistic perceptions. This study reveals a recurring pattern of teacher discourse focused on unsuccessful students compared to students who experience academic success. When students show signs of struggle, teachers invest additional time and effort investigating the student’s history or present circumstances so that appropriate supports can be enacted.

Informal ways to collect student-based information often relies on observational data such as teacher or family communication, anecdotal data shared between teaching professionals, or conversations with students to learn more about their interests and learning needs. Formal structures that exist to collect and share student-based data exists in student cumulative records of attendance, behavior, emotional or learning issues that impact student performance. Students with individualized educational plans also have holistic information stored with their achievement data.

Teachers generally rely on their own means of getting alternative data to compare to skills-based information. At the time that Interpretation tasks (comparing scores and contemplating curriculum connections) are in full swing, teachers consider both informal and formal data types to be relevant and useful to plan effective instructional adjustments.
When comparing formal data availability for successful and unsuccessful students, research subjects agreed that the most student-based data is available for unsuccessful students who are of greatest academic need. There was incidental mention of accessing or using student-based data for gray area students. There was no mention of integrating student-based data for academically advanced students.

The most consistent practice for storing and retrieving both holistic and achievement data for student populations of greatest need occurs during Phase 3 if a student is being evaluated for specialized services. Otherwise, the extent that teachers integrate student-based data is highly variable. It often depends on what data teachers believe is available and relevant to understanding skill-deficits that students are demonstrating during this phase.

**Phase 3: Adjustment Tasks (Reinforcing and Referring)**

Adjustment tasks involve planning appropriate modifications to instructional practice to strengthen student connections to curriculum concepts. Teachers plan engaging learning activities based on information they’ve collected in Phase 1 (Observation) and data they have cognitively processed in Phase 2 (Interpretation).

As research subjects describe their experiences gathering skills-based and student-based data to plan instructional adjustments, their perceptions of student success or lack of success was based on fixed score ranges for mastery. However, when teachers integrated additional student-based data, they were more cognizant of patterns and pace of student skill attainment.
Teachers consider any number of variables to contribute to student-based data they may integrate into planning interventions. Some examples of informal observations include noting student performance when adjustments such as pre-teaching are applied, improving attendance, or assigning a reading partner advance. For the most part, research subjects relied heavily on score results, but others relied on gut feelings or other cues they were collecting and interpreting in their classroom setting. Consequently, instructional adjustments that teachers elected to implement in Phase 3 yielded a wide array of tasks: reminding, explaining, prodding, pre-teaching, re-teaching, coaching, partnering, focusing, discussing, grouping, and re-grouping. From this pool of tasks, two predominant core tasks emerged: reinforcing and referring.

To overview teacher perceptions of instructional practice specific to Phase 3, Table 2 presents the core tasks for each data use phase. Notable deviations in practice occur in the transition between Phases 2 and 3 as teacher perceptions begin to cognitively typecast successful or unsuccessful learners.
### Table 2: Core Tasks of Data Use

<table>
<thead>
<tr>
<th>Data Use</th>
<th>PHASE 1</th>
<th>PHASE 2</th>
<th>PHASE 3</th>
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</thead>
<tbody>
<tr>
<td>THEMES</td>
<td>OBSERVATION</td>
<td>INTERPRETATION</td>
<td>ADJUSTMENT</td>
</tr>
<tr>
<td>Task 1</td>
<td><strong>Collecting</strong> critical skills data</td>
<td><strong>Comparing</strong> scores forms a perception of learner type as - Successful - Unsuccessful</td>
<td>Unsuccessful Perception</td>
</tr>
<tr>
<td>Task 2</td>
<td><strong>Analyzing</strong> data</td>
<td>Unsuccessful Perception</td>
<td>Successful Perception</td>
</tr>
<tr>
<td></td>
<td><strong>Contemplating</strong> student connections to curriculum concepts based on learner type: - Unsuccessful learner (<em>Intensive Contemplation</em>) - Successful learner (<em>Abbreviated Contemplation</em>)</td>
<td><strong>Reinforcing</strong> critical skills at same or below level specified by standard, benchmark, or curricula program</td>
<td><strong>Reinforcing</strong> critical skills at same or above level specified by standard, benchmark, or curricula program</td>
</tr>
<tr>
<td>Task 3</td>
<td><strong>Collect</strong> additional, multiple data sources based on learner type as - Unsuccessful (<em>Intensive</em>) - Successful (<em>Abbreviated</em>)</td>
<td><strong>Integrating</strong> student-based data to plan appropriate adjustments - Unsuccessful Perception (Intensive integration of holistic data) - Successful Perception (<em>Little/No</em> integration of holistic data)</td>
<td><strong>Referring</strong> for specialized services Team approach to Phase 1, 2, 3</td>
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<td></td>
<td></td>
<td></td>
<td><strong>Referring</strong> to next level of skills or rigor in same subject</td>
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### Reinforcing Tasks

Teachers perceive *reinforcing* to be a core task in professional practice in Phase 3: Adjustment. When planning learning activities to reinforce student connections to curriculum, teachers make instructional adjustments to engage learners in acquiring...
deficit skills or strengthening existing skills. Teachers plan reinforcements to build fluency and extend understanding of curriculum concepts. They routinely rely on observational perceptions of student performance on past or present reinforcements to decide which activities generate excitement or seem mundane. All research subjects were of the opinion that sustained periods of time in learning reinforcements fortify student connections to critical skills in the curriculum. This section provides a few examples of ways that teachers strategically adjust their practice and concludes with a summary of referral structures when teachers perceive their adjustments have not affected measurable learning gains.

There are many ways that teachers work to create engaging learning opportunities for students to reinforce skills. The following anecdote is offered as one of numerous examples of how teacher routinely formulate student-based perceptions over time. This information is often held in teacher memory and tapped into when teachers perceive student learning struggles. Dorothy describes “instinctive” observational student-based data she considers as highly relevant to planning proactive learning activities as

... more of a gut thing. Like, I just know my kids. You know, as you’re reading the lesson to prepare you think “Oh yeah, I know what they’re gonna get stuck on. I know I’m going to have to re-teach or pre-teach this.” So, it’s not a formal assessment, it’s more of... knowledge of the kids (Interview Transcript #9, Lines 21-24).

Using student-based data she has gathered informally by just “knowing her kids” works in a way for Dorothy to begin formulating engagement strategies she hopes will
proactively prepare students for a pending skills check or introduction of new
curriculum concepts. The tight cognitive cycles of data use involve collecting and
analyzing what she knows student performance to have been with past skill sets (Phase
1). She compares those scores and contemplates pending curriculum concepts (Phase
2). Integrating her knowledge of student learning approaches with historical
performance on other skills guides the planning proactive or reactive reinforcement
learning activities (Phase 3).

Kathleen, on the other hand, applies a formative assessment tool (entry/exit
card) to collect and compare skill-based data rather than integrate her assumption of
what students may or may not know. She relies on score results to plan reinforcement
strategies for the current unit of study or to confirm moving on to new concepts. She
details the rapid succession of data collection, interpretation, and engagement routine:

Like today I did 2 exit cards. I did one in math. I did one in language. So the one
in math is going to tell me how to group kids next week based on who knows the
fraction to percent equivalents and the language one tells me which kids know
the be verbs so I know whether to go on or not with linking verbs (Interview
Transcript #7, Lines 36 – 39).

Here the formative assessment (exit card) effectively defines successful and
unsuccessful students based on attainment of skills-based score ranges. The grouping
decision she mentions is guided by assessment results. Contemplating the degree to
which students have established connections to curricular concepts informs her decision
to plan individualized or group supports for various students.
An alternative to grouping for practice is to remain in a whole group setting and facilitate skills-practice by actively engaging select students who exhibit under-developed curriculum connections. Detailing how adjustment decisions are guided by data observation and interpretation, Kathleen explains how she collects and analyzes data frequently. The data on skills attainment helps her determine which students will receive more specific re-teaching or practice adjustments:

I have tons... of sheets in the grade book... I take those 6 or 7 kids (with lowest assessment scores)... and put their names on an index card, and I tape it on the inside of the folder from which I teach the subject. So I always have the names of those 6 kids I should call on most often... and it can change every 2-3 weeks depending on ... different skills (Interview Transcript #7, Lines 133-149).

In this instance, she provides additional practice by actively questioning individual students in a group setting. If her usual routine is to limit all students to 1 or 2 questions, engaging struggling student more frequently than her usual routine evidences an adjustment strategy based on data interpretation.

Integrating student-based data and skills knowledge is commonplace for planning reinforcement activities. By combining informal observations that students enjoy competitive games and group reading, those activities become the means by which students later engage in critical skills practice situations. Marilyn perceives student engagement will be heighted when practicing automaticity (or fact fluency) in language or math skills-practice scenarios:
Working toward automaticity... we read poems every day 2 to 3 times... we practice. We get it on Monday, you practice it five days just to get the flow of the language... we’re practicing our word cards. We work with them with friends... different riddles and things... if (working with automaticity) with numbers when you’re playing war, who can say the numbers, the 2 numbers fast. Who can decide which is greater and less first... working toward increasing their speed and also their self confidence in making the right choice (Interview Transcript #10, Lines 185-201).

These instructional adjustments not only present additional opportunities for student-based data collection (such as fluency rates in partner or group settings) but also underscore the importance teachers place on skills-focused activities to increase gains in critical skills between assessment intervals.

Whether students are grouped or supplied with individual supports, teacher observations of how students respond to instructional adjustments provides useful data while contemplating connects or disconnects to curriculum concepts. Such student-based data usually becomes anecdotal data which teachers usually keep track of in memory rather than any formal notation practices that are student-specific (grade books, seating charts). However, teachers often relay anecdotal data on student performance at any point in the data cycle, including a more intensive adjustment decision: referring for specialized services.

Referring Tasks

*Referring* students for specialized services occurs after a well-documented regimen of strategic learning experiences have been applied and monitored in the classroom setting. Teachers perceive referring students for specialized services to be a data-intensive experience. When achievement data signals students who are lagging far
below anticipated ranges of competency, the phases of Observation, Interpretation, and Adjustment are enacted by teachers as they contemplate whether their own instructional adjusts are making a difference, or whether a referral should be made for highly individualized support.

At school sites, intervention teams are part of instructional practice consistent with a Response to Intervention (RtI) instructional model. RtI is a model for professional practice that implements progress monitoring and a continuum of supports that are leveled for most students, some students, or few students. Teachers perceive most student needs to be met by teacher adjustments to instruction in Tier I. Tier II interventions for some students provide more adjustments to curriculum selection and delivery methods. Tier III interventions serve a very small population of students whom educators agree have the greatest need (Cummings et al., 2008; Greenfield et al., 2010).

In the following account, Marilyn describes how teachers become part of a collaborative referral process in which participants consider multiple data sources to leverage additional instructional support as needed to maximize learning gains:

We sit down as a team ... math team, title math teacher, the entire 1st grade... or Title reading teachers, the entire 1st grade. We sit down as a group and we collaborate together, and we decide which classroom has the greatest need for intervention.... Just because we have equal amount of children doesn’t mean ... equal amounts of children... will leave our room for intervention. Because one classroom may have a greater need than others... we always take the children with lowest needs in the district to make sure they get the greatest amount of service (Interview Transcript #10, Lines 158 – 165).
Here, the definition of “greatest need” may not align with set ranges of standardized achievement scores for proficiency. Because referring teachers are actively involved at every stage of the data use cycle, the informal data (often student-based, anecdotal information) is formalized when it is integrated into a record of how students performed at each level of engagement the classroom teacher applied as Tier I or Tier II interventions. Therefore, teachers consider multiple and varied data sources as important priorities when they are involved in referring and planning student learning interventions.

Schools seek to limit the number of referrals beyond Tier I for many reasons. Referring a student for more intensive intervention support initiates a collaborative approach to evaluate existing practice and strategize connections between curriculum-based programs and student-based programs. Time and scheduling considerations are factored in to the number of students who may ultimately be evaluated for more intensive learning interventions. The adults who have been connected to the student’s instruction (teachers, Title 1 specialists, school psychologists) convene and execute all three phases of the data cycle. They present the collected data (skills-based and student-based) and engage in interpreting scores (through comparison and knowledge of student curriculum connections) to define the student population who has greatest need for intensive engagement (reinforcing or teaching deficit skills).

This study found consensus between all research subjects that that the referral process has sharpened their own data collection and interpretation skill. Kathleen
describes improvements in progress monitoring that she attributes to the collaborative
data reflection in SIT teams (Student Intervention Teams) in her school. She perceives
student benefits when teachers use data more actively than in the past:

Benchmark assessments were given... but nobody ever looked at it, so it didn’t
drive instruction. So I think finding out and paying more attention to how to use
the data... (when teachers are) recommending kids to SIT team... is forcing us to
use the data more... when we set up intervention (Interview Transcript #7, Lines
171-173).

Shelley affirms the transition of primary responsibility for interventions being
passed back to classroom teachers. She attributes the decline in referral
accommodations to be lack of specialized services for students in intermediate grades.

Teachers now engage in more collaborative planning to integrate appropriate
instructional approaches in mainstream classrooms.

Right now our whole 5th grade is really working on our reading comprehension.
That’s one thing that has been a little lower. Once they get to 5th grade, we lose
a lot of support... we no longer have title services, we do not have chapter
services for our students... we have full inclusion in our school, so... we are going
through a whole new process of identification of learning disabled students, so a
lot of those students fall into the gray area... I want to be responsible for their
learning, so a lot of it revolves right now around their reading comprehension. So
we really look at those assessments that we do that deal with that skill
(Interview Transcript #8, Lines 134 - 144).

Besides experiences with Response to Intervention teams (RtI) or Student
Intervention Team (SIT) referral processes, teachers describe grade level meetings or
informal peer discussion situations as places when they conduct data interpretation and
engagement planning. When teachers come together to share skill-based data patterns
and discuss ways to improve learning, they integrate student-based data to plan
instructional supports that will not conflict with what they know or perceive to be student barriers to learning.

All research subjects confirmed that team approaches are reserved for student populations who meet the accepted definition (in set terms or by group consensus) of the most at-risk for not making adequate gains during the school year. Teachers perceive student-based data helps close gaps between score discrepancies and contemplating curriculum disconnects. Referrals are based on a combination of curriculum-based data and student-based data. Team review of referrals includes planning effective reinforcements based on what has or has not worked in the past.

**Data Use Discrepancies**

The purpose of this study was to construct a conceptual map that represents teacher perceptions of data use tasks that enhance data interpretation. As teachers move from Phase 1 (Observation) to Phase 2 (Interpretation), the core tasks of data practice become more variable as they become impacted by individual teacher perception of student need. Although it was possible to note that consensus exists for students who struggle with curriculum connections, there were inconsistencies in practice that merit mention in the closing section on findings.

**Successful Students Perceptions**

Teacher perception of student struggle was a contributing factor to whether teachers sought alternative data to plan reinforcements to leverage reinforcement supports. Teachers consistently collected additional data when comparing scores
revealed problems with curriculum connections. However, when Shelley and Marilyn discussed reinforcements for their advanced students, the tasks they applied were score comparison (Phase 2) and a jump to Phase 3 task, reinforcing. Incidentally, there was no mention of referring successful students for collaborative planning (such as RtI or SIT teams) based on perceptions that successful students had already attained the average expectation.

When comparing teacher practice that is consistent or variable from the data use cycle of this study, there were inconsistencies noted in Table 3. In Phase 1, teachers did not seek student-based data to plan the reinforcement for successful learners. In Phase 2, teachers conducted an abbreviated approach to comparing scores to affirm critical skills attainment. Teachers did not contemplate extent of connections to curriculum, nor did they integrate student-based data to discern the details of a suitable reinforcement. In Phase 3, student success with the reinforcement was monitored in a way consistent with all students: by repeating the cycle of collecting scores, comparing them to desired range, and planning the next reinforcement.

Of the few instructional adjustments described for successful students who exceeded score ranges, the common approach was reinforcing skill attainment at the next level of rigor. Marilyn explains her decision to advance a student to read at the next grade level was primarily based on skills-based data. If student-based data was a consideration, it was not evident in that teacher’s interview transcript data. Describing the progression of data use, Marilyn reflects:
I do have an advanced reader in my room. She’s pulled out to read with the 2nd grade in the afternoon. So, if we have someone who’s way over the top, we do try to get them in with kids at their ability level. I wish it would occur during our reading time. It doesn’t.... and if she doesn’t always get her instruction at her level the whole day... there is a part of the afternoon that she does get to go and work with students at her level (Interview Transcript #10, Lines 59-66).

To recount the progression of data use enacted, Marilyn began with observation tasks collecting and analyzing skills data. Comparing scores to benchmark range proved connections to curriculum were solid and/or advanced. The next task in the cycle is usually omitted: integrating student-based information. The cycle resumes with an engagement in practicing (at a higher reading level). There may or may not have been referring involved for permission for subject acceleration from 1st to 2nd grade for the reading content area.

Shelley also omits collection or analysis of multiple data sources in Phase 2, but spends time on contemplating curriculum connections that Marilyn did not allude to. In Phase 1, Shelley describes data collection observations,

My grade book, my assessment book, I use that all the time... and I’m deciding who works with who, what group’s going to work together for that particular skill... I teach the high math class so I’m collecting data and trying to figure out what’s another challenge I can offer kids in the high math class. And so I might dig on the internet, I might be in a 6th grade math book for exercises to challenge my high 5th grade math students (Interview Transcript #8, Lines 90 – 95).

Phase 2 comparisons are made readily and flow into contemplating curriculum connections occur. In this situation, the teacher expresses a reliance on the curriculum program to provide the next level of rigor by consulting the textbook content at the next grade level. Shelley also consults internet sources for alternate reinforcement material,
having contemplated that student ability might require supplementary, skills-based practice.

A finding related to teacher perception of success was situated in the reliance that teachers place on curriculum materials to which their schools subscribe. Not only do curriculum program frameworks establish foci for data collection, they also hold teachers within a parameter of acceptable or anticipated skill-attainment that not all students follow. After describing the math series spiraling concept curriculum design, Dorothy explains that

Because we have to rely on it (the curriculum) spiraling, it’s not very in-depth at each point. It’s as though ... you don’t have a good idea who grasped it because it’s a very brief introduction and sometimes... it threw too much at them at once. So you don’t know “Where’s the hole?” Did they not recognize numbers? Did they not understand the new format? Did they not understand the factual process? ...when something is presented in a way that ... a teacher would do differently, it’s hard to figure out which piece is missing (Interview Transcript #9, Lines 160 – 164).

Here, the curriculum design works against what the teacher has processed in Phase 1 and 2. Collecting, analyzing, and comparing scores led to contemplating where student connections and disconnects were occurring. A tension was perceived by the lack of depth in the curriculum design (a spiraling design of ascending, brief concept practice), that blocked her ability to interpret which tasks to plan reinforcements in Phase 3. There were multiple skills she sensed needed reinforcement, but Dorothy could not discern which ones required instructional adjustments. When asked if student-based information guided evaluation of curriculum programs as “fitting”
student learner needs, Dorothy perceived the instructional focus is on “changing the teaching, not the program, in my opinion” (line 185).

The findings of this study answers the guiding question of what teachers perceive to be core tasks of practice within school system operations of data use. By focusing on the critical task of data interpretation, this study makes a contribution to a small body of literature dedicated to teacher perceptions of data use skills, especially data interpretation. This study frames its findings in common themes that emerged from the authentic voices of teaching professionals. The variance of teacher perspectives of successful learning, repertoire of teaching strategies, and access to multiple to data sources contribute to a scattering of instructional options for students. However, when tracking ways that teachers operate in data use, this study reveals consensus of tasks in three phases. The phases Observation, Interpretation, and Adjustment yield several interdependent tasks that teachers perceived to be most relevant to data interpretation. The resultant concept map (Appendix 4) is offered as a tool for reflection and discourse that will ultimately work toward understanding professional practice in data use and student learning.
CHAPTER 6 – DISCUSSION

The findings of this study show teachers deeply invested in making data cycles work. However, there are implications of the inadvertent support of “base-lining” skills-based achievement that is perpetuated by data use routines focused on monitoring predominantly skills-knowledge results. For teachers to close the gap between student achievement and teacher instructional practice, ongoing refinement of existing data use practices is a necessity.

Data repositories in schools hold an abundance of skills-based data for teachers to retrieve and interpret in ways that teachers perceive are core expectations for professional practice. Structures that inadvertently impose limitations on types of data available to teachers works against several recommendations in the literature review (Chapter 3) for this study. The old adage “You become what you focus on” is offered as a banner consideration that frames discussion on study implications and connections to existent literature. An acknowledgement of study limitations and recommendation for future research is found at the conclusion of this chapter.

Implications

The findings of this study imply educational advocates should support the enhancement of data interpretation by strategically implementing processes for collecting a variety of skills-based and student-based data. As schools work to refine
data use practices, it is imperative to support ongoing discourse to understand where consistencies and inconsistencies exist with regard to data use and instructional practice. This study found many structures to afford teachers access to abundant skills-based data. However, when teacher perceptions of success are linked to the data in most abundance, it begs the questions what educators might be missing in the absence of student-based data that offer a holistic understanding of student learning strengths or struggles. As educators engage in taking inventory of current data sources, they will require tools to build repertoires of alternate ways to gather student-based, holistic data.

As it stands, student-based data collection is usually collected informally, unless the student has been formally identified as an unsuccessful learner. Because teacher participation in RtI or SIT team meetings are limited to students with intensive substandard need, teachers rely on their own resources (which may or may not be limited) to refine data interpretation and instructional planning for students of diverse abilities and strengths. Teachers concur that the data interpretation and instructional planning they experience in grade level meetings, faculty meetings, or RtI/SIT meetings supports their efficiency in planning reinforcements. However, the skills-attainment focus in all these settings implies teachers must initiate a reform in these structural meetings to expand discussion and professional learning to address the diverse needs of for the entire school population.
An unexpected finding is that teacher participation in data reflection and instructional planning for success is minimal compared to the time teachers currently invest in making RtI and SIT participation possible. When RtI or SIT structures bring teachers together to compare scores, data sources, and contemplate curriculum connections, the skill-deficit focus consequently limits reinforcement strategies to “fixing” skills. Consequently, teachers prioritize their own professional learning to ensure they have sufficient expertise in critical skills instruction.

As schools gain momentum in gathering multiple data sources and create structures for data reflection, working to establish routines of multiple data sources is critical. This study found teachers perceived Professional Learning Communities or Response to Intervention team meetings as excellent vantage points for school personnel to improve instructional practice.

Professional Learning Communities at one school site met on a weekly basis for 45 minutes. Describing the general purpose for collegial meetings, Marilyn acknowledges there is a broad purpose with no formal agenda: “... we are to take the data and we are to do something with it to make a difference in our classrooms” (Interview Transcript #10, Lines 276 -277). Marilyn explains participation is voluntary and variable on a week to week basis. Representation may be centered on one grade level or span multiple grade levels and that “nobody is responsible for facilitating meetings" (Interview transcript, #10, Lines 285 – 291). As teachers routinely bring their own agenda to these sessions, Marilyn emphasizes teacher preference to use these
meetings to explore alternate ways to implement reinforcements (Phase 3) rather than commit time to tasks in Phase 1 (Observation) or Phase 2 (Data Interpretation). “Today for our PLC time we looked at Nooks and I brought Nooks into my room. And then I had kids work on the Nooks... like a Kindle...”(Lines 285 – 291). Having made observation of student engagement with an electronic reading tool, Marilyn’s observations become anecdotal data she intends to share with peers during professional learning meetings.

Although these meetings work as a swap meet for instructional ideas, the implication for building more student-based data is possible if/when teachers report their observational data on performance observations. When teacher report change in achievement as a result of a specific tool or intervention, the discourse that follows supports teacher investigation of which resources actually impact student learning in a measurable way.

Another aspect of promising practice was Kathleen’s mention of her school’s use of a computerized data repository with the potential to archive skills-based and performance-based data (SIMS, Student Intervention Monitoring System). The SIMS system has the capacity to house records of student learning constraints and preferences, referral details for specialized services, and suggestions for instructional strategies that teachers have applied toward skill-attainment. This study found student-based data, although highly valued, is not consistently maintained and integrated during the data interpretation phase for all students. Having access to student-based data via technology would afford a significant increase of instructional options compared to the
limited information that teachers encounter over time they invest in group meetings for individual students.

**Literature Connections to Findings**

Having established the three phases of data tasks as Observation, Interpretation, and Adjustment, I consulted the literature for data use cycles that presented a focus or elaboration on data interpretation. I found the data use cycle presented by Hamilton et al. (2009) to be strikingly consistent with the tasks I have detailed in this study. The three phases of a data cycle according to that panel are a) collect and prepare a variety of data about student learning, b) interpret data and develop hypotheses about how to improve student learning, c) modify instruction to test hypotheses and increase student learning (p. 10). Since my study presented a focal point on data interpretation, what the panelists term as “interpret data and develop hypotheses,” involved an initial overview of class’s relative strengths and weaknesses to anticipate collective understanding and resource needs. The panelists cited in Hamilton et al. (2009) recommend

> Another useful objective is to identify student’s individual strengths and weakness so that teachers can adapt their assignments, instructional methods, and feedback in ways that address those individual needs (p. 14).

> Understanding individual strengths and weaknesses is what I have wrapped into the concept of student-based data. The literature recommends that student strength/weakness evaluation be individualized. The literature assumes this will be done for all students when teachers engage in data interpretation. However, this study has shown that this is not the case. Teachers reserve the integration of student-based data
for situations when they perceive lack of success. The integration of student-based data for adequate or advanced performance is random or abbreviated. Therefore, the student-based data of strengths and weaknesses that comprise the whole population is usually lacking.

Similarly, teacher discussion of individual students has been a phenomenon that school personnel and researchers have interpreted as “off task” during large group data reflection sessions. Halverson et al. (2007) use the term data reflection as a structured and often collaborative approach to data interpretation. In their findings on teacher participation in data interpretation, researchers described the focus that teachers placed on individual students during data reflections sessions: “We also found teachers were more engaged in discussions about individual students rather than grade level or subject-matter groups... the formal leader took responsibility for shifting discussions from individual student interventions to programmatic implications” (p. 21). Researchers noted teacher talk about students was a common occurrence in all four school settings.

In data reflection scenarios that researcher describe in the Halverson et al. study (2009), teacher’s inclination to share anecdotes about individual students was perceived as disengagement. However, it is arguable that teachers might perceive their approach to data interpretations as active engagement. It has been established that teachers make tight cognitive transitions between the three core tasks in data interpretation. As they compare student scores and contemplate student connections to curriculum, they
integrate student-based data when making meaning. Because much holistic student
data is retrieved anecdotally from teachers, the inclination for teachers to engage in
student-specific talk could be perceived as respectful engagement in data reflection
tasks.

Halverson et al. (2009) also noted that the intended purpose of the data
reflection session was to facilitate collegial discourse on “student interventions” and
“programmatic implications.” Teachers’ decision to share anecdotal data is consistent
with the data use model in this study where Observation, Interpretation, and
Adjustment are inter-dependent cognitive processes. When teachers contemplate
curriculum programs (Phase 2), they segue often rapidly into Phase 3: planning
appropriate learning interventions. Teachers are aware they have limited access to peer
expertise outside of data reflection sessions, so it is not surprising they employed the
core tasks of data interpretation, from a teacher’s perspective, whether they were in
large or small groups.

A third consideration is noting that teachers preferred anecdotal talk about
students over discussion of programmatic implications. This study showed consensus
between research subjects acknowledging their existing programs are consistent with
standards-based assessments and aligned to core curriculum. It was evident that
teachers did not express any dissatisfaction with the numerous curriculum materials and
programs at their disposal. Therefore, since teachers express general acceptance of
existing priorities on teaching critical skills, it is understandable teachers would trade
talking time about programs that they already perceive as imposed or fixed for time
exchanging student-based information. Even though facilitators worked to guide data
reflection discussion in programmatic implications, teachers organized their data
reflection time as if curricular programs and materials are fixtures to which schools have
invested ongoing commitment.

In the literature on professional practice in data use, Brunner et al., (2005)
affirms significant hindrance is prioritizing instructional time. While discussing Phase 1
data collection tasks, Marilyn expressed concerns of conflicting priorities constrained by
time:

It takes a lot of time to collect it (data)... when you do this assessment and that
assessment, you feel like you’re spending more time collecting data than you are
with instruction, or they (students) are with projects, creating projects. So that’s
one frustration with data is that it takes a long time to collect (Interview
Transcript #10, Lines 233 – 239).

Marilyn’s time concerns are linked to a perception that time invested in the
school data cycle deters her instructional practice implementing other instructional
approaches such as constructivist or project-based learning. This is a common
perception of teachers according to the Kahttri et al. (1995) study which reveal common
constraints working against performance instruction and assessments. The researchers
found “The effects of performance assessment were not uniform in schools we visited.
We found lack of time and poorly defined content and performance standards hindered
teachers’ efforts to adopt performance assessments” (p. 18).
Marilyn attributes a lack of autonomy in her professional practice as a result of increasingly standardized practice expectations from external stakeholders in education. She explains that the standards-based assessment framework determines the targets for monitoring achievement. The skills focus in this framework does not necessarily reflect philosophies for instruction from a teacher’s perspective. When asked how data she collects is used to confirm selection of appropriate instructional materials and curriculum, she responds “I will tell you, it’s not the data showing that (curriculum material selection), it is the common core that is telling us what children need to master” (Interview Transcript #10, Lines 325 – 326).

Lalley and Gentile (2009) affirm the standards have “nearly universal agreement in principle, but practical implementation is another matter” (p. 28). When teachers interpreted student performance “relative to established goals and standards independent of other student’s performance” (p. 31) teacher professional judgment came into play. Researchers found variable ratings of mastery existed from one teacher to another. This finding was evidenced in this study when Marilyn voiced concern that the achievement score ranges are “sadly... based on the majority of the children” (line 340). Although she was aware of target ranges for mastery in local assessments, the resultant effect on her practice was a regimen of planning reinforcement learning activities or making referral for specialized services for students who fell far below “majority” achievement ranges.
Another consideration in the literature on data interpretation is the reliance on critical skills data to report student learning gains. The Greenfield et al. study (2010) on Response to Intervention implementation found problems with varying interpretation of what constitutes data. Findings showed a need for professional development to select the most relevant data to link the intervention practices teachers are expected to know and execute with proficiency. Although schools afforded meetings once a month to interpret and identify intervention needs, teachers did not consider meetings to support the next steps in planning lessons or interventions that students needed. My study found that teachers perceived the most relevant data to be skills-based data. In situations when teachers observed the success or problems with interventions, their observations became informal, student-based performance data that was guided future instructional plans. Without routines of integrating student-based data (as with successful students), resultant instructional plans defaulted to “practice as usual” adjustments in instruction.

Planning instructional adjustments for the classroom and/or in preparation for referral processes has significantly increased teacher time and attention spent in Phase 1 and Phase 2 of data cycles. Response to Intervention requires documentation of appropriate use of evidence-based interventions before a child is referred for a special education evaluation. The implication for teacher practice is to plan and deliver instructional strategies in an ascending pyramid of increasingly individualized intervention, based on student profile and data achievement.
Research subject Kathleen articulates the iterative cycle of Observation, Interpretation, and Adjustment as the enactment of progress monitoring which is becoming routine practice in her workplace.

I think people are paying a lot more attention to progress monitoring... we’re really looking at have we done anything to fix that child’s problem that is data driven?... some people say to me “All we do is test, we test too much.” But I don’t know. I guess I don’t totally agree. I think there’s some benefit in any test ... I can get information from it. It can help me figure out what we need to do for the child” (Interview Transcript # 7, Lines 182- 189).

As teachers continue to use data more actively than past practice, their routine implementation of Phase 1 and 2 data use is working to enhance more success when adjusting instruction to close achievement gaps (in Phase 3).

Elliot and Fuchs (2006) suggest progress monitoring results in more efficient planning instructional techniques. The resultant effect is moving students to faster attainment of state standards. This study cited Kathleen’s anecdotal account of how she monitored the implementation of a particular formative assessment using an entry/exit card strategy. Including this performance data on the assessment spreadsheets she maintains, she has replicated a very skill-based data report to plan an instructional adjustment such as grouping students for skills reinforcement. When the data identifies students who are not making adequate progress despite targeted intervention attempts, her anecdotal observations are supported by quantifiable scores.

Graney and Shinn’s (2005) conceptualization of formative assessments involves ongoing tasks of collecting student performance data so that timely program changes
can be made while instruction is taking place in classrooms. This study acknowledges that teams convene for the specific work of cycling through Phases 1, 2, and 3 to arrive at a program design decision to reinforce skill-attainment for students far below articulated achievement ranges. Also both data sources (skills-based scores and student-based anecdotal observations) are necessary for evaluating which students qualify for program design supports that extend beyond the classroom.

When teachers discussed their experiences with SIT teams, or implementing the program plan that the SIT team prescribes, it was evident that teachers did not engage in questioning patterns of success or problems that students had connecting to programs to which their schools subscribed. When asked about their own learning priorities and their perceptions about data use patterns, each teacher presented a unique perspective.

Dorothy accepts skill attainment as an instructional priority for primary-aged children. She emphasized critical skills were “super important... understanding of very basic math skills like place value, understanding coin recognition, coin value... like those very basic building block areas” (Interview Transcript #9, Lines 98 – 101). Shelley found that the data was not lacking, but sufficient materials that presented challenge for students with solid skill-understanding presented problems for her instructional planning.

Two research subjects of variable opinions imply their curricular options are either imposed or constrained by existing priorities. Kathleen explained that learning
priorities and her core curriculum was “pretty directive of what we have to teach and what they have to learn” (Interview Transcript #7, Line 83) as directed by standards-based instruction frameworks. Marilyn alludes to keeping pace with the barrage of skills-based data collection as reasons why she feels locked into critical skills instruction as opposed to alternate, constructivist activities and learning such as “projects, creating products” (Interview Transcript #10, Line 237).

Shelley concurs there is ample data for her to collect, analyze, compare, and contemplate when planning engagements. However, she perceives a problem with consistency when planning engagements to accommodate advanced skills that are atypical of average achievement ranges. She also mentions that existing curriculum materials are designed for the average range of proficiency. In her school setting that creates cluster groups for advanced math students, this shortcoming routinely impacts her instructional planning.

I have a lot of data to make those (instructional) decisions... I think the data is there, and I think I know what skills my students need help on... but what I find difficulty with is finding consistent materials to teach on a day-to-day, week-to-week, month-to-month basis that stays consistent for kids... We just don’t have... a program that’s set up and uses... one publisher that covers all those skills on a consistent basis for all levels...we have a math series that is offered. For math class I’m venturing all over the place anyway... because I find my own material. (Interview Transcript #8, Lines 210 -223).

Shelley’s desire for local, skills-based consistency is apparently coming into conflict with the existing program design to which her school has subscribed. Because the curricular programs common to language, reading and math instruction provide a
framework for ascending skill attainment, this perception intimates a need for instructional practice consistency in skill acquisitions and/or in having a reliable succession of mastery level ranges monitor learning gains.

As teachers move between phases of data interpretation to planning instructional adjustments, more options are needed to close the gap between skills-based learning and other possibilities. Exposure to a variety of frameworks for intelligence (Gardner, 1983; Sternberg, 1985), creativity (Torrance, 1973; Sternberg, 1985), and critical, hierarchical thinking (Bloom, 1958) has the potential to expand teacher perspectives during data interpretations. One tool to incorporate with student-based data integration might be a general listing of key terms applicable to human intelligence (Appendix 6) from leading theorists of human intelligence in that last five decades (Bloom, 1958; Torrance, 1973; Gardner, 1983; Sternberg, 1985).

As schools refine data use cycles and make decisions about what systems may/may not support the integration of critical skill data with student-based data, it is evident that the discrepancies in practice for struggling students and capable students will need to be resolved. With existing policies requiring schools to report annual yearly progress in achievement, the downside of data system reporting is the inadvertent promotion of baseline critical skills achievement. To promote school environments equipped to serve diverse student populations, this study recommends enhancing data interpretation through consistent integration of student-based, holistic data to plan instructional adjustments.
Study Limitations

One limitation of the study was the elementary level perspective that made initial coding of the findings somewhat difficult when asking the question “What is this a study of?” in a deductive reasoning manner consistent with grounded theory (Glaser, 1978). The recruited research subjects often referenced curriculum-based sources for data use discussion. Two subjects were assigned teaching duties at 1st grade and two taught 5th grade. All subjects taught all content areas. As patterns of critical skill reliance began to emerge as a prevalent theme in teacher discourse, it was initially difficult to filter codes for skills-focus (during Phase1, analyzing tasks) as a generalizable trend that could extend to K-12 teachers, given the obvious reliance the subjects placed on curriculum-based practice. It was occasionally possible to get a K-12 perspective, as when Shelley talked about a district-wide commitment to electronic assessments in core subjects (language/reading and math):

The Read-About program is a tool we use to help us understand the specific skill where students are at-risk, we are just looking at MAP testing, the Measures of Academic Progress that is being installed in our district in January. We are going all of us are going to an in-service... and that assessment tool is going to be put in our district as well” (Interview Transcript #8, Lines 164 – 175).

In talking about pending K-12 implementation of MAP assessments, Shelley’s perception that this new data source would be in alignment with a program she already perceives as “most useful for her interactions with students” (line 163). Shelley’s observation is consistent with the literature with data repositories in K-12 schools as storehouses of predominantly critical skill data (Aarons, 2009; Knapp et al., 2006). Other
criterion-referenced assessments that subjects mentioned included standards-based reports cards and WKCE (Wisconsin Knowledge and Concepts Exam). These data sources span K-12 use and are divided by core subject areas.

A second limitation of this study is the small number of participants and school perspectives represented. Although more participants might diversify the range of perspectives and experiences of data use, the existing data provided a rich supply of tasks specific to data use that could be compared to findings in Study Two. Using a constant comparative method of emerging concepts between both studies (Appendix 1), it was possible to validate teacher perceptions of core tasks of data use. Additionally, it was advantageous to recruit research subjects who, individually, had many years of experience in the teaching profession. Their longevity in the profession enabled inherent comparisons between former practice and present practice for data use expectations.

Although limited by a small sampling and an elementary curriculum perspective, the findings successfully created a model for understanding data interpretation that is based in authentic teacher voice. The findings show data interpretation tasks to become variable at the point that integrating student-based data (or not) is guided by teacher perceptions of successful or unsuccessful learners. Comparing the findings of this study with predominant themes in existing literature guides a concluding recommendation for schools build systems of practice of incorporating multiple data source (Hamilton et al., 2009) to improve instructional planning for all students.
Future Research

Using the findings of this study to inform the next extension of understanding, there were limitations to an elementary perspective that could be addressed by a subsequent study with research subject representation of a K-12 teaching perspective. That accomplished, a guiding research question would seek to understand “What multiple forms of assessment (skills-based, student-based) do teachers perceive are most useful in planning engagement strategies for students meeting or exceeding mastery levels of learning?” Subsequent questions situated under this guiding question would press subjects to detail the tasks they apply toward collecting a variety of data sources, interpreting data, and planning respectful instructional adjustments to advance learning. The findings would offer contributions at several levels of understanding for student achievement. Besides understanding what inventories of multiple assessments (skills-based, student-based) are actively utilized, we would also have a better understanding of assessment and instructional approaches that supports success.
References


## Appendices

### Appendix 1: Coding Comparison Chart

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<td>3</td>
<td>focusing</td>
<td>analyzing</td>
<td>Marilyn</td>
</tr>
<tr>
<td>A</td>
<td>4</td>
<td>focusing</td>
<td>comparing</td>
<td>Dorothy</td>
</tr>
<tr>
<td>O, I</td>
<td>4</td>
<td>gauging</td>
<td>comparing</td>
<td>Shelley</td>
</tr>
<tr>
<td>O, I</td>
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<td>gauging</td>
<td>contemplating</td>
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</tr>
<tr>
<td>O, I</td>
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<td>measuring</td>
<td>contemplating</td>
<td>Kathleen</td>
</tr>
<tr>
<td>O, I</td>
<td>2</td>
<td>measuring</td>
<td>analyzing</td>
<td>Dorothy</td>
</tr>
<tr>
<td>O, I</td>
<td>1</td>
<td>measuring</td>
<td>analyzing</td>
<td>Dorothy</td>
</tr>
<tr>
<td>O, I</td>
<td>2</td>
<td>measuring</td>
<td>integrating</td>
<td>Marilyn</td>
</tr>
<tr>
<td>O, I</td>
<td>1</td>
<td>posting</td>
<td>integrating</td>
<td>Shelley</td>
</tr>
<tr>
<td>O, I</td>
<td>1</td>
<td>scaling</td>
<td>reinforcing</td>
<td>Kathleen</td>
</tr>
<tr>
<td>I, A</td>
<td>2</td>
<td>strategizing</td>
<td>reinforcing</td>
<td>Kathleen</td>
</tr>
<tr>
<td>I, A</td>
<td>1</td>
<td>targeting</td>
<td>analyzing</td>
<td>Shelley</td>
</tr>
<tr>
<td>I, A</td>
<td>2</td>
<td>targeting</td>
<td>comparing</td>
<td>Kathleen</td>
</tr>
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</table>
## Appendix 2: Contact Summary Sheet

<table>
<thead>
<tr>
<th>Task</th>
<th>Evidence</th>
<th>Theme Aspect</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>O – collecting</strong></td>
<td><strong>Shelley – integrating</strong> &quot;Then once the data is collected from that I use that to help steer my next instructional focus or my next day’s lesson or next week’s unit type thing…. based on the success or the failures of the students” (Interview Transcript #8, Lines 12 – 32).</td>
<td><strong>Data collection perception- skills focus in all assessments keeps instruction focused on skill attainment gains for next data check.</strong></td>
</tr>
<tr>
<td><strong>O – analyzing</strong></td>
<td></td>
<td><strong>Data interpretation perception – typecasting successful or not influences integrating student based data needed to plan engagement - may be observation of interventions like grouping, re-teaching</strong></td>
</tr>
<tr>
<td><strong>I – comparing</strong></td>
<td></td>
<td><strong>Collection and Analysis instantaneous (formative assessment tool)</strong></td>
</tr>
<tr>
<td><strong>I – conceptualizing</strong></td>
<td></td>
<td><strong>Data interpretation perception – typecasting successful or not influences decision to group, re-teach, move on (Adjustments to reinforce skills)</strong></td>
</tr>
<tr>
<td><strong>I – integrating</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>A – reinforcing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>O - leads to I leads to E</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>O – collecting</strong></td>
<td><strong>Kathleen- “And it’s just 3 or 4 questions … I give them questions to answer and I have it corrected in like 2 minutes. And then I know whether I need to re-teach something of if I need to pull a small group that didn’t get something and then I know what I’m going to do the next day” (Interview Transcript #7, Lines 26 -34).</strong></td>
<td><strong>Collection and Analysis instantaneous (formative assessment tool)</strong></td>
</tr>
<tr>
<td><strong>O – analyzing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>I – comparing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>I – conceptualizing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>I – integrating</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>A – reinforcing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>O leads to I leads to E</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 3: Coding Scheme (Study One) Data Driven Instructional Systems

**Data Acquisition** refers to the process schools implement to seek, collect, and prepare information for instruction. School leaders provided examples of data collection that was not limited to test score results.

**Data Reflection** acknowledges processes schools utilize to make sense of student learning data. The study described two types of data reflection: data retreats and faculty meetings.

**Program Alignment** involves the approach the school leverages to make the instructional program congruent with such things as content and performance standards, what is taught in the classroom, and connections to non-curricular initiatives such as guidance support programs, professional development, and community outreach.

**Program Design** involves the school perception of instructional needs through creation or adaptation of curricula, student service programs, and instructional strategies geared toward improving achievement while addressing instructional issues. Researchers found two distinct categories of programs used to shape instructional programs: 1) curriculum based programs which instruct students in conventional classroom settings; 2) student-based programs which are designed to customize school resources to the needs of individual students.

**Formative Feedback** describes the ongoing flow of information to improve student instruction and instructional program quality in a timely manner. Described as the most critical and most difficult to implement in a successful DDIS, schools often find systematic feedback on current programs too expensive to develop and rely on occasional, anecdotal assessments.

**Test Preparation** includes activities designed to motivate students for improved performance on district and state assessments. Researchers observed curriculum-embedded approaches to test preparation to integrate the concept of standardized tests into the regular instructional program.
Appendix 4: Teacher Perceptions of Core Tasks That Enhance Data Interpretation

Observation

- Collecting
- Analyzing

Interpretation

- Comparing
- Contemplating
- Integrating

Adjustment

- Reinforcing
- Referring
## Appendix 5: Core Tasks of Data Use

<table>
<thead>
<tr>
<th>Data Use</th>
<th>PHASE 1</th>
<th>PHASE 2</th>
<th>PHASE 3</th>
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<tbody>
<tr>
<td><strong>THEMES</strong></td>
<td><strong>OBSERVATION</strong></td>
<td><strong>INTERPRETATION</strong></td>
<td><strong>ADJUSTMENT</strong></td>
</tr>
<tr>
<td>Task 1</td>
<td><strong>Collecting</strong> critical skills data</td>
<td><strong>Comparing</strong> scores forms a perception of learner type as:</td>
<td>Successful Perception</td>
</tr>
<tr>
<td></td>
<td>- Successful</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Unsuccessful</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 2</td>
<td><strong>Analyzing</strong> data</td>
<td></td>
<td>Successful Perception</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Contemplating</strong> student connections to curriculum concepts based on learner type:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Unsuccessful learner (Intensive Contemplation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Successful learner (Abbreviated Contemplation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 3</td>
<td><strong>Collect</strong> additional, multiple data sources based on learner type as:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Unsuccessful (Intensive)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Successful (Abbreviated)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Integrating</strong> student-based data to plan appropriate adjustments</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Unsuccessful Perception (Intensive integration of holistic data)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Successful Perception (Little/No integration of holistic data)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Referring</strong> for specialized services</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Team approach to Phase 1, 2, 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Referring</strong> to next level of skills or rigor in same subject</td>
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</table>
Appendix 6: Contemplating Intelligence Theories

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>THEORY</strong></td>
<td>Taxonomy of Thinking</td>
<td>Multiple Intelligence</td>
<td>Triarchic Intelligence</td>
<td>Creativity</td>
</tr>
<tr>
<td><strong>Intelligence Aspect</strong></td>
<td>Knowledge</td>
<td>Bodily/Kinesthetic</td>
<td>Analytical</td>
<td>Emotional Expressiveness</td>
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<tr>
<td></td>
<td>Comprehension</td>
<td>Naturalist</td>
<td>Creative</td>
<td>Storytelling Articulateness</td>
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<tr>
<td></td>
<td>Application</td>
<td>Logical/Mathematical</td>
<td>Practical</td>
<td>Movement or Action</td>
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<tr>
<td></td>
<td>Analysis</td>
<td>Musical/Rhythmic</td>
<td></td>
<td>Expressiveness of Titles</td>
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<tr>
<td></td>
<td>Synthesis</td>
<td>Verbal/Linguistic</td>
<td></td>
<td>Synthesis of Incomplete Figures</td>
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<tr>
<td></td>
<td>Evaluation</td>
<td>Visual/Spatial</td>
<td></td>
<td>Synthesis of Interview Transcript, Lines</td>
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<td></td>
<td>Interpersonal</td>
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<td>Unusual Visualization</td>
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<tr>
<td></td>
<td>Intrapersonal</td>
<td></td>
<td></td>
<td>Humor</td>
</tr>
<tr>
<td>-----------------</td>
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<td>-------------------------</td>
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</tr>
<tr>
<td>THEORY</td>
<td>Taxonomy of Thinking</td>
<td>Multiple Intelligence</td>
<td>Triarchic Intelligence</td>
<td>Creativity</td>
</tr>
<tr>
<td>Intelligence Aspect</td>
<td></td>
<td></td>
<td></td>
<td>Extending or Breaking Boundaries</td>
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<tr>
<td>Intelligence Aspect</td>
<td></td>
<td></td>
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<td>Richness of Imagery</td>
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<tr>
<td>Intelligence Aspect</td>
<td></td>
<td></td>
<td></td>
<td>Colorfulness of Imagery</td>
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<tr>
<td>Intelligence Aspect</td>
<td></td>
<td></td>
<td></td>
<td>Fantasy</td>
</tr>
</tbody>
</table>

Reflection: Discuss domains of intelligence for which you have made formal or informal observation or wish to collect more information.

Instructional Adjustment: ____________________________________________________________
Appendix 7: Connecting Data to Instructional Practice

PHASE 1: OBSERVATION

- Collect a variety of data (skills-based, student-based) for analysis
- Analyze data for key concepts, desired skill-sets and ways of thinking (intelligence theories)

PHASE 2: INTERPRETATION

- Compare data to articulated definition for success
- Contemplate student connections to learning resources, assessment instrument feature
- Integrate information from OBSERVATION Phase

PHASE 3: ADJUSTMENT

- Plan respectful learning reinforcements and/or extensions for learning
- Monitor and document student performance
- Refer student for additional learning supports
Appendix 8: Consent form signed by case study participants

UNIVERSITY OF WISCONSIN-MADISON
Research Participant Information and Consent Form

Title of the Study: Teacher Perceptions of Tasks that Enhance Data Use

Principal Investigator: Dr. Michael K. Thomas (phone: 608-263-6987) email: mthomas@education.wisc.edu

Student Researcher: Gretchen Wolfe (phone: 608-931-4820) email: gretchenwolfe@charter.net

DESCRIPTION OF THE RESEARCH

You are invited to participate in a research study about teacher data use.

You have been asked to participate because you are a teacher who encounters data (loosely defined) and you use it in some way to help you plan for student success.

The purpose of the research is to understand what types of data that you feel is the most useful to you in your work.

This study will include teachers who work in a public school setting in the United States who serve students at the elementary, middle, or high school level.

You may respond to questions about your data use in a personal interview in a public setting or by telephone.

Audio tapes will be made of your participation. I will be the only person listening to the recorded conversation so that I may prepare a transcript. The tapes will be kept for up to 2 years before they are destroyed.

If you decide to participate in this research you will be asked to participate in an interview lasting approximately 1 hour. You may be asked to participate in a second, follow-up interview lasting a similar period of time.

Your participation will last approximately 60 minutes per session and will require 1 session which will require up to 2 hours in total, if you agree to a follow-up interview.
ARE THERE ANY RISKS TO ME?

We don't anticipate any risks to you from participation in this study.

ARE THERE ANY BENEFITS TO ME?

We don't expect any direct benefits to you from participation in this study.

HOW WILL MY CONFIDENTIALITY BE PROTECTED?

While there will probably be publications as a result of this study, your name will not be used. Only group characteristics will be published.

WHOM SHOULD I CONTACT IF I HAVE QUESTIONS?

You may ask any questions about the research at any time. If you have questions about the research at any time you should contact the Principal Investigator Michael Thomas at 608-263-6987. You may also call the student researcher, Gretchen Wolfe at 608-931-4820.

If you are not satisfied with response of research team, have more questions, or want to talk with someone about your rights as a research participant, you should contact the Education Research and Social & Behavioral Science IRB Office at 608-263-2320.

Your participation is completely voluntary. If you begin participation and change your mind you may end your participation at any time without penalty.

Your signature indicates that you have read this consent form, had an opportunity to ask any questions about your participation in this research and voluntarily consent to participate. You will receive a copy of this form for your records.

Name of Participant (please print):_____________________________________________________

______________________________________   ______________________

Signature   Date

______________________________________   ______________________