CHAPTER 1
General Introduction
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Over the last decades regular schools have received increasing responsibility of providing education that suits all children, including children with disabilities. This development has influenced educational practices in the U.S. as well as in Europe. Schools needed to shift from a standard instructional approach, generally beneficial for average to above average children, to adaptive ways of teaching and instructions, tailored to the needs of each individual child (e.g., Glaser, 1981; Ysseldyke, 2005). Recently, an assessment approach with a focus on problem solving and providing recommendations has evolved within the field of school psychology (Brown-Chidsey, 2005a; Floyd, 2010; Pameijer, 2006; Sheridan & Gutkin, 2000). This is in contrast with the current standard psychological assessment approach in which, generally, a large range of information regarding the initial referral question is acquired, by administering a comprehensive battery of tests.

From the perspective of the problem-solving model, or needs based assessment model (e.g., Pameijer & van Beukering, 2007; Pameijer, 2006) assessment can be seen as a structured procedure, in which for each case or referral, all possible relations to the problem and complaints are considered with the aim of finding the appropriate interventions corresponding to the needs of the child. An important step in this assessment procedure is to formulate specific hypotheses, which present the most plausible explanations or descriptions of the problem. In addition, testing materials (e.g. tests, questionnaires, observations), have to be selected to answer each hypothesis with the aim of guiding interventions. However, the standard, traditionally used tests available for psychologist, in particular intelligence and cognitive ability tests, do not provide very useful information for planning interventions (Brown-Chidsey, 2005a; Glaser, 1981; Pameijer, 2006).

Despite the increased emphasis on assessment for interventions, the current practice of school psychologists still includes a substantive use of these standard cognitive ability test batteries (Floyd, 2010; Machek & Nelson, 2010). The tests are frequently administered with the purpose of providing useful information regarding selection, eligibility for special education services or identification of learning disabilities.
However, the emphasis on IQ scores in making decisions regarding diagnosis of learning disabilities and special education placements has been critiqued by several researchers and practitioners (e.g., Brown-Chidsey, 2005b; Fletcher, Denton & Francis, 2005; Salvia & Ysseldyke, 2003; Tzuriel, 2000a). In particular the instruments have shown different test scores towards children with different cultural backgrounds (e.g. Elliott, 2003; Hessels, 2000) and children with a low social economic status (e.g. Tzuriel, 2000a; Lidz & Elliott, 2000). Another issue concerns the diagnosis of children with learning disabilities and distinguishing those from children with only low achievements (Fletcher, et al, 2005). Standard tests scores provide information about learning only in an indirect manner (Day, Engelhardt, Maxwel & Bolig, 1997), and there is little evidence that test outcomes could provide direct links to the teaching practice (e.g., Floyd, 2010; Haywood & Lidz, 2007). The concept of dynamic testing was developed in response to these shortcomings of these traditional measures (e.g., Elliott, Grigorenko & Resing, 2010; Lidz & Elliot, 2000; Sternberg & Grigorenko, 2002).

Both Vygotsky’s theory as well as Feuerstein’s mediated learning experience (MLE) theory (Feuerstein, Rand & Hoffman & Hoffman, 1979) served as the main conceptual basis of dynamic assessment (Sternberg & Grigorenko, 2002). Vygotsky (1978) already acknowledged the limitations of standard tests in identifying learning abilities and guiding interventions. According to Vygotksy, two children with a comparable level of cognitive development may vary extensively in their degree of learning under teacher’s guidance. He assumed that children might perform above the limits of their initial capabilities when assisted by a more experienced adult. To determine the level of cognitive functioning, the Zone of Proximal Development should be determined: The distance between a child’s actual level of development, a child’s current level of independent problem solving, and potential level, which is the level a child can reach with the assistance of adults or more capable peers (Vygotsky, 1978).

Feuerstein on the other hand, emphasized the quality of the interaction between child and environment, and developed his theory of Mediated Learning Experience (Feuerstein et al., 1979). With an adult as mediator between child and stimuli, the stimuli could be modified for the child. Various mediating strategies could be used, e.g.
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focusing the child on the crucial aspects of the stimuli, attaching meaning to them, or relating them to familiar contexts. Feuerstein presumed cognitive modifiability of children, which could be reached by the use of adequate mediated interactions (Lidz, 2002; Tzuriel, 2000a, 2001).

Common for dynamic testing procedures is that all have an intervention or training phase included in the procedure, aimed to determine how individual instruction can lead to improvement in a child achievement on cognitive tasks (Elliott, et al., 2010). However, dynamic procedures differ in format and in degree of standardization and structure. A pretest-training-posttest design is often adopted, in which the pre- and posttest are both administered in a neutral, standardized manner, and help or feedback are given only during the intervention phase (e.g. Sternberg & Grigorenko, 2002; Resing, 1997, 2000). In other designs, instructions and feedback are rather interwoven with the test-items. Interventions are then provided directly when children encounter difficulties (Elliott et al., 2010). Further, the degree of standardization varies. Interventions can be very individualized guided by the specific characteristics of responses of the child (e.g., Lidz, 2002; Tzuriel, 2001). Often these type of interventions have been developed from a rather clinical approach (Elliot et al., 2010; Sternberg & Grigorenko, 2002), with as main purpose facilitating children’s learning processes, identification of deficiencies and recommending improvements of children’s cognitive functioning (Tzuriel, 2000). Individualization, however, requires high expertise for administration (Grigorenko, 2009; Sternberg & Grigorenko, 2002).

Other dynamic testing procedures include a more structured and standardized instruction procedure in order to obtain more quantitative useful data (e.g., Schlatter & Büchel, 2000; Hessels, 2000). A specific structured approach of dynamic testing is the use of graduated prompts techniques, in which the amount of help children need is indicative of a child’s potential for learning (e.g., Campione & Brown, 1987; Resing, 2000; Resing & Elliott, in press). In this approach help is provided as long as the child is not able to independently solve a problem, according to a hierarchical structured prompts protocol. Children are guided verbally, first with general prompts, and when
needed, with more and more specific prompts to the solution. In some of these protocols metacognitive skills, such as planning and relation to prior tasks, are included (e.g., Campione & Brown, 1987, Resing, 2000).

The effects of dynamic tests and assessments have been demonstrated by various studies (see for an overview Sternberg & Grigorenko, 2002; Tzuriel, 2000). Quantitative and qualitative outcomes of dynamic assessment provide insights into the potential for learning of children and their responses to instruction (Fuchs, Fuchs, Compton, Bouton, Caffrey & Hill, 2007; Lidz, 2002; Tzuriel, 2000a). Most research in dynamic assessment has demonstrated the value of dynamic tests and assessment in providing a more accurate indication of a child’s learning potential compared to their performance on a standard test (e.g. Hessels, 2000; Resing, 1997; Tzuriel, 2000a). Further, various studies have shown the additional value of dynamic testing outcomes regarding placements in special education (e.g. Resing, 1990; 1997), regarding the potential of children with intellectual disabilities (e.g. Hessels-Schlatter, 2002; Lifshitz, Weiss, Tzuriel & Tzemach, 2011) or regarding children with a different cultural background (e.g. Hessels, 2000; Resing, Tunteler et al., 2009).

Because dynamic testing is a process oriented form of testing, outcomes of dynamic assessment are assumed to be informative in guiding classroom instructions and interventions (e.g. Haywood & Lidz, 2007; Tzuriel, 2000a). The graduated prompts approach is assumed to be a particular useful approach in linking assessment to classroom instruction (Grigorenko, 2009; Jeltova, Birney, Fredine, Jarvin, Sternberg & Grigorenko, 2007). Resing (1990, 1997) for example, defined the potential for learning in terms of the amount and type of help children needed during training and showed that children with comparable standard test scores required different quantities and types of hints, which could have implications for placement and instructions. This graduated prompts procedure also provided insights into individual children’s problem solving strategies (Resing, Tunteler, de Jong & Bosma, 2009). However, not much is yet known regarding individual differences in prompts children require to solve cognitive tasks.
In the context of assessment for intervention, and the emphasis on adapting instructions to the needs of individual students, studies regarding the applicability of dynamic testing procedures should also be considered. Advantages of dynamic test outcomes have incidentally been recognized by school psychologists (Deutch & Reynolds, 2000) and special education coordinators (Freeman & Miller, 2001). However, there is limited research on the use of dynamic testing outcomes for teachers and in particular regarding planning interventions and formulating educational plans.

The current thesis addresses the above described issues. Investigated is whether and how dynamic testing procedures, in particular those with a graduated prompts approach, contribute to assessment procedures focused on interventions and classroom recommendations. Further the question is examined whether teachers value the outcomes of dynamic testing procedures in the process of formulating educational plans for individual children in their own classroom or regarding hypothetical students. The studies presented in the current thesis aim to address the following research questions, which are explored in regards to typical developing children or to children with special needs and their teachers:

1. Is there evidence for the use of dynamic testing procedures to identify individual differences in children’s need for instruction which could contribute to needs based assessment?
2. How useful are outcomes of dynamic testing procedures for teachers, regarding educational interventions and formulating educational plans?

The current thesis encompasses a series of six studies in which these research questions are addressed consecutively. The first three chapters focus in particular on the identification of children’s need for instruction either regarding children in special education or children with arithmetic difficulties in regular education. For reasons of different populations and ages, the dynamic tests and training procedures used, differ among studies. However, within each study a pretest-training- posttest design was employed, including a training based on hierarchical prompts techniques.
Chapter 2 describes the contribution of a reversal task to the dynamic testing procedure and to identify individual needs for interventions regarding young children (on average 6 years) with moderate to mild learning difficulties. In this exploratory study the relation between a dynamic test and reversal task, in which children constructed analogical reasoning problems for the examiner, was examined. We expected that children’s ability to construct their own analogies would relate strongly to the dynamic test results, and less to intelligence scores. Further, we explored how observed behaviors during the reversal task would contribute to the description of a child’s potential for learning.

Chapter 3 reports on individual variation in the need for instruction of a group of, on average 11 years, old children in special education with moderate to severe intellectual disabilities. In this study children were asked to construct a series of analogies after the administration of a dynamic analogical reasoning test. For both the training procedure of the dynamic test and the analogies-construction task, graduated prompts techniques were used. We expected that dynamically tested children would achieve higher and differentiated scores on the posttest compared to untrained children and that trained children would show variation in their need for instruction during the training and the construction task. In addition, the value of dynamic testing results for special education teachers has been explored.

Chapter 4 reports on the contribution of multi-protocols during a dynamic prompts training. We aimed to identify the need for instruction at different steps of the problem solving process and individual differences in required help regarding children with arithmetic difficulties in regular education. To all children a complex seriation task was administered. The adapted training of the dynamic test that was used consisted of several graduated prompts protocols, which corresponded to the various steps discerned in the problem solving process. We expected different patterns of required prompts. We further expected to find individual differences regarding children’s need for instruction.

The last three chapters of this thesis concern the applicability of dynamic testing results in educational settings. In Chapter 5 and 6, teachers evaluated information
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reported based on dynamic testing of the children in their own classroom. In the last chapter, the potential value of dynamic testing information was investigated by an electronic survey for teachers.

Chapter 5 describes the perception of teachers in regular education regarding the reported dynamic testing results of typically developing children in their classroom. Teachers received and evaluated reports concerning children in their classroom, either dynamically tested or based on standard test results, as well as classroom observations prior to and after testing. Teachers’ ratings of learning potential of each child were gathered by interviews and questionnaires. It was expected that teachers would rate the dynamic testing reports as highly valuable for planning interventions compared to the standard reports. Further we investigated whether teachers would change their estimations of potential for learning in response to the reported dynamic testing results or would adapt their teaching practices.

Chapter 6 describes a similar procedure as in chapter 5, yet, teachers of children with severe arithmetic difficulties participated. In this study we evaluated the usefulness of recommendations provided by reports based on the dynamic training procedure or standard test. In this study it was further investigated which aspects of dynamic testing outcomes teachers valued as useful for their classroom practice as well as for formulating educational plans. For that reason teachers completed a follow up questionnaire regarding the use of specific dynamic testing information.

Chapter 7 explores what information teachers value for writing education plans for their children and specifically their opinion regarding the value of dynamic testing information by means of an internet survey. Further, it was investigated whether teachers’ background variables, such as experience, age and training, as well as teacher’s sense of efficacy affected their responses in the opinions and evaluation of information based on dynamic assessment.

The thesis concludes with an overview of the results to answer the central questions. Implications regarding the applicability of dynamic testing procedures in assessment for intervention procedures are discussed as well as implications regarding educational settings.