

From High Chair to High School:

Research-Based Principles for Teaching Complex Thinking

Roland Tharp and Susan Entz

Imagine a classroom—or if you are fortunate, remember one—like this:

Teachers and students work together on real products, real problems. Activities are rich in language, with teachers encouraging students to develop their capacities to speak, read, listen to, and write English and the special languages of mathematics, science, the humanities, and art. Curriculum is taught through meaningful activities that relate to the students' lives and experiences in their families and communities. Teachers challenge students to think in complex ways and to apply their learning to solve meaningful problems. The classroom is full of talk; the basic teaching interaction is conversation. A variety of activities take place simultaneously (individual work; teamwork; practice and rehearsal; mentoring through side-by-side, shoulder-to-shoulder teacher-student work). Students have systematic opportunities to work with all their classmates. They learn and demonstrate self-control and common values: hard work, rich learning, and helpfulness to others.

This classroom description is an enactment of the research-based practices demonstrated to be most effective for all populations we have studied (Tharp et al. 2000), kindergarten through middle school. Four decades of research in the field of education and diversity have produced a clear and solid body of evidence strong enough to guide teachers, regardless of the languages, ethnicities, race, or prosperity of their communities. No matter children's cultures, races, individual interests, or abilities, these findings apply and thus are particularly appropriate for fully inclusive classrooms.

The authors both work with the national Center for Research on Education, Diversity and Excellence (CREDE) and the senior author worked with its predecessors, the National Center for Research on Cultural Diversity and Second Language Learning and the Kamehameha Early Education Program (KEEP). There we conducted 200 studies of children considered to be potentially at risk of academic failure due to cultural and linguistic diversity, race, poverty, and geographic isolation. The children we studied include Latinos, Native Americans, Native Hawaiians and Alaskans, Asian and Caribbean immigrants, and African Americans and Whites living in poverty in inner cities and rural mountain settings. These are the children who frequently have been left behind and who continue to be left behind, although knowledge is available for reforms that would bring them all along into school success.

The research work has been slow, laborious, and careful. Drawing from our own work and from all our colleagues', we used analytic deduc-

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Photos courtesy of Susan Entz.

tion to discover five elements present in all successful programs for at-risk students:

- joint productive activity
- language and literacy development across the curriculum
- contextualization
- challenging activities
- instructional conversation

These elements lead to improved academic performance, school attendance, dropout rates, student engagement, and/or parental and community satisfaction. Regardless of grade level, cultural or racial group, or subject matter, two or more of these elements were present in successful programs.

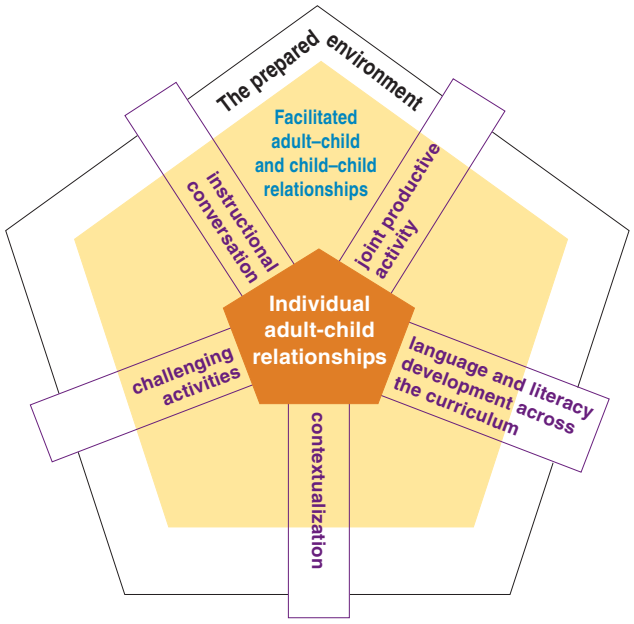
We then spent five years seeking exceptions to these universals, urging colleagues (through print, Internet, television, speeches, focus groups) to help us find them. We found none. For the next 12 years, we systematically studied these universal five elements, separately and in combination. Finally, we refined the elements into Five Standards for Effective Pedagogy.

The word *standard* was selected for its more traditional use, that of a banner or flag around which to rally and that guides the way, rather than its usage as a criterion that establishes levels of performance. "As banners, the pedagogy standards convey ideals, not templates" (Dalton 1998). In this paradigm, standards provide general guidance for teachers, schools, and teacher educators interested in pedagogy and its effects on learning (Tharp et al. 2000). Now we are able to measure the degree to which teachers are enacting the standards and to assist them through training and coaching (Doherty et al. 2002).

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The evidence is clear. Using all appropriate methods, from ethnography to experimental random-assignment trials, in kindergarten through middle school, the findings are uniform. These elements have been tested on special education populations as well (Gallimore, Tharp, & Rueda 1989). The more the five standards are present in a classroom, the higher the student scores on standardized tests of academic achievement (Tharp 1982; Hilberg, Tharp, & DeGeest 2000; Doherty et al. 2002, 2003; Tharp et al. 2003).

Creation of a Community of Early Learners through Implementation of the Five Standards for Effective Pedagogy



The five standards

1. Joint productive activity: Students and teachers producing together. Working together toward a common goal is the ideal setting for encouraging mutual assistance and for developing language in meaningful contexts. It is especially valuable for teachers to participate with children during activities; there they can see, evaluate, assist, and be most responsive to each child's strengths and needs.

2. Language and literacy development: Developing language and literacy across the curriculum. In every activity, throughout every domain of instructional goals, the teacher has a metagoal: developing children's language and literacy.

3. Contextualization/making meaning: Connecting school to students' lives. Every major theory of human development—from cognitive science to sociocultural theory—assumes that understanding develops by connecting new information to things already known. Embedding the abstract goals of school in the knowledge, experiences, and values of children and their families increases retention and comprehension more than any other single strategy.

4. Challenging activities: Teaching complex thinking. Children learn what they are taught, and the more the teacher challenges them to use ever more complex thinking, the more they grow into it. The human

brain is designed to seek new experiences and incorporate them into its developing structures (Shonkoff & Phillips 2000). Since learning changes the physical structure of the brain, compelling cognitive challenges have a decisive and long-term impact on the actual architecture of the brain (Shore 1997; Bransford, Brown, & Cocking 2000).

5. Instructional conversation: Teaching through conversation. At times children do need to listen in large groups, to hear instructions and follow them, and to practice some routines together, with teacher leading and children chorusing. But this is not the ideal context for learning, and there is no warrant in research or theory for allowing whole-group instruction to increasingly dominate classrooms, from preschool through high school. Rather, individual and small group dialogues, pervasive in the quality preschool classroom, offer the ideal model for learning. Only in dialogue, an instructional conversation, can a teacher assess and assist in maximum responsiveness to children's development.

Although we discuss each standard in turn, all five are integrated facets of a unified classroom experience, just as in the ideal classroom described in the opening and the effective learning environment presented on the pages that follow. Each standard is important and even when used alone can enhance teaching and learning. However, when used in combination, the five provide a powerful teaching approach. When teaching and learning are organized in these ways, research consistently shows higher student achievement, engagement, pleasure, and harmony. But *why* is that so?

Key adult-child interactions at home

A clue lies in the ways families prepare their infants and children in the first three years of life for the greatest success in school (Shonkoff & Phillips 2002). Infants and children who will one day be successful in school are immersed in conversations with their mothers and fathers and families, beginning with infant babble. When a baby notices something, the mother talks to her about it. The mother also draws the baby's attention to interesting people, things, and books and begins to read stories when the child can only point to the letters and pictures. These conversations are always more complex than a learning child can fully comprehend, but the parent leads the child into the challenging zone of new vocabulary and new thoughts (Hart & Risley 1995). The five teaching standards describe teacher-child interactions that maximize those same interactions. This is perhaps the best explanation of why the CREDE standards, like the parent-child interactions in Hart and Risley's research, lead to higher child academic readiness and achievement (Doherty et al. 2003).

The most likely explanation for the effectiveness of the standards is that they create the nearest possible school equivalent of a family environment filled with conversation and opportunities to engage in complex thinking.

Learning in the context of the natural environment promotes inquisitiveness and persistence because the issues are meaningful to the child. Minds are fundamentally developed in relationship-based activities. How better can adults create comfort and confidence than by enacting their love through listening, conversing, assisting, and doing things together with their children?

Children prepared in this way are given the tool kit of language, thought, and love of learning that is school readiness. Children who hear far less language, see far less text, and receive verbal communications consisting primarily of directions and warnings from their caregivers lack the necessary skills for success in the classroom. Many schools do not offer this tool kit to children; they presume that families have provided it. And so the achievement gap is evident on the first day of school and widens every day thereafter.

Teachers in schools that transform their classrooms—under the Five Standards for Effective Pedagogy—do not assume that children have these language and thinking skills; they *teach* them. So the most likely explanation for the effectiveness of the standards is that they create the nearest possible school equivalent of a family environment filled with conversation and opportunities to engage in complex thinking. Because the continuity of effective learning environments at home and school is most obvious at the point of the transition—preschool—we draw our examples from there.

Developmentally appropriate practice and the five standards in action

The congruence between CREDE's five research-based standards and NAEYC's developmentally appropriate practices (Bredekamp & Copple 1997) is evident in a literature-based unit presented by early childhood

teacher Sheri Galarza at the Kamehameha Preschool on the Island of Hawaii (Tharp, Entz, & Galarza 2002). The preschool serves four- and five-year-olds of Native Hawaiian heritage, from families of modest means, whose first language is largely Hawaiian Creole. When planning any new unit, Ms. Galarza reflects on her individual preschoolers and on the rural lifestyle of the community, where wild boars roam the mountains and some families keep livestock.

Making meaningful connections

The four-year-olds recently embraced the story of the Three Little Pigs and are now enthusiastically reenacting it. They talk about family experiences with wild pig hunting, and the class visits a high school animal-husbandry project to see pigs in a farm setting. Drawing upon their own firsthand experiences with both wild and domesticated pigs makes the story more meaningful to the children. The teacher guides a conversation about experiences with real animals and those in storybooks, stressing the difference between things that are real and those that are pretend. Ms. Galarza realizes that the pig activity presents a solid base for future learning. She also knows that one family has a goat, so she builds a Five Standards unit around the traditional tale of the Three Billy Goats Gruff.

Ms. Galarza introduces this new book at circle time, teaches the group a song about a troublesome troll, and then involves the children in planning a field trip to a coffee farm where a goat resides. The children benefit from the firsthand experiences of touching the goat's beard, watching it feed on grass, and hearing the *trip-trap-trip-trap* of its hooves on the driveway, just like in the book. For

Congruence between CREDE's Five Standards and NAEYC's Developmentally Appropriate Practice

Five Standards for Effective Pedogogy	Developmentally Appropriate Practices (Bredekamp & Copple 1997)
Standard 1—Joint productive activity: Teachers and students producing together	Children develop and learn best in the context of a community where they are safe and valued, their physical needs are met, and they feel psychologically secure (p. 15). Development occurs in a relatively orderly sequence, with later abilities, skills, and knowledge building on those already acquired (p. 10). Early experiences have both cumulative and delayed effects on individual children's development. Optimal periods exist for certain types of development and learning (p. 10).
Standard 2—Language and literacy development: Developing language and literacy across the curriculum	Domains of children's development—physical, social, emotional, and cognitive—are closely related. Development in one domain influences and is influenced by development in other domains (p. 10).
Standard 3—Contextualization/making meaning: Connecting school to students' lives	Development and learning occur in and are influenced by multiple social and cultural contexts (p. 12).
Standard 4—Challenging activities: Teaching complex thinking	Development proceeds in predictable directions toward greater complexity, organization, and internalization (p. 10). Children are active learners, drawing on direct physical and social experiences as well as culturally transmitted knowledge to construct their own understandings of the world around them (p. 14). Development advances when children have opportunities to practice newly acquired skills as well as when they experience a challenge just beyond the level of their present mastery (p. 14). Children demonstrate different modes of knowing and learning and different ways of representing what they know (p. 15).
Standard 5—Instructional conversation: Teaching through conversation	Development proceeds at varying rates from child to child as well as unevenly within different areas of each child's functioning (p. 10). Recognition that individual variation is not only to be expected but also valued requires that decisions about curriculum and adults' interactions with children be as individualized as possible (p. 9).

the children with no previous experience with goats, such sensory explorations provide the cognitive structures needed to make the literary experience more meaningful.

Each member of the class, including those with language and other developmental delays, can make the connection between the fictional characters in the story and the habits of real animals that live in their community. An important home-school-community connection is forged, and both the story and the field trip create a common context for subsequent activities.

Teachers and students producing together

Later in the week Ms. Galarza works with small groups to plan a reenactment of "The Three Billy Goats Gruff" using large stick puppets and a building block bridge. Each child learns all the roles in the play. For example, the teacher reminds the group that the troll in the story bellows, "Who's that walking on my bridge?" They discuss the tone of voice and decide that the troll would say his part in a mean voice. Then the children in the small group all practice the troll's lines. After learning the parts, the group decides by consensus who will portray each character. Ms. Galarza agrees to narrate the story and serve as the informal director.

Digital photographs are taken during each group's dramatization and used to make group books in which the children sequence the events in the story and dictate captions for the pictures. Ms. Galarza reads the stories to the whole group, and the books become popular selections in the library corner (Entz & Galarza 2000; Rivera et al. 2002).

Complex thinking and language and literacy through instructional conversation

After reenacting the story, each small group talks about the troll's behavior. The children decide that he's mean and a bully. They think he probably doesn't have any friends. Because forming friendships is very important to these four-year-olds, they consider this a serious problem. The teacher suggests that the children use their own experiences in making and keeping friends to write an advice column to the troll. In the process, the children practice listening carefully as others speak, comment on and reinforce suggestions made by their classmates, and volunteer their own solutions. The group moves from suggestions on personal hygiene, such as "Brush your teeth," to more sophisticated advice on social interaction, such as "Use your words" and "Don't butt heads."

The teacher records each suggestion and then encourages children to sign their names next to their ideas. The four-year-olds decide to read their advice column to the rest of the class during the second circle time, then post it on the door for their parents to see at the end of the day.

The process of meaningful and sustained dialogue is not always easy. The more verbal children offer their suggestions quickly and their words flow smoothly. For other children, the process of taking in the question, contemplating it, and then organizing a response is slow and labored. The teacher sets a warm, supportive tone for these children, giving each one plenty of time to participate. The children learn that waiting for a child whose verbal skills are less developed sometimes yields keen insights that contribute to the strength of the overall product.

Each small group dramatizes the story and participates in a small group project. In addition to the advice column, small groups explore different ways to confront a bully and other approaches the troll could have used to get what he wanted.

Extended activities

When the small group activities are over, Ms. Galarza puts the props in the dramatic play center, which becomes a popular activity choice during center time. Because each class member learned all of the story roles and participated in the informal plays, the story takes on changes of plot and additional characters as the experienced thespians improvise their own story lines.

A variety of activities related to goats and trolls are added to the learning centers, across the curriculum, to reinforce key concepts of the story. Because Ms. Galarza identified specific content and developmental objectives for the class and for individuals before the unit began, the learning center activities are designed to offer theme-related opportunities to reinforce emerging skills.

Some children develop math concepts by sorting objects into sets of small, medium, and large and making color and size patterns with small plastic goats. Others improve motor skills by creating goat pictures using a negative painting technique at the easel. Pop-up troll cards encourage writing, games built on the story's *trip-trap* sounds promote phonological awareness, and two-part word-picture matching games are popular additions to the literacy center. Among a host of other activities, the children assemble a goat puzzle, eat goat cheese for snack, and fashion troll characters out of playdough. The library center features a variety of fiction and nonfiction books about goats as well as the child-made books created throughout the unit.

Class progress is measured against the group objectives identified at the beginning of the unit, and the Work Sampling System (Meisels et al. 1995) is used to document individual progress.

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Culminating activity

The culminating activity for the unit gives the four-year-olds a chance to don billy goat headbands and go trip-trapping along the sidewalk to enjoy a picnic in a grassy meadow. During the extended unit, the children are exposed to developmentally appropriate activities built around strong, research-based instructional principles. They develop into a strong, supportive community of eager learners. And they have as much fun as gamboling goats.

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