



Tools of the Mind

Elena Bodrova and Deborah Leong

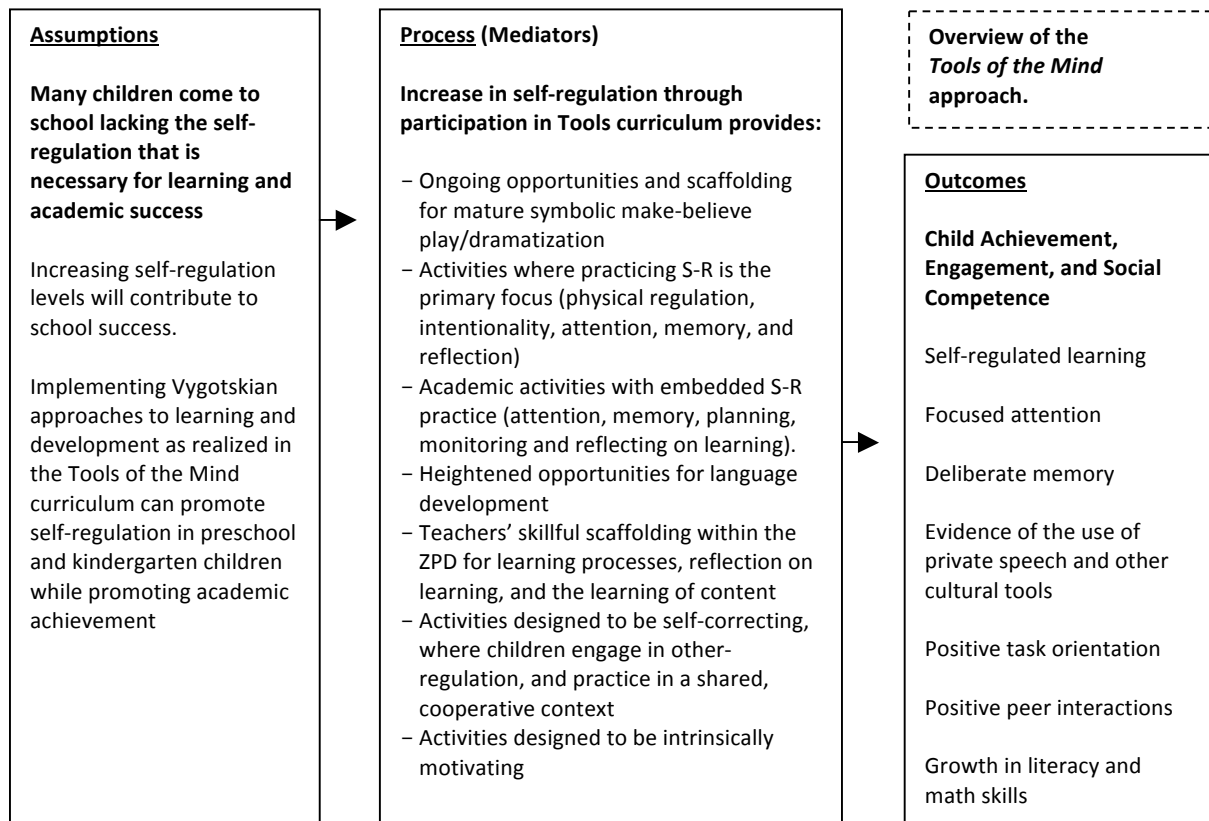
Key Facts about Tools of the Mind

Goal: Use teaching and classroom strategies to develop children’s self-regulation/executive function skills to promote effective learning and achievement.

Who: Preschool and Kindergarten age children, primarily at-risk children in urban settings.

What: Pre-Kindergarten and Kindergarten curriculum, teaching approach and professional development program for teachers. Trains teachers to use continuous dynamic assessment to scaffold learning and individualize instruction.

Where: Head Start classrooms, public preschools, classrooms with a majority of non-English speakers, and inclusion and self-contained special education programs.





Overview

Tools of the Mind (Tools) is an early childhood [pre-kindergarten and kindergarten] curriculum based on cultural-historical theory, developed by the Russian psychologist Lev Vygotsky. From the Vygotskian perspective, cognitive and social-emotional self-regulation¹ are viewed as an integrated unit, rather than separate domains. This approach has shaped the content and pedagogy of the *Tools* program.

Tools of the Mind is designed to produce both short-term and long-term results that have been linked in research to the development of self-regulation, which children apply to learning as well as social and emotional behaviors. In order to be successful in school and beyond, a child has to develop social and cognitive competencies that allow him or her to (1) become a deliberate, self-regulated learner capable of establishing adequate social relationships with other participants in the teaching and learning process, and (2) adopt the specific position and role of “student” characterized by such things as interest in the very process of learning, understanding the “standard” by which they will know if they are correct, understanding the relationship between effort to learn and outcome for any given learning task, willingness to play by the school rules, and readiness to follow the teacher’s directions, among others.

In a *Tools* preschool, children develop the underlying skills that lead to the ability to take this position. In kindergarten, they begin to practice these skills. The *Tools* kindergarten program provides practice thinking about “learning” itself through a calibrated process of making learning goals and judging whether or not these are met. Current practices prevalent in non-*Tools* Early Childhood classrooms ignore the importance of scaffolding children’s thinking about learning itself, and concentrate, instead, on content. These practices do not deliberately help children develop the capacity to judge whether their learning is “correct,” or more generally, whether they are meeting their own goals. In contrast, *Tools of the Mind*, consistent with Vygotskian pedagogy, aims to scaffold children so they can act as “masters of their own behavior.” Applied to a classroom setting, *Tools* children learn and behave differently and are less dependent on common classroom and behavior management tactics, such as rewards/punishments.

While some programs focus specifically on classroom management techniques and activities designed to promote social and emotional competence in children at risk for behavior problems, thereby addressing social and emotional development as separate from cognitive development, *Tools* addresses self-regulation in *all* activities. It also differs from programs that focus primarily on academic content, such as the development of literacy or mathematics skills, in that it considers the development of self-regulation to be integral to the acquisition of content. Unlike these other programs, *Tools* is based on the premise that the quality and quantity of academic learning is dependent on a child’s ability to cognitively self-regulate. This means that paying attention, remembering on purpose, and being able to flexibly move from one aspect of a learning task to another have a direct effect on how much children learn and how quickly they learn it. In this view, content provides a means for practice, but is not the sole end goal of learning.

¹ In this document, the terms self-regulation and executive function are used interchangeably, to mean inhibitory control, working memory, and cognitive flexibility.



Program Administration

Tools of the Mind has been used primarily with at-risk children in urban settings. It has been implemented in Head Start classrooms, public preschools administered by school districts, classrooms with a majority of non-English speakers, and inclusion and self-contained special education programs. Tools has gone from serving 6K students in 2008, to 30K in 2011, and is currently being implemented in 18 states, including large districts like Washington, DC, Toronto, Canada, and Santiago, Chile.

Teachers in *Tools* classrooms have Masters degrees, BA degrees, AA degrees, and CDA's. Teacher aides and assistants, who receive the same curriculum training as teachers, often have only a high school diploma.

Theory of Change

Self-regulation is defined as the control of emotion, attention, and physiological responses to stimulation through cognitive and behavioral processes and strategies that support goal-directed actions. There are multiple interrelated aspects of self-regulation, including executive functions, effortful control, and emotion regulation, which are important for the development of metacognitive thinking ability, and the child's sense of self-efficacy as a student. *Tools* is a systemic intervention affecting all components of the classroom in order to produce self-regulation and improved academic outcomes. In *Tools* programming, cognitive and social-emotional aspects of self-regulation are integrated, and self-regulation, primarily executive function (EF), is a) a primary focus, b) embedded in academic content, and c) embedded in symbolic make-believe play and games. These activities exercise self-regulation abilities while also strengthening the acquisition of academic content. Furthermore, these self-regulation-promoting activities are embedded in a system of instructional improvement that is theory-driven and clearly linked to assessment. Teachers are trained to use dynamic assessment and to link assessment to instruction that is individualized to different children's learning styles.

Key Components of the Program

- A necessary condition for the emergence of self-regulation is children's learning and internalization of specific cultural tools that would allow them to eventually use self-regulatory behaviors independently. These cultural tools become mental tools when the child applies them on his own. For example, one of the first tools that children in the program learn is self-talk, or "private speech" (Vygotsky, 1987). By talking or gesturing while doing an activity, a child can support the mental processes being learned in the activity as well as his or her attention and memory, which are a challenge when he or she is developing self-regulation.
- Children's self-regulatory abilities originate in social interactions and only later become internalized and independently used by children (Vygotsky, 1978). This means that in order to develop self-regulation, children need to have opportunities to engage in "other-regulation." Children must act both as subjects of another person's regulatory behaviors and as actors regulating other people's behaviors. Current practices used in non-*Tools* classrooms emphasize "teacher regulation," in which all activities are directed by the adult, rather than encouraging children to practice without continual teacher direction. In contrast, *Tools* embeds "other-regulation" into typical classroom practices to change the way that children interact with each other as they learn.

- Teachers in *Tools* classrooms provide individualized scaffolding to all children in all activities. Scaffolding interactions are used in the course of teaching to help a child transition from being assisted by an adult in performing a new task to being able to perform it independently (Bodrova & Leong, 2007). *Tools* programming is also based on the belief that only those interactions that fall within each individual's Zone of Proximal Development (ZPD) support the very skills and knowledge that are on the edge of emergence (Vygotsky, 1978). For this reason, activities in the *Tools* classroom are designed to account for a wide developmental range, enabling all children to learn. No child is held back by the group, and no child is left behind because the activity is too difficult.
- Teachers in *Tools* classrooms promote the essential aspects of mature and intentional make-believe play as a part of daily activities, and facilitate children's transition from make-believe play to playing games with rules. Essential aspects of mature and intentional make-believe play include (a) using toys and props in a symbolic way; (b) developing consistent and extended play scenarios based on a story; (c) taking on and staying in a pretend role for an extended play episode or a series of play episodes; and (d) consistently following the rules that determine what each pretend character can or cannot do (Bodrova & Leong, 2007).
- *Tools* professional development is designed to change teachers' understanding of self-regulation, its role in learning and development, and how they can support its development. The goal is for teachers to shift their role in the classroom from direct teaching of a group to individualized teaching and scaffolding within a *Tools* activity. During training, teachers are introduced to techniques to monitor children's attention and check for understanding. Eventually, teachers learn to concentrate on learning processes so that they make sure that children get the right answer for the right reason.

Activities in the *Tools* Curriculum

The *Tools* curriculum includes activities that focus primarily on self-regulation, such as:

- **Play Plans.** In this activity, preschool children learn to plan and monitor their own performance by drawing or writing about who they are going to be (i.e. a doctor, a baker) and what they are going to do in that role. Children are expected to follow their plans for the beginning of their play. The plan starts on paper, but is modified and negotiated with other children as each new make-believe situation evolves. The Play Plan has several functions: it helps children stay in their roles, which is critical for the development of self-regulation, and helps them decide whether or not they acted the way that they had planned. It also forms the basis for learning how to change and modify plans, and makes the rules of what is going to happen explicit, so that children can regulate one another.



- **Learning Plans.** This activity helps kindergarten children begin to monitor and evaluate their performance in learning activities. These plans help children remember which center to go to, which "must do" activity and work product to do in that center, and which centers they have not visited yet. In this way, Learning Plans help children stay on task when they finish with something in a given center. They also have a box for a child's study buddy to mark when work is finished, and in this way provide a means for children to begin to learn to review their own work by practicing "other-regulation." Finally, these plans help children reflect on their own learning. At the end of each week, during

Name: Gregory		Date: 5/22-5/24	
Study Buddy: Maxine			
1 Listening Center	<input checked="" type="checkbox"/>	1 Story and Charts	<input checked="" type="checkbox"/>
Alexander Very Good		HURDY	
2 Investigations	<input checked="" type="checkbox"/>	2 Friendship Center	<input checked="" type="checkbox"/>
FUR		Sentences	
1 Word Puzzles	<input checked="" type="checkbox"/>	1 Make a Book	<input checked="" type="checkbox"/>
sound Puzzles		OUR DES	
2 Literacy Games	<input checked="" type="checkbox"/>	2 Sound Center	<input checked="" type="checkbox"/>
BOOKS		SUCR	
My Learning Goal is: always in the sound center			



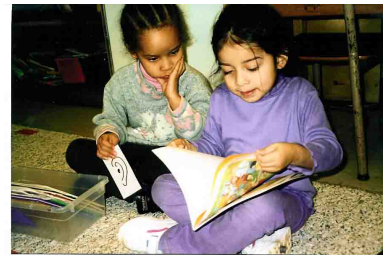
an individual Learning Conference with the teacher, the child, with the teacher’s help, sets a learning goal that is placed at the bottom of the next week’s Learning Plan.

- **The Freeze Game.** This activity also helps children gain experience in monitoring and regulating their performance. In this activity, children dance to music and are shown a picture of a stick figure in a particular position. When the music stops, the children freeze in that position. As the year progresses, the game becomes more difficult and involves additional steps.



The *Tools* curriculum also includes activities in which the development of self-regulation is embedded in academic content. These activities include:

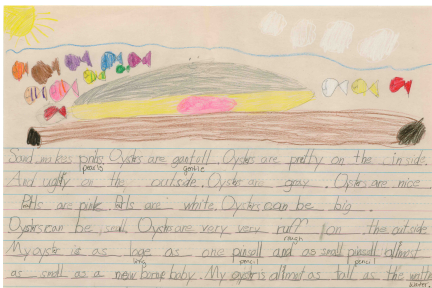
- **Buddy Reading.** This activity exercises self-regulation by requiring children to take turns and develop the ability to remain in the role of “reader” or “listener” for the entire activity. *Tools* teachers use visual representations of lips and ears to support self-regulation in this activity.
- **The Numerals Game.** This math activity follows a similar format, requiring children to alternate roles as “doers” and “checkers.”



The doer receives a number card and counts out that number of small teddy bears into a cup. The checker then takes the bears and puts them on a checking sheet with a numeral and corresponding number of dots. If the bears cover the dots with no extra bears, the children know that the number is correct. By taking on doing and checking roles individually, rather than simultaneously, in activities such as Buddy Reading and the Numerals Game, children are able to develop proficiency in each activity as well as an increased cognitive set-shifting ability.



- **Scaffolded Writing.** Invented by Tools in 1995, Scaffolded Writing embeds self-regulation/EF in the writing process. Children plan what they are going to write prior to writing. They then plan the message out by drawing a line to stand for every word. They then go back and depending on the child’s developmental level, they will represent each word with initial sounds, Initial and ending



sounds, until they reach the point of representing every sound using phonetic/estimated spelling. Many kindergarten children begin to use spelling or word patterns in their writing, leading to conventional spelling. In preschool, children add on to stories or write about what they see when they observe objects in science. In kindergarten, children summarize chapters the teachers have read to them in a fictional story and they write facts they want to remember after listening to fact books. Scaffolded Writing develops planning skills and the

ability to monitor one’s writing. Children reread their writing to their study buddy, encouraging self-monitoring for meaning by listening to your thoughts as you read.



Key Challenges and Barriers to Implementation from a School Leader's Perspective

- **An emphasis on self-regulation requires a new way of doing business at the school level.** Although it sounds like emphasizing self-regulation is intuitive, a focus on the development of children's self-regulation skills requires a huge paradigm shift for teachers, and making changes to traditional ways of teaching, and classroom and behavior management. For example -
 - Reinforcement is a widely used strategy to increase children's motivation to learn and complete tasks. Children wait until the teacher tells them that they are right or until the teacher praises them or may give them a reward, like a sticker. Tools requires teachers to abandon reinforcement strategies and instead focus on building intrinsic motivation. Children must engage in learning tasks without the external reward, but with an internal drive. To operationalize this in a classroom, teaching and learning activities have to be carefully designed in order to allow for children to self-monitor, plan and follow through. Put another way, teachers have to build in the children an understanding of how to follow the rules on their own even when an adult is not there.
 - Teachers have to teach differently in order to help children develop as self-regulated learners. In most classrooms, teachers focus on teaching new content and correcting children's errors. In Tools classrooms, teachers have to focus on helping children learn how to learn *while* teaching new content. This means that a teachers' feedback to a child is not primarily centered on the fact that the child made an error. Instead, a Tools teacher focuses her feedback to a child on what the child needs to understand in order to correct the error. In order for teachers to make this shift, they must have a deep understanding of the developmental trajectory for a given skill, and how that error fits into it.
 - Teachers have to provide children feedback on their learning in real-time, and place less emphasis on "grading" after the fact. The emphasis in early primary classrooms tends to be "you got 12 right and 10 wrong." Feedback is given long after children have forgotten what they were thinking when they made the mistake. In a Tools classroom, the teacher has to be able to give more immediate feedback when the child makes an error. The entire classroom has to be set up so that children practice on their own and learn to correct themselves, and the teacher walks from child to child examining the errors that are being made, and in real-time, helps the child understand what the mistake was and why it happened.
 - The classroom management system has to be set up in a way that children can run the classroom on their own. Instead of the teacher reprimanding children after arguments happen, the children have to know how to solve arguments on their own and the classroom rules have to allow for this. For example, in Tools Kindergarten we have a "dispute bag" which contains tools for solving the question of who goes first. These are cultural tools like flipping a coin or pulling a straw. Teachers have to make distinctions between children that are obedient and children that are self-regulated. This means that teachers have to abandon behavior management systems and let children develop strategies to control their impulses and conform to classroom rules and routines.
 - Teachers have to change their mindset regarding challenging child behaviors. Teachers in Tools classrooms understand the causes of behaviors like aggression and bullying in young children not to because of the child's personality and home life, but to be a result of a lack of self-regulation. Aggressive children usually know other alternatives for getting what they want, but at the moment of decision between hitting and asking, they cannot inhibit their initial reaction, which is to hit or grab or push. Teachers have to abandon strategies such as



“time out,” and view changing these behaviors as a learning goal that is influenced through the development of self-regulation skills.

- **Supporting teachers through the change process.** School leaders must recognize that the paradigm shift noted above can be a very difficult transition for teachers. It’s not uncommon to see teachers struggle emotionally, doubt their efficacy, and ultimately resist making the changes they need to in order to support self-regulation development. T
- Teachers that have a great deal of self-regulation themselves are more adept at making these changes. Teachers have to be able to suppress their own anxiety and their old teaching habits to take on this new way of doing and thinking. School leaders can be supportive to teachers by reinforcing that the learning goals in the area of self-regulation are a high priority and communicate to teachers that innovation in their teaching practice is highly valued. Finally, school leaders need to consider how to help teachers experiment and adopt new teaching strategies in the context of school accountability pressures.

Key Challenges and Barriers to Implementation at the Site Level

- **Adequate Teacher Training.** The goal is to transform teacher practice and make teachers more reflective and intentional. Developing a training program that has sufficient support for teachers, coaches, special education staff, and administrators has been far more difficult and time consuming than actually developing the activities. Many of the early childhood teachers in at-risk programs have low levels of formal schooling and professional preparation, and thus, require a great deal of intensive technical assistance, including video exemplars, and coaching support to internalize the strategies and activities they need to know to be able to implement the program with fidelity.
- **Training Trainers.** All *Tools* trainers are either ex-teachers or ex-coaches who have implemented the program in the classroom. Since it takes time for a person to gain enough experience with *Tools* to be able to teach it to others, developing trainer capacity has been a slow process. Moreover, our current training model relies heavily on direct contact with trainers to support implementation with fidelity. As such, we are limited in how quickly we can scale the program. Our ability to grow *Tools* is dependent upon our ability to train an adequate number of trainers.
- **Lack of Understanding of the role of mature make-believe play in developing Self-Regulation-Executive Function.** Pre-K teachers do not understand how to promote the kind of play that will increase a child’s self-regulation skills. In kindergarten the value of play in the development of self-regulation has been completely lost, and its value in promoting listening comprehension is also missed.
- **Funding for Teacher Training.** The *Tools* program is as much a professional development program for early childhood teachers as it is a curriculum that provides teachers with the how and what to teach. This means that programs that want to implement *Tools* must have access to resources to support professional development. It is often the case that programs budget only for curriculum manuals and not for teacher training to support implementation.
- **Providing Materials for the Classroom.** All of the materials necessary to implement *Tools* are things that teachers can make on their own or can download from the computer and print out. This is a strength of the program, as it is less costly and can be implemented in classrooms that have few other resources. At the same time, it presents a challenge when the teachers have little time to make materials or are not willing to do so, and the program lacks resources to purchase these materials.



Key Challenges and Barriers to Implementation in the Broader Context of Policy, Research, Resources, and Funding

- **The Nature of Self-Regulation.** Self-regulation is not easy to modify. We have been able to influence the levels of self-regulation for many children, but not all. For some children, it takes more than just the two or three years that they are in Pre-K and Kindergarten. Furthermore, our observations of children in first grade who have gone through the program reveal that self-regulation on its own is not enough for children to successfully meet the demands of formal schooling. Children have to have both a high level of self-regulation and the ability to read and to perform at grade level for math. Children who struggle with reading or mathematics are likely to lose self-regulation as they become frustrated.
 - As mentioned previously, *Tools* was originally only a preschool intervention. The program was extended into kindergarten at the request of a number of school districts, and a Bridge to First Grade program has been developed to extend many *Tools* activities into the primary grades. While we think it is necessary to extend *Tools* teaching tactics into the primary grades, the accountability pressures at these grade levels make the context challenging for maintaining a focus on self-regulation.
- **Expanding the Definition of Self-Regulation-Executive Function.** Outside of the field of neuroscience and psychology, self-regulation is often very narrowly defined as social regulation or impulse control, and conflated with social/emotional development. The contribution of self-regulation to cognitive skills and an understanding of how it influences the child's ability to plan, monitor, and be an intentional learner is poorly understood by many practitioners in the field of education. This more narrow view of self-regulation doesn't take into consideration how learning difficulties may have at their source self-regulation issues, thus, leaving open the possibility that interventions will emphasize just the social aspects of self-regulation, and be inadequate for influencing the underlying cognitive skills children need to be successful in school.
- **Measures of Self-Regulation.** The field is still in the earliest stages of developing assessments for self-regulation and looking at the relationship between self-regulation assessments and other measures of academic achievement. We do not yet know which self-regulation measures are the most sensitive, with particular concerns about classroom-based measures that may have low ceilings. We also need to understand more about which self-regulation measures are more predictive of later success. Many measures work at one age but not another, making longitudinal evaluation and experimental design studies difficult.
- **The Short-Term Orientation of Research Funding.** Self-regulation/executive function is being studied in a 2-year window at best. There are very few longitudinal studies being conducted, and very little funding is available for them. In addition, there is no funding available to study programs that extend for 3 years (as in the case of *Tools*, in which children can attend for two years in preschool and then go to a *Tools* kindergarten). It's also true that this short window makes it difficult for sites that have a high level of fidelity to be included in research studies. For example, it's been the case with *Tools* that in all five random control studies it's been a part of, the teachers have been in the first or second year of learning the program when data on child outcomes were collected. It is extremely difficult to measure outcomes and fidelity in tandem. We have learned from implementation science studies that fidelity in the second year of implementation is actually worse than in the first year and that it is really the third and fourth years where fidelity reaches its zenith. Finally, this short-term orientation does not allow one to study certain "latent" outcomes of intervention that may not manifest



themselves in the early school years, but may surface as school demands on children increase or change.

- **The State Standards Movement.** At the prekindergarten level, the lack of common standards across states and Head Start means that Tools often has to adapt activities to meet the differing expectation of what children should know and be able to do across programs and states. In kindergarten, the common core standards movement provides an opening for a greater focus on self-regulation, however, this has not yet translated to implementation at the district and classroom level. Therefore, in the absence of standards specific to self-regulation, it's likely that decisions about teaching and learning at the early primary grades level will not place an equal emphasize on self-regulation skills and continue to focus on implementation of new academic content standards.
- **Assessment Practice and Policy.** Related to the point noted above regarding little emphasis on self-regulation in the early primary grades, assessment practices in kindergarten continue to be too narrow focusing on testing or evidence of progress on narrowly defined literacy outcomes. This has serious implications for teaching and learning, as teachers tend to want to focus pacing of instruction and favor certain pedagogical approaches that are likely to show more immediate progress on a narrow set of early literacy skills, which may or may not be the most important to emphasize early in the kindergarten year.
 - *Tools* has worked with districts and state departments of education to try the program without the burden of testing and assessment in the first year. Work with Head Start has depended entirely on the grantee. In some programs, where the administration has been committed to working out these issues, the program has been implemented in full.
- **School District Organization and Turnover in Administrations.** Some school districts are highly centralized, and upper administration is adept at helping teachers adapt to new curricula. Other districts are not, making implementation spotty at best. Along the same lines, teachers unions may support changes in curriculum, but they can also file grievances against their districts so that they do not have to adopt anything new. Principals often do not have experience teaching in either preschool or kindergarten with recent evidence showing that in fact many have little experience teaching primary grades. This limits their ability to evaluate and know what is “self-regulated” behavior in young children and knowing what activities are developmentally appropriate for this age group. The biggest barrier, however, is turnover in Superintendents or upper-level staff. There is never a guarantee that a program that is started will be continued.
 - *Tools* has developed a special training program and iPad application to help Principals understand the program and know when it is being implemented well, so that they can effectively evaluate teachers and be motivated to have the program continue.
- **Maintaining Fidelity.** Districts and programs may want to bring in other activities that they feel the children need, but these activities are unlikely to have theoretical coherence with the *Tools* approach, which aims to ensure that the classroom remains focused on self-regulation.
 - *Tools* has developed an endorsement process for teachers in their second year to ensure that the fidelity of the intervention is being maintained. In this process, which is free to the district, teachers submit answers to a set of written questions, videotape their work in the classroom, and produce a paper reflecting on that video footage. Endorsement lasts for 3 years, after which teachers must re-apply. *Tools* also pays a number of endorsed teachers to help with first year training in other districts and states, and uses the endorsed teacher pool to recruit trainers and coaches for other districts.



References

- Barnett, W. S., Jung, K., Yarosz, D., Thomas, J., Hornbeck, A., Stechuk, R., et al. (2008). Educational effects of the Tools of the Mind curriculum: A randomized trial. *Early Childhood Research Quarterly, 23*(3), 299-313.
- Berk, L. E. (1992). Children's private speech: An overview of theory and the status of research. In R. M. Diaz & L. E. Berk (Eds.), *Private speech: From social interaction to self-regulation* (pp. 17-53). Hillsdale, NJ: Lawrence Erlbaum.
- Bodrova, E., & Leong, D. J. (2007). *Tools of the Mind*. (2nd ed.) Columbus, OH, Merrill/Prentice Hall
- Diamond, A., Barnett, S., Thomas, J., & Munro, S. (2007). Preschool program improves cognitive control. *Science, 318*, 1387-1388.
- Frenyough, C. and E. Fradley (2005). "Private speech on an executive task: relations with task difficulty and task performance " *Cognitive Development 20*(1): 103-120.
- Luria, A. R. (1969). Speech development and the formation of mental processes. In M. Cole & I. Maltzman (Eds.), *A handbook of contemporary Soviet psychology* (pp. 121-162). New York, NY: Basic Books.
- Shue, P. L., Shore, R. A., Lambert, R. G., (2012). Prekindergarten in public schools: An Examination of Elementary School Principal's perceptions, needs, and *confidence* levels in North Carolina. *Leadership and Policy in Schools, 11*, (2) p 216-233.
- Vygotsky, L. S. (1987) Thinking and speech. In R.W. Reiber & A. S. Carton (Eds.), *The collected works of L. S. Vygotsky: Vol. 1. Problems of general psychology* (N. Minick, Trans.) (pp. 39-285). New York: Plenum Press. (Original work published 1934).
- Vygotsky, L. (1978). *Mind in society: The development of higher mental processes*. Cambridge, MA: Harvard University Press.
- Vygotsky, L. S. (1967). Play and its role in the mental development of the child. *Soviet Developmental Psychology, 5*(3), 6-18.