Title	Curriculum-based dynamic assessment: An innovative tool for educators and students
Author(s)	Alice Seng Seok-Hoon and Mogens Jensen
Source	*ERAS Conference, Singapore, 24-26 November 2004*
Organised by	Educational Research Association of Singapore (ERAS)

Curriculum –Based Dynamic Assessment: An Innovative Tool For Educators And Students

Alice Seng Seok-Hoon
National Institute of Education

Mogens Jensen
International Center for Mediated Learning

During the last two decades there has much dissatisfaction with standardized testing as done in the classroom. A major criticism is that the test score provides important information on the child's intellectual performance but not about the child's learning processes or deficient cognitive functions that are responsible for learning difficulties, and mediational strategies that facilitate learning. (Feuerstein et.al, 1979). Teachers need to know not only about the actual level of performance, but also what a child might achieve with an adult's guidance or a peer's help, the nature of learning processes, specific deficient cognitive functions and specific strategies that facilitate learning.

According to Tzuriel (2000) many children fail in classroom tests or school examinations because of lack of opportunities for learning experiences, cultural differences, specific learning difficulties or traumatic life experiences. Their poor scores just do not indicate their learning potential especially from children experiencing some sort of learning difficulty. As the objective of standardized testing is to describe the performance of children generally in terms of their relative positions with their peers, there is no way we can find out their learning processes and to recommend adequate prescriptive teaching and remedial learning strategies.

In addition, standard tests do not relate to non-intellective factors that can influence individuals' cognitive performance. These non-intellective factors can be for example intrinsic motivation, need for mastery, locus of control, anxiety, frustration tolerance, self confidence and accessibility to mediation.. These are no less important than the pure cognitive factors in determining children's intellectual achievements. Many important decisions about school and intervention programs are also made at an early age so there is an urgent need for alternative assessment made of the child to take place in their early years.

The focus of the present paper is to describe a school assessment model based on advances in recent cognitive and neuro-learning science that teachers can use to enable children coming from diverse backgrounds with both general and special learning needs to achieve high academic standards and learn how to learn. This curriculum based dynamic assessment model developed by Jensen (2003) provides a coherent 'reach-to-teach' alternative that enables schools to ensure that all students receive the monitoring they need to develop the mastery of thinking and learning strategies in the classroom and to apply them outside school.

According to Jensen (2000) this assessment model is able to 'anticipate, recognize, address and document student learning needs and to match them without delay with specific and effective instruction.' The model embraces the broad philosophy

1. that knowledge, skills, and learning ability are constructed in the mind of the learner rather than transmitted or inherited.
2. that properly directed effort develops ability and
3. that educational investments can be made to help all students strengthen their literacy, content achievement and problem solving ability.

The MindLadder model: An innovative tool for educators and students
This is a set of five programs based on a dynamic model of assessment and learning that has been developed and researched to help students achieve well and learn how to learn more. Achieving academic content and developing knowledge construction skills are like two legs of a pair of scissors: both need to be present- the better one is, the better the other can be. The MindLadder model uses a scientifically based approach built on advances in the cognitive and learning sciences that have shifted the perception of knowledge, skills, and learning ability from something that is inherited or transmitted to something that is constructed in the mind of the learner.

In a sense, this model requires a paradigm change in how we educators look at testing, assessment and learning. This paradigm shift may involve, according to Jensen, a fundamental change in our perception of the human being and the person that the human can become. Scientists researching in the area of cognitive and knowledge structures have confronted evidence of stability and change. In the areas of intellective functioning and learning much evidence points to stability over time and much point to change. The period from infancy through the early, middle and later school years frames the intervals of greatest interest (Jensen 2003).

Two prevailing assessment and instructional models are possible. These models can place the emphasis anywhere within a continuum that at one extreme focuses upon the most stable or rigid aspects of intellective functioning and, at the other, focuses upon its most changeable and plastic aspects. Where the focus is placed determines the relative emphasis between modeling stability vs. modeling change. Models that emphasise stability over change tend to conceptualise the structures that govern intellective functioning and learning as systems that are relatively 'recalcitrant and impervious' to variation in other systems. These models assume that relatively **closed** systems govern intellective functioning. Conversely, models that emphasise change over stability tend to conceptualise the structures that govern intellective functioning as systems that are or perhaps can become sensitive to the effects of variation in other systems. These models assume relatively **open** systems.

The paradigm that supports the MindLadder dynamic assessment and learning model favors the change model. It stresses the view about the development of cognitive modifiability and plasticity in human functioning, and shifts from an emphasis on

modeling **stability over change** to an emphasis on modeling **change over stability**. Change models such as the MindLadder dynamic assessment and learning model aim to build on the plasticity and flexibility of human intellective functioning over its more static and rigid properties.

The objective of a curriculum based dynamic assessment is not to categorise the learner or to measure change as the difference between fixed poles. Rather, the objective is to understand and foster the intervening processes whereby the development of plasticity and flexibility in intellective functioning occur. To achieve this objective, dynamic approaches to assessment and learning embody an interactive format between teacher/examiner and student/examinee in which the teacher/examiner or mediator deliberately attempts to produce changes in the learner's functioning. In the MindLadder approach the format is designed to enable both mediator and student to become knowledgeable about the roles which cognition, knowledge of content, concepts, skills, experience, motivation, affect, emotion, attitudes and behavior all can play in the student's knowledge construction processes and academic achievement. Using deliberate and sensitive efforts within a process-oriented, developmental perspectives, the trained mediator helps the learner acquire insight and gain control over a wide range of cognitive functioning to strengthen learning and knowledge construction skills.

Role of Mediated Learning Experience

The MindLadder model describes how knowledge construction functions can be developed and integrated with content via both mediated and active learning experiences to produce efficiency and a readiness to learn how to learn. (Jensen 2003). Students learn to construct knowledge and gain competence using systems of symbols that are rendered meaningful by context and, more generally by culture. Mediated Learning Experience (MLE) describes a set of **qualities** in human relationships. As qualitative characteristics of interactions between human beings MLE can be observed and applied across cultures, settings, content areas, languages of communication, ages and levels of functioning.

The MLE characteristics that are found in the MindLadder model include:

1) intentionality-reciprocity
2) transcendence
3) meaning
4) feeling of competence and
5) regulation of behavior.

The qualities can all be trained and modeled for parents and teachers. These five qualities of MLE emphasise the need to establish a bond between mediator and learner around content and activities that are used to identify and label knowledge construction functions, explain what they do, how they work and why they are used, while guiding the learner to use these mental tools with growing confidence and increasing performance efficiency.. While interacting with a learner, or group of learners, the mediator can use a large variety of techniques to foster and strengthen the development of new and initially unfamiliar modes of perceiving, thinking and responding. These include, among many others,

selecting, repeating, labeling, grouping, highlighting and sequencing sources of information.

Classroom Implementation

The MindLadder classroom learning program is constructed around two fundamental design principles. (Jensen 2003).

1. The program must provide the classroom teacher with the freedom and opportunity to mediate the development of students' knowledge construction functions.
2. The program must integrate students' development of knowledge construction functions with the acquisition of curricular objectives and academic standards.

The overall goal is to enable students to achieve high academic standards while learning how to assemble and use knowledge.

Implementation of the MindLadder classroom learning approach requires an updated content curriculum, a set of high academic standards and a set of outcome measurement devices. In addition to standardized achievement tests, the set of outcome measurement devices can include a mix of prepost testing, portfolios tied to reflective self-evaluation, preparation of real products , problem based learning and other forms of authentic performance assessments. Teachers approach curricular achievement and the development of knowledge construction skills as two mutually reinforcing parts of one process. They learn how to identify the knowledge construction functions that underpin academic standards within subject areas, curricular materials and outcome measures and how to mediate the development of these functions across the curriculum via active student involvement in classroom learning activities.

Based on the curriculum they learn how to facilitate students' transition from lower to higher levels of efficiency through experiences with real and meaningful problems. They learn that a little mediation often goes a long way and how to keep the learning process moving. They help their students to become more efficient in problem solving and trouble shooting skills. The classroom becomes a community of diverse learners providing an emotionally safe environment for challenging learning to take place. Whole group instruction, individual work, teams, pairs and shared interest groups can be used together with computer programs and multi-media technology if available.

A study was conducted to test the ability of the MindLadder classroom learning model to improve students' achievement and learning in the upper primary grades. The study tested two hypotheses.

(1) teacher mediated development of students' knowledge construction skills via the curriculum is associated with improved academic achievement and improved student reasoning and

(2) improvements in academic achievement and reasoning are associated with students' perceptions of their knowledge construction skills and the provision of mediation in the classroom environment.

The study drew on 347 students in ten experimental and ten control classes within four elementary schools (two experimental and two matched controls) . While an effort was made to ensure randomness in the selection of project schools and classroom teachers, the design of the study was treated as a quasi-experimental design. Steps were taken to protect the study against both internal and external threats to the validity of its findings. Student background variables were collected and analysed across experimental and control groups to ensure protection against selectivity.

Experimental teachers received training and coaching in the development of students' knowledge construction functions prior to the collection of baseline data. They learned how to develop knowledge construction functions within and across content domains and how to facilitate students' transition from lower to higher levels of efficiency. Teachers observed and interacted with a master teacher, each got a videotape of the master teacher at work with her students, received coaching in their own classrooms and participated in team-based work groups to discuss their experience with the new practices. Teachers were encouraged to reflect via a semi structured journal on their classroom lessons and especially lessons shared with the coach. Throughout the study, the teachers were encouraged to use a team format to discuss issues, get fresh ideas, trouble shoot problems and to access coaches and trainers as needed

Data on school achievement and intellective functioning were collected based on:
The Iowa Test of Basic Skills (ITBS)
Criterion References Competency Tests (CRCT)
The Cognitive Abilities Test (CogAT)
Student Learning Profile (SLP)

Results and Discussion

The study described here investigated the possibility that teacher-guided development of students' knowledge construction functions (KCF from MindLadder) is associated with improved academic achievement and reasoning. Results indicate that MindLadder students outperformed control students on measures of both academic achievement and reasoning. Overall, the statistical analysis accounted for 69% of the variance in academic achievement and 52% of the variance in reasoning. On the ITBS significant differences favoring the MindLadder students were obtained in Reading, Language, Math and Social Studies. On the CogAT experimental students scored higher on both verbal and non-verbal reasoning.. On an independent measure of academic achievement, the CRCT, MindLadder students outperformed control students in Reading and in Maths. Also, students who qualified for special help in the MindLadder classrooms benefited much more from their educational experience than students who qualified for special help in the control classrooms.

One interpretation suggests that the higher academic achievement and reasoning scores in the experimental group could be due to the extra attention that experimental teachers received in comparison to the teachers in the control schools. To fully control for this possibility the study would have had to employ a third type of project school.

Specifically, MindLadder students achieved better results on the ITBS in comparison with control students who self-reported similar levels of knowledge construction skills that contribute to cognitive competence and cognitive focus. Among students that rated their classroom-learning environment above the median in teacher mediation and facilitation, MindLadder students scored significantly higher on the ITBS than control students. The experimental program appears, in a sense, to have rubbed off on students who ordinarily might be somewhat harder to reach.

The data from the present study , in sum, indicate that the development of knowledge construction functions may be of considerable importance in helping schools to find ways to secure better outcomes for their students. Replications and extensions of the present study across both setting and student variables are necessary, but the results of the present investigation suggest that this dynamic assessment model can be an effective way to address students' academic achievement and cognitive learning needs. The strong results of this experimental study were obtained only with only a moderate amount of teacher training and support. More training and support, one may speculate, would be likely to yield even better results.

References

Feuerstein, R. (1979). Ontogeny of Learning. In: M.T.Brazier (Ed), Brain mechanism in memory and learning. Proceedings of the International Brain Research Organization Syposium. Royal Society, London, July 1977. New York: Raven.

Jensen, M.R. (2003a). Mediating Knowledge Construction: Towards a Dynamic Model of Assessment and Learning. Part !: Philosophy and Theory. Educational and Child Psychology, Vol 20(2), 100-117.

Jensen, M.R. (2003b). Mediating Knowledge Construction: Towards a Dynamic Model of Assessment and Learning. Part II: Applied Programs and Research. Educational and Child Psychology. Vol 20(2) 118-142.

Jensen M.R. (2000). The MindLadder model: using dynamic assessment to help students learn how to assemble and use knowledge. In C.S. Lidz & J.G.Elliott (Eds.) Dynamic Assessment: Prevailing models and applications. Advances in Cognition and Educational Practice, Vol 6 (pp 187-227). London: JAI/Elsevier Science.

Seng, A.S.H. Lucy P.K.H & Tan O.S. (2003) Mediated Learning Experience with Children: Applications Across Contexts. McGrawHill (Asia).

Tzuriel D. (2000) Dynamic Assessment of Young Children: Educational and Intervention Perspectives. Educational Psychological Review Vol 12 (pp 385-435).