Dynamic Assessment:

An Introductory Resource Guide for School Psychologists

A doctoral project submitted to the faculty

of the Shirley Mount Hufstedler School of Education

in partial fulfillment of the requirements for the degree of

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By

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Dedication

I dedicate my dissertation to my family. I thank my beautiful wife Karly for her love and support throughout this process. You're always there to push me when you know I can reach farther, caution me when I'm over my head, pick me up when I fall, and jump back on the rollercoaster with me every day. I love you with all my heart. I thank my son Joshua who inspires me to reflect on my actions and grow as a person, so that I may set a guiding example for him. I thank my father Roger for setting that example for me. And lastly, I thank my mother Jennifer whose legacy lives on through me and her grandson.

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Abstract

Objective. The role of the school psychologist is changing. Increasingly, school psychologists are expected to link assessment data to school based interventions. Yet, the static assessment tools traditionally used by school psychologists were never designed for this purpose. This project presents a detailed description of dynamic assessment (DA); a qualitative process approach directly connecting assessment to intervention. *Methods.* Beginning with the theoretical roots of DA, including the work of Lev Vygotsky and Reuven Feuerstein, a framework is established for viewing students' minds as open systems capable of change. Components of DA, including key cognitive functions and the use of mediated learning, are described in the context of promoting changes in students across home and school settings. In response to a need for professional training in DA, a resource manual was developed and reviewed by experts in the field as well as practicing school psychologists. *Results:* The aim of the resource manual was to provide valid information regarding DA tools and techniques in a user-friendly manner for school psychologists. Results were examined and the resource manual was found to be a valuable tool for introducing school psychologists to DA principles and techniques. *Conclusion:* DA tools and techniques add value to traditional assessment practices by bridging cognitive assessment and intervention. There is a need for professional development in the area of DA and the resource manual *Bridging Assessment and Intervention: An Introduction to Dynamic Assessment for School Psychologists* is a useful tool in helping to meet this need.

Key Words: *dynamic assessment, mediated learning, school psychology, cognitive, intervention*

Introduction

Dynamic assessment (DA) is a broad term that covers a wide range of assessment procedures. Common to all of these procedures is some form of a test-teach-test assessment model (Lidz, 1991; Grigorenko & Sternberg, 1998; Haywood & Tzuriel, 2002). DA rests on four primary assumptions including:

> (a) Accumulated knowledge is not the best indication of ability to acquire new knowledge. (b) Everyone functions at less than 100% of capacity. (c) The best test of any performance is a sample of that performance. (d) There are many obstacles that can mask one's ability; when the obstacles are removed, greater ability than was suspected is often revealed. (Haywood & Tzuriel, 2002, p. 40)

DA differs from more traditional static tests in that the focus is on the process rather than the product of learning. DA also creates an intentional link between assessment and intervention (Lidz, 1991; Grigorenko & Sternberg, 1998). Under this model the "assessee is viewed as a learner who is capable of change" (Lidz & Elliot, 2000, p. 6), and the school psychologist actively evokes this change by asking questions, providing feedback, regulating behavior (e.g. impulsive responses), and mediating new thinking and learning skills (Haywood & Lidz, 2007). Since DA captures students' ability to learn and apply new cognitive skills, as opposed to measuring prior knowledge, DA is often described as a method for assessing *potential* rather than current *ability* (Lidz, 1991; Grigorenko & Sternberg, 1998).

Static vs. Dynamic Assessment

The dominant models of cognitive functioning in the field of school psychology treat the mind as a closed system largely incapable of change (Jensen, 2003a). The

assumption is that one's abilities are hard wired and psychologists can therefore measure a student's current level of performance and make reliable predictions about future performance. DA, on the other hand, assumes that the mind is a relatively open system. This model assumes a relative degree of flexibility or plasticity of the human mind (Jensen, 2003a). The objective of DA, therefore, is not to measure a student's current level of functioning, but rather help the learner improve his/her performance while identifying interventions that may bring about more stable changes in his/her functioning should they be implemented in the classroom and home settings.

Traditional intelligence tests have been criticized for their limited connections between tests scores and school performance, an emphasis on the product of one's performance rather than the process of one's thinking, and results that do little to guide the development of targeted intervention. In contrast to traditional cognitive tests, DA seeks to capture a student's capacity to learn and develop new thinking skills. This is accomplished by observing the changes that occur in response to mediation and the child's ability to transfer thinking skills across tasks (Elliot, 2003).

While standardized cognitive tests have historically been used for the purpose of classification, DA serves a different role. Rather than seeking to classify students, psychologists use DA to identify instructional strategies for modifying a child's functioning (Elliot, 2003). As Haywood (as cited in Elliott, 2003) writes,

> There should be scant satisfaction in knowing that our tests have accurately predicted that a particular child will fail in school. There are many sources of such predictor information. What we need are instruments and approaches that can tell us *how to defeat those very predictions*. (p. 22)

In reviewing roughly 30 years of research in the area of DA, Haywood and Tzuriel (2002) found that DA involving the mediation of cognitive strategies contributes to improved performance, transfers across different tasks when deliberate efforts are made to support the generalization of skills, and leads to meaningful and ecologically valid interventions. They also found that DA provides hope in the face of often-pessimistic static test results.

Models of Dynamic Assessment

Broadly speaking, there are two distinct types of DA: one that seeks to measure change and one that seeks to promote change (Caffrey, Fuchs, & Fuchs, 2008; Elliot, 2003; Grigorenko, 2009; Grigorenko & Sternberg, 1998). Caffrey et al. (2008) described these opposing perspectives as "research oriented" and "clinically oriented" (p. 255) forms of DA. The research oriented model is more standardized and the objective is to reliable measure the degree of change and the amount of investment imparted by the psychologist, creating an index by which to predict future learning. This model includes a static pretest, typically followed by a series of graduated prompts, and concluding with a standardized posttest. The degree of change in student performance in response to mediation is the operationalization of his/her degree of modifiability.

While this section will touch on the research approach briefly, this paper focuses chiefly on a clinical DA approach. Milton Budoff, as well as Joseph C. Campione and Ann L. Brown, are leading proponents of standardized DA approaches (Lidz, 1991; Griorenko & Sternberg, 1998). Budoff (1987) promoted learning potential assessment (LPA) as an alternative to traditional IQ tests for use with culturally and linguistically diverse children. His method provides coaching to familiarize children with the tasks,

thus limiting the influence of prior knowledge and experience. However, by teaching the tasks themselves, rather than assessing and mediating underlying cognitive processes, the LPA does not provide a link between assessment and targeted individualized interventions (Lidz, 1991).

Similarly, Campione and Brown (1987) sought to quantify modifiability by creating a standardized measure of change. Campione and Brown developed a model of DA that assesses a child's modifiability based on the number of prompts or hints needed to successfully solve a given problem, determining the amount of assistance needed to move from one level of performance (response to intervention) to the next. However, this model falls short of identifying specific underlying functions or differentiated (e.g. individualized) intervention strategies.

The clinically oriented approach, on the other hand, is non-standardized and relies heavily upon the assessor's expertise and clinical insights, allowing him/her to more fluidly adapt to the specific needs of the student. This approach, favored by Feuerstein, Rand, and Hoffman (1979), Jensen (2003a), and Lidz (1991), is far less concerned with quantitative measurement and is more focused on identifying patterns of strength and weakness, assessing the student's response to trial interventions, and identifying the types of interventions that hold the greatest promise for promoting stable changes in the learner. This model of DA is comprised of frequent interaction between the client and the psychologist throughout the assessment process (Grigorenko, 2009). The psychologist is continually assessing the student's performance and intervening as much as necessary in order for the student to successfully solve the problems at hand.

Without a standardized structure, it is up to the assessor to flexibly respond to the student's needs. The assessor must carefully observe the student's behavior, inquire about the process by which he/she solves a given problem, assess the component processes and the degree to which the child spontaneously demonstrates these skills, and intervene using mediated learning strategies to impart to the child the necessary cognitive and affective skills. While the lack of structure may present an initial challenge to the assessor as the child develops his/her skills, ultimately this type of assessment more closely approximates an authentic learning situation, and through the use of trial interventions creates a bridge between psychological assessments and intervention recommendations (Lidz, 2002). When the student's performance is obstructed by inefficient thinking skills, the assessor introduces approaches to learning and problem solving that support student task performance, lending insight into the type and amount of intervention required to bring about changes in performance across other settings and situations (Haywood & Lidz, 2007). While a school psychologist's recommendations remain hypotheses, DA allows the assessor to base his/her recommendations on empirical data (e.g. clinical observations) as opposed to a presumably stable cognitive profile (Lidz, 2002). Miller (2007) writes that "school psychologists have many 'cookbook' resources that provide recommendations based on common academic and behavioral problems…[but] there is little solid evidence for many of the recommendations that are consistently made by practitioners" (p. 29).

Identification of the Problem

The rise of Response to Intervention (RTI) over the past decade has shifted the primary focus of school psychology from testing and placement to assessment and

intervention. While RTI has great potential in terms of supporting students to overcome academic difficulties, when students fail to make anticipated progress in response to targeted and systematic academic intervention they may require an assessment of the underlying cognitive processes influencing their failure to respond (Hale & Fiorello, 2004; Schmitt & Wodrich, 2008). As a process-oriented approach based on a theory of cognitive modifiability, DA holds tremendous promise in an era in which the goal of school psychological evaluations is to bridge assessment and intervention, and not simply to determine eligibility and placement. Despite the promise of DA, however, these tools and techniques are rarely utilized by school psychologists.

The majority of school psychologists are not familiar with DA and many of those who are at least somewhat familiar with the techniques do not utilize them in their practice due to insufficient knowledge and skills as well as presumed time constraints (Haney & Evans, 1999). The fact that the majority of school psychologists are not familiar with DA is not surprising given the fact that only a small fraction of school psychology graduate programs teach DA skills as part of a cognitive assessment courses (Lidz, 1992)

Purpose of the Project

The purpose of this project is to develop an introductory "resource guide" for DA designed for practicing school psychologists that provides background information regarding the theoretical foundation of DA, the practical applications of DA in today's school environment, essential knowledge that one must have to develop beginning level skills in DA, and tools that school psychologists can use as they hone their skills and incorporate DA principles and techniques into their practice. The resource guide serves

as a training tool to help fill the void currently left by graduate programs and present DA as a set of skills that add value and can be feasibly incorporated into a school psychologist's practice. Further, in order to ensure the content validity and usability of the resource guide, experts in the field of DA as well as practicing school psychologists including those who do not currently use DA as part of their assessment repertoire all completed reviews of the guide.

Literature Review

The application of DA begins with a change in mindset. The psychometric tests that are typically administered by school psychologists are based on the premise that human intellectual ability is a "fixed" or "hardwired" trait, viewing the human mind as a closed system impenetrable by outside forces. This premise guides school psychologists in making decisions regarding what a child is "able" or "unable" to do and make predictions about future achievement. DA, on the other hand, is based on an almost antithetical premise: the idea that the human mind adapts and changes in response to environmental demands. As such, the aim of DA is not to identify stable characteristics and make predictions based on current performance, but rather to assess changes in the child's performance in response to trial interventions and determine the investment required to bring about such changes. Because DA is based on fundamental changes in one's mindset, this literature review will begin with a discussion of the theoretical roots of DA.

Lev Vygotsky

Lev Vygotsky was the father of cultural psychology (Gindis, 1999), and is commonly credited with creating the foundation for DA (Gindis, 1999; Grigorenko & Sternberg, 1998). Vygotsky was one of the first to highlight the significant limitations of standardized cognitive tests based on the assumption that ability is a static condition. He proposed that cognitive ability is a temporary state that exists within a continual process of change. Consequently, he advocated that children's development should not be measured by the product of their performance, but rather the process by which they solve problems as well as their response to adult mediation of new thinking and learning skills

(Gindis, 1999). Such assessment is more qualitative than quantitative in nature and hinges on careful questioning and observation of a student's problem solving strategies as well as his/her acquisition and generalization of new skills. Critical to understanding DA are Vygotsky's theories of the socio-cultural aspects of cognitive development, the zone of proximal development (ZPD), and process-oriented assessment.

Social-cultural aspects of cognitive development. Typical models of psychological assessment are based on the premise that learning follows development. Therefore, if one can determine the child's current level of functioning, then one can predict what the child is capable of learning. However, Vygotsky (1978) set forth that the relationship between development and learning is bidirectional and that the act of learning changes the structure of the child's mind and spurs on further cognitive growth. In other words, in Vygotsky's view, learning awakens development.

Vygotsky (1934/1986, 1978) proposed that thinking and learning skills first exist outside of the child, in the minds and actions of more competent individuals, and are transmitted to the child through joint endeavors, whether explicitly taught or simply observed. Over time, these psychological processes (or tools) become integrated into the child's way of thinking, thus altering the way in which the child interprets and acts in the world. As such, the development of higher levels of cognitive functioning is social in nature and occurs through the interaction between as child and a more competent individual such as a parent or teacher (Vygotsky, 1978).

Zone of Proximal Development. Vygotsky (1934/1986, 1978) contended that children develop cognitive skills through their interactions with more competent individuals. He used the term "zo-ped" or "zone of proximal development" (ZPD) to

describe the area between a child's current problem solving ability and his/her ability to solve problems using the logical principles demonstrated by a more competent adult mediator. It is within the ZPD that cognitive development occurs. By solving problems within his/her ZPD, the child internalizes the thinking skills modeled by the adult mediator and integrates them into his/her own thinking processes so that he/she may use them independently in future problem solving situations.

Vygostky (1978) suggested that evaluators assess children within their ZPD by presenting them with tasks that are a bit beyond their current ability level and providing just enough mediation or intervention in order for the child to extend beyond his/her current level of functioning. In doing so, the assessor can explore the process through which the child acquires new learning. According to Vygotsky, measures of what a child is able to accomplish with the assistance of a more competent person may be a better predictor of their ability to learn than tests of what they are able to accomplish independently. Measures of the child's actual developmental level (i.e. independent performance) are retrospective in that they are looking back at what the child has already learned. Measures of ZPD, on the other hand are prospective; they capture a glimpse of what the child may be capable of achieving in the future given appropriate conditions. To illustrate his point, Vygotsky (1934/1986) wrote,

> Having found that the mental age of two children was, let us say, eight, we gave each of them harder problems than he could manage on his own and provided some slight assistance: the first step in a solution, a leading question, or some other form of help. We discovered that one child could, in cooperation, solve problems designed for twelve-year-olds, while the other could not go beyond

> problems intended for nine-year-olds. The discrepancy between a child's actual mental age and the level he reaches in solving problems with assistance indicates the zone of proximal development; in our example, this zone is four for the first child and one for the second. Can we truly say that their mental development is the same? Experience has shown that the child with the larger zone of proximal development will do much better in school. *This measure gives a more helpful clue than mental age does to the dynamics of intellectual progress*. (p. 187).

Process vs. product-oriented assessment. Based on his socio-cultural theory of human cognitive development, Vygotsky (1934/1986, 1978) advocated that it is far less important to measure a child's current level of development, in other words the skills and modes of thinking that they already possess, than it is to assess the child in the process of learning. Vygotsky (1978) wrote that we "need to concentrate not on the *product* of development but on the very *process* by which higher forms are established" (p. 64). He went on to write that "although stimulus-response methodology [of psychological assessment] makes it extremely easy to ascertain subjects' responses, it proves useless when our objective is to discover the means and methods that subjects use to organize their own behavior" (p. 74). This type of assessment is not easily quantifiable, and is better left to qualitative techniques such as open-ended questions, careful observation, and detailed descriptions (Vygotsky, 1978). With the use of complex tasks, the assessor can observe and mediate cognitive processes such as "deliberate attention, logical memory, abstraction, the ability to compare and to differentiate" (Vygostky, 1934/1986, p. 150).

Alexander Luria. Consistent with the theories put forth by Vygotsky, Alexander Luria (1966, 1973), the father of modern neuropsychology, rejected the notion that higher-level cognitive functions were fixed entities bestowed entirely by nature. Rather, he asserted that higher mental functions are complex processes with social origins. In describing higher-level cognitive functions and their neurological bases, Luria (1966) wrote that complex interconnected cortical zones

> are not found ready-made in the child at birth (as in the case of respiratory and other systems) and do not mature independently, but are formed in the process of social contact and objective activity by the child, gradually acquiring the character of the complex intercentral connections. (p. 33)

Luria (1966) criticized psychometric tests for: (a) their strict adherence to preconceived classification systems that may not reflect that actual cognitive processes underlying an individual's performance, and (b) their emphasis on standardization and quantitative data at the expense of a qualitative analysis of clients cognitive strengths and weaknesses. According to Luria, it is not sufficient to determine whether or not someone presents with a cognitive deficit. Rather, a psychologist's assessment should include a qualitative analysis of the deficit characteristics, the source of the cognitive impairment, and its impact on functioning. This type of approach requires a great deal of flexibility on the part of the examiner, making strict standardization a barrier to effective assessment.

Luria (1966) also advocated for the use of "experimental teaching" within the context of psychological assessment, a central component of DA discussed in depth throughout later sections of this dissertation. Experimental teaching, according to Luria,

allows the psychologist to move beyond the identification of cognitive deficits and assess the stability of the impairment as well as strategies that might assist the client in rehabilitation.

Edith Kaplan. Building on the work of Luria, Edith Kaplan (1988) also advocated for a process approach to neuropsychological assessment. She pointed out that a right or wrong answer does not address the cognitive strategies that the individual employed in order to reach his/her conclusion. On the other hand, the "close observation and careful monitoring of behavior enroute to a solution (process) is more likely to provide more useful information than can be obtained from right or wrong scoring of final products (achievement)" (p. 129). In turn, this information leads to the design of more effective interventions as well as more precise monitoring of the student's response to those interventions over time.

While Kaplan (1988) advocated for a process-oriented approach to neuropsychological assessment, her methodologies differed from the more clinical DA approaches, based on the work of Feuerstein et al. (1979), detailed below. For example, Kaplan's process approach, upon which the Delis Kaplan Executive Function System (DKEFS) is based (Delis, Kaplan, & Kramer, 2001), applies statistical analysis to the qualitative aspects of a client's performance, something that is not done as part of DA. Furthermore, while Kaplan's (1988) process approach teases out the cognitive processes by which an individual reaches a problem solution, DA goes further by trial testing interventions within the assessment process and documenting their effectiveness. Not only do these procedures further pinpoint intervention recommendations, they also serve

to validate the examiner's hypotheses regarding processes, which, if made more efficient, would improve learning and problem solving.

School neuropsychology. The process-oriented approach is now influencing the practice of school psychology, specifically school neuropsychology. Miller (2007), former president of the National Association of School Psychologists (NASP) and founder of the American Board of School Neuro-Psychology (ABSNP), writes that "practitioners and researchers have recognized the importance of both the quantitative and qualitative aspects of a child's performance…The process assessment approach assists school neuropsychologists in determining the strategies a child uses to solve a particular task" (p. 27). Similarly, Hale and Fiorello (2004) advocate that school psychologists go beyond reporting observed behaviors and take into consideration the "*input, processing,* and *output demands* of the tests you administer, and relating the findings to all other obtained data" (p. 92). In other words, it is not sufficient for a school psychologist simply to know that a student solved a problem correctly or not. Rather, a school psychologist needs to understand how the child arrived at his/her answer, rightly or wrongly, in order to inform interventions that may improve the child's future independent functioning.

Reuven Feuerstein and the Learning Potential Assessment Device (LPAD)

Reuven Feuerstein and colleagues built on the concepts proposed by Vygotsky and created a formal theory and clinical tools for DA (Grigorenko & Sternberg, 1998). Based on this premise that a child's cognitive ability is best assessed within the process of learning and problem solving, Feuerstein developed his Learning Potential Assessment Device (LPAD) and established the architecture for DA tools and techniques (Lidz,

1991). Feuerstein et al. (1979) designed the LPAD to tap a student's potential for future learning when given appropriate intervention or mediation, rather than skills accumulated from past experience.

The content of DA tasks is of minimal importance in and of itself. The value is in uncovering the student's underlying thinking skills, observing the child's acquisition of new cognitive functions, assessing their ability to apply newly acquired skills to novel learning and problem solving tasks, and document the investment needed to bring about changes in functioning. While this can be done with any task that is not automatized, the LPAD provides a series of novel tasks, removed from the student's knowledge base, so that the assessor can work with student in accessing the raw thinking strategies that are less influenced by prior experience (Feuerstein et al., 1979; Feuerstein, Feuerstein, & Falik, 2010). Many of these tasks are similar to popular standardized cognitive and neuropsychological tests (e.g., Raven's Progressive Matrices, Rey-Osterrieth Complex Figure Test), whereas others were developed by Feuerstein and his colleagues (e.g. Stencils, Set Variations).

The role of the assessor is to actively intervene by asking questions, providing feedback, anticipating difficulties, teaching necessary concepts, modeling (verbalizing) thinking (metacogntive) skills, and encouraging the student to evaluate the outcomes of his/her thinking and behavior (Feuerstein et al., 1979). Of course, the objective is not to teach the student how to perform a particular task, but rather make the student consciously aware of his/her own thinking and learning skills, in other words the cognitive processes, that lead to his/her successful performance and encourage him/her to

apply the same skills to future problems (Feuerstein et al., 1979, 2010). As Feuerstein et al. (1979) wrote:

> the goal of the Learning Potential Assessment Devise is not to seek differences among individuals as their stable and immutable characteristics, but rather to search for the modifiability of these characteristics and concomitantly to look for strategies and modalities for the most efficient and economical way to overcome the barriers imposed by these differences. The goal of the LPAD is to know about the differences in order to overcome them. (p. 125)

Structural cognitive modifiability. The assumption underlying traditional cognitive batteries and similar tests is that the strength of one's performance reflects fixed, biologically-based mental abilities. In contrast, Feuerstein et al. (1979) promote the view that the human mind is not a closed system, immutable to the influence of experience, but rather a complex open system, defined by continual change, as interdependent functions adapt to changing environmental conditions. In order to capture this idea, Feuerstein et al. introduced the concept of Structural Cognitive Modifiability (SCM), referring to deep-seated changes in the way an individual learns and solves problems.

Consistent with this theory, students are not described as "able" or "unable" to perform certain type of tasks. Rather, Feuerstein et al. (1979) referred to poorly developed functions, which are described below, as those that were not *spontaneously* utilized by the individual or were applied in an *inefficient* manner requiring adult mediation in order to develop further. Feuerstein et al. proposed that weak cognitive skills do not reflect an innate inability, "but rather ineffective attitudes, faulty work

habits, and inadequate modes of thinking – in other words, functions that can be trained to operate more adequately" (p. 70).

Cognitive functions. Feuerstein et al. (1979) suggested that thinking and problem solving skills should be analyzed across three different stages of a mental act: input, elaboration, and output phases. They were clear, however, in explaining that while artificial distinctions between these phases are beneficial for the purpose of identifying areas of strength and weakness as well as developing interventions, in actuality the mental act is a dynamic (as opposed to linear) process that involves the complex interaction of various cognitive functions. In addition, he acknowledged the powerful role of non-intellectual factors such as one's motivation towards learning.

Feuerstein et al. (1979) identified 27 cognitive functions (8 input, 11 elaboration, 8 output). The input phase is oriented towards gathering information as one learns or solves problems and involves skills such as gathering information systematically and considering multiple pieces of information. The elaboration phase functions are those required for processing and creating meaning from available information including planning, generating hypotheses, and using logical evidence to support conclusions. Lastly, the output phase functions serve to communicate one's thinking. The word communication will be used to describe any type of behavior, verbal or otherwise, that expresses one's thinking. These skills include expressive language, being precise and accurate, and restraining impulsive behavior.

Feuerstein's model of DA incorporates mediated learning experiences (MLE), a concept described in depth later, as the "teaching" phase of the assessment process. The meditational interactions between the examiner (mediator) and the student are

intentionally designed to elicit the student's ability to grasp new principles and operations (i.e. cognitive functions), assess the investment required to transmit new concepts, evaluate the student's application of new principles across tasks, and determine strategies that hold promise for helping the student overcome obstacles to successful learning and problem solving (Feuerstein et al., 1979).

Mediated Learning Experience (MLE). Expanding on the Vygotsky's socio-cultural theory of human cognitive development, Feuerstein introduced his theory of MLE. Feuerstein et al. (1979) defined MLE as an

> interactional process between the developing human organism and an experienced, intentioned adult who, by interposing himself between the child and the external source of stimulation, 'mediates' the world to the child by framing, selecting, focusing, and feeding back environmental experiences in such a way as to produce in him appropriate learning sets and habits. (p. 71)

The intentionality on the part of the adult is what separates MLEs from other types of interactions. The adult intentionally sets out to attach meaning to the child's experience by orienting the child to important pieces of information, labeling items, defining various aspects of the experience, making comparisons to prior knowledge, and providing repetition (Feuerstein et al., 1979). These interactions are intended to help the child organize his/her thinking about the world around him/her. As Vygotsky (1978) wrote, "every function in the child's cultural development appears twice: first, on the social level, and later on the individual level; first between people (*interpsychological*), and then inside the child (*intrapsychological*)" (p. 57).

When conducting DA, the assessor uses MLE to instill in the child greater insight into his/her thought processes and assists him/her in generalizing principles (operations) across different types of tasks (Feuerstein et al., 1979). The assessor does so by modeling reflective thinking and providing feedback to establish a relationship of intentionality and reciprocity with the child, teach him/her that he/she are capable of change, mediate the meaning of different cognitive functions and their use across contexts, work with the child in developing a sense of competence, and promote self-regulated learning and problem solving (Feuerstein et al., 1979, 2010). Each of these strategies is described in detail in a subsequent section of this dissertation. However, it is important to note here that the school psychologist uses MLE through a series of trial interventions in which the student is made aware of his/her own thought processes and how even subtle changes in the way he/she approaches tasks can lead to widely different outcomes (Feuerstein et al., 2010).

Components of Dynamic Assessment

Now that the theoretical tone for this discussion has been set, this review will now focus on the components of DA, beginning with a description of the cognitive functions underlying thinking and problem solving. Standardized cognitive tests are designed to measure specific skills such as auditory processing, visual processing, or abstract reasoning, as described in the test manual. However, despite the test designer's best efforts to isolate specific skills, based on clinical evidence or factor analysis, higher-level cognitive acts are the product of a complex system of interconnected functions (Feuerstein et al., 1979; Jensen 2003a; Luria, 1966, 1973; Vygotsky, 1934/1986, 1978). For example, the Rey-Osterrieth Complex Figure (ROCF) Test, a popular

neuropsychological assessment tool that is often used as part of DA, is presumed under standardized administration to measure visual perception and spatial organization. However, successful performance is dependent on a number of other thinking skills including metacognition, attention, organization, working memory, and strategy use (Kirkwood, Weiler, Bernstein, Forbes, & Waber, 2001). While the static administration limits the scope of interpretation, a DA approach opens the door for the psychologist to evaluate the student's use of a full range of skills. Furthermore, by incorporating a meditation phase as part of the administration, in order to promote the student's use of necessary cognitive skills, one can better isolate the specific processes in need of intervention as well as mediation strategies that may promote cognitive growth.

Kirkwood et al. (2001) demonstrated this in a study of 202 learning disabled students. They first administering the ROCF test in its standard format (initial copy and recall phases) and identified students who performed below the average range. With the children who performed below the average range, the researchers re-administered the test highlighting the organizational structure of the figure. From this group the researchers were able identify a subset of students that benefited from the additional scaffolding of organizational strategies (n=58) and a group that did not benefit (n=32). The group that benefited demonstrated improvement in the organization of their figures at both the copy and recall phases of the assessment, while the group that failed to benefit showed improved organization during the copy phase, but failed to do so when asked to recall the figure from memory. The authors were therefore able to discriminate between children whose poor performance was due to visual perceptual difficulties from those with metacognitive difficulties. In order to further validate these results, the participants were

administered the WISC-III and those who benefited from the metacognitive instruction were found to perform significantly higher than the non-responders on the object assembly subtest, again suggesting a difference in visual processing skills.

Kenwood et al. (2001) demonstrated that poor performance on the ROCF test among students with learning difficulties occurred for different reasons (e.g. failure to spontaneous use of metacognitive strategies for encoding information v. deficits in visual processing). Further, the researchers found that the majority of students with learning difficulties who initially performed below the average range where able to significantly improve their performance with additional metacognitive skills (e.g. organization strategies) instruction. The authors, therefore, concluded that the DA approach was valuable both in identifying the cognitive processes that gave rise to poor performance and ultimately in developing appropriate interventions.

Cognitive functions. As described previously, Feuerstein et al.'s (1979) LPAD was designed to explore and mediate the use of 27 different cognitive functions. However, other models have been proposed. For example, Jensen (2003a) introduced a total of 75 "knowledge construction functions" (KCF) including 45 cognitive functions, 10 motivational attributes, 10 personality characteristics, and 10 performance skills, all of which have been shown to respond to mediation. He referred to these KCF as "brain tools" that can be investigated and developed through DA, have meaningful contexts both in the home and school settings, and can be brought under one's intentional control. Of the 45 cognitive functions, however, Jensen (2008) identified 16 that he has found to be particularly important in the development of efficient cognitive functioning. Lidz (1991), on the other hand, outlined 10 thinking skills associated with successful learners, based

on research literature. Drawing on the work of these leaders in the field of DA, 15 essential cognitive functions are described below. This is not to imply that they are the 15 "most essential" functions, merely that these 15 thinking skills are essential for successful learning and problem solving.

Receptive language. Students must have a sufficient bank of prior knowledge and the accompanying verbal labels to comprehend incoming language-based information. Feuerstein et al. (1979) and Jensen (2003a) refer to this skill as "verbal tools." In contrast, Lidz (1991) describes this skill as having the necessary knowledge and skill base in order to engage in a particular task. Either way, this skill involves not only an understanding of individual words, but also an understanding of underlying concepts and connections between ideas, both of which allow students to accurately interpret incoming information.

Perception of time. Successful students have a clear perception of time and are able to accurately sequence events. Feuerstein et al. (1979) and Jensen (2003a) recognize this as an essential skill and use the term "temporal orientation" to describe it. A clear perception of time is essential not only for sequencing events but also for establishing cause and effect relationships, predicting outcomes, and summarizing past experiences. Consequently, while Lidz (1991) does not explicitly include perception of time as a core cognitive skill, it is invariably involved within other functions.

Spatial orientation. Students must have a clear perception of space and be able to orient and maneuver objects in relation to their spatial orientation. Again, Feuerstein et al. (1979) and Jensen (2003a) recognize this as an essential cognitive skill. Space is a relative concept, and the clear perception of space allows students to accurately locate

and mentally orient objects in relation to one another. Spatial concepts have clear applications to mathematics and hard sciences but also play a significant role in visualizing and comprehending language-based information.

Systematic exploration. Successful students gather information in a systematic, as opposed to random, fashion. Feuerstein et al. (1979) and Jensen (2003a) use the phrase "systematic exploratory behavior," whereas Lidz (1991) similarly contends that student must have the skills to be systematic and strategic when needed.

Multiple sources of information. Students must demonstrate the skills to gather multiple pieces of information and attend to them simultaneously. Successful thinking and problem solving requires that one gather information from multiple sources, or consider multiple perspectives or points of view. While Lidz (1991) does not list this skill explicitly, it is nevertheless involved in all higher-level cognitive activity. Feuerstein et al. (1979) and Jensen (2003a) refer to this skill as the use of multiple sources of information.

Defining the problem. Students must be able to accurately define the problem in question and identify the most relevant pieces of information. Feuerstein et al. (1979) refer to the adequacy with which one perceives and defines the problem at hand. Jensen (2003a) describes this capacity as goal seeking and setting. However, these are largely the same set of skills. Having defined one's objective is a prerequisite for other processes such as determining the most relevant pieces of information, establishing plans, identifying cause and effect relationships, and generating solutions.

Planning. Successful students develop plans and sequence steps in order to achieve goals. Feuerstein et al. (1979) and Jensen (2003a) simply refer to this skill as

planning behavior, while Lidz (1991) describes the application of task-related strategies. At the heart of planning are the skills to determine the most economical and efficient series of steps for achieving a desired result. Furthermore, one must execute a plan in a systematic fashion, monitor one's progress, and modify one's plan as needed in order to best meet one's objectives.

Encoding and retrieving information. Students must use intentional strategies to encode and later evoke information from memory. Jensen (2003a) refers to the volitional evoking of information from memory while Lidz (1991) simply states that the child must have good memory storage and retrieval skills. Feuerstein et al. (1979) do not refer to long-term memory directly, though they refer to the obstacles created by an episodic grasp of reality in which each event is perceived as a distinct experience. In such cases the child does not perceive connections to prior experiences or knowledge stored in long-term memory.

Comparing and forming relationships. Successful students compare, form relationships with, and organize information into meaningful units. Feuerstein et al. (1979) refer to spontaneous comparative behavior while Jensen (2003a) describes both comparative behavior and the need to establish relationships. All cognitive skills are critically important; however, one's ability to compare and contrast pieces of information is vitally important for higher-level intellectual functions in that it allows one to organize items or events into categories based on shared attributes. This in turn lays the foundations for concept formation. Identifying connections and relationships between experiences and ideas allows one to establish continuity or shared meaning and use patterns and rules to solve problems. Along the same lines, ordering, grouping, and

categorizing information based on common attributes allows students to transcend their immediate experience in order to create new meanings and predict future outcomes.

Hypothetical thinking. Students must consider hypothetical possibilities when solving problems. Feuerstein et al. (1979) refer to hypothetical or "iffy" thinking as well as one's use of strategies for hypothesis testing. While Jensen (2008) did not include hypothesis generation as one of the 16 foundational skills, hypothetical "if…then…" thinking is included in his full KCF model. In addition, while Lidz (1991) does not refer directly to hypothesis generation or testing, she does emphasize the importance of flexibility in terms of applying strategies and processes. Problem solving certainly involves the consideration of cause and effect relationships as well as hypothetical outcomes based on the evidence at hand. These skills, rooted in an understanding of the interconnectedness between pieces of information, allow a student to make predications and form generalizations.

Logical evidence. Successful students support conclusions with logical evidence. Feuerstein et al. (1979) refer directly to one's use of logical evidence and Lidz (1991) describes this skill as a reflective and analytical approach. Jensen's (2003a) full model includes the need for logical evidence and his basic model refers to the use of strategies for inferential thinking, which involves a logical cognitive style. After all, drawing inferences or insight from one's experience involves making logical connections between what one already knows and what one is either learning now or predicting about the future.

Expressive language. Successful students have an expressive vocabulary that is sufficient for clearly and effectively communicating ideas. In their models, Feuerstein et

al. (1979) and Jensen (2003) describe the use of verbal tools at the input (receptive) and output (expressive) phases of cognitive processing. In contrast, Lidz (1991) does not make such distinctions in terms of one's knowledge base. Nevertheless, one must possess an adequate vocabulary, understand the relationships between concepts, and be able to retrieve the words needed to communicate one's thinking to others.

Precision and accuracy. Successful students perform tasks with precision and accuracy when it is important to do so. Feuerstein et al. (1979) and Jensen (2003a) include the need for precision and accuracy in their models of cognitive functioning and Lidz (1991) refers to a similar set of skills when writing about one's concern for the adequacy of his/her problem solutions. This skill refers to one's ability to express, whether through verbal communication or any other modality, complex concepts and relationships with clarity, precision, and accuracy.

Restraining impulsive behavior. Students must be able to restrain impulsive responses. Barkley (1997) described behavioral inhibition as including three interrelated cognitive processes: the inhibition of initial impulsive responses, the ability to stop an ongoing response, and creating time for reflection and self-directed action by ignoring other competing events (e.g. sights and sounds). This skill sets the stage for executive functions to occur, including: working memory; self-regulation of affect, motivation, and arousal; internalization of speech; and reconstitution or analyzing and synthesizing thoughts and behaviors. In other words, the skills to restrain impulsive responses set the stage for other cognitive functions. Consistent with Barkley's writings, Lidz (1991) explained that one's ability to inhibit impulsive responses sets the stage for them to comprehend information, create meaning, and generate hypotheses. Feuerstein et al.

(1979) referred to the need to restrain impulsive behaviors and Jensen's (2003a) model includes self-regulation.

Attending to outcomes. Successful students monitor actions, attend to and evaluate outcomes, and makes changes as needed. Lidz's (1991) model of cognitive functioning includes the skills to apply task-relevant strategies, monitor progress, and evaluate the outcome of one's efforts. Similarly, Jensen (2003a) includes attention to outcomes as one of his 16 fundamental thinking skills and Feuerstein et al. (1979) describe how a trial and error response style obstructs efficient cognitive processing. A self-regulated approach in which one attends to outcomes and uses this feedback to guide one's behavior allows one to approach tasks in a goal-driven, systematically planned, and logical fashion.

Mediation techniques. Following Feuerstein's model of DA, mediated learning serves as the intervention phase of the test-intervention-test model. Mediated learning techniques guide the assessor as he/she explores hypotheses regarding cognitive or affective weaknesses that are obstructing performance, and are intended to bring about at least temporary changes in the child's use of higher-level cognitive functions (Lidz, 2002). In her research, Lidz (2002) has found that changes in performance brought about by mediation exceed the influence of practice effects. In addition, students' posttest performances have been shown to better predict future academic performance than their pretest scores (Lidz, 1991).

While different models of mediated learning have been proposed, based on the work of Feuerstein et al (1979), Lidz (1991, 2002), and Jensen (2003a), six central meditational interactions emerge as powerful in promoting changes in students' thinking

and learning skills. These include: mediation of intentionality and reciprocity, mediation of a change mindset, mediation of meaning, mediation of transcendence, mediation of a feeling of competence, and mediation of self-regulation.

Mediation of intentionality/reciprocity. Intentionality on the part of the assessor refers to his/her explicit aim to engage with the child in a way that brings about changes in the child's functioning and maximizes success (Lidz, 1991, 2002). This involves a higher level of affective involvement than is characteristic of traditional cognitive testing, as the assessor must communicate, both verbally and nonverbally, that he/she cares about the child and isare invested in the child's success (Lidz, 2002). As an example, Jensen (2008) suggests telling the child,

> When things get tough I'm goind to help you, because I want you to be successful. And if things are still tough, I'm going to help you out some more, because I want you to be successful. And if things are still tough after that, what do you think I'm going to do? (Symposia).

The answer, of course, is to help some more. However, the student is also made aware of the fact that the mediator's objective is to teach him/her new ways of thinking and solving problems in general, not simply to meet the immediate demands of an isolated, and perhaps even meaningless, task (Kozulin & Presseisen, 1995).

Mediation of a change mindset. The belief that human beings are capable of changing, of modifying their thinking and learning skills, is the foundation upon which such cognitive modifiability takes place (Feuerstein et al., 2010). Mediation of a change mindset involves communicating to the student that he/she is capable of success and that competence is something that one develops as opposed to a stable characteristic with

which one is born (Lidz, 1991, 2002). The assessor makes the child aware of his/her growing proficiency by providing feedback about improved performance and his/her ability to learn and change as a result of his/her experience, hard work, and strategy use (Lidz, 1991).

Carol Dweck, professor of psychology at Stanford University, and her colleagues have conducted fascinating studies illustrating the impact of a child's perceptions of intelligence on academic and cognitive performance. Mueller and Dweck (1998) found that fifth grade students who adopted an "entity theory" of intelligence, defining intelligence as stable trait, were more likely to set performance-oriented goals, attributed low performance to low ability, were less likely to persist in the face of challenge, experienced less task enjoyment after setbacks, and their performance declined after experiencing failure. In contrast, students who held an "incremental theory" of intelligence, perceiving ability as a quality that is malleable through hard work and learning, exhibited greater task persistence and task enjoyment even in the face of challenge. Furthermore, when confronted with a setback, these students were more likely to attribute poor performance to insufficient effort or strategy use rather than low ability.

As part of an 8-week educational intervention, Blackwell, Trzesniewski, and Dweck (2007) taught junior high school students that intelligence was a dynamic and malleable characteristic that reflected one's effort and strategy use. The students were taught "that learning changes the brain by forming new connections, and that students are in charge of this process" (p. 254). Following the intervention, the students demonstrated knowledge of brain plasticity, were more likely to endorse an incremental theory of intelligence, and three times more students from the experimental group were reported by

their teachers to demonstrate improvements in motivation and performance as compared to students in the control group.

Mediation of meaning. Mediation of meaning is the act of making the student's experiences both important and memorable (Feuerstein et al., 2010; Lidz, 1991, 2002). A child's experience may not present as having any particular importance or value until a mediator infuses meaning into the situation (Kozulin & Presseisen, 1995). The mediator makes explicit his/her affective investment, highlights important components of the activity, and gives purpose to the child's thoughts and behaviors (Kozulin & Presseisen, 1995; Lidz, 1991, 2002).

The mediation of meaning should move beyond content specific skills to include the underlying cognitive functions that have meaning beyond the task at hand. Vygotsky (1934/1986) advocated that it is critically important that individuals develop a conscious awareness of their own thinking processes. Vygotsky proposed that "becoming conscious of our operations and viewing each as a process of a certain *kind* – such as remembering or imagining – leads to their mastery" (p. 171). Making these skills meaningful to the child involves comparing and contrasting concepts and experiences, identifying relationships, and extracting generalizing principles (Lidz, 1991).

Mediation of transcendence. Transcendence is central to mediated learning. Transcendence is the intentional bridging of concepts that the student is currently learning to other aspects of his/her lives, both past experiences and likely future events. In doing so, the child forms connections between past, present, and future as well as patterns across context, forming a foundation for the generalization of skills (Lidz, 1991).

As such, mediation of transcendence forms the foundation for sustainable changes in the way that the child learns and solves problems.

The assessor mediates transcendence by directing the child's attention toward his/her use of thinking and learning skills as opposed to the particular task at hand (Feuerstein et al., 2010; Kozulin & Presseisen, 1995). After all, the intention of the mediator is not to teach the child a narrow set of skills that only apply a particular time and space, but rather mediate a set a skills that are more generally applicable, so that in the future the child can apply them across varying conditions. The assessor therefore works with the child to move from concrete examples to abstract concepts, extracting generalizing principles that allow the child to explore hypothetical situations and cause and effect relationships (Lidz, 1991).

Mediation of a feeling of competence. Another important part of DA and mediated learning is developing in the student a sense of competence. Accompanying a feeling of competence is a willingness to take on challenges as well as an increased likelihood that the child will achieve mastery of the task that he/she has undertaken (Lidz, 1991). In DA, the assessor instills in the child a sense of competence by highlighting successes and making an explicit connection between the student's efforts and his/her achievements (Feuerstein et al., 2010). The successes that the student experiences in the DA setting can then be used as bridges to feeling competent in other situations.

The assessor controls the testing conditions to create an appropriate level of challenge, requiring hard work, while allowing the student to experience success (Lidz, 1999). As the child successfully solves problems the mediator gradually adjusts the level of complexity, providing just enough scaffolding for the child to be successful while

feeling a sense of accomplishment and mastery (Lidz, 1991). Further, the assessor provides praise and encouragement through feedback not only about the child's success on particular tasks but also by highlighting specific strategies that lead to successful outcomes (Lidz, 1991, 2002). As appropriate, the assessor pulls back, allowing the child space to take on challenges independently (Lidz, 1991).

Feuerstein et al. (1979) found that students' sense of competence greatly improved after gaining insight into their own thinking and experiencing a higher level of functioning after applying newly revealed cognitive functions. Their new sense of mastery serves as motivation fueling their desire to take on increasingly complex activities. In addition, parents and teachers whose perceptions of their students were based on low levels of past performance begin to interact differently with the children and youth after observing the changes that occur through DA. By creating supportive audiences around the students – audiences who view them as capable and challenge them accordingly – the seeds of change that are instilled in the children, both in terms of thinking skills and self perception, take root and begin to flourish (Feuerstein et al., 1979).

Mediation of self-regulation. Feuerstein et al. (1979) found that the mediator may need to help the child regulate impulsive behavior by providing prompts or restricting the amount of information with which the student is presented at any given time. While the goal is for the student to develop the skills to self-regulate, the assessor may initially need to take a more active role in regulating the child's behavior by altering testing conditions (e.g., covering up distracting stimuli) and prompting desired behaviors. The assessor then facilitates the use of self-regulation on the part of the learner by

making explicit the connection between restraining impulsive behaviors and successful problem solving (Lidz, 1991). The assessor challenges the student to take increasing responsibility for his/her own behavioral regulation and highlights his/her successes in order to foster his/her sense of competence. As such, the student learns to regulate his/her behavior, reflect on his/her own thought processes, and expand his/her repertoire of thinking skills.

Regulating one's behavior, by restraining the impulse for immediate action, gives that person the time needed to gather sufficient information, think through various options, and select the most economical approach to solving a problem (Barkley, 1997; Feuerstein et al., 2010). In other words, the individual gives precedent to thinking over immediate action. Restraining the impulse for immediate gratification allows the student to set goals based on his/her projection of future outcomes.

Response to Mediation and Intervention Design

The ultimate goal of mediation is to transform students from passive recipients of information to active constructors of knowledge (Feuerstein et al., 1979; Jensen, 2003a; Lidz, 1991). However, sustainable changes in the way that a child learns and solves problems do not occur as a result of one or even several DA sessions. In order for meaningful changes to occur, cognitive functions must be mediated for the child across meaningful contexts over an extended period of time.

When conducting DA, novel problem solving tasks are valuable for the same reason that novel tasks are valuable for standardized psychological assessment. Since students must rely on cognitive processes rather than acquired skills, the assessor is then able to observe the child's raw problem solving strategies, asking questions to elicit

information about their thought process, and actively mediating cognitive functions needed to solve the problems successfully (Jensen, 2003b). As such, the assessment allows psychologists to better understand the way a child solves problems and develop interventions in specific areas that may be obstructing academic achievement (Jensen, 2003b).

As an intermediate step between more purely cognitive tasks and meaningful educational intervention, the assessor may work with the child on applying newly developing cognitive skills to academic content. Concerned with the relevance of school psychological evaluations to the development of meaningful interventions, Lidz (2002) developed her Curriculum-Based Dynamic Assessment (CDA) approach to explore a child's processing strengths and weaknesses within the context of meaningful academic curriculum. Rather than performing error analysis to identify task procedures, CDA is used to understand the underlying cognitive processes that the child is utilizing, or failing to utilize, in solving the problem at hand (Lidz, 2002). Trial interventions therefore target the processing demands of the task to help the child elevate his/her current level of performance.

To sustain growth, however, further educational intervention must target cognitive weaknesses currently obstructing learning and problem solving. As Feuerstein et al. (2010) wrote, "if the environment does not require the person to be modified but adapts itself to him or her – what has been called and *autoplastic response* – meaningful and sustained change will not occur" (p. 127). Changes must occur within the child not just in the environment around the child, and information obtained through DA can serve as a blueprint for bringing about such changes. Through DA the school psychologist

identifies both spontaneous and inefficient cognitive skills as well as specific meditational strategies demonstrated to improve performance by enhancing the student's currently inefficient use of cognitive functions. This process may then be replicated by parents and teachers by mediating needed cognitive skills across meaningful home-cultural and school contexts (Robinson- Zañartu & Aganza, 2000; Robinson-Zañartu & Campbell, 2000).

Use in Educational Settings

DA represents not merely a different set of assessment procedures but rather a shift in one's mindset, a belief that humans have the potential to make meaningful changes in their thinking and learning skills given appropriate opportunities (Lidz, 1991). The process of DA is rooted in one's recognition that no person is functioning at his/her full potential, that all students are capable of change, and that this change can be brought about by creating new habits of mind (Feuerstein et al., 1979; Lidz, 1991). As noted in chapter one, there are two distinct types of DA, both of which are rooted in the premise that change is possible and should be promoted. The more clinical approach to DA, the type that this author has focused on up until this point, is qualitative in nature, with the objective of identifying and describing meditational interventions that bring about at least temporary changes in learners. The other type of DA, the type that seeks to reliably measure learning potential, is more structured and quantitative in nature, and therefore more conducive to research studies beyond single subject case studies. While this dissertation does not focus on this type of DA, research studies that have emerged from this approach provide data supporting the value of DA in measuring learning

characteristics, primarily the capacity to change, that are not assessed by static tests of cognitive processing.

Swanson and Howard (2005) examined whether DA of learning potential provides a unique contribution to the understanding of a child's reading achievement beyond what is obtained with the use of traditional cognitive tests. The authors' second objective was to examine whether DA helps psychologists differentiate between reading disabled (RD) students and non-disabled poor readers. Swanson and Howard used the Swanson Cognitive Processing Test (S-CPT) to measure changes in working memory (WM) that occur relative to the students' initial unassisted performance (gain score) as well as their independent WM performance at a later date (maintenance score). The mediation followed standardized procedures and included information regarding working memory strategies (e.g., rehearsal, chunking, etc.) as well as a series of graduated prompts (or hints) when the child did not spontaneously (independently) recall the information that was presented. In their study the number of prompts that the child required was the operational definition of their ZPD or "learning potential."

Swanson and Howard (2005) conducted their study with 70 children (14 poor readers, 25 skilled readers, 12 with RD, and 19 with reading and math disabilities [RD/MD]). Consistent with the literature on reading assessment, Swanson and Howard found that students with RD and poor readers could not be differentiated by their initial (i.e. unassisted) WM test score, but that as a group, poor readers' performances (e.g. gain score) improved significantly as compared to students with RD in response to mediation. However, it was the performance of students with RD/MD that was most resistant to mediation. Further, a high percentage of children with RD (60%) and RD/MD (70%) did

not maintain the initial gains made with additional adult prompting, suggesting that these students were less "changeable" or responsive to this type of intervention. The authors suggest that those labeled RD and RD/MD who did maintain improved performance, 40% and 30% respectively, may have been incorrectly identified as learning disabled.

Swanson and Howard (2005) also found that DA adds unique predictive power in identifying learning disabled children beyond what is gained through traditional cognitive tests. The authors wrote that "hierarchical regression showed that dynamic assessment factor scores contributed 6% of the variance to reading and 25% to mathematics" (p. 31). Their findings support the fact that measures of "change" tap unique abilities that are neglected by static cognitive tests, providing an additional indicator of a child's ability to benefit from instruction.

Similarly, Fuchs et al. (2008) found that DA made a unique contribution to the prediction of future mathematical problem solving skills of third graders (n=122), distinct from the predictive power of static cognitive tests or tests of achievement. The authors used algebra problems as DA tasks, since these problems were novel to third grade students and were distinct from pre and posttest measures (math word problems), yet shared underlying cognitive skills (quantitative relationships). Again, a student's performance on the DA measure was determined by the number of prompts required for him/her to master an algebraic skill (e.g. finding missing variable in addition equation). Based on factor analysis, Fuchs et al. found that students' learning potential was a distinct characteristic from "existing language ability, nonverbal reasoning, attentive behavior, and math skill" (p. 846). Their findings validate the distinction between static measures of what one is currently capable of doing and one's ability to learn under the guidance of

a more competent adult mediator (e.g. ZPD). Further, the authors found that future mathematical problem solving ability was predicted by a combination of DA performance along with other pretreatment factors including language skills, nonverbal reasoning, attention, and mathematics skills. Each of these factors on its own failed to produce the predictive power of all of the factors combined. Consequently, while DA was not sufficient in and of itself for predicting future mathematical problem solving ability, DA was necessary as one component of a more comprehensive set of measures (Fuchs et al., 2008).

Compton et al. (2010) sought to develop a two-stage early screening program for identifying at-risk first grade readers that ensured the identification of true positives (e.g., students who are at risk) while reducing the number of false positives (e.g., students who test low but are not truly at risk). The researchers found that in addition to phonemic decoding efficiency as an effective first level screening (i.e., identifying true positives and eliminating true negatives), the addition of DA significantly reduced the number of false positives as a second tier screener. As with the previous studies, Compton et al. measured the number of increasingly explicit prompts necessary for a student to correctly decode pseudo consonant-vowel-consonant (CVC), CVC*e*, and CVC*ing* words. The more intense and explicit the instruction needed, the more likely the first grade student was to experience reading difficulties in third grade. Progress monitoring of word identification fluency was also found to reduce false positives to the same extent as DA with no statistical advantage; however, while the DA procedures administered as part of the study took a single 20-30 minute assessment, progress monitoring was conducted once a week over a period of 5 weeks. Furthermore, running records and oral reading

fluency measures were found to add little predictive power beyond the first level screening in term of students' response to future classroom instruction (Compton et al., 2010)

Different Methods for Different Objectives

DA serves a different purpose than standardized, norm-referenced measures, and therefore is not intended to replace static psychological tools. Rather, DA is a value-added technique that can easily be used in conjunction with more traditional assessment methods. While traditional tests measure the skills that the student currently possesses, comparing them with same-age peers, DA provides information about the student's potential to change and the methods that have been demonstrated to bring about such change (Caffrey et al., 2008). As such, DA adds value to standardized measures by providing a qualitative description of the factors underlying low performance and informing the type and intensity of interventions that may be needed (Lidz, 1991; Grigorenko & Sternberg, 1998).

Consequently, rather than attempting to use DA tools and techniques as a substitute for standardized tests, it may be better to use them as an addition to standardized tests or for different purposes entirely. While school psychologists use standardized tests for the purpose of diagnosis and classification, DA tools and techniques are better fit for the role of exploration and intervention (Elliot, 2003). In other words, the questions being asked are not "what is this child and where does he/she fit?" but rather, "how does this child learn and how can educators do a better job of teaching him/her?"

In addition, the qualitative data derived from DA may be more accessible to educators than standardized cognitive test data, facilitating meaningful collaboration between the assessing school psychologist and those responsible for providing the interventions. Freeman and Miller (2001) conducted a survey among special education coordinators in the United Kingdom to assess their perspectives regarding the utility of a variety of different assessment results, including norm-referenced cognitive tests, DAs, and curriculum-based measures. Those surveyed were provided with statements pulled from actual assessment reports, the assessment literature, and research papers. Participants were then asked to rate those statements based on how familiar they were with the type of information, how useful the information might be in understanding students' difficulties, and how useful the information would be in designing interventions. Examples included the following:

- "Emma's scores were as follows: verbal IQ=79, performance IQ=86; an average IQ=100." (Norm-referenced cognitive test)
- "At the input phase (taking in information needed for the task), Nicola demonstrated difficulties understanding the need for precision in data-gathering; her exploratory behavior was unplanned and unsystematic." (Dynamic Assessment)
- "In mathematics, Andre is able to count with one-to-one correspondence up to 20 and can add and subtract numbers up to 10 accurately. He can continue simple number patterns, such as 2, 4, 6…and write the number up to 25 correctly" (Curriculum-based measurement)

Freeman and Miller (2001) found that special education coordinators generally found the curriculum-based measures to be the most useful in terms of understanding the student's difficulties and developing appropriate interventions. This makes sense given that they surveyed participants from an educational background. However, in looking at the psychological data, despite the fact that the norm-referenced data were more familiar to the special education coordinators, the DA results were viewed as being more helpful both in terms of understanding the students' learning strengths and needs as well as in developing appropriate interventions. The least helpful types of information ("not useful at all") for the special education coordinators was a list of subtest scores, statistical analysis of test scores, and information based on a pattern of subtest scores. In contrast, descriptions from DA reports, including information about specific teaching strategies that assisted the child as well as the strategies that the child used both before and after mediation, were generally rated as "helpful."

Dynamic Assessment and Response to Intervention

The value that DA adds to a school psychologist's repertoire as a process approach that links assessment to intervention is of particular importance given the increasing role that Response to Intervention (RTI) is taking within the profession. The test-teach-test approach utilized in DA to assess change is similar in many regards to RTI. In fact, the two are so similar that Caffrey et al. (2008) suggested DA may be appropriate to use as an alternative to RTI. The primary difference between the two is that RTI may take place over the course of 10-30 weeks, whereas DA can be conducted in as few as one testing session (Caffrey et al., 2008). Grigorenko (2009) speculated that DA and RTI may actually represent the same construct since they share so many

overlapping characteristics. One of the primary overlapping facets is the fact that both approaches are more focused on intervention services than diagnostic labels. Lidz (2002) proposed that her CDA approach is ideal for pre-referral intervention teams such as Student Study Teams (SSTs) or Instructional Support Teams (ISTs). DA and RTI are models of change, both change in terms of assessment approach and change in terms of the transformations brought about within the learner. Of course, within the context of the DA one does not set out to bring about permanent changes in the learner, but rather identify strategies that hold promise of doing so if implemented across settings over a period of time (Grigorenko & Sternberg, 1998).

A number of researchers have applied the mediated learning strategies typically employed within a DA context to the classroom setting in order to measure their impact on student achievement. Robinson-Zañartu and Campbell (2000) compared student achievement between third grade students (n=36) who received mediation-infused science curriculum with similar students (n=37) who received the standard district curriculum. The goal of mediation was to develop higher-order scientific thinking skills by explicitly teaching rules of effective reasoning within the third grade science curriculum. By infusing the teaching of thinking skills into the standard curriculum and assigning homework that promotes the use of thinking skills within the home cultural context, the project aimed to facilitate the students' generalization and flexible use of new modes of thinking.

After a 1 month unit on space, students who received the MLE-infused curriculum outperformed their control group peers across three different measures including teacher-made tests of content knowledge, drawings of the solar system from

memory (e.g., sequence and relative size of planets), and comparing and contrasting characteristics of different planets using Venn diagrams. Consistent with achievement gap data, the researchers found that when provided with the standard curriculum, monolingual English-speaking students outperformed emerging English speakers (English Language Learners or ELs) from lower socioeconomic status (SES) backgrounds (e.g., higher rate of free and reduced lunch). However, EL students from lower SES backgrounds receiving MLE significantly outperformed matched peers receiving the standard curriculum. Further, EL students from lower SES backgrounds receiving MLE performed comparable to monolingual English speaking students from a higher SES background receiving the standard curriculum on measures of content knowledge and visual memory of the solar system, but significantly outperformed them on the comparing and contrasting task. Lastly, Robinson-Zañartu and Campbell (2000) found that monolingual English-speaking students receiving MLE outperformed matched peers in terms of comparing and contrasting planet characteristics. Although the study was limited by its small sample size, it nevertheless supports the notion that mediation of thinking and learning skills as a valuable component of student achievement.

Guterman (2002) examined the use of written Metacognitive Awareness Guidance (MCAG) in combination with reading assessments with 300 Israeli fourth grade students in order to evaluate the process of reading development (e.g. reading potential) within the students' ZPD rather than simply measure the product of prior learning and experience. The MCAG was designed to mediate "psychological tools" aimed at engaging the students in higher-level thinking skills through explicit self-talk. Prior to reading a passage, students were asked to provide written responses to questions

aimed at promoting more effective information gathering (e.g., "The reading passage that you are about to read is from…and it is called…"), activation of prior knowledge (e.g., "Write a short paragraph about the title…using the words…"), forecasting potential problems (e.g., "What could be a problem?", "What could be a solution?"), self-regulation (e.g., "Say the following out loud: 'Now I know more about…, what I already know about …will help me understand and remember…'"), and use of metacogntive skills (e.g., "Since I know X and Y, I can presume that…").

Prior to using MCAG, the treatment group did not differ from controls in terms of reading comprehension. However, with the use of MCAG the treatment group significantly outperformed controls in terms of their comprehension on all three reading passages used as part of the study (Guterman, 2002). Further, the greatest differences between the groups were found on comprehension questions determined to have the greatest cognitive complexity and difficulty levels, and these patterns held true for both lower middle class and upper middle class students. In addition, the treatment group demonstrated greater awareness of metacogntive reading strategies, as measured by their performance on the Metacognitive Strategies Index (MSI) questionnaire (Schmitt, 1990) 14 days after the reading assessments were conducted.

Mogens Jensen (2003b), founder and director of the International Center for Cognition and Learning (formerly the International Center for Mediated Learning), developed the MindLadder program with the aim of incorporating both assessment and intervention components of the DA process, drawing explicit connections between the trial interventions explored through the assessment process and interventions that are delivered in the home and classroom settings. In contrast to previous models of DA that

emphasized the mediation of cognitive function through entirely novel problem solving, assuming an automatic generalization of cognitive skills across contexts, the MindLadder program emphasizes the development of KCF within the context of meaningful academic content. Through the process of cognitive mediation, children "learn how to learn" by developing the habits of mind necessary for constructing knowledge.

Jensen (2003b) conducted a quasi-experimental study examining the impact of the MindLadder classroom learning model on student achievement among upper elementary students. Participants included 347 fourth, fifth, and sixth graders divided into experimental and control group classrooms. Teachers for the experimental groups were provided with training and ongoing coaching in terms of the identification of KCF, underlying content standards, strategies for introducing KCF as part of the whole class lessons (e.g., "Brain Tool" portfolios including definitions and illustrations of their use), and developing lessons that allow students to gain insight into their own KCF while working on academic standards.

The Iowa Test of Basic Skills (ITBS) was used as a baseline and outcome measure, and the Georgia Criterion Referenced Competency Tests (CRCT) were used as a second posttest measure of achievement. In addition, students were given the Cognitive Abilities Test (CogAT) as an outcome measure of cognitive skills and the students completed the Student Learning Profile (SLP) to assess their knowledge and use of specific KCF (Jensen, 2003b).

Jensen (2003b) found that students who participated in the MindLadder classrooms for a period of 1 year outperformed the control group on the ITBS in areas of Reading, Language, Math, Social Studies, and ITBS Composite scores. In addition, the

MindLadder group outperformed controls on the Georgia CRCT in both Reading and Math. In terms of their performance on cognitive measures, the MindLadder group significantly outperformed controls on measures of Verbal and Non-Verbal Reasoning as measured by the CogAT. In fact, Jensen reported that the MindLadder program "accounted for 69 percent of the variance in academic achievement and 52 percent of the variance in reasoning" (p. 132).

Further, when looking specifically at students receiving special education services, whereas non-qualifying students performed much higher than qualifying students overall, qualifying students in the MindLadder program performed significantly higher on outcome measures than did qualifying students in the control group. Lastly, when assessing students' responses on the SLP, those in the MindLadder group who rated themselves above the median level on the competence and focus scales outperformed control group peers with similar perceptions. Interestingly, a similar pattern, with MindLadder students outperforming controls, was observed when comparing participants who perceived themselves as having below median levels of competence and focus (Jensen, 2003b).

Challenges with Implementation

While DA is not a new approach, it is rarely practiced within educational settings (Haywood & Tzuriel, 2002). Despite the utility of DA assessment as a means of assessing cognitive processes and linking assessment to meaningful educational interventions, school psychology graduate programs do little to train future school psychologists in DA methods. Lidz (1992) surveyed school psychology trainers across the nation in order to determine the extent to which DA was incorporated into their

cognitive assessment courses. Lidz found that 80% of respondents had at least some ("barely familiar" to "quite familiar") knowledge of DA. However, the majority (56%) learned about DA through readings as opposed to workshops (26%) or coursework (10%). In addition, while 68% of respondents had learned about DA in their cognitive assessment courses, only 13% of those courses taught skills while 87% merely talked about it or assigned readings. School psychology trainers perceived the following major advantages of DA: the fact that it is a process-oriented as opposed to a product-oriented approach (43%), connection to interventions (13%), and reduced cultural bias (11%). Respondents noted perceived limitations of DA as a lack of technical adequacy (32%), time constraints (25%), and a mismatch with the demands of school psychologists (24%).

Given Lidz's (1992) findings, it is not surprising that few school psychologists are skilled in DA and even fewer incorporate it as part of their practice. In a follow-up to Lidz's survey of DA training in school psychology graduate programs, Haney and Evans (1999) conducted a national survey of school psychologists to determine trends in the familiarity with and use of DA within the schools. They found that more than half of the respondents (56%) were "not at all familiar with dynamic assessment" (p. 297). Further, of those who were familiar ("barely" – "quite"), only 29% had used DA in the past 6 months. Of those who were familiar with DA yet had not used the technique in the past 6 months, 31% reported that this was due to lack of adequate knowledge and 24% reported that it was due to time constraints. Of those who used DA, 41% reported that they did so in order to gain insight into students' processing strengths and weaknesses, while 19% did so to assess achievement and 16% to assess cognitive functioning. The use of DA for

the purpose of implementing trial interventions and documenting their outcomes was not an option for survey participants; however, 4% of respondents marked "other".

Purpose of Project

RTI holds tremendous potential for supporting students as they overcome academic difficulties. However, when students fail to make anticipated progress, additional information regarding their use of underlying cognitive processes may be needed in order to tailor interventions to the students' individual needs (Hale & Fiorello, 2004; Schmitt & Wodrich, 2008). As such, the roles of school psychologists are changing from conducting evaluations to determine eligibility and placement to assessing students for the purpose of designing and monitoring interventions. DA holds promise in this new era of school psychology. As a qualitative approach for investigating a student's spontaneous or inefficient use of the cognitive processes, DA may be used at Tiers II or III of an RTI model when the goal is to understand a student's insufficient progress in response to purely academic interventions. Even more importantly, perhaps, is that DA is used to trial interventions (e.g., mediation of cognitive functions), document changes in student performance, and guide the design of individually-tailored interventions in home and school settings. Unfortunately, despite the promise of DA and its history of over 30 years of clinical and research support, the tools and techniques are rarely utilized by school psychologists.

The majority of school psychologists are not familiar with DA, and many of those who are at least somewhat familiar with the techniques do not utilize them in their practice due to insufficient knowledge and skill or perceived time constraints (Haney & Evans, 1999). The fact that the majority of school psychologists are not familiar with DA

is not surprising given the fact that only a small fraction of school psychology graduate programs teach DA skills as part of cognitive assessment courses (Lidz, 1992). The purpose of this project was to develop a resource guide for DA, designed for practicing school psychologists, that provides background information regarding the theoretical foundation of DA, practical applications of DA in today's school environment, essential knowledge that one must have to develop beginning level skills in DA, and user-friendly tools that school psychologists can use as they hone their skills and incorporate DA principles and techniques into their school psychology practice. The resource guide titled *Bridging the Gap Between Assessment and Intervention: An Introduction to Dynamic Assessment for School Psychologists* was designed to serve as a training tool to help fill the void currently left by graduate programs and present DA as a set of skills that both adds value to, and is feasible to incorporate within, one's practice. Further, in order to ensure the content validity and usability of the resource guide, experts in the field of DA reviewed the resource guide to ensure its content validity, after which the resource guide was field tested with practicing school psychologists in order to assess its utility.

Methodology

The need to develop a resource guide for school psychologists that provides both theoretical knowledge and practical tools for the implementation of DA within schools emerged from a review of the literature. This section is intended to outline the process by which the resource guide was developed, provide a brief overview of its content, and discuss the method by which the content of the resource guide as well as its usability was validated.

Instructional Design

An instructional system design procedure was utilized in order to create a user-friendly resource guide for school psychologists that supports the development of basic knowledge in the area of DA and provides baseline strategies and tools for incorporating DA principles and techniques within one's practice. A review of the research literature revealed that DA principles and techniques are rarely used within the field of school psychology, despite their relevance in regard to process-based assessments and RTI. This discrepancy was the driving force behind the current project: to develop a user-friendly resource guide describing the theoretical foundation of DA, applications to school psychology within the context of process based assessment and RTI, definitions of key concepts (e.g., cognitive functions and mediated learning), and practical tools for the purpose of developing DA skills as well as gathering multiple sources of information regarding students' use of cognitive functions.

The overarching objective of this project was to pull together over 75 years of clinical research in the area of DA, dating back to the seminal work of Lev Vygotsky, and present it in a manner that is both meaningful and compatible with the contemporary

practice of school psychology. Consequently, the resource guide draws influence from researchers often credited with the theoretical and clinical foundation of DA including Vygotsky, Luria, and Feuerstein. Furthermore, consistent with this author's goal of linking theory to practice, the resource guide outlines practical applications of DA based on the work of contemporary researchers and practitioners, including Lidz, Jensen, Robinson-Zañartu, and others. To ensure the content validity of the resource guide as well as its practical application to the field of school psychology, this author obtained reviews and feedback from experts in the field of DA as well as practicing school psychologists. This information was used to determine the accuracy of the information presented as well as the relevance of the resource guide and its contribution to the field of school psychology.

Content Design

Based on research in the area of school psychology and the use of DA, the vast majority of practicing school psychologists have either no or minimal training in this area. Consequently, the resource guide was designed to be user-friendly to those who have a limited DA background. In other words, this author strove to avoid obscure or overly technical language, provide information in a concise manner, and provide examples to illustrate potentially foreign concepts.

The resource guide begins with an overview of the theoretical foundation of DA. It is the opinion of this author that beginning with theory is of the utmost importance since DA may require a radical paradigm shift on the part of school psychologists. Practitioners working from a "closed system" framework of human functioning must shift to an "open system" perspective in which children and youth are viewed as capable

of creating, with the assistance of adult mediators, meaningful changes in the way that they think, learn, and solve problems. This, of course, is directly tied to a practical shift from a "static model" of cognitive testing to the adoption, or at minimum incorporation, of a "change model" of cognitive assessment. The former aims to precisely measure already established knowledge and skills, while the latter strives to elicit changes in student performance through the acquisition of new cognitive functions.

Following the discussion of the theoretical foundation of DA is a rationale for its value as a component of a comprehensive school psychological service delivery model. As a process-oriented approach to cognitive assessment, which incorporates the use of trial interventions, DA is a natural fit in the current era of school psychology with the increasing role of RTI. This author, therefore, provides an overview of DA as method for assessing cognitive processes, descriptions of 15 key cognitive functions that are targeted through DA, and outlines six central components of MLE. Lastly, the resource guide includes tools that school psychologists can use as they develop their DA skills and gather multiple sources of information to support conclusions regarding cognitive strengths and weaknesses as well as intervention recommendations.

Expert Review

Expert reviewers were solicited early in the development of the resource guide. Eight experts in the field of DA were identified based on the following criteria: (a) the individual has published work in the area of DA and/or mediated learning; (b) the individual has taught graduate level course(s) in DA and/or mediated learning; and/or (c) the individual has received graduate level training in the area of DA and mediated learning, has received supervision in the application of DA principles and techniques, and

uses DA as part of his/her school or clinical psychology practice. The purpose of soliciting expert feedback is to ensure that the content of the resource guide is consistent with the current body of knowledge in the area of DA and mediation.

This author emailed DA experts with a brief description of the dissertation project and resource guide and asked if they would review the resource guide and provide feedback in the form of an attached survey, including both Likert scale responses and open-ended questions. All 8 of the experts replied to the email stating that they would participate in the study. They were then mailed a copy of the resource guide (Appendix A), a cover letter (Appendix B) including instructions for their participation, a consent form (Appendix C), a feedback questionnaire (Appendix D), and a stamped and addressed return envelope for the consent form and feedback survey. Of the 8 experts that initially agreed to participate in the study, 6 returned completed consent forms and questionnaires.

Field Testing

Following the expert review, the resource guide was distributed to practicing school psychologists to gather feedback regarding the relevance and utility of the resource guide. School psychologists were primarily recruited from a large southern California school district with the only criteria being that they were currently working as school psychologists and agreed to participate in the study. An email soliciting participation was sent out to a listserv of 152 school psychologists; 20 school psychologists replied that they would participate. As with the expert reviewers, school psychologists were asked if they would review the resource guide and provide feedback in the form of an attached questionnaire including both Likert scale responses and open-

ended questions. This questionnaire was different from the one administered to DA experts; the feedback from school psychologists was used to assess the usefulness of the resource guide for those practicing in the field. Those who respond that they would participate were mailed a copy of the resource guide (Appendix A), a cover letter (Appendix E) including instructions for their participation, a consent form (Appendix F), a feedback questionnaire (Appendix G), and a stamped and addressed return envelope for the consent form and feedback questionnaire. Of the 20 who initially agreed to participate, 13 returned completed consent forms and field test questionnaires.

Method of Evaluation

The evaluation of the resource guide involved an analysis of the feedback questionnaires completed by both expert reviewers and practicing school psychologists. The questionnaires were designed to gather information relevant to the content validity of the resource guide (e.g. expert reviewers) and its relevance for practicing school psychologists.

Timeline for Project

Formal approval to pursue project was obtained from the dissertation committee on December 6, 2011, and the initial draft of the resource guide was completed on December 13, 2011. Expert reviewers were solicited and feedback was received by February 15, 2012. Based on the expert reviews, revisions to the resource guide were made in preparation of the field-testing phase of the project. Field-testing results were collected by March 5, 2012 and data analysis was conducted on March 11, 2012.

Confidentiality and Ethical Concerns

This author has maintained the confidentiality of both DA expert and school psychologist reviewers by securing all identifying information and recording data on a separate document on which reviewers will remain anonymous.

Results

This section describes the results derived through the process of developing the resource guide *Bridging the Gap Between Assessment and Intervention: An Introduction to Dynamic Assessment for School Psychologists.* The results include data gained through the expert review process as well as changes made to the resource guide in response to expert feedback. Further, results from the field test conducted with practicing school psychologists is presented, including both quantitative data gained through Likert scale ratings as well as qualitative data obtained through open-ended questions.

Expert Review Participants

Six experts in the areas of DA and/or mediated learning participated in this phase of the resource guide development. Three of the participants have published an article, book chapter, and/or book on DA and/or mediated learning; 4 have presented on the topic of DA and/or mediated learning at a professional conference; 4 have taught a graduate level course on DA and/or mediated learning; and 5 have completed graduate-level coursework in DA and/or mediated learning, received supervision in the application of DA and/or mediated learning, and currently use DA/mediated learning as part of their practice as a school or clinical psychologist.

Quantitative results. The expert review questionnaire included three Likert scale statements to which the expert could respond 1-*Strongly Agree*, 2-*Agree*, 3-*Somewhat Agree*, or 4-*Disagree*. The statements included: (a) this resource guide would be a useful tool for introducing DA to practicing and/or training school psychologists; (b) as an introduction to DA, the resource guide covers key concepts related to the topic; and (c) the resource guide accurately reflects DA principles and techniques.

As shown in Figure 1, 5 of the 6 experts reported that they either "agree" or "strongly agree" that the resource guide would be a useful tool in introducing DA to practicing and /or training school psychologists. The sixth expert reported "somewhat agree." In response to the statement "As an introduction to dynamic assessment, the resource guide covers key concepts related to the topic," 5 of the 6 experts reported that they "strongly agree" and the other reported that they "agree" (Figure 2). And lastly, as shown in Figure 3, the experts were split in terms of their responses to the statement "The resource guide accurately reflects dynamic assessment principles and techniques." Two of the experts reported that they "somewhat agree" and the other 4 reported that they "strongly agree."

Qualitative results. Experts were asked to provide their opinions as to the strengths of the resource guide; their responses were rather consistent. The experts typically commented that the resource guide presents complex concepts in an extremely accessible narrative style. In addition, they commented that the resource guide concisely covered a lot of ground, including the theoretical background and basic concepts of DA, and that the resource guide had the potential for sparking interest in those who are not familiar with DA.

Experts were also asked to comment on ways in which the resource guide could be improved. One of the expert reviewers believed that the original title of the resource guide, *The What, Why, and How of Dynamic Assessment: A Handbook for School Psychologists*, overpromised the reader in that it implied a more detailed, comprehensive, and authoritative resource than it actually is. As a result the title of the resource guide was changed to *Bridging the Gap Between Assessment and Intervention: An Introduction*

to Dynamic Assessment for School Psychologists in order to clarify the intent of the document, which is to introduce school psychologists who may not be familiar with DA to the foundational theory, guiding principles, and basic techniques of DA. In addition, rather than referring to the document as a "handbook," this author made the decision that it would be better described as a "resource guide."

Two of the experts raised concern about the notion of the "15 Essential Cognitive Functions," questioning how these were determined to be *the* "essential" functions. As a result, the developer revised this section of the resource guide, clarifying that these are not the "*most* essential" cognitive functions, but rather that many researchers in the area of DA agree that these 15 functions are "essential" to learning and problem solving.

One of the experts suggested that the resource guide could be rewritten as a staff development tool for school psychologists with references to other resources that participants could access, should the presentation spark an interest in learning more about DA. The expert's input was taken into consideration, both in the addition of a recommended resources section as well as in planning for the future direction of this project. Other experts suggested adding additional examples, as this may be helpful in an introductory manual for novice readers, and a sample DA interaction and a sample DA report were added to the resource guide in order to address this concern.

Additional suggestions included broadening the coverage of DA, including connections to executive functioning, metacognition, and use with culturally diverse student populations for whom traditional psychometric measures may be inappropriate. Each of these was considered by this author both prior to, and in the process of, developing the resource guide; however, the breadth of coverage needed to be balanced

with the practicality and scope of the project, and these important connections were intentionally left out. Nevertheless, this author's future plans for the project include expanding the breadth of the coverage to include each of these suggested areas.

Field Test Participants

Field test participants included 13 school psychologists working in southern California. Of those who participated in the field study, one has worked as a school psychologist for less than 2 years, four for 2-4 years, five for 5-7 years, and three for 8 or more years. In terms of their highest level of education, 5 of the participants have a masters' degree, 4 have an educational specialist degree, and 4 have a doctorate degree. Eight of the participating school psychologists work more than 50% of the time at elementary level, 3 work more than 50% of their time at the middle school level, and 2 works more than 50% at the high school level. Lastly, none of the participants described themselves as being "very familiar" with DA, 4 described themselves as being "familiar," 8 as "somewhat familiar," and one as "not familiar."

Quantitative results. Participants in the field study provided feedback regarding the content, readability, and applicability of the resource guide. As shown in Figure 4, 12 of the 13 participants reported that they either "agree" or "strongly agree" that the resource guide "offers a new paradigm from which to view student learning and the assessment of learning skills." In terms of the readability of the resource guide, 12 of the 13 participants "agreed" or "strongly agreed" that the section describing cognitive modifiability was clearly written and easy to understand; all 13 of the participants "agreed" or "strongly agreed" that the section describing the 15 cognitive functions was clearly written and easy to understand; and 12 of the 13 participants reported that the

section describing the 6 mediated learning strategies was clearly written and easy to understand. These results are presented in Figures 5-7.

Two of the primary reasons cited in the research for school psychologists not using DA include perceived timed constraints and insufficient knowledge and skills. As part of this project, after reading the resource guide, participants were asked if they could imagine themselves incorporating aspects of DA into their service delivery without creating substantial time constraints and whether they were interested in learning more about DA and/or mediated learning. Participant responses to these items are illustrated in Figures 8 and 9. Nine of the 13 participants reported that they "agree" or "strongly agree" with the statement, "I can imagine myself incorporating aspects of dynamic assessment into my service delivery without creating substantial time constraints" (Figure 8). Three of the participants reported that they "somewhat agree" and 1 participant did not agree. Lastly, 11 of the 13 participants reported that they "agree" or "strongly agree" with the statement "after reading this resource guide I am interested in learning more about dynamic assessment and/or mediated learning" (Figure 9). One participant reported somewhat agreed, and 1 did not agree.

Qualitative results. In addition to the Likert scale questions, participants were asked to comment on ways in which the resource guide could be improved as well as provide any additional comments that came to mind (Appendix H). In general, participants expressed that the resource guide provided a good description of the theoretical background and rationale for DA, that the resource guide was well written and easy to understand, and that the examples provided in the indices of the resource guide were helpful in illustrating key concepts. In terms of improving the usefulness of the

resource guide, field test participants reported that it would be helpful to include a "how to" guide or tips for administration, more visuals, and examples of recommendations for teachers and parents.

Overview of Results

Overall, the feedback provided by experts was useful both in guiding the development of the resource guide as well as in making plans for future projects. As a group, they generally reported that the resource guide would be a useful tool for introducing school psychologists to DA, that it covers the key concepts related to DA and mediated learning, and that it accurately reflects the principles and techniques of DA and mediated learning. Field test participants generally reported that the resource guide offered a new paradigm from which to view student learning and the assessment of learning skills, that the resource guide was clearly written and easy to understand, that readers could imagine themselves incorporating aspects of DA in to their service delivery without substantial time constraints, and that after reading the resource guide they were interested in learning more about DA and mediated learning. As a group, the field test participants found the resource guide to be informative and easy to understand, but expressed that additional instructions for implementing DA, visuals, and sample recommendations for teachers and parents would improve the usefulness of the resource guide for school psychologists.

Discussion

This project has documented the value of DA as a process-oriented approach that bridges assessment and intervention. Through the use of mediation during the assessment process, a school psychologist using DA trials a series of interventions aimed at creating at least temporary changes in the way the student approaches novel learning and problem solving tasks. By documenting the student's performance before and after the mediation of new cognitive functions, as well as the strategies used to create a change, the school psychologist establishes a blueprint for improving student learning and problem solving across home and school learning contexts.

Despite the promise of DA as a bridge between assessment and intervention, only a fraction of school psychologists have received training in this area of cognitive assessment. Further, of those who have at least some knowledge of DA, many do not use this approach due to perceived time constraints or a lack of adequate knowledge and skill. In response to this problem, this author developed a resource guide titled *The Bridge Between Assessment and Intervention: An Introduction to Dynamic Assessment for School Psychologist* as a means of introducing the theories, contemporary applications, and basic principles and techniques of DA. Further, the resource guide was specifically designed in order to present complex, and potentially foreign, concepts in a plainly written and easy to understand manner.

Summary of Expert Review

As a group, the experts generally reported that the resource guide would be a useful tool for introducing school psychologists to DA, that it covers the key concepts related to DA and mediated learning, and that it accurately reflects the principles and

techniques of DA and mediated learning. The experts also provided useful feedback that was used in revising the resource guide including changing the title of the document as well as adding resources that the reader can access should he/she be interested in learning more about DA and/or mediated learning. Additional suggestions included drawing connections between the 15 cognitive functions described in the resource guide and executive functioning, as well as describing the value of DA in assessing culturally and linguistically diverse students for whom traditional psychometric tests may be inappropriate. This author weighed these suggestions in light of the goals of the project, which were to develop a concise and easy to read introductory resource guide, and ultimately deferred these objectives to future projects.

Summary of Field Test

Field test participants generally reported that the resource guide offered a new paradigm from which to view student learning and the assessment of learning skills, that the resource guide was clearly written and easy to understand, that readers could imagine themselves incorporating aspects of DA in to their service delivery without substantial time constraints, and that after reading the resource guide they were interested in learning more about DA and mediated learning. As a group, the field test participants found the resource guide to be informative and easy to understand, but expressed that additional instruction for implementing DA, visuals, and sample recommendations for teachers and parents would improve the usefulness of the resource guide for school psychologists.

These results suggest that the resource guide, *Bridging Assessment and Intervention: An Introduction to Dynamic Assessment for School Psychologists*, is a valuable tool in addressing two major obstacles that currently prevent many practicing

school psychologists from using DA. These obstacles include perceived time constraints of DA and inadequate knowledge and skills. The resource guide presents DA as beginning with a change in mindset and including straightforward principles and techniques that can supplement more traditional psychological assessment practices. Further, the resource guide presents DA within a contemporary framework of RTI, strongly advocates for the value of DA, and introduces new and potentially foreign concepts and terminology in plainly written and easy to understand language. Perhaps due at least in part to these factors, school psychologists who read the resource guide generally reported that it was clearly written and easy to understand, that they could imagine incorporating aspects of DA without creating substantial time constraints, and that they were interested in learning more about DA and mediated learning. As such, the resource guide addresses some of the primary problems contributing to the general absence of DA in the field of school psychology.

Limitations

The current study is limited by the small sample size. The resource guide was reviewed by 6 experts and 13 practicing school psychologists. A larger sample size of experts and school psychologists would yield a wider range of knowledge and experience that may provide additional insights into both the validity and usability of the resource guide. The experts were selected for their knowledge and experience in the clinical application of DA, as opposed to a more research-oriented approach. This was an intentional part of the research design since the resource guide reflects this style of DA; however, it may still limit the breadth of input provided during the expert review process. In addition, participation in the field-testing was voluntary. It is possible, particularly in

light of the small sample size, that voluntary participants shared common characteristics that would influence the outcome of the study. For example, school psychologists participating in the field study may already have an interest in DA, be more likely to respond positively to survey studies due to a generally helpful and supportive spirit, or happen to share a geographic location in which DA is more prominent and viewed more positively than in other regions. Of course, the opposite of these may also be true.

While the sample size for the field test was small, limiting the generalizability of the findings, respondents still represented a wide range of experience spanning from "less than 2 years" to "8 or more years" of work as a school psychologist. They also ranged in level of educational attainment including school psychologists with "masters degree," "educational specialist degree," and "doctorate (Ed.D., Psy.D., Ph.D.)" level training. Furthermore, participating school psychologists reported to work more than 50% of their time working at "elementary," "middle school," and "high school" levels, and reported a range of familiarity with DA, including "not familiar," "somewhat familiar," and "familiar."

The current study was also limited by a lack of data regarding the participants' use of DA following their review of the resource guide. For instance, will the participating school psychologist attempt to incorporate some aspects of DA, either DA techniques or a change paradigm, into their assessment and intervention practices? Of those who do attempt to use DA, what will be the outcomes? Do their practices reflect the principles of DA as described by Feuerstein, Jensen, and Lidz? How will the students respond? Will DA data be useful in collaborating with parents and other educators in the design and implementation of interventions across settings? Will there be differences in

the implementation of DA across student demographics including ethnicity, SES, age, gender, program, or learning needs?

Along the same lines, while the vast majority (92%) of field test participants responded ("somewhat agree" to "strongly agree") that they can imagine themselves incorporating aspects of DA into their practice without substantial time constraints and that they were interested in learning more about DA, these reports are speculative and the study does not offer data as to whether or not this proves to be true. Nevertheless, given that perceived time constraints and adequate knowledge and skill are two primary reasons cited by school psychologists as to why they do not use DA, the results of the study are promising. If DA is presented as a supplement that adds value to traditional assessment methods and is presented in a clear and practical manner, it may be more likely that a broader range of school psychologists will adopt aspects of this approach.

Furthermore, item 9 on the field test questionnaire reads, "I can imagine myself incorporating aspects of dynamic assessment into my service delivery without creating substantial time constraints;" 69% percent of the respondents reported that they "agree" or "strongly agree" with this statement. While these results are promising given that perceived time constraints are a major factor deterring school psychologists from using DA, the question still does not yield information as to which aspects of DA school psychologists imagine themselves using. Future research is needed in order to understand the particular aspects of DA that school psychologists believe can be implemented without substantial time constraints as well as whether or not this proves to be the case for school psychologists who adopt these approaches.

Future Development and Dissemination

The future development of the resource guide will delve into the neurological factors involved in DA and mediated learning. For example, Goldberg (2001) and Posner and Rothbart (2007) discuss the role of the prefrontal cortex and anterior cingulate in self-regulated learning and problem solving, the very skills one seeks to assess and develop through DA and mediated learning. Goldberg also suggested that the right hemisphere specializes in novel problem solving, exploring multiple meanings and relationships, whereas the left hemisphere typically specializes in consolidation of rote knowledge and skills. This would have implications for DA in that one is assessing cognitive functions involved in novel learning and problem solving as opposed to established knowledge and skill sets. And lastly, mirror neurons have been implicated in social reciprocity and may be central in the process of DA in that the mediator and student must establish a relationship of intentionality and reciprocity (Feuerstein et al., 2010).

Additional areas for further development of this resource guide include the overlap between the cognitive functions assessed through DA and skills associated with executive functioning such as setting goals, planning, monitoring, strategy use, metacognition, and self-regulation. DA has also been highlighted in the research as an appropriate alternative assessment for culturally diverse student populations (Hilliard III, 1996), and this important benefit of DA should be included in future editions of this resource guide. Lastly, while the resource guide hints at the connection between trial interventions used during the DA process and the development of interventions for the

home and school settings, specific intervention strategies or recommendations are not outlined; this will be addressed in future editions.

In order to disseminate the DA resource guide, it will uploaded to the Internet so it will be available to those learning and implementing DA in school settings. In addition, parts of the resource guide will be revised and submitted for professional publication to outlets such as *CASP Today*, *Communique*, *Contemporary School Psychology*, *School Psychology Review*, and/or *Psychology in the Schools*.

The resource guide will also be adapted to a presentation format so the author can present the material as part of professional development trainings for practicing school psychologists. In addition, as a graduate level instructor, this author can incorporate the research either as part of a DA course or as a component of a broader course such as "Advanced Alternative Assessment." This product will also be submitted as a proposal to the California Association of School Psychologists (CASP) and the National Association of School Psychologists (NASP) for consideration as an annual conference poster, paper, or mini-skills presentation.

Conclusion

As a process approach linking assessment and intervention, DA holds tremendous promise in the field of school psychology, particularly in the current era of RTI. However, DA is rarely utilized within the field, often times due to perceived time constraints or inadequate knowledge and skill. The resource guide, *Bridging Assessment and Intervention: An Introduction to Dynamic Assessment for School Psychologists*, aids the profession by presenting DA as a supplement to traditional psychometric testing that provides the school psychologist with additional insights into the types of interventions

(i.e. mediating strategies) that assist the student in overcoming learning obstacles. School psychologists who read the resource guide reported that it was clearly written and easy to understand and that it presents a new paradigm for viewing student learning and the assessment of learning skills. Further, they generally reported that they can imagine themselves using aspects of DA without incurring substantial time constraints and that after reading the resource guide they were interested in learning more about DA and mediated learning in order to advance their knowledge and skills in this area.

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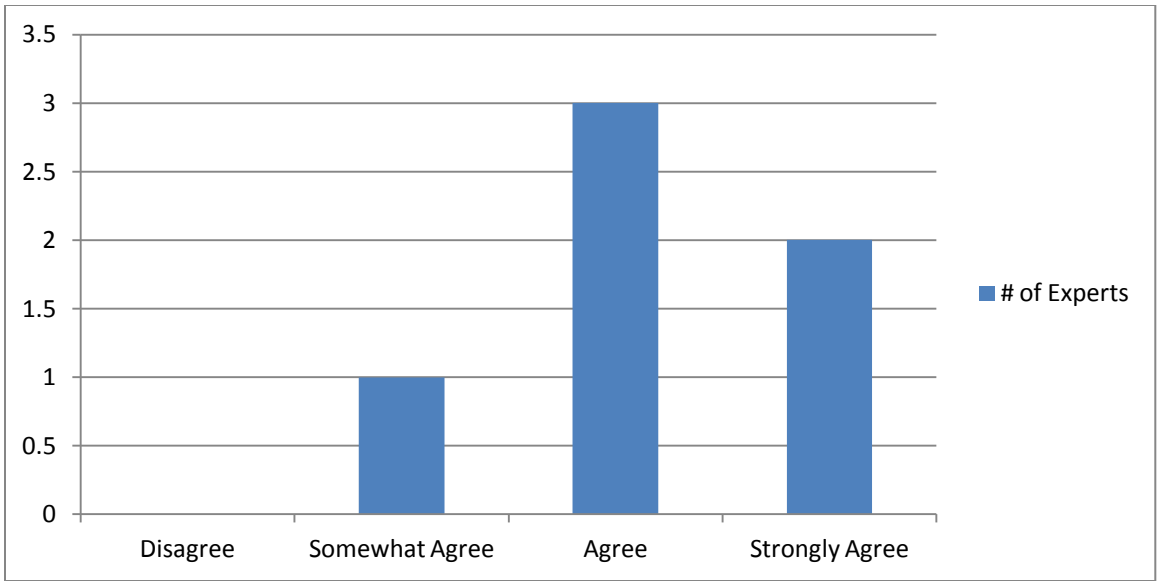

Figure 1. The number of experts that responded "disagree", "somewhat agree", "agree", or "strongly agree" to the statement "The resource guide would be a useful tool for introducing DA to practicing and/or training school psychologists".

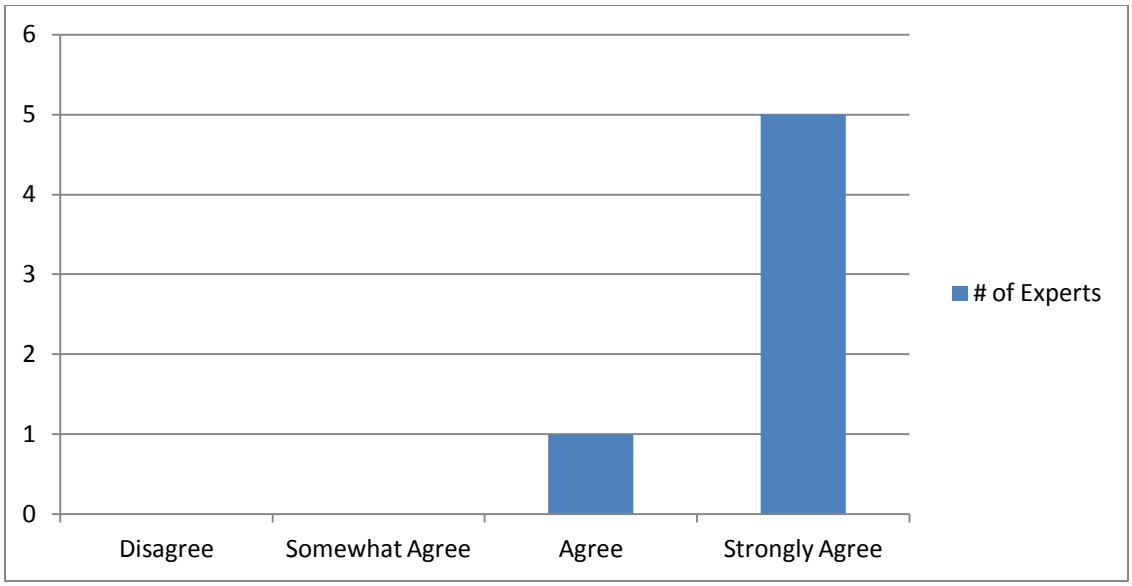

Figure 2. The number of experts that responded "disagree", "somewhat agree", "agree", or "strongly agree" to the statement "As an introduction to DA, the resource guide covers key concepts related to the topic".

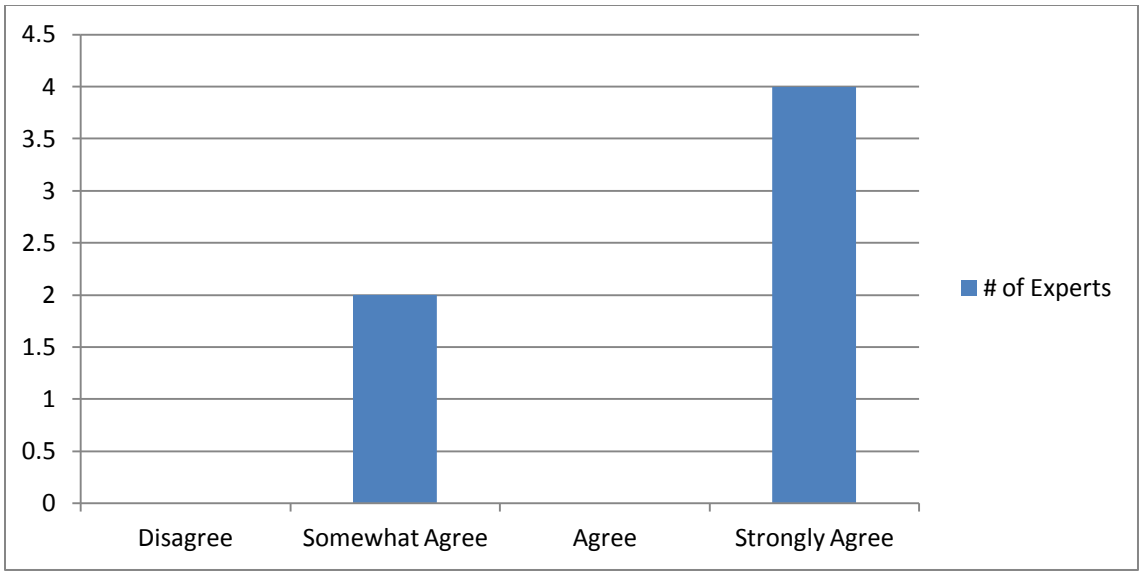

Figure 3. The number of experts that responded "disagree", "somewhat agree", "agree", or "strongly agree" to the statement "The resource guide accurately reflects DA principles and techniques".

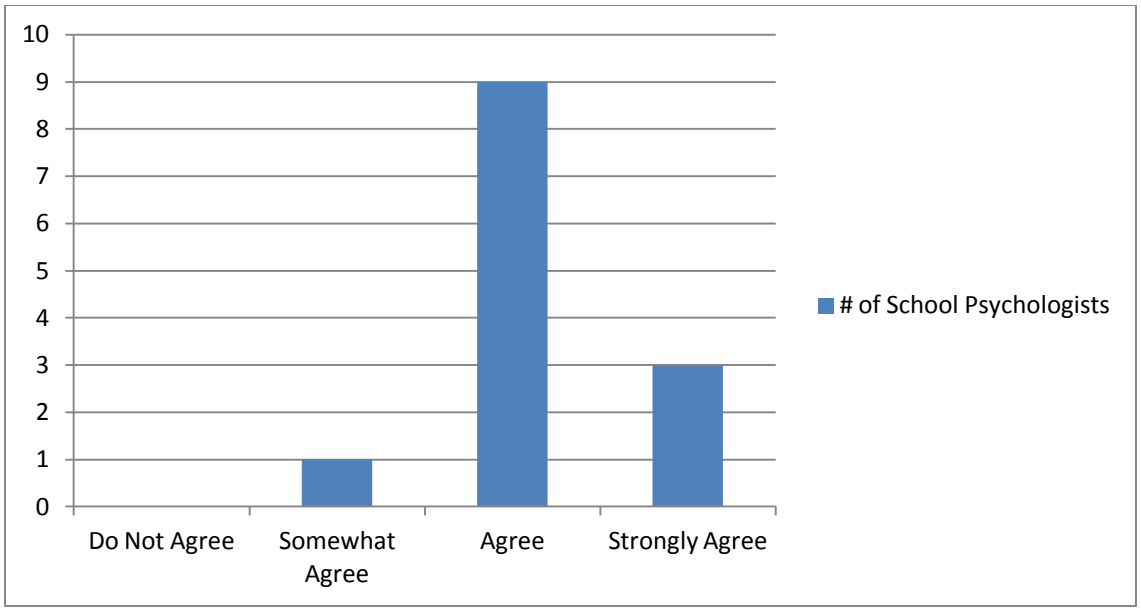

Figure 4: The number of school psychologists who reported that they "Do Not Agree", "Somewhat Agree", "Agree", or "Strongly Agree" with the statement "The resource guide offers a new paradigm from which to view student learning and the assessment of learning skills."

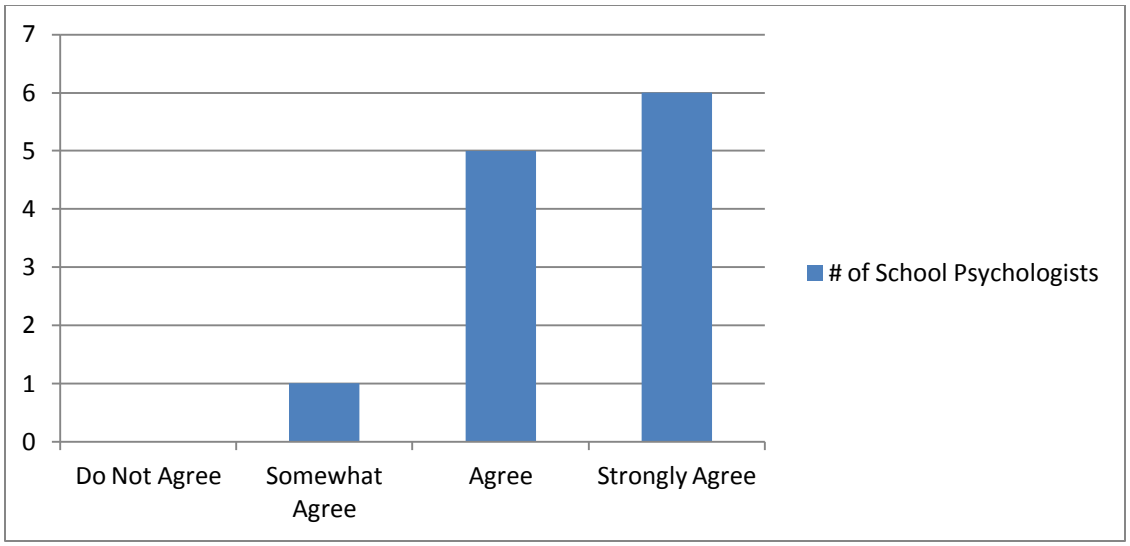

Figure 5: The number of school psychologists who reported that they "Do Not Agree", "Somewhat Agree", "Agree", or "Strongly Agree" with the statement "Other school psychologists would find the section describing cognitive modifiability (i.e. change) clearly written and easy to understand."

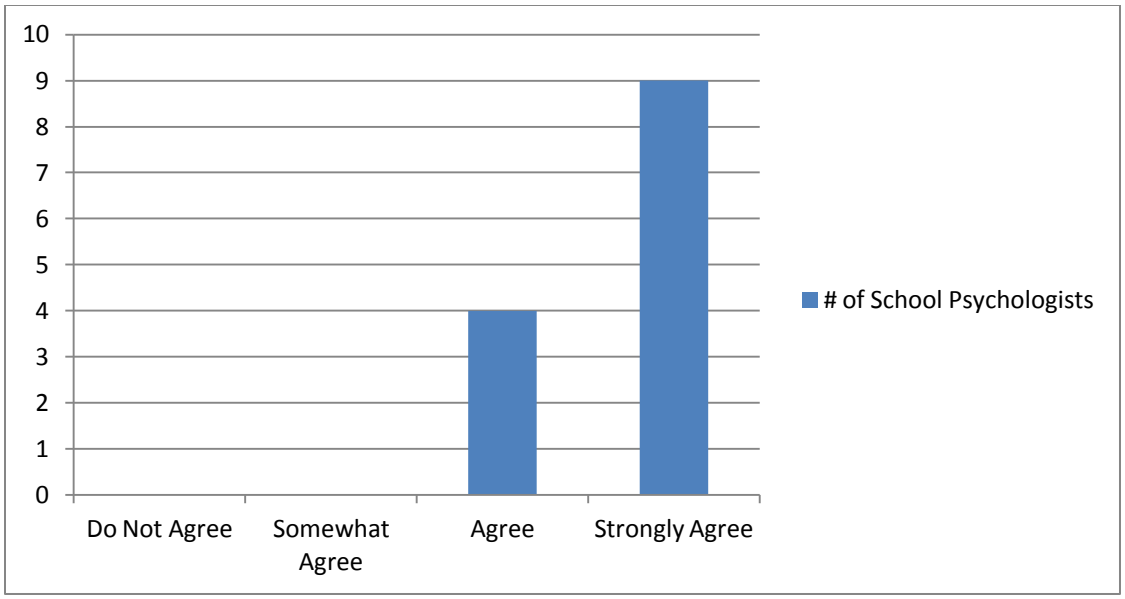

Figure 6: The number of school psychologists who reported that they "Do Not Agree", "Somewhat Agree", "Agree", or "Strongly Agree" with the statement "Other school psychologists would find the section describing 15 cognitive functions (i.e. thinking and learning skills) clearly written and easy to understand."

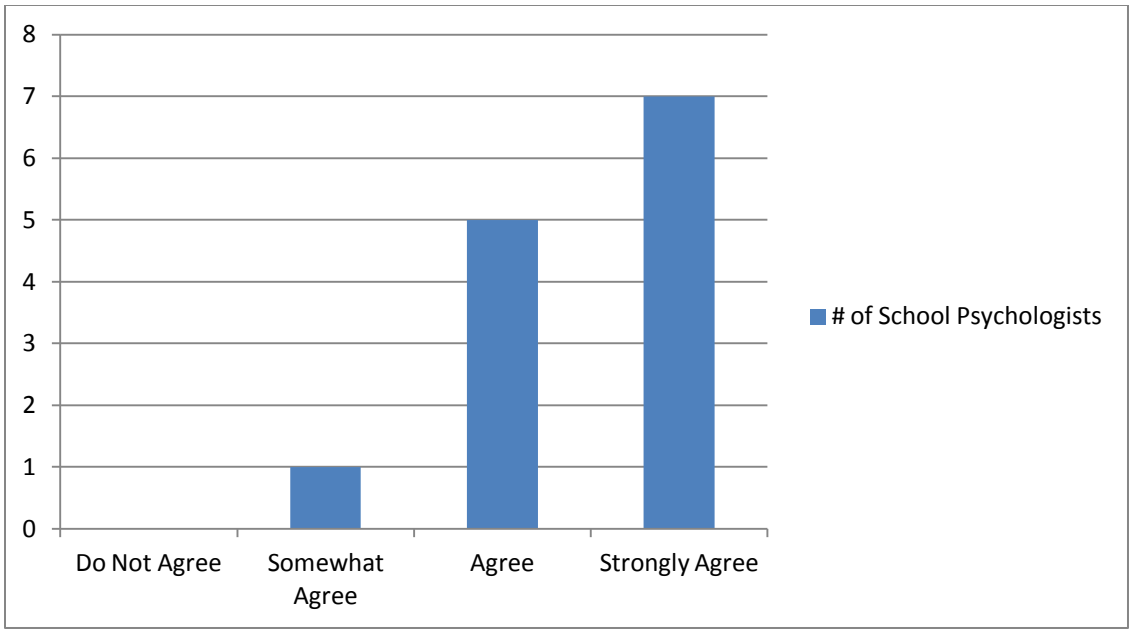

Figure 7: The number of school psychologists who reported that they "Do Not Agree", "Somewhat Agree", "Agree", or "Strongly Agree" with the statement "Other school psychologists would find the section describing 6 mediated learning strategies clearly written and easy to understand."

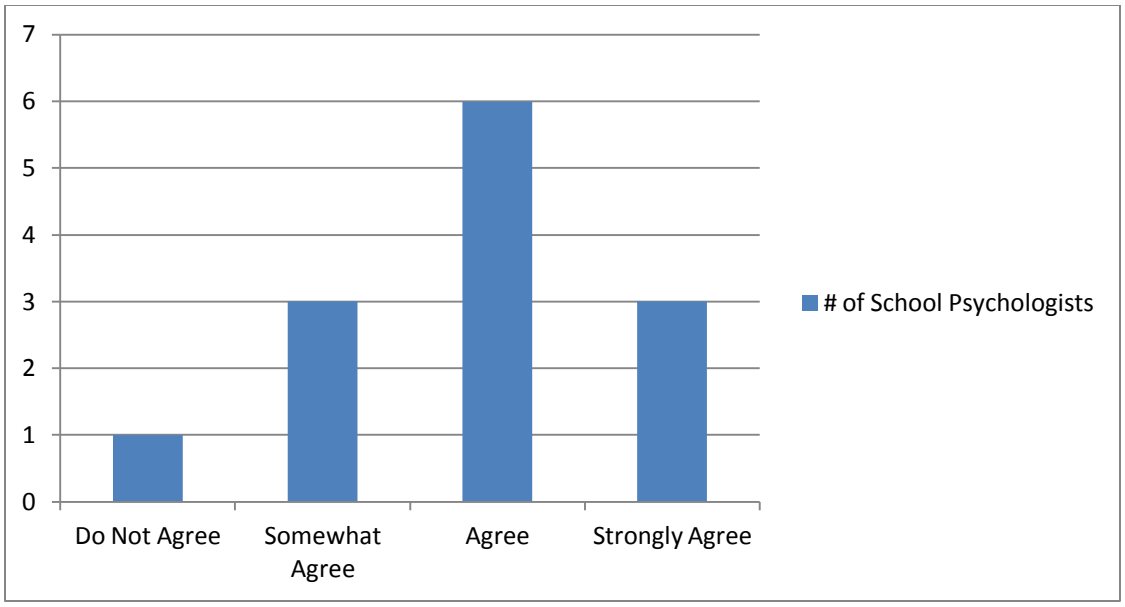

Figure 8: The number of school psychologists who reported that they "Do Not Agree", "Somewhat Agree", "Agree", or "Strongly Agree" with the statement "I can imagine myself incorporating aspects of dynamic assessment into my service delivery without creating substantial time constraints."

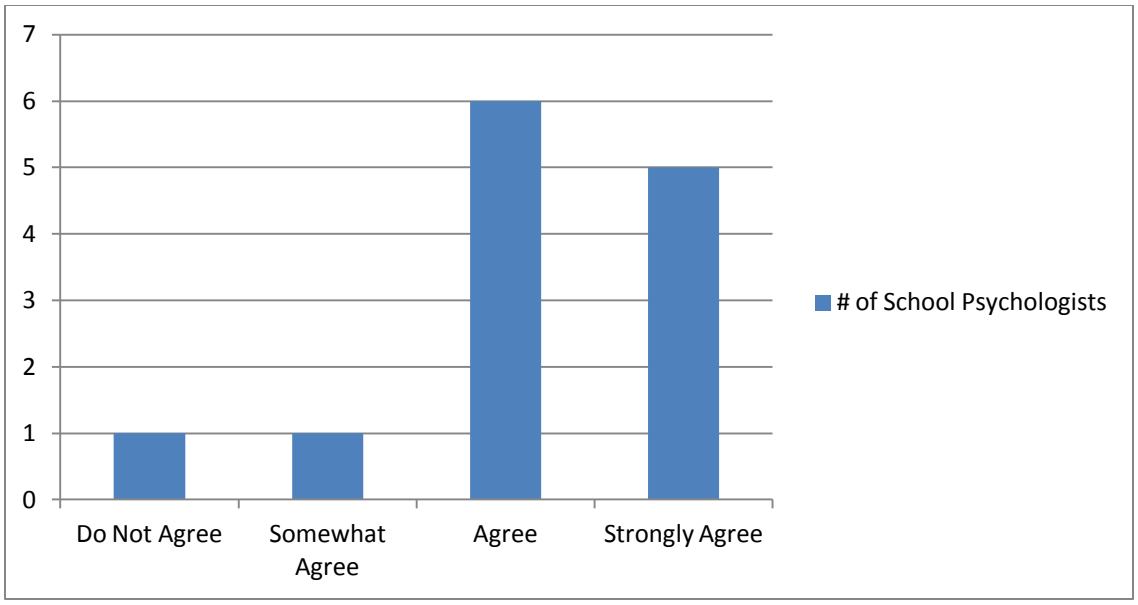

Figure 9: The number of school psychologists who reported that they "Do Not Agree", "Somewhat Agree", "Agree", or "Strongly Agree" with the statement "After reading this resource guide I am interested in learning more about dynamic assessment and/or mediated learning."

APPENDIX A

Resource Guide

Bridging the Gap Between Assessment and Intervention:

An Introduction to Dynamic Assessment for School Psychologists

James Bylund, Ed.S., NCSP, LEP

2012

ABOUT THE AUTHOR

James Bylund, Ed.S. is a practicing school psychologist for San Diego Unified School District (SDUSD) as well as the owner of James Bylund, Licensed Educational Psychologist. He is a Nationally Certified School Psychologist (NCSP) and a Licensed Educational Psychologist (LEP). Mr. Bylund earned a Master's (M.A) degree in Education from San Diego State University, an Education Specialist (Ed.S.) degree in School Psychology from San Diego State University, and is currently a candidate for Doctor of Psychology (Psy.D.) in Educational Psychology at Alliant International University. His areas of specialization include Dynamic Assessment and Mediated Learning, assessment of Executive Functioning, Solution-Focused Brief Counseling, and Motivational Interviewing.

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I would like to acknowledge Carol Robinson-Zañartu, Ph.D. for the tremendous influence she has had over me in terms of my interest in, and understanding of, dynamic assessment and mediated learning. Her inspiration, teaching, and mentorship are reflected throughout this text in the conceptualization and application of "thinking skills" and "mediating interactions". For a greater understanding of dynamic assessment and mediated learning, school psychologists and other educators are encouraged to read *Teaching 21 Thinking Skills for the 21st Century: The MiCosa Model* (in review) written by Dr. Robinson and her colleagues Patricia Doerr and Jacqueline Portman.

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Introduction

Each and every one of us holds beliefs about the nature of intelligence, whether we are aware of it or not, and many of us in the United States hold the implicit belief that "intelligence" is a fixed biological trait. As a school psychologist I cannot count the number of times that I have heard a parent make a statement such as "Brittany has never been good at math. She gets that from me. I always struggled with math too." A parent that makes this statement, though perhaps never saying so explicitly, believes that intellectual abilities are "hard wired" and are passed down genetically from one generation to the next. When I hear comments like this I have to stop and ask myself, if Brittany believes that she is bad at math and will always be bad at math no matter how hard she tries, just like her mom, what in the world is going to motivate her to put forth the effort needed to master the mathematical principles she is learning in class? Moreover, if Brittany's parents and teachers hold the same beliefs then what is going to motivate them to instill hope in Brittany, challenge her to push harder and reach farther, and invest their time and effort to help Brittany overcome any learning obstacles? And lastly, what can I as a school psychologist do to help Brittany, her parents, and teachers change course and implement strategies to enhance success?

These experiences have motivated me to search for answers. Ironically, despite popular belief, decade's worth of studies in the fields of cognitive psychology and neuroscience have not only challenged, but for all intents and purposes refuted, the notion that heredity is the sole determinant of intellectual abilities (Flynn, 2007; Goldberg, 2001; Nisbett, 2009; Rosenzweig, 2003). As we learn more about the structure and function of the brain it is increasingly clear that the brain changes as we learn from, and adapt to, environmental demands.

Despite these findings however, the dominant models of cognitive functioning in the field of school psychology treat the mind as a closed system that functions in isolation from outside influences (Jensen, 2003a). The assumption is that students' abilities are stable hard wired characteristics, allowing psychologists to measure a student's current level of performance and make reliable predictions about future functioning. In other words if the child is "low average" today they'll be the same way years from now, and while we can do our best to help them out, their ability to think and learn will not change in any significant way. This assumption is what Kuhn (1962) would refer to as a paradigm of "normal" science, and it guides both the development of test instruments and our interpretations of the results. Despite popular practice, however, there is limited connection between "intelligence" tests scores and school performance. Standardized "intelligence" and cognitive processing tests focus almost exclusively on the product of one's performance (e.g. "right" or "wrong") rather than the process of one's thinking (e.g. how they reached an answer), and while results lead to certain diagnostic classifications they do little to guide the development of targeted intervention (Elliot, 2003).

Dynamic assessment (DA), on the other hand, offers an alternative to the prevailing paradigm of traditional psychometric testing. DA assumes that the mind is a relatively open system that is modifiable through skill acquisition and development (Jensen, 2003a). The objective of DA, therefore, is not to measure a student's current level of functioning, but rather assist the learner in improving performance while identifying interventions that may bring about more stable changes in their functioning. Rather than seeking classification, psychologists utilizing DA aim to identify instructional strategies for improving the child's current performance levels (Elliot, 2003).

This resource guide is written with the aim of introducing school psychologists to DA. It serves not as a comprehensive resource of everything DA, but rather a launching point from which a school psychologist sets out to learn more about DA and incorporate aspects of these principles and techniques within their service delivery. The following pages offer a new paradigm from which to view student learning and the assessment of learning skills as I outline the basic principles underlying DA and provide general guidelines for incorporating DA into one's school psychology practice.

What is Dynamic Assessment?

Dynamic Assessment (DA) is a broad term covering a wide range of assessment procedures. However, the common denominator of all such approaches is a test-teach-test model (Grigorenko & Sternberg, 1998; Haywood & Tzuriel, 2002; Lidz, 1991). Broadly speaking, there are two distinct types of DA, one that seeks to measure change and one that seeks to promote change (Caffrey, Fuchs, & Fuchs, 2008; Elliot, 2003; Grigorenko, 2009; Grigorenko & Sternberg , 1998). Caffrey et al. (2008) described these two approaches as "research oriented" and "clinically oriented." The research oriented model is more standardized in terms of its structure and delivery, and the objective is to reliably measure the student's degree of change as well as the investment required to bring about such change. The clinically oriented approach on the other hand, which is the focus of this introduction to DA, relies heavily on the psychologist's expertise and clinical insights as they fluidly respond to the needs of the student. This approach is far less concerned with quantitative measurement but rather a qualitative analysis of student's cognitive strengths and weaknesses, descriptions of the child's responses to mediation (e.g. intervention), and the identification of intervention strategies that, if

implemented over time and across settings, would likely result in sustainable changes in the way the student learns and solve problems.

The Spirit of DA: A Model of Change

The application of DA begins with a change in mindset. The psychometric tests that are typically administered by school psychologists are based on the premise that human intellectual ability is a "fixed" or "hardwired" trait. In other words, the human mind is a closed system impenetrable by outside forces. It is this premise that guides us in making decisions regarding what a child is "able" or "unable" to do and make predictions about future achievement. DA, on the other hand, is based on an almost antithetical premise. DA is based on the idea that the human mind is an open system that adapts and changes in response to environmental demands. As such, the aim of DA is not to identify stable characteristics and make predictions based on current performance, but rather assess changes in the child's performance in response to trial interventions and determine the type and amount of investment required to bring about such changes.

Within a DA model, students are viewed as learners who are capable of changing in response to appropriate instruction, and the school psychologist's role is to evoke this change by asking questions, providing feedback, regulating behavior, and mediating (or guiding the development of) new thinking and learning skills (Haywood & Lidz, 2007). The belief that students are capable of fundamental changes in the ways they learn and solve problems is at the core of DA and represents a sharp shift from the assumption of fixed cognitive ability that underlies traditional psychometric batteries. As Haywood (as cited in Elliot, 2003) stated "There should be scant satisfaction in knowing that our tests have accurately predicted that a particular child will fail in school. There are many

sources of such predictor information. What we need are instruments and approaches that can tell us *how to defeat those very predictions"* (p. 22).

Since DA represents a radical shift in mindset from the traditional practice of school psychology, it is important in my mind to set the stage with the theoretical roots of these tools and techniques. Lev Vygotsky is commonly credited for creating the foundation for DA by describing the socio-cultural influences on human development, introducing the concept of the Zone of Proximal Development (ZPD), and advocating for process-oriented, as opposed to product oriented, approaches to cognitive assessment.

Lev Vygotsky: A Theory of Change

Vygotsky (1934/1986, 1978) set forth that the relationship between development and learning is bidirectional in that the act of learning changes the structure of the child's mind and spurs on further cognitive growth. In other words, learning awakens development. He proposed that thinking and learning skills first exist outside the child, in the minds and actions of more competent individuals (e.g. parents), and are transmitted to the child through joint endeavors, whether explicitly taught or simply observed. Over time, these psychological processes become integrated into the child's way of thinking about and acting upon the world.

In order to conceptualize the notion that human development occurs in the context of social interaction, Vygotsky (1934/1986, 1978) introduced the term "zo-ped" or the Zone of Proximal Development (ZPD). This concept describes the area between a child's current problem solving ability and their ability to solve problems using the logical principles provided by a more competent adult mediator. It is within the ZPD that cognitive development occurs. Vygotsky (1978) advocated that psychologists should

assess children within their ZPD by presenting them with tasks one level beyond their current independent functioning, providing just enough instruction for the child to think about and solve the problem more efficiently, and assess the types of cognitive processes that unlocked the child's ability to reach higher levels of achievement.

Vygotsky was one of the first to highlight the significant limitations of static cognitive tests and the narrow set of information that one can gain through such procedures. He wrote that we "need to concentrate not on the *product* of development but on the very *process* by which higher forms are established" (Vygotsky, 1978, p. 64). He went on to write that "Although stimulus-response methodology [of psychological assessment] makes it extremely easy to ascertain subjects' responses, it proves useless when our objective is to discover the means and methods that subjects use to organize their own behavior" (Vygotsky, 1978, p. 74).

Reuven Feuerstein: Assessing and Promoting Change

Reuven Feuerstein built on the concepts proposed by Vygotsky and created formal theories and clinical tools for DA (Grigorenko & Sternberg, 1998). Based on the premise that a child's cognitive ability is best assessed within the process of learning and problem solving, Feuerstein developed his Learning Potential Assessment Devise (LPAD) and established the architecture for clinical DA tools and techniques (Lidz, 1991). As Feuerstein, Rand, and Hoffman (1979) wrote, "the goal of the Learning Potential Assessment Devise is not to seek differences among individuals as their stable and immutable characteristics, but rather to search for the modifiability of these characteristics and concomitantly to look for strategies and modalities for the most efficient and economical way to overcome the barriers imposed by these differences" (p. 125).

In addition to the LPAD, Feuerstein introduced theoretical concepts to explain the changes that he observed in students' functioning as well as the methods he and his colleagues used to elicit these changes. Similar to Vygotsky, Feuerstein promoted the idea that the human mind is an open and complex system defined by continual change as interdependent cognitive functions adapt to meet the challenge of changing environmental conditions. In order to capture this idea, Feuerstein introduced the concept of Structural Cognitive Modifiability (SCM), referring to the deep seeded changes in the way an individual learns and solves problems (Feuerstein et al., 1979).

Expanding on Vygotsky's socio-cultural theory of human cognitive development and the ZPD, Feuerstein introduced his theory of Mediated Learning Experience (MLE), a concept that is central to the model of DA described below. Feuerstein et al. (1979) described MLE as an "interactional process between the developing human organism and an experienced, intentioned adult who, by interposing himself between the child and the external source of stimulation, 'mediates' the world to the child by framing, selecting, focusing, and feeding back environmental experiences in such a way as to produce in him appropriate learning sets and habits" (p. 71). Within the context of DA, MLE serves as the "teaching" phase of the assessment process.

Why Use Dynamic Assessment?

DA is not merely a different set of assessment procedures but rather a shift in one's mindset, a belief that humans have the potential to make meaningful changes in their thinking and learning skills given appropriate opportunities (Lidz, 1991). The process of DA is rooted in one's recognition that no person is functioning at their full potential, that all students are capable of change, and that this change can be brought about by creating new habits of mind (Feuerstein et al., 1979; Lidz, 1991).

Rather than attempting to use DA tools and techniques as a substitute for standardized tests, it may be better to use them as an addition to current assessment procedures or for different purposes entirely. While school psychologists use standardized tests for the purpose of diagnosis and classification, DA tools and techniques are better fit for the role of exploration and intervention (Elliot, 2003). In other words, the questions being asked are not "what is this child and where do they fit?" but rather "how does this child learn and how do we do a better job of teaching them?" The principles and techniques that are described below can be used with a student when you're working on novel cognitive tasks (e.g. matrices), academic activities (e.g. solving a math word problem), or simply going back to test the limits when administering a standardized test battery.

The Research: Measuring Change

As noted in the introduction of this resource guide, there are two distinct types of DA, one that seeks to measure change ("research oriented") and one that seeks to promote change ("clinically oriented"). While the primary focus of the writing is on the clinically oriented approach to DA, "research oriented" studies have demonstrated that changes in student performance in response to trial interventions reflect abilities (i.e. Zone of Proximal Development) that are separate from those tapped by traditional cognitive tests. Researchers in this area have demonstrated that working memory (WM) performance following mediation (i.e. gain score) reliably separates "poor readers" from those with learning disabilities while standardized tests of WM failed to do so (Swanson & Howard, 2005); that "learning potential" provides a unique contribution to the prediction of future math performance beyond that of information gained through standardized cognitive and achievement tests (Fuchs et al., 2008); and that DA (using a decoding task) as a second tier screener for reading intervention, following measures of

phonemic decoding efficiency, was more effective in reducing the number of students falsely identified as "at risk" than running records and measures of oral reading fluency (Compton et al. 2010).

DA and RTI: A Model of Change

The rise of Response to Intervention (RTI) over the past decade has been changing the roles that many school psychologists serve. Up until recently, the prominent role of a school psychologist has been to determine eligibility for special education services and assist the Individualized Education Program (IEP) team in deciding on the most appropriate educational placement for eligible students. Increasingly, however, our role is to assess a child's functioning in order to inform the design and implementation of educational interventions. Tier I and Tier II (of a 3 Tier RTI Model) interventions target students' observable academic and behavioral difficulties. However, when a child fails to achieve anticipated progress in response to systematic academic and behavioral intervention, the educational team may need an assessment of the underlying cognitive processes in order to better understand and respond to the students' needs (Hale & Fiorello, 2004; Schmitt & Wodrich, 2008).

Traditional cognitive batteries have been criticized for their limited utility in connecting assessment results to individualized interventions. This is not surprising given that tests themselves were never designed for this purpose. DA, on the other hand, is. While traditional tests measure the skills that the student currently has, DA provides information about what the student is capable of achieving in the future if given the right intervention (Caffrey et al., 2008). In other words DA is used to assess the child's ability to change and move in new directions, and provides a road map (e.g. trial interventions) for how to get there. Since DA serves a different purpose, it is not intended to replace

standardized, norm referenced cognitive tests. Rather, DA is another tool that school psychologists may use in conducting assessment for the purpose of designing and monitoring intervention.

The value that DA adds to a school psychologist's repertoire, as a process approach linking assessment to intervention, is of particular importance give the increasing role that RTI is taking within the profession. In fact, the two are so similar to one another that Caffrey et al. (2008) suggest that since DA incorporates a teach-test-teach approach it may be appropriate to use it as an alternative to RTI. Further, Grigorenko (2009) speculated that DA and RTI may actually represent the same construct since there are so many overlapping characteristics between the two approaches. One of the primary overlapping facets is the fact that both DA and RTI are more focused on intervention services than diagnostic labels.

Numerous studies have demonstrated that providing mediated learning as an intervention alongside academic skills instruction enhances student achievement. Robinson-Zañartu and Campbell (2000) compared student achievement between 3rd grade students who received mediation infused science curriculum with similar students who received the standard district curriculum. The authors found that infusing science curriculum with the mediation of thinking and learning skills eliminated the gap between lower socio-economic second language learners and their higher socio-economic monolingual English-speaking peers. Similarly, Guterman (2002) found that students who were mediated cognitive functions involved in reading comprehension significantly outperformed controls with the greatest differences found on the most difficult and cognitively complex reading comprehension tasks. Lastly, Jensen (2003b) conducted a study examining the impact of his MindLadder program on student

achievement amongst upper elementary school students. He found that students in MindLadder classrooms, in which Knowledge Construction Functions (KCF) were mediated within the context of academic curriculum, outperformed control group students on statewide achievement tests and measures of cognitive ability.

How to Conduct Dynamic Assessment?

In order to begin using DA as part of their practice, a school psychologist must learn two essential features of DA. These two features include a) the general aim or goal of DA and b) the techniques used to reach that goal. The target of DA is the student's independent and efficient use of the cognitive functions (Feuerstein et al., 1979; Jensen, 2003a; Lidz, 19991), in other words thinking and learning skills, 15 of which are described below. Every student varies in terms of their use of these interconnected cognitive processes. Our goal is to elicit and document the child's spontaneous use of their cognitive strengths and provide intervention to enhance their use of currently inefficient skills in order to maximize success. This of course leads us to the second component of DA, the techniques. These techniques are referred to as Mediated Learning (Feuerstein et al., 1979; Jensen, 2003a; Lidz, 19991) and include 6 intervention strategies used by the school psychologist to enhance student cognitive functioning.

Cognitive Processes: Targets for Change

Now that we have established the spirit of DA and the reasons that DA adds value to the practice of school psychology, we can turn our attention to the components of DA beginning with cognitive functions involved in thinking and learning. As one sets out to develop knowledge and skill in DA, the first objective should be to familiarize oneself with the cognitive functions involved in learning and problem solving. These functions

differ in some ways from the psychological processes (e.g. auditory processing, visual processing, sensory-motor integration) typically associated with the diagnosis of learning disorders. While learning disorders are typically associated with "hard wired" characteristics (e.g. phonological processing), the cognitive functions targeted through DA are those that a student can learn to control and develop through meaningful instruction and practice. Since DA is a fluid and unscripted assessment technique, it is important that the assessor is familiar with the cognitive functions and how they apply both to the assessment task and other activities that the student participates in at school, in the home, and in their community. Attachment F of this resource guide provides some examples of academic tasks that involve the cognitive functions described below.

Despite the efforts of standardized test designers to isolate discrete cognitive skills, the fact remains that the higher level mental acts involved in learning and problem solving are the product of complex interactions between multiple cognitive functions (Feuerstein et al., 1979; Jensen, 2003a; Luria 1966, 1973; Vygotsky, 1934/1986, 1978). Our goal in DA, therefore, is not to isolate the factor or factors obstructing learning, but rather to identify the interrelated functions that, when acting in concert, support an optimal level of functioning for the individual child. These notions of synergy and change are why Feuerstein et al. (1979) referred to poorly developed functions, which are described below, as those that were not *spontaneously* utilized by the student or were applied in an *inefficient* manner requiring adult mediation. Feuerstein et al. proposed that weak cognitive skills do not reflect an innate inability, "but rather ineffective attitudes, faulty work habits, and inadequate modes of thinking – in other words, functions that can be trained to operate more adequately" (p. 70).

Feuerstein et al. (1979) suggested that thinking and problem solving skills should be analyzed across three different stages of a mental act including input (i.e. gathering information), elaboration (e.g. making information meaningful), and output phases (e.g. communication). Feuerstein was clear, however, in explaining that while artificial distinctions between these phases are beneficial for the purpose of identifying areas of strengths and weakness, the truth is that all mental acts are dynamic processes that involve the complex interconnection of various cognitive functions.

Feuerstein et al.'s (1979) model includes 27 different cognitive functions; however, there is no clear consensus as to the specific number or types of functions that can or should be assessed. For example, Jensen's (2003a) MindLadder program targets a total of 75 different Knowledge Construction Functions (KCF) including 45 cognitive functions, 10 motivational attributes, 10 personality characteristics, and 10 performance skills, all of which have been demonstrated to be sensitive to mediation. Lidz (1991) on the other hand outlined 10 thinking skills associated with successful learning. Most recently, Robinson-Zañartu, Doerr, and Portman (in review) present 21 thinking skills for the 21st century as part of their MiCosa Model for teaching cognitive functions within the core content standards. What is common about the cognitive skills identified by each of these researchers is that they are meaningful both in the school and home contexts and that they can be brought under one's direct control. Drawing on the work of Feuerstein, Jensen, Lidz, and Robinson-Zañartu, 15 "essential" cognitive skills are described below. By "essential," I am not implying that they are the most essential; merely that each of these skills has been identified by researchers in the field of DA to be important for learning and school performance. For additional information on these and other thinking and learning skills, readers are encouraged to review the resources provided in Attachment A of this text.

Understands Words and Concepts- Students must have a sufficient knowledge base and the accompanying verbal labels in order to comprehend incoming language based information.

Has a Clear Perception of Time – Successful students have a clear perception of time and are able to accurately sequence events.

Has a Clear Perception of Space – Students must have a clear perception of space and be able to maneuver images relative to their spatial orientation and relationships.

Gathers Information Systematically – Successful students gather information in a systematic, as opposed to a random trial and error, fashion.

Uses Multiple Sources of Information – Students must gather multiple pieces of information relevant to the problem and attend to them simultaneously.

Identifies and Defines the Problem – Successful learners and problem solvers accurately define the problem at hand and identify the most relevant pieces of information.

Develops and Follows Plans – Students must develop plans for approaching learning and problem solving, and sequence the steps necessary for achieving goals.

Stores and Retrieves Information – Successful students have the skills to encode information by making meaningful connections, and use strategies for evoking or retrieving that information at a later date.

Compares, Forms Relationships, and Organizes Information– Students must have the skills to compare, form relationships between pieces of information, and organize the information in meaningful ways.

Generates Hypotheses (if…then…) – Successful students consider hypothetical possibilities based on cause and effect relationships when solving problems.

Supports Conclusions with Logical Evidence – Students must support conclusions with logical evidence, often times by drawing inferences and insights from one's prior knowledge and experience.

Uses Words and Concepts to Explain Thinking – Successful students have an expressive vocabulary that frees them to effectively communicate their thinking.

Uses Precise and Accurate Communication – Students must perform tasks, as well as demonstrate their thinking, with precision and accuracy when it is important to do so.

Restrains Impulsive Behaviors – Successful student are able to restrain impulsive behaviors enabling them to reflect on the problem and direct other cognitive processes.

Attends to Outcomes and Adjusts Strategies as Needed – Students must monitor their actions, attend to and evaluate the outcomes, and make changes as needed.

As mentioned above, in order to conduct DA the school psychologist must familiarize themselves with these cognitive functions and understand their application to learning and problem solving. It is therefore important for school psychologists learning DA to begin analyzing tasks (e.g. cognitive tests, academic assignments, everyday activities) in terms of the underlying cognitive functions. As one does this, two things happen. First, the school psychologist begins to see how these functions are involved in every mental activity whether it's a task from a cognitive battery, reading a newspaper article, or finding their keys in the morning as they're are rushing out the door to work. Second, the school psychologist develops their clinical abilities to efficiently analyze the processes underlying student performance during assessment, whether they are administering cognitive tests, process analyzing an academic task, or observing student performance in the classroom.

When conducting DA, the school psychologist has a number of methods for assessing cognitive strengths and weaknesses. As you read each of these methods it is of course important to keep in mind that while they may generate working hypotheses, any conclusions must be triangulated with multiple sources of information (C. Robinson-Zañartu, personal communication, January 24, 2012). First, the school psychologist can infer the student's spontaneous or inefficient use of functions through observation. For example, the school psychologist observes the student's quick (and inaccurate) response style and can infer that they are failing to restrain impulsive responses and therefore neglecting to gather information systematically, establish a plan, generate hypotheses or support conclusions with logical evidence. The school psychologist may then follow up with open ended inquiries such as "explain to me how you solved this problem", "what

did you do that helped you remember the information?", or "how do you know you have the right answer?" in order to shed further light on the strategies that the student used to reach their conclusion.

And finally, the school psychologist can assess the student's cognitive strengths and weaknesses by recording their response to mediation, a concept that is described in detail below. For example, when a student presents as having a particular difficulty (e.g. considering two or more pieces of information) the school psychologist mediates this skill to the child and observes for changes in performance. If the child's performance improves in response to mediation then the school psychologist can infer that the student's inefficient use of this skill was in fact obstructing their performance. After all, the student's performance improved after they learned and began applying the new thinking skill. Further, the school psychologist now has insights in terms of the type of instruction (i.e. mediation) that lead to improved performance suggesting that a similar improvement may be expected if the mediation is provided across different types of tasks. This, of course, is now the launching point from which to develop interventions across settings designed to develop the student's use of thinking and learning skills. Attachment C provides an example of a DA interaction between an assessor and a student while testing the limits of a standardized matrices task. The interaction demonstrates some of the thinking and learning skills described above, as well as the mediation strategies introduced in the following section.

For additional information regarding the assessment of cognitive functions, readers are encouraged to visit the International Center for Cognition and Learning's website (2011). The website provides information for clinicians on the application of DA principles and techniques including resources, information on training, as well as the

MindLadder instruments which are designed to introduce and gradually develop the use of cognitive functions in students.

Mediated Learning: Making Change Happen

Alexander Luria (1966), the father of modern day neuropsychology and an avid proponent of process-oriented assessment, advocated for "experimental teaching" within the context of psychological assessment. Luria found that proving trial interventions within the context of psychological assessment allows the psychologist to move beyond the identification of cognitive deficits in order to assess the stability of the impairment as well as strategies that might assist the client in rehabilitation. DA is a form of "experimental teaching" used to gain insight into the types of interaction (i.e. mediation) between and adult and the student that enhances their use of thinking and learning skills (i.e. cognitive functions). Trial interventions, therefore, target the processing demands of the task (e.g. gathering information systematically, considering multiple pieces of information, supporting conclusions with logical evidence) to assist the student in elevating their level of performance. These interventions include the mediated learning approaches described in more detail below and can be replicated by parents and teachers in order to develop the student's cognitive skills across meaningful home-cultural and school contexts (Robinson-Zañartu & Aganza, 2000; Robinson- Zañartu & Campbell, 2007).

School psychologists can apply DA principles and techniques when working with students on any number of activities whether it is abstract cognitive tasks, academic objectives, or any other activity that involves the use of thinking skills. Feuerstein uses abstract tasks in his Learning Potential Assessment Devise (LPAD) and Instrumental Enrichment (IE) program since these tasks rely on raw cognitive strategies rather than

acquired skills. Lidz (2002), on the other hand, promotes the use of Curriculum-based Dynamic Assessment (CDA) and Jensen's MindLadder program utilizes a combination of the two. What is important is that the task is something that is relatively novel, in other words has not been automatized, so that child's conscious use of thinking skills can be elicited and mediated.

Mediated learning serves as the intervention or teaching provided within the context of DA. Mediated learning techniques guide the assessor as they explore hypotheses regarding the cognitive or affective functions that are obstructing optimal performance. While different models of mediated learning have been proposed, the 6 adult-student interactions described below are consistent with the models proposed by Feuerstein et al. (1979), Jensen (2003a), Lidz (1991), and Robinson-Zañartu et al. (in review). These researchers have found the following adult-child interactions to be powerful in promoting changes in students' thinking and learning skills. These interactions include the mediation of intentionality/reciprocity, mediation of a change mindset, mediation of meaning, mediation of transcendence, mediation of a feeling of competence, and mediation of self-regulation.

Mediation of Intentionality/Reciprocity – Intentionality on the part of the assessor refers to their explicit aim to engage the student in a way that brings about changes in their performance and maximizes success. This involves a higher level of affective involvement than is characteristic of traditional cognitive testing as the assessor must communicate, both verbally and non-verbally, that they care about the student and are invested in their success. Some examples are provided below:

- "Some of the problems today are difficult and you are going to have to think really hard to solve them. My job is to help you with the really difficult problems because I want you to be successful. I also want to teach you some skills that will

help you think about and solve other types of problems like the ones in your math class" (use examples that the child may be struggling with and, therefore, has an interest in improving);
- "When the problems get hard, I'm going to help you, because I want you to be successful. And if it's still hard after that, I'm going to help you some more, because I want you to be successful."

Mediation of a Change Mindset – The belief that human beings are capable of modifying their thinking and learning skills is the foundation upon which such cognitive modifiability occurs. Mediation of a change mindset involves communicating to the student that they are capable of success and that competence is something that one develops as opposed to a fixed characteristic that one is born with. The assessor makes the child aware of their growing proficiency by providing feedback about improved performance and their ability to learn and change as a result of their experience, hard work, and strategy use. Some examples are provided below.

- "People usually think one of two things about intelligence; either your smart or not and this never changes, or you can grow your intelligence. The truth is that when we think and learn we form new and stronger connections in our brain, just like an athlete builds their muscles when they exercise";
- "Wow, that's incredible. That problem you just solved stumps college students. You concentrated really hard and used the strategies we talked about. Your brain is probably working overtime right now making new connections."

Mediation of Meaning – Mediation of meaning is the act of making the student's experience important and memorable. The student's experience may not present as having any particular importance or value until the mediator infuses meaning into the situation. Vygotsky (1934/1986) advocated that it is critically important that individuals develop a conscious awareness of their own thinking processes. Therefore, the mediation of meaning should not focus on the specific task at hand but rather the thinking skills involved in the task that have value across a wider range of contexts.

- "That's fascinating how you solved that problem. Tell me how you did it… So you compared the pieces of information, found the relationship between them, and then put them in order. And that help you find the answer. Can I ask you a tough question? Tell me about another time that you used that same strategy and it helped you out?"
- "Tell me why you chose 'B' for your answer? (Student changes response). Ok. Tell me why you think it is "D" and not 'B'. …Oh I see. So you needed to consider multiple pieces of information when you solve this problem and the first time you only looked at one piece. That is a really important problem solving skill. I want to you think about multiple pieces of information on the next problem and let's see what happens."
- "I noticed that you solve the problems really quickly. Can I offer a suggestion? I'm curious to see what would happen if you stopped the impulse to choose an answer, and spent a little more time thinking about the problem. Sometimes it is helpful to solve problems quickly, but other times it's more important to take our time and make sure it's right. Can you try stopping that impulse and see if it makes a difference?…(Student solves problem correctly)…You're right. That's awesome. When you restrain your impulse to choose an answer, and spend more time thinking through the problem, you get it right. Let's try that again."

Mediation of Transcendence - Transcendence is the intentional bridging of concepts that the child is learning in the context of the assessment to other aspects of their lives, both past experiences and likely future events. In other words, the adult works with the child to illustrate the ways in which their newly developing skills "transcend" the current time and space. In doing so, the child forms connections between past, present, and future contexts, forming a foundation for the generalization of thinking skills. The assessor therefore works with the student to move from concrete examples to abstract concepts of thinking and learning skills, extracting generalizing principles that allow the student to explore hypothetical situations and cause and effect relationships.

- "Tell me about a time in the past when you were really systematic in searching for information (assuming that this term has already been introduced, defined, and practiced). How did it help you?"

- "Making a plan before you start solving tough problems has really helped you to be successful on these tasks. Thinking into the future, when else might it be important for you to come up with a plan before you start working?"
- "Let's see if making hypotheses helps when we are reading too. How about you take out your book so that we can do some reading together. But this time we are going stop every once in a while to make a hypothesis."

Mediation of a Feeling of Competence - Accompanying a feeling of competence is a willingness to take risks and an increased likelihood that the student will achieve mastery of the task that they have undertaken. In order to mediate competence, the assessor highlights successes for the students and makes explicit connections between the student's effort, use of cognitive functions, and successful outcomes. As the child successfully solves problems the assessor gradually increases the level of complexity, providing just enough scaffolding for the student to be successful while at the same time feeling a sense of accomplishment and mastery.

- "Wow that was incredible. That was a really tough problem. I can tell that you were working hard and using some great strategies. Tell me how you did it."
- "Wow, that's awesome. How does it feel to solve such difficult problems? Tell me about the strategies you used to solve this problem."
- "I'm really proud of how hard you worked with me today. Your improvement in solving these problems shows me that you learned a lot. Tell me about some of the things you learned today?"

Mediation of Self Regulation – While the goal is for the student to develop the skills to self regulate, the assessor may initially need to take a more active role in regulating the student's behavior by altering testing conditions (e.g. covering up distracting stimuli) so that the student can activate other cognitive functions. The assessor then facilitates the use of self regulation on the part of the learner by making explicit the connection between restraining impulsive behaviors and successful

outcomes, and challenging them to take increasing responsibility for their own behavioral (and metacognitive) regulation.

- "Sometimes it's really temping to come up with an answer quickly. When we give in to that temptation we leap to an answer without taking the time to look at all of the information. This time I want you to take your time to look, and even more importantly think, before you leap to an answer."
- "I'm going to cover the answers so you can't see them and have to use your brain to solve the problem. This time I want you to describe what the answer will look like."
- "Wow, when you look before you leap, and use your brain to really think about all the information, you can solve some really difficult problems. Let's see what happens when I uncover the answers. Remember to keep looking and using your brain before you choose an answer."

Conclusion

Dynamic Assessment (DA) is a broad term covering a wide range of assessment procedures, all of which include some form of a test-teach-test approach. The underlying assumption behind DA is that human cognitive functioning is an open and modifiable system, and the goal of DA is to identify areas of cognitive strength and weakness as well as mediation strategies that enhance student functioning. The value that DA adds to a school psychologist's repertoire, as a process-oriented approach linking assessment to intervention, is of particular importance give the increasing role that Response to Intervention (RTI) is taking within the profession. A deep void exists between traditional psychometric tests and the development of meaningful educational intervention, and DA bridges that gap.

A school psychologist may incorporate DA tools and techniques at tiers II and III of an RTI model using abstract cognitive tasks, curriculum based activities, or simply while testing the limits of psychometric measures. However, in order to begin incorporating DA into their practice, a school psychologist must first become familiar

with the cognitive functions underlying student learning and problem solving, and develop skills in the area of mediated learning. Attachment A of this introductory resource guide provides a list of resources that interested school psychologists are encouraged to read.

Attachment B is a list of "15 Cognitive Functions" divided across the information gathering, meaning making, and communication phases of the thinking and learning process. As a school psychologist develops their DA skills, they may wish to use this tool during the assessment process in order to guide them in gathering and interpreting qualitative aspects of the student's performance.

Attachment C is a sample DA interaction between the assessor and the student. The interaction is based on an assessor using DA techniques to test the limits of a student's performance on a standardized matrices task. One of the potential benefits of testing the limits following standardized administration of a test is that you have a quantifiable pre and post measure. Of course the amount of investment and types of mediation required to bring about the change is still qualitative. The other advantage of using DA to test the limits is that yields additional information about the student's thinking and learning skills without adding substantial time to the assessment process.

In addition, attachments D and E include a "DA Clinical Observation Form" and an "MLE Rating Scale". The DA Clinical Observation Form is intended to be used in the course of an assessment to guide the school psychologist's thinking as they record essential information related to the cognitive functions targeted for trial intervention as well as the meditational strategies used and their outcomes. The MLE Rating Scale, on the other hand, may be used for self reflection following a DA session, as an observation form for trainees working in dyads or small groups, or as an observation form for school

psychologists observing interactions between a student and their teacher or parent. The MLE Rating Scale is based on a similar scale developed by Carol Lidz (1991); however, the form included in Attachment E of this resource guide has been adapted to reflect the 6 mediating interactions described in section titled "Mediated Learning: Making Change Happen".

As with any assessment, it is critical that a school psychologist support each conclusion with data from multiple informants across multiple contexts. Therefore, in addition to the assessment and observation forms describe above, the Attachment F of this resource guide is a teacher rating scale that targets 15 thinking and learning skills (i.e. cognitive functions) in order to gather information regarding the student's use of thinking skills in daily learning activities. Further, to provide context for the application of the 15 cognitive functions to English Language Arts and Mathematics, Attachment G includes examples of each of the thinking skills as they apply to classroom learning. The examples are based largely on Common Core Standards for 4th, 7th, and/or 10th grade in order to demonstrate the application of DA and Mediated Learning to 21st Century classrooms. Again, school psychologists are encouraged to read *Teaching 21 Thinking Skills for the 21st Century: The MiCosa Model* (Robinson-Zañartu et al., in review) for an in depth understanding of the application of thinking skills and mediated learning in the classroom setting.

And lastly, Attachment H is an excerpt from an assessment report in which DA was incorporated. The assessment was conducted with a ninth grade student who had been identified as having significant learning disabilities as well as an emotional disturbance. While he had historically performed very poorly on standardized tests, making it difficult to identify strengths and avenues for intervention, through DA he

demonstrated many intact learning skills and a high degree of modifiability. Furthermore, the assessment provided a hopeful picture and resulted in some strategies that lead to improve performance.

It seems appropriate to end this resource guide by repeating Carl Haywood's quote regarding the use of DA. Haywood (as cited in Elliott, 2003) stated "There should be scant satisfaction in knowing that our tests have accurately predicted that a particular child will fail in school. There are many sources of such predictor information. What we need are instruments and approaches that can tell us *how to defeat those very predictions"* (p. 22). DA is one such approach. I am convinced that by exploring the cognitive processes by which a student solves problems, trialing interventions aimed at enhancing a student's cognitive functioning, and working with parents and teachers to extend these interventions into the student's home and classroom, we as school psychologists can fulfill our new role as both assessor and interventionist, and lay the groundwork for future student success.

Attachment A:

Dynamic Assessment Resources

Recommended Books:

Haywood, H. C., & Lidz, C. S. (2007). *Dynamic assessment in practice: Clinical and educational applications*. New York, NY: Cambridge University Press.

Jensen, M. (2009). The mind's ladder: Dynamic assessment guidebook 2.0. Roswell Georgia. Cognitive Education Systems.

Lidz, C. S. (1991). *Practitioner's guide to dynamic assessment*. New York, NY. The Guilford Press.

Mentis, M., Dunn-Bernstein, M., & Mentis, M. (2008). Mediated learning: Teaching, tasks, and tools to unlock cognitive potential (2nd Ed). Thousand Oaks, CA. Corwin Press.

Robinson-Zañartu, C., Doerr, P., & Portman, J. (in review). *Teaching 21 Thinking Skills for the 21st Century: The MiCosa Model*. (Under contract with) Pearson/Allyn Bacon.

Recommended Websites:

www.dynamicassessment.com: The Dynamic Assessment Website is designed for those using and researching DA principles and techniques. The website offers resources for learning DA procedures, training opportunities, and a long list of dynamic assessment books and articles.

www.mindladder.com: The International Center for Cognition and Learning (ICCL) website offers a wealth of information for educators and clinicians interested in Dynamic Assessment and/or Mediated Learning. The website offers information regarding valuable resources, trainings, and MindLadder program materials including a secure internet accessed "LearningGuide" that provides a color-coded map of students functions which can serve as a lead-in to DA. An electronic advisor built into the application also provides teachers with resources for developing functions in the classroom.

Attachment B

15 COGNITIVE FUNCTIONS

GATHERING INFORMATION	PROCESSING INFORMATION	COMMUNICATING INFORMATION
– Understand words and concepts – Have a clear perception of time – Have a clear perception of space – Gather information systematically – Use multiple sources of information	– Identify and define the problem – Develop and follow a plan – Store and retrieve information from memory – Compare, form relationships, and categorize information – Generate hypotheses (if…then…) – Support conclusions with logical evidence	– Use words and concepts to explain thinking – Use precise and accurate communication – Restrain impulsive responses and/or actions – Monitor progress, evaluate outcomes, make changes as needed

Attachment C

Sample Dynamic Assessment Interaction

The following is an example of a Dynamic Assessment interaction while testing the limits of a student's performance on a matrices task. One of the potential benefits of testing the limits following standardized administration of a test is that you have a quantifiable pre and post measure. Of course the amount of investment and types of mediation required to bring about the change is still qualitative. As you read through the example note that the mediating interactions are focused on thinking skills rather than the task itself. Focusing on the skills rather than the task allows the assessor to begin bridging to more relevant academic tasks towards the end of the exchange. This bridging is the beginning of building a sense of transcendence, that thinking skills transcend beyond the task in front of student and apply to tasks that they engage in both in and out of school.

	Interaction	**Cognitive Function(s)**	**Mediating Interaction**
Assessor	"I'm going to stop taking score now and I want to talk about how you solved these problems. If the problem is hard, I'm going to help you out, because I want you to be successful. And if it's still hard, I'm going to help you more, because I want you to be successful. And if it's still hard after that, what do you think I'm going to do?"		Mediating Intentionality (More can be done, however, to make the student aware of the assessors intention to develop new thinking skills)
Student	"Help me."		
Assessor	"Why?"		
Student	"Because you want me to be successful" (Often times a student will say, "skip it" or "move on" suggesting that intentionality/ reciprocity has not been established [also suggests an external locus of control]. In such cases additional effort needs to be made to establish one's goal to help the student be		Reciprocity

	successful by learning new thinking skills.)		
Assessor	Let's take a look at this one here (turn back to the first item that the student missed). You said the answer was "D". Tell me how you came up with the answer.		
Student	(student pauses for a moment) "Oh, it's not "D" it's "B".		
Assessor	"Well, before you said it was "D" and now you're saying it's "B". Are you willing to bet me $100? (wait for answer) Tell me why you **know** you have the right this time?"		Trying to elicit use of logical evidence to support conclusion.
Student	"Before I was just looking at the shape and I didn't notice the color. This time I looked at both"	Multiple Sources of Information	
Assessor	"Oh, I see now. So you noticed that it is really important to pay attention to more than one piece of information at a time when you're solving these problems. That's a really important skill. You know what you also did this time? You supported your answer with logical evidence. You didn't just give me the answer but you told me **why** it's the answer. I wonder if that will help you out on the next one too. (Turning the page) Take a look at this one."		Mediating Meaning (multiple sources of information) Mediation of Meaning (support conclusion with logical evidence) (Beginning to bridge to the next task. This is not Mediation of Transcendence yet, but moving in that direction)

Student	"The answer to this one is C" (correct response)	The students thoughtful response style illustrates her ability to restrain impulsive behavior	
Assessor	"Ok, but tell me how you did it"		
Student	"Well when you look here (pointing to the first column of the matrix) there is a pattern going down. Triangle, square, circle. And the color changes"	Again, demonstrating use of multiple sources of information (near transfer). Identifying the pattern illustrates spontaneous comparisons, forming relationships, and categorizing. Used logical evidence to support conclusions (near transfer)	
Assessor	Your right. When you make sure your paying attention to multiple sources of information, and use logical evidence, you are able to solve these problems really well. You're doing a lot better than the first time you tried them. Would you like to do some more?"		Again Mediating Meaning (multiple sources and logical evidence) Mediating a Feeling of Competence
Student	"Sure" (student was previously hesitant to participate in standardized testing and was asking when we would be		Again, showing reciprocity w/ the assessor

	finished)		
Assessor	(The student went on to solve a number of problems that she previously had difficulty with) Wow. You did a great job with these problems. Can I tell you something I noticed? The first time through, you were choosing your answers based on the first piece of information you got. But the second time you paid attention to all the information in front of you and you, and you were able to solve really difficult problems. Your effort and use of thinking skills really pays off. These problems stump adults. I want you to think about other times when it is important to think about more than one piece of information and to use logical evidence when you are learning or solving problems at school. Take some time to think about it and tell me what you come up with.		More Mediation of Meaning Hinting at Mediation of a Change Mindset (more should be done to emphasize one's ability to change and connections can be drawn to students change in performance on this task) Mediation of a feeling of Competence Beginning to Mediate Transcendence (far transfer)
Student	(Student takes some time to think about it). "I guess it's important in math"	Beginning go demonstrate a sense of transcendence.	
Assessor	That's interesting. Do you have some of your math work? I want you to show me what you mean.		Continuing to build a sense of transcendence

Attachment D
DA Observation Form

Name: **Date:**

Tool(s):

Initial Hypotheses:

MEDIATION/ TRIAL INTERVENTION	CLINICAL OBSERVATIONS/NOTES
Establish Intentionality and Reciprocity	**How is I/R established?** *(e.g. when things get hard, I'm going to help you, because I want you to be successful)* **How does student respond?** *Fixed mind set (e.g. "skip it and go to the next one")? Or growth mind set (e.g. :help me some more")*
Mediate a Change Mindset	**How is a Change Mindset mediated to the student?** *(provide any examples/analogies given)* **How does the student respond?** *(Is the student engaged? Do they name other areas of their life where they demonstrated improvement/ mastery? Do they show increased effort?)*
Mediate Meaning of New Thinking Skill(s)	**What thinking skill(s) is mediated?** (*e.g. student does not demonstrate spontaneously)*

	S1: **S2:** **S3:**
Mediation of Meaning Continued	**What is the meaning and value of the thinking skill(s)?** *(as mediated)* **S1:** **S2:** **S3:** **Is the student able to communicate the meaning and value of new skill?** (provide example of student statement) **S1:** **S2:** **S3:**

	How does the student's performance change after mediation? **S1:** **S2:** **S3:**
Mediate a Sense of Competence	**How is competence mediated to the student?** *(e.g. process-oriented praise)* **How does student respond? How does student's performance change?**

Mediate Transcendence of Thinking Skills	**How is skill bridged to similar tasks?** (e.g. near transfer). **Does the student demonstrate near transfer spontaneously or is additional mediation required?** *(Meaning? Competence?)* **How is skill bridged to different tasks?** (e.g. far transfer). **Does the student demonstrate far transfer spontaneously or is additional mediation required?** *(Meaning? Competence?)*
Mediate Self Regulation	**What external regulatory strategies are needed initially?** *(e.g. covering up response choices, verbal prompts to slow down, etc.)* **How is the importance of self regulation mediated?** *(e.g. mediation of meaning, analogies, connections to past experiences, etc.)* **What changes are observed in the student's performance?**

Attachment E

MLE Rating Scale

Student: **Date:**

Mediator: **Observer/Rater:**

Task(s):

Mediation of Intentionality/Reciprocity **-** The mediator explicitly engages with the child in a way that brings about changes in their functioning and maximizes success. This involves a higher level of affective involvement than is characteristic of traditional cognitive testing as the mediator must communicate, both verbally and nonverbally, that they care about the child and are invested in their success. The child is also made aware of the fact that the mediators objective is to develop in her new ways of thinking and solving problems in general, not simply to meet the immediate demands of an isolated task.

0 = No evidence

1 = Inconsistently present

2 = Consistent evidence verbal *or* affective intentionality to maximize success

3 = Consistent evidence verbal *and* affective intentionality to maximize success through use of thinking skills

Examples:

Mediation of a change mindset **-** The mediator communicates to the child that she is capable of success and that competence is something that one develops as opposed to a stable characteristic that one is born with. The mediator makes the child aware of their growing proficiency by providing feedback about improved performance and their ability to learn and change as a result of their experience, hard work, and strategy use.

0 = No evidence

1 = Discusses possibility of change in a general sense

2 = Discusses possibility of change including examples from student performance

3 = Discusses change with examples of student performance, hard work, and use of thinking skills.

Examples:

Mediation of Meaning **-** The mediator makes the child's experiences both important and memorable. A child's experience may not present as having any particular importance or value until a mediator infuses meaning into the activity. The mediator makes highlights important components of the activity and gives purpose to the child's thoughts and behaviors. The mediation of meaning should move beyond content specific skills to include the underlying cognitive functions that have value beyond the task at hand. Making these functions meaningful to the child involves comparing and contrasting concepts and experiences, identifying relationships, and extracting generalizing principles.

0 = No evidence

1 = Gives labels to intact thinking skills and highlights students use without much elaboration

2 = Gives labels, introduces new thinking skills, highlights use and importance of skills to current task

3 = Gives labels, introduces new skills, highlights use of skills, infuses meaning/importance beyond the task at hand (i.e. generalizing principle)

Examples:

Transcendence **-** The mediator bridges concepts that the child is currently learning to other aspects of their lives, both past experiences and likely future events. In doing so, the child forms connections between past, present, and future, forming a foundation for the generalization of skills across contexts. The mediator mediates transcendence by directing the child's attention toward their use of thinking and learning skills as opposed to the particular task at hand. The mediator therefore works with the child to move from concrete examples to abstract concepts, extracting generalizing principles that allow the child to explore hypothetical situation and cause and effect relationships.

0 = No evidence

1 = Simple, non-elaborated reference to a past or future experience

2 = Provides an elaborate reference to a past *or* future use of thinking skills

3 = Elicits elaborated reference of past or future experience from the student including cause and effect relationship between students use of particular skills and the outcomes of their experience.

Examples:

Mediation of Competence - The mediator instills in the child a sense of competence by highlighting successes and making an explicit connection between the student's efforts and their achievements. The mediator controls the learning conditions to create an appropriate level of challenge, requiring hard work, while allowing the child experience success. As the child successfully solves problems the mediator gradually adjusts the level of complexity, providing just enough scaffolding for the child to be successful while feeling a sense of accomplishment and mastery. Further, the mediator provides praise and encouragement through feedback not only about the child's success on particular tasks but also by highlighting specific strategies that lead to successful outcomes. As appropriate, the mediator pulls back, allowing the child space to take on challenges independently.

0 = No evidence

1 = Provides occasional verbal and/or non-verbal praise/ encouragement

2 = Provides frequent verbal and non-verbal praise and encouragement

3 = Provides frequent verbal and non-verbal praise and encouragement specifically highlighting the students use of particular thinking and learning skills that enhance performance.

Examples:

Self Regulation- Initially, the mediator may need to assist the child in regulating impulsive behavior by providing prompts or restricting the amount of information that the student is presented with at time (e.g. covering up distracting stimuli). The mediator then promotes self regulation by making explicit the connection between restraining impulsive behaviors and successful problem solving. The mediator challenges the child to take increasing responsibility for their own behavioral regulation and highlights their successes in order to foster their sense of competence. As such, students learn to regulate their behavior, reflect on their own thought processes, and expand their repertoire of thinking skills.

0 = No evidence

1 = Provides simple directions

2 = Elaborates on directions and reorganizes task (e.g. cover up response choices) to meet students needs

3 = Encourages student to use their own mind to organize task (e.g. uncover response choices and encourage self regulation) and engage in self regulated learning and problem solving.

Examples:

Attachment F

THINKING SKILLS QUESTIONNAIRE

Student Name: **Teacher Name:**

Class Subject: **How long have you known this student?**

Directions: Consider the student in relation to the typical or "average" student in your class(es) and rate them (*your best estimate)* by circling one response for each item. Response choices range from 1 through 5 based on the scale below:

1 = Well below average; 2 = Below average; 3 = Average; 4 = Above Average; 5 = Well above average

If you are unable to provide an *estimate* of the student's skill(s) relative to their peers, please leave the item blank.

Numbers 1 thru 5 relate to the way in which the student GATHERS information.					
1. Has sufficient knowledge of the words and concepts needed to access the curriculum.	1	2	3	4	5
2. Has a clear perception of time and accurately sequences information	1	2	3	4	5
3. Has a clear perception of space and spatial relationships.	1	2	3	4	5
4. Gathers information in a systematic, as opposed to random trial and error, fashion.	1	2	3	4	5
5. Utilizes multiple pieces (or sources) of information and can attend to them simultaneously.	1	2	3	4	5
Numbers 6 thru 11 relate to the way that the student MAKES MEANING of information.					
6. Accurately recognizes and defines the problem at hand.	1	2	3	4	5
7. Utilizes effecting planning strategies.	1	2	3	4	5
8. Uses effective strategies for memorizing and recalling information.	1	2	3	4	5
9. Compares, forms relationships, and organizes information in meaningful ways.	1	2	3	4	5

10. Considers hypothetical (if…then…) possibilities when solving problems (e.g. flexibility).	1	2	3	4	5
11. Supports conclusions with logical evidence.	1	2	3	4	5
Numbers 12 thru 15 relate to the way that the student <u>COMMUNICATES</u> information (spoken and written [including both words and numbers]).					
12. Demonstrates sufficient language skills in order to clearly communicate ideas.	1	2	3	4	5
13. Performs tasks with precision and accuracy.	1	2	3	4	5
14. Restrains impulsive responses and/or actions	1	2	3	4	5
15. Monitors progress towards goals, evaluates results, and makes changes as needed.	1	2	3	4	5
Numbers 16 thru 20 relate to non-intellective factors.					
16. Perceives self as capable of learning material/completing assignments.	1	2	3	4	5
17. Presents as motivated to achieve academically.	1	2	3	4	5
18. Appears comfortable taking chances and sees mistakes as learning opportunities.	1	2	3	4	5
19. Asks questions when needed.	1	2	3	4	5
20. Collaborates effectively with others.	1	2	3	4	5

What are her/his greatest strengths in your class?

What are her/his greatest challenges in your class?

Attachment G
15 Cognitive Functions in 21st Century Classrooms

The following are examples of the 15 cognitive functions (i.e. thinking and learning skills) applied to English Language Arts and Mathematics at the upper elementary, middle school, and high school levels. This is not an exhaustive list, but merely some examples of how these skills apply to the academic achievement. Many of the examples are pulled from the Common Core Standards for grades 4, 7, and 10 in order to demonstrate the application of DA and Mediated Learning to 21st Century Classrooms.

Understands Words and Concepts- Students must have a sufficient knowledge base and the accompanying verbal labels in order to comprehend incoming language based information.

- *English Language Arts:* The student determines the meaning of words and phrases, including domain specific words and phrases, as they read age and grade appropriate text.
- *Mathematics:* The student understands mathematical terms and concepts in both verbal and symbolic forms appropriate to their age and grade level.

Has a Clear Perception of Time – Successful students have a clear perception of time and are able to accurately sequence events.

- *English Language Arts:* The student in upper elementary grades estimates the time required to complete tasks, describes the chronology of events, and sequences events in narratives. In middle and high school the student increasingly analyzes the development of a theme or central ideas over the course of text and uses transition words to convey sequences and signal shifts from one time to another.
- *Mathematics:* In addition to estimating the time needed to complete tasks, the student consistently recalls the sequence of steps needed to solve multiple step equations and word problems appropriate for their age and grade level.

Has a Clear Perception of Space – Students must have a clear perception of space and be able to maneuver images relative to their spatial orientation and relationships.

- *English Language Arts:* The student uses spatial words and phrases to describe experiences and events, and creates accurate visual images of events described in text. As they progress through middle and high school the student understands the development of a setting within the text including the proximal relationships between people and places. They use spatial concepts to convey experiences and events and use transition words to signal shifts from one setting or location to another.
- *Mathematics:* In the upper elementary grades the student understands the relative size of measurement units. In middle school and high school the student understands that the distances between two rational numbers is the absolute value of the difference, are able to describe how two or more geometric forms are related in space, and solve increasingly complex mathematical problems appropriate for their age and grade level.

Gathers Information Systematically – Successful students gather information in a systematic, as opposed to a random trial and error, fashion.

- *English Language Arts:* When looking for information in text, the student does so in a systematic fashion, surveying titles, headings, and reference pages.
- *Mathematics:* In the upper elementary grades the student carefully attends to symbols and signs, systematically follows the sequence of steps when calculating long division problems, and accurately gathers and interprets data from graphs and charts. As the student progresses through school they apply this systematic approach to increasingly complex problems.

Uses Multiple Sources of Information – Students must gather multiple pieces of information relevant to the problem and attend to them simultaneously.

- *English Language Arts:* The student integrates information from two or more sources, develops topics with facts, definitions, details, quotes, and other information related to the topic. As they progress through middle and high school they cite several pieces of evidence to support their analysis of text and gather relevant information from multiple sources when composing a written product.
- *Mathematics:* The student attends to multiple variables when solving math problems such as identifying the least common denominator in order to compare two fractions. As they progress through school they demonstrate this skill with increasingly complex problems and use strategies (e.g. written notations) to manage necessary information.

Identifies and Defines the Problem – Successful learners and problem solvers accurately define the problem at hand and identify the most relevant pieces of information.

- *English Language Arts*: The student understands assignments, selects relevant topics, and identifies sources from which to draw information.
- *Mathematics*: The student de-contextualizes word problems and creates an abstract situation that can be represented symbolically appropriate for their age and grade. As the student progresses through school they recognize the type of equations they are solving and apply the correct operations.

Develops and Follows Plans – Students must develop plans for approaching learning and problem solving, and sequence the steps necessary for achieving goals.

- *English Language Arts:* The student develops plans when approaching writing assignments, presentation or other long term tasks. They understand the purpose of the task, identifies their audience, and develops a well organized product.
- *Mathematics*: The student analyzes multiple step problems and breaks them down into their component parts.

Stores and Retrieves Information – Successful students have the skills to encode information by making meaningful connections, and use strategies for evoking or retrieving information at a later date.

- *English Language Arts*: The student recalls specific details from the text to describe characters, settings, and events. They demonstrate their ability to store and recall information on tests and quizzes as well as when presenting information on a given topic.
- *Mathematics*: The student has memorized and can efficiently recall multiplication facts. In middle and high school they not only efficiently recall math facts but also key terms, principles, formulas and steps for calculating solutions.

Compares, Forms Relationships, and Organizes Information – Students must have the skills to compare, form relationships between pieces of information, and organize the information in meaningful ways.

- *English Language Arts*: The student describes the overall structure of events, ideas, and concepts. They create an organizational structure and group related ideas in writing, and use transition words to connect ideas. As the student develops their skills in this area they analyze how the author develops and contrasts the points of view of different characters or narrators in the text. They compare and contrast the portrayal of time, place, and characters and the historical account of the same period. They also produce well organized written products with clear relationships and reasoning behind their claims.
- *Mathematics:* In the upper elementary grades the student generates number patterns and compares fractions using =, <, and > symbols. In middle school the student solves problems based on scale drawings of geometric forms and determines whether quantities have proportional relationships. In high school they recognize and makes use of patterns and structure, make sense of quantities and their relationships to the problem at hand, and recognize and use counterexamples to a given problems.

Generates Hypotheses (if…then…) – Successful students consider hypothetical possibilities based on cause and effect relationships when solving problems.

- *English Language Arts:* The student analyzes multiple perspectives or points of view depicted in text, draws inferences from prior knowledge, makes predictions about what might happen next, and considers different interpretations.
- *Mathematics:* The student considers similar problems and attempts to solve simpler versions of the original problem in order to gain insight to its solution. In middle school the student rewrites expressions in different forms to shed light on problems and relationships between quantities, and in high school they flexibly use different properties of operations or objects.

Supports Conclusion with Logical Evidence – Students must support conclusions with logical evidence, often times by drawing inferences and insights from one's prior knowledge and experience.

- *English Language Arts*: The student explains how the main idea is supported by key details, summarizes text, explains the author's use of reason or evidence to support a point of view, and supports ideas with facts and details in written responses. In middle and high school the student analyzes an argument or

specific claim made in the text and evaluates whether the evidence is relevant and the reasoning is valid.
- *Mathematics*: The student shows their work to justify their conclusions and distinguishes between correct and flowed logic or reasoning. They also assess the reasonableness of answers using estimation and show work to justify conclusions.

Uses Words and Concepts to Explain Thinking – Successful students have an expressive vocabulary that frees them to effectively communicate their thinking.

- *English Language Arts:* The student uses words and phrases that clearly express their ideas both verbally and in writing.
- *Mathematics*: The student uses language to explain mathematical concepts and procedures.

Uses Precise and Accurate Communication – Students must perform tasks, as well as demonstrate their thinking, with precision and accuracy when it is important to do so.

- *English Language Arts*: The student accurately describes information from the text and uses precise language when expressing ideas both verbally and in writing.
- *Mathematics*: The student communicates precisely, both verbally and when showing their work on paper. They calculate problems accurately, specify units of measurement, and labels graphs.

Restrains Impulsive Behaviors – Successful student are able to restrain impulsive behaviors enabling them to reflect on the problem and direct other cognitive processes.

- *English Language Arts*: The student sustains attention during silent reading and class lessons, and writes over an extended period of time while maintaining focus on the purpose of the task.
- *Mathematics*: The student thoughtfully plans approaches for solving problems rather than jumping into a solution attempt and carefully attends to signs and unit labels when solving problems.

Attends to Outcomes and Adjusts Strategies as Needed – Students must monitor their actions, attend to and evaluate the outcomes, and make changes as needed.

- *English Language Arts*: The student develops and strengthens papers and presentations through a process of editing and revising their work, maintains focus on the purpose of the task and target audience, and changes their approach as needed.
- *Mathematics*: The student actively monitors and evaluates progress over the course of the problem solving process and changes course as needed. They also check answers to problems using different methods/opposite operations.

Attachment H

Sample Dynamic Assessment Report

The following is an excerpt from a report incorporating dynamic assessment. As a background, this is from a triennial review for a student who qualified for special education services due to a learning disability (auditory and visual processing deficits) impacting reading, written language, and mathematics as well as an emotional disturbance. When administered standardized cognitive tests he performed the low average to below average range on all tests administered consistent with previous evaluations. The student generally found school to be overwhelming and it was difficult to engage him in learning. He was polite with teachers, which was a recent change, but refused to do homework even when offered help afterschool. The section of the report is titled *Response to Mediation* and the assessment tools used are from Mogens Jensen's MindLadder dynamic assessment kit. As you will read below, the student possessed many of the input (gathering information systematically) and output (being precise and accurate) functions, but had difficulty with comparing, forming relationships, and categorizing information. He also lacked a feeling of competence. However, he responded wonderfully to mediation. Consequently, the recommended interventions focused on building a change mindset, developing a sense of competence, and instruction that focused on conceptual understanding rather than following rote procedures since he wasn't making the connections independently.

RESPONSE TO MEDIATION

Student was presented with three separate dynamic assessment tasks (Complex Figure Drawing, Matrices, and Templates) in order to assess a number of cognitive functions related to learning and problem solving (described below). Beyond simply assessing these skills, when Student's performance was obstructed by cognitive weaknesses, these skills were mediated or taught to him in order to determine how readily he acquired and applied these skills to future problem solving tasks.

Complex Figure Drawing:

On the first dynamic assessment/mediated learning task (Complex Figure Drawing), Student was shown a model figure constructed primarily of straight lines. He was first asked to copy the figure while having the model in front of him and then asked to reproduce the figure from memory. This type of task is traditionally reported to be a measure of visual perceptual organization; however, as with the other tasks described below, successful performance is supported by numerous underlying cognitive functions that one can learn and develop through mediation and practice. Consequently, a learning phase then followed in which Student was taught the thinking strategies (i.e. cognitive functions) that might help him with this and other learning and problem solving tasks. After Student was taught these strategies, the copy and memory phases of the task were repeated.

During the initial copy and memory phases of the task, Student demonstrated cognitive strengths in terms of approaching the task in a strategic manner (working from the outside in), being precise and accurate in his representation, and comparing his work to

the model figure. However, he did not recognize the organizational structure of the figure or the interrelated connections between the parts. These cognitive skills support memory and learning, and on his first attempt to reproduce the figure from memory, Student recalled 10 of the 18 parts of the figure. However, *after minimal mediation, or teaching, regarding the importance looking for the organizing structure or relationships between pieces of information (in this case the complex figure), Student's performance improved tremendously as he accurately recalled 17 of the 18 parts from memory and reproduced the image with near perfect precision and accuracy*.

Matrices:

The following week, Student was administered a dynamic version of a non-verbal reasoning task (Matrices), allowing for interactions between him and the examiner. Student intuitively approached tasks in a systematic manner, gathered multiple sources of information (color, shape, size, direction, quantity, and spatial location), and used comparative behavior in order to identify patterns and relationships between various images [Note: this last skill is one that he had difficulty with the previous week]. Student completed the first 10 tasks independently; however, on the 11th item, which required a more cognitively complex transformation, Student's performance stalled. At this point, *Student was praised for his success on all of the items up until this point in order to affirm his sense of competence, and he was encouraged to use the thinking skills that he had been using up until this point including systematically gathering information, using labels to describe his thinking, looking at multiple sources of information, and comparing images to identify patterns and relationships*. Initially, this was difficult for Student as he perseverated on his initial incorrect response. However, *by encouraging him to use his thinking skills he was able to reach a correct response and then move on to increasingly difficult items solving them independently*.

Templates:

On the final dynamic assessment task (Templates), Student was presented with 25 single dimensional 'templates'. Seven of the 'templates' were solid color (e.g. green) squares, and the other 18 'templates' were colored frames with geometric shapes (e.g. hexagon) 'cut' from the center. The objective of the task was for Student to mentally construct various 'kaleidoscope like' images, made up of different colors and shapes, by placing one stencil on top of another in his mind's eye. The images that Student was asked to construct increased in complexity from one to the next, and *he progressed through many of the items without requiring any mediation on the part of the examiner. In fact, he was able to construct images made up of 4 stencils without any type of support, suggesting that many of the required cognitive functions were intact for this type of task*. The only point at which Student exhibited difficulty was on items that required him to visualize overlapping pairs of 'templates' that shared the same color, making the distinction between the two more difficult to perceive. Consequently, *the examiner mediated cognitive functions including comparing and contrasting, attention to outcomes, and use of logical evidence. Student was receptive to this mediation and went on to solve problems up to 6 stencils. In addition, Student felt a sense of accomplishment in his success which increased his engagement in the task. In fact, he stayed after school to solve new problems even though he had the option to leave.*

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APPENDIX B

Expert Review Cover Letter

DATE

Dear Prospective Participant,

First, I want to thank you for participating in my dissertation project. My research has been in the area of Dynamic Assessment and Mediated Learning, and despite the great promise of these methods only a fraction of school psychologists are familiar with DA and even fewer use these tools/techniques in their practice. In response to this problem I have been developing a "user friendly" handbook for school psychologists introducing DA as a set of practical and value added tools and techniques that begin with a change in the way we view students and the process of learning. Ultimately, I will be field testing the handbook with practicing school psychologists to assess the accessibility and usefulness of the tool; however, I first want to ensure that the content of the handbook is consistent with current knowledge in the area of DA as determined by experts in the field.

DIRECTIONS: Included in this packet are an Informed Consent Agreement, a copy of the handbook (*The What, Why, and How of Dynamic Assessment*), an Expert Review Questionnaire, and a stamped/addressed return envelope. Please read the Informed Consent Agreement and sign if you wish to participation in this project. Then, read *The What, Why, and How of Dynamic Assessment* and complete the Expert Review Questionnaire. I will be using this information to revise the handbook prior to completing field testing with practicing school psychologists. Once you have finished, please return the signed Informed Consent Agreement and the completed Expert Review Questionnaire using the stamped addressed envelope provided in this packet. The draft of *The What, Why, and How of Dynamic Asssessment* is yours to keep.

Thank you for your participation. I greatly appreciate it. If you have any questions or concerns regarding your participation in this project, please feel free to email or call me.

_____

James Bylund
[redacted]
San Diego, CA 92108

APPENDIX C

Expert Review Consent Form

Alliant International University, San Diego

10455 Pomerado Road
San Diego, CA 92131-1790
(858) 635-4772

Informed Consent Agreement

The What, Why, and How of Dynamic Assessment: A Handbook for School Psychologists

Your participation is being requested as part of a doctoral dissertation study. Before you consent to participate, please read the following and, if needed, ask James Bylund any questions you may have in order to ensure you fully understand your involvement in this study.

PRINCIPAL INVESTIGATOR: James Bylund, Educational Psychology, Doctoral Candidate at Alliant International University (AIU), San Diego.

PURPOSE OF THE STUDY: The study is part of a doctoral research project being conducted by James Bylund at AIU under the direction of William Brock, Ph.D and Steven Fisher, Psy.D. The purpose of the study is to develop a handbook for school psychologists introducing the principle components of dynamic assessment (DA) including theories of cognitive modifiability, cognitive functions, and mediated learning. The handbook is designed to introduce school psychologists to DA and provide some guidelines for beginning to develop these skills and incorporate them into their practices.

PROCEDURES TO BE FOLLOWED DURING RESEARCH: You are being asked to read the handbook and complete an attached evaluation form. Your participation will likely take a minimum of 45 minutes and you are being asked to complete the evaluation within 3 weeks. Upon completing your review, please return the Informed Consent Agreement and Expert Review forms to James Bylund at [redacted], San Diego, California 92108. A return envelope is included.

RISKS: There are no known risks for participating in this study; however, your opinions to some items may be sensitive and you may withdraw from this study at any time. You may also choose not to respond to any questions you do not feel comfortable answering.

BENEFITS FOR PARTICIPATION: The only potential benefit to you for participation in this research project may be new knowledge or insights regarding dynamic assessment and/or mediated learning. Of course your participation and feedback

will also be shaping the development of the handbook and therefore supporting the advancement of DA in school psychology.

CONFIDENTIALITY: All identifying information will remain confidential unless otherwise required by law. Signed consent forms will be kept separate from the evaluation forms, which will not include any identifying information. The results of this study will be included in the dissertation and may be used for professional purposes; however, your name will never be included nor will any other information that could reasonable be used to identify you as a participant.

SUBJECT RIGHTS AND RESEARCH WITHDRAWAL: Your participation in this study is entirely voluntary. If at any point you decide not to participate in this research project there will be no penalty or loss of benefit to which you would be otherwise entitled including your relationship with AIU or the researcher, James Bylund. If you elect to participate in the study, you may also choose not to answer any questions you wish without any explanation of your reasoning.

SIGNITURE AND ACKNOWLEDGEMENT: My signature below indicates that I have read the above information and have had the opportunity to ask question to help me understand what my participation will entail. I agree to participate in the study until I decide otherwise. I acknowledge having received a copy of this agreement and have been informed that by signing this consent form I am not giving up any of my legal rights.

Signature of Research Participant	Date
James Bylund	[redacted]
Researcher's Name	Contact Phone Number
Researcher's Signature	Date
William Brock	[redacted]
Name of Chairperson	Contact Phone Number

APPENDIX D

Expert Review Questionnaire

Expert Review Questionnaire

Please check each of the following that apply.

__ I have published an article, book chapter, and/or book on dynamic assessment and/or mediated learning

__ I have presented on the topic of dynamic assessment and/or mediated learning at a professional conference.

__ I have taught a graduate level course on dynamic assessment and/or mediated learning

__ I have completed graduate level coursework in dynamic assessment and/or mediated learning, received supervision in the application of dynamic assessment and/or mediated learning, and currently use dynamic assessment/mediated learning as part of my practice as a teacher, school psychologist, or clinical psychologist.

1. This handbook would be a useful tool for introducing dynamic assessment to practicing and/or training school psychologists.
   A. Strongly agree
   B. Agree
   C. Somewhat agree
   D. Do not agree

2. As an introduction to dynamic assessment, the handbook covers key concepts related to the topic.
   A. Strongly agree
   B. Agree
   C. Somewhat agree
   D. Do not agree

What other concepts should be included in an introductory handbook on dynamic assessment?

_____
_____
_____
_____

3. The handbook accurately reflects dynamic assessment principles and techniques.

A. Strongly agree
B. Agree
C. Somewhat agree
D. Do not agree

What dynamic assessment principles and/or techniques were not presented accurately in the handbook? Please describe:

_____
_____
_____
_____

What do you see as being the strengths of the handbook?

_____
_____
_____
_____
_____

In what ways can the handbook be improved?

_____
_____
_____
_____
_____

Additional Comments:

_____
_____
_____
_____
_____

APPENDIX E

Field Test Cover Letter

DATE

Dear Prospective Participant,

First, I want to thank you for participating in my dissertation project. My research has been in the area of Dynamic Assessment and Mediated Learning, and despite the great promise of these methods only a fraction of school psychologists are familiar with DA and even fewer use these tools/techniques in their practice. In response to this problem I am developing a "user friendly" resource guide for school psychologists introducing DA as a set of practical and value added tools and techniques that begin with a change in the way we view students and the process of learning.

DIRECTIONS: Included in this packet are an Informed Consent Agreement, a copy of the resource guide (*Bridging the Gap Between Assessment and Intervention*), and a Field Test Questionnaire. Please read the Informed Consent Agreement and sign if you wish to participation in this project. Then, read *Bridging the Gap Between Assessment and Intervention* and complete the Field Test Questionnaire. Once you have finished, please return the signed Informed Consent Agreement and the completed Field Test Questionnaire either via email or using the included return envelope. The draft of *Bridging the Gap Between Assessment and Intervention* is yours to keep.

Thank you for your participation. I greatly appreciate it. If you have any questions or concerns regarding your participation in this project, please feel free to email or call me.

_____

James Bylund
[redacted]
San Diego, CA 92108

APPENDIX F

Field Test Consent Form

Alliant International University, San Diego
10455 Pomerado Road
San Diego, CA 92131-1790
(858) 635-4772

Informed Consent Agreement

Bridging the Gap Between Assessment and Intervention: An Introduction to Dynamic Assessment for School Psychologists.

Your participation is being requested as part of a doctoral dissertation study. Before you consent to participate, please read the following and, if needed, ask James Bylund any questions you may have in order to ensure you fully understand your involvement in this study.

PRINCIPAL INVESTIGATOR: James Bylund, Educational Psychology, Doctoral Candidate at Alliant International University (AIU), San Diego.

PURPOSE OF THE STUDY: The study is part of a doctoral research project being conducted by James Bylund at AIU under the direction of William Brock, Ph.D and Steven Fisher, Psy.D. The purpose of the study is to develop a resource guide for school psychologists introducing the principle components of dynamic assessment (DA) including theories of cognitive modifiability, cognitive functions, and mediated learning. The resource is designed to introduce school psychologists to DA and provide some guidelines for beginning to develop these skills and incorporate them into their practices.

PROCEDURES TO BE FOLLOWED DURING RESEARCH: You are being asked to read the resource guide and complete an attached evaluation form. Your participation will likely take a minimum of 45 minutes and you are being asked to complete the evaluation within 3 weeks. Upon completing your review, please return the Informed Consent Agreement and Expert Review forms to James Bylund at [redacted], San Diego, California 92108. A return envelope is included.

RISKS: There are no known risks for participating in this study; however, your opinions to some items may be sensitive and you may withdraw from this study at any time. You may also choose not to respond to any questions you do not feel comfortable answering.

BENEFITS FOR PARTICIPATION: The only potential benefit to you for participation in this research project may be new knowledge or insights regarding

dynamic assessment and/or mediated learning. Of course your participation and feedback will also be shaping the development of the resource guide and therefore supporting the advancement of DA in school psychology.

CONFIDENTIALITY: All identifying information will remain confidential unless otherwise required by law. Signed consent forms will be kept separate from the evaluation forms, which will not include any identifying information. The results of this study will be included in the dissertation and may be used for professional purposes; however, your name will never be included nor will any other information that could reasonable be used to identify you as a participant.

SUBJECT RIGHTS AND RESEARCH WITHDRAWAL: Your participation in this study is entirely voluntary. If at any point you decide not to participate in this research project there will be no penalty or loss of benefit to which you would be otherwise entitled including your relationship with AIU or the researcher, James Bylund. If you elect to participate in the study, you may also choose not to answer any questions you wish without any explanation of your reasoning.

SIGNITURE AND ACKNOWLEDGEMENT: My signature below indicates that I have read the above information and have had the opportunity to ask question to help me understand what my participation will entail. I agree to participate in the study until I decide otherwise. I acknowledge having received a copy of this agreement and have been informed that by signing this consent form I am not giving up any of my legal rights.

Signature of Research Participant	Date
James Bylund	[redacted]
Researcher's Name	Contact Phone Number
Researcher's Signature	Date
William Brock	[redacted]
Name of Chairperson	Contact Phone Number

APPENDIX G

Field Test Questionnaire

Field Test Questionnaire

1. How many years have you worked as a school psychologist?
    a. < 2 years
    b. 2 – 4 years
    c. 5 – 7 years
    d. 8 or more years

2. Highest level of education
    a. Current Graduate Student
    b. Master's Degree
    c. Education Specialist Degree
    d. Doctorate (Ph.D., Psy.D., Ed.D)

3. Grade levels with which your work (>50% of your time)
    a. Elementary (grades K – 5)
    b. Middle School (grades 6 – 8)
    c. High School (grades 9-12)
    d. Adult Education (ages 19 – 22)

4. Prior to reading the resource guide, how familiar were you with dynamic assessment?
    a. Very familiar
    b. Familiar
    c. Somewhat familiar
    d. Not familiar

For items 5 - 10, please rate the degree to which you agree with the statement.

5. The resource guide offers a new paradigm from which to view student learning and the assessment of learning skills.
    a. Strongly agree
    b. Agree
    c. Somewhat agree
    d. Do not agree

6. Other school psychologists would find the section describing cognitive modifiability (i.e. change) clearly written and easy to understand.
    a. Strongly agree
    b. Agree
    c. Somewhat agree
    d. Do not agree

7. Other school psychologists would find the section describing 15 cognitive functions (i.e. thinking and learning skills) clearly written and easy to understand.
    a. Strongly agree
    b. Agree
    c. Somewhat agree
    d. Do not agree

8. Other school psychologists would find the section describing 6 mediated learning strategies clearly written and easy to understand.
    a. Strongly agree
    b. Agree
    c. Somewhat agree
    d. Do not agree

9. I can imagine myself incorporating aspects of dynamic assessment into my service delivery without creating substantial time constraints.
    a. Strongly agree
    b. Agree
    c. Somewhat agree
    d. Do not agree

10. After reading this resource guide I am interested in learning more about dynamic assessment and/or mediated learning.
    a. Strongly agree
    b. Agree
    c. Somewhat agree
    d. Do not agree

What could be done to improve the usefulness of the resource guide for school psychologists? (if additional space is needed please use the back of this sheet or attach additional paper)

_____

_____

_____

_____

Additional Comments:

_____

_____

_____

_____

APPENDIX H

Field Test Verbatim Responses

Field Test Verbatim Response to Open Ended Questions

What could be done to improve the usefulness of the resource guide for school psychologists?

The handbook does a good job of giving the history, the theory, and the rationale for why we need to be more dynamic in our assessments and move towards DA. I like the appendices of checklists and "protocols" that help encourage the use of DA. I think your title is appropriate as an "introduction" but not as a handbook as you state in your email. Handbooks to me, provide practical strategies on implementation. As written, this "handbook", doesn't incorporate or address the hurdles that have been DA's way in a practical manner. 1) Logistics of time to complete, 2) The actual HOW TO incorporate the process within the scope of assessment and RtI in a practical manner, 3) There aren't any directions on how to use the appendix resources. The need for buy-in from school staff to understand DA. How do we train our own staff on the mediated learning strategies? How do we encourage them to incorporate that into their own instruction to support the findings we come up with from our own DA, 4) Although the appendices offer good resources and possible protocols, the description of how to use the resources is limited, 5) It would be helpful if you provided a vignette or case study of how DA is used from RtI through Assessment, 6) if you are not going to provide more 'practical' tips, then I would stick to calling it an introduction to DA rather than "bridging the gap".

I like the handbook. It is easy to understand, simple and an interesting perspective to our field. It motivated me to focus more on DA. I agree with the theories and believe it is very beneficial. I am running into a few problems with DA. Time and helping others to understand it. The handbook did describe DA as a supplement to standardized testing for qualification purposes. I have been through the training for DA and still do not feel as though I have a strong grasp on the system. This handbook though is a helpful tool in that understanding. A guide for administration may be the next step. Thank you.

I think the addition of the indices was helpful. The examples help clarify the concepts described in the manual.

More visual support if possible

I had an idea o take the 15 "essential" cognitive skills and use them within the recommendations section of my reports, explaining them in a way that parents could find useful within the home. This might veer from your focus a bit, but it would be nice to see some examples parents can easily take and use to enhance their child's learning.

The only thing I suggest is some editing to fix some typos – a minor issue

You provided a sample DA dialogue and report, it would be great to see what your recommendations to the teacher would be. Do DA reports typically include these or do they only the learning session as you did?

Very informative handbook, I especially found the link between DA and RtI as well as the sample reports helpful in understanding the implementation of this model.

I would like to see more examples of how it applies to the classroom, how teachers can support thinking skills, and more info on the thinking processes, and how to mediate. Definitely a good starting point!

The handbook is a good introduction to the topic. I suppose the next step would be to provide some assessment tools for applying these principles/techniques

I cannot think of anything at this time.

Additional Comments:

I think the way you explained things in the manual not only clarified for me the definition of DA – but also showed me how to incorporate these practices, not just for assessment, but also for planning, implementing, and monitoring interventions.

Very interesting topic that I wish I had learned about earlier. I like the examples.

Very well written! This really did give a clear description of DA and all related theories and it really did make me want to learning and practicing DA more! Good luck with it all!

I think it is a great introduction to DA, especially for those unfamiliar or w/ limited knowledge of DA. It definitely would lead people to do more research or training on the subject so they can incorporate it to practice, which appears to be your aim. Good luck!

Excellent job. This is a topic that I want to integrate into my assessment repertoire.

Could use a chart connecting skills with mediation.

I like the idea of using these strategies for testing the limits. I would like to know what other tasks, other than matrices, would be good for DA. What about auditory tasks?

It is well written and easy to understand. I would love to receive training in this area. I feel it could greatly benefit students.