DISTRICT OF COLUMBIA
PUBLIC SCHOOLS
Office of Transformation Management

Tools of the Mind Early Childhood Curriculum: Empirical Research Review

Overview:

Tools of the Mind (Tools) is a research-based program that builds strong foundations for school success in preschool, pre-K and kindergarten students by promoting their intentional and self-regulated learning. The Tools program focuses on helping students develop specific executive function skills, such as inhibitory or effortful self-control, working memory (holding thoughts in the mind) and cognitive flexibility (the ability to shift and focus attention). Teachers learn how to teach academic content in the areas of literacy, math, science, and social studies in a manner that also works to build self-regulation skills in young children.

The effectiveness of the Tools program has been the subject of numerous research studies in the field of early education and neuroscience. Tools has been shown to improve self-regulation skills in young children and predict later achievement in reading and math. Tools is currently expanding in many states and local school districts across the country. As a result, the Tools program is now a part of several, rigorous longitudinal studies examining the effects for special populations such as dual language learners, as well as, the program's effects on teacher practice as measured by teacher and child interactions.

History of Tools of the Mind:

Dr. Elena Bordova and Dr. Deborah Leong began development of Tools of the Mind over 15 years ago at the Metropolitan State College of Denver. The theoretical framework for the program is based on Vygotskian principles of teaching and learning. In 2001 Dr. Bordova and Dr. Leong published research on Tools Pre-K and Kindergarten students that found significant gains in literacy skills in comparison to a control group. That same year, the International Bureau of Education, an arm of the United Nations Educational, Scientific, and Cultural organization (UNESCO), named Tools an exemplary innovative educational program. Soon after that the International Reading Association designated Scaffolded Writing, a technique invented by Tools to teach early writing, as a model literacy technique.

Self-Regulation & School Readiness Research:

The link between self-regulatory skills and school readiness skills is well established in the empirical literature, especially for at-risk children.

- Both Blair and Razza (2007) and McClelland, et al. (2007) examined self-regulation in Head Start children during the preschool year and found it to predict math and literacy skills in both preschool and later in kindergarten.
- Duncan, et al.'s (2007) analysis of six longitudinal datasets provides further support for the linkage between self-regulatory skills and later literacy and math achievement.
- Still other longitudinal research has found relationships between preschool self- regulation and social competence in the classroom (Denham, et al., 2003; Eisenberg, et al., 1997). In three of these reports (i.e., Blair & Razza, 2007; Duncan, et al., 2007; McClelland, et al., 2007) self-regulatory behaviors *uniquely* predicted children's academic outcomes. This means that the better children's self-regulatory behaviors the greater outcomes in general academic readiness. This lead Blair and Razza to argue that preschool intervention should focus on helping children

develop self-regulation as well as math and literacy skills. Some scientists have even argued that the ability to resist distraction, a skill scientists call "executive function," may be more important to academic success than traditional measures of intelligence.

On-going Research on the Tools of the Mind Curriculum:

Intrigued by the idea that a curriculum could influence executive function skills in a developmentally appropriate and cost effective way, the National Institute for Early Education Research (NIEER) began a randomized design study of the curriculum in 2004. The results of the study (Barnett, et al., 2008) found the Tools students to have higher rates of self-regulation. In addition to student gains, teachers trained in Tools scored higher in classroom management measures, used classroom time more productively, and had a higher rate of appropriate and cognitively challenging interactions, as measured by the Early Childhood Environmental Rating Scale (ECERS) and the Classroom Assessment Scoring System (CLASS).

In a follow-up study Dr. Adele Diamond (University of British Columbia Medical School) compared the self-regulation/executive levels of children in *Tools* preschool classrooms with a group of matched controls who did not attend Tools, and found higher levels of executive function/self-regulation as measured on neurocognitive tests (Diamond, et.al. 2007). Student levels of self-regulation were correlated with achievement levels on standardized tests (Woodcock Johnson, Peabody Picture Vocabulary test).

Tools is currently the subject of a number of rigorous research studies:

- Dr. Carol Hammer (Temple University) and Dr. Clancy Blair (New York University) are conducting a study to examine the impacts of Tools specifically on Dual Language Learners.
- Dr. Blair is also conducting a separate study to determine the extent of the effects of *Tools of the Mind* on aspects of self-regulation and self-system processes in children in Kindergarten through first grade. Specific emphasis is on how self-regulation affects emotion regulation, stress responses and learning of academic skills.
- Dr. Dale Farren and Dr. Mark Lipsey (Vanderbilt University) are conducting a large scale efficacy study.
- Dr. Jere Behrman (University of Pennsylvania) is studying the effects of an early childhood program on cognitive and non-cognitive variables, including school readiness and achievement, and physical health in developing countries. This study is taking place in Chile and the curriculum they are using is Tools of the Mind.
- Dr. John Levin (University of Chicago) has begun a 15 year longitudinal study of the effects of preschool intervention as opposed to a parent program on the development of academic and non-cognitive skills and child achievement.

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