

The Miracle of Learning

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The Prism of Learning Model

Prism (priz'em) n. a crystalline solid with at least three similar faces paralleling a single axis, for producing or analyzing a continuous spectrum.

Think of the light coming out of a prism. It's beautiful! That's the way we need to think of the minds of our children. They are beautiful! They are like iridescent rainbows with a spectrum of colors, sparkling and twinkling. Each is unique with its own combination of colors, shades, and shapes. The present world has a lot of technical knowledge, but it cannot necessarily produce more geniuses or better people. Intellectual ability is still there in everyone—we just need someone to turn on the switch. Educators can be the most important “illuminators,” especially for children without advantages in their home environments. If we turn on the switch, we will see thousands and thousands of beautiful colors!

The miracle of learning prism has three sides. On one side is the environment, another the competencies or outcomes we expect from learners, and on the third side are the learning processes. In the middle, or the axis, are human abilities. Often, the three dimensions are not in harmony, and seldom do we synchronize these dimensions with the inner, natural abilities of children. Our responsibility as guides in the learning process is to create more harmony in all dimensions so that the full spectrum of abilities can be integrated and separated in the same way that a prism refracts the light. We must provide the kind of environment that will enable each child to be illuminated from within.

Problem Solving: The Key Construct in Intelligence and Creativity

At the heart of all theories of intelligence and creativity is the concept of problem solving. Various theories exist to explain the abilities needed to resolve everyday problems as well as to create new knowledge. We will use a simple definition: A problem is “a question or situation that presents doubt, perplexity, or difficulty; a question offered for consideration, discussion, or solution” (Webster's II: New Riverside University Dictionary, p. 937). A problem is not necessarily bad. It is a **challenge**: something we want to resolve, change, or create. Problem solving, then, is the process of answering questions, resolving difficulties, creating solutions, and investigating perplexing situations.

To solve problems, we must use five general capacities—memory, creativity, logic, intuition, and metacognition—and nine types of human abilities: social, emotional, somatic, visual, auditory, mathematical, linguistic, mechanical/technical, and scientific. Each of these capacities and abilities will be defined as we explain our model in the following sections.

General Capacities

Memory

Remembering information and experiences is the most basic of the general intellectual capacities. To recall a previous experience or data received at an earlier point, we must not only encode it in some way, but we must be able to access or recall that information or experience. We must be able to bring it out of storage so we can use it in a meaningful, relevant way in a present situation.

Creativity

Creativity is a general capacity necessary to the functioning of all the dimensions of human abilities. Creativity is the ability to think of, develop, or implement unique and appropriate ideas or solutions. Creativity can result from the association or connection of previously unconnected ideas or things. Ideas or solutions that are creative can be new to the world such as when a scientist develops a revolutionary new theory, or can be new to the individual such as when someone creates a new recipe for cooking!

Reasoning/Logic

Reasoning or logic is the general capacity to think in systematic ways, and is a necessary element in all human abilities. The logic necessary to solve a problem in one area may be very different from the logic necessary to solve a problem in a different area. For instance, a humanitarian problem cannot be resolved simply by using numbers and symbols, nor can it be solved through application of formal principles of physics. However, logic has a clearly defined set of principles that can be explained or demonstrated in some way so that others see a chain or connection in the reasoning process. Logical reasoning is a necessary part of evaluating ideas before selecting one as the solution to a problem, and is the key element in “critical” thinking.

Metacognition

Metacognition is self-awareness and the ability to monitor one’s own thinking. It is the general capacity to reflect on your own problem solving processes, identify your own logic (or lack of it!), see your own flaws, recognize your intuitive insights, and think about your thinking. Metacognitive ability also includes the ability to decide which of your own abilities to use at a particular time—when to be creative or when to be critical, for instance.

Intuition

Intuition often is thought of as the opposite of logic or reasoning, and can be described as the act of knowing without the use of identifiable processes. However, intuitive insights are not illogical! In fact, they may be highly logical. However, the individual may not immediately know the steps necessary to demonstrate the logic of her ideas. Intuition is the ability to know something immediately—without going through steps or sequences of thought. Intuition is the language of understanding, and can be considered our real **first language** while the words, symbols, and sounds we learn are part of our **second language**. Gifted people often can’t make others understand what they mean because they have a hard time conforming their first language into their second language. Their ideas are so complex they often do not have the words or the structure to explain the knowledge they have gained through their first language. Others have a hard time understanding them because they don’t have the structure to see or comprehend the gifted person’s ideas.

Human Abilities

At the most specific level, humans have nine different types of abilities: social, emotional, somatic (touch, movement, taste), visual, auditory, mathematical, linguistic, mechanical/technical, scientific, and spiritual. People have a spectrum of abilities—a broad range of related qualities that are combined in many different ways to solve problems, meet challenges, and create new products. In all activities and careers several of these basic types of ability are needed. However, most activities and careers have two or three that are dominant, and therefore essential to success.

Social abilities are skills we need to get along with other people.

Emotional abilities are the skills we need to manage our emotions.

Mathematical abilities consist of the use of abstract models, numbers, mathematical figures and objects that symbolize abstract ideas.

Somatic abilities include large muscle movement as well as small muscle movements, and also include touch, taste, and smell.

Visual abilities include seeing things accurately and clearly through one’s physical eyes as well as seeing images clearly in one’s mind.

Auditory abilities are skills in hearing, producing, and manipulating sounds.

Linguistic abilities are skills in using words.

Mechanical/Technical abilities are the skills needed to understand, create, and repair machines or other devices that perform or help perform human tasks.

Scientific abilities include observing, identifying, describing, classifying, studying, and explaining natural phenomena.

Spiritual abilities include knowledge, ability, and willingness to see beyond bodies and objects to develop awareness and understanding of phenomena related to the human soul or spirit.

Learning Processes

Learning processes can be explained by using the metaphor of a tree. Some learning processes include observing, feeling, connecting, decoding, remembering, imagining, composing, duplicating, symbolizing, translating, developing, crystallizing, transforming, playing, listening, searching, reflecting, sensing, enjoying, producing, exploring, engaging, and inventing. Some learning processes are conscious and some are subconscious. In the tree metaphor, this could be explained by comparing the root system of a tree to the system of branches. Some processes are above the surface while others are below the surface. The trunk, when cut, is the place where you can see evidence of growth over time.

Competencies

Competencies are the things we want children to learn as a result of school or life experiences. Often, educators attempt to categorize or compartmentalize these competencies, separating the academic subjects in artificial ways. Knowledge is connected and interdependent just as our bodies and all natural systems are connected and interdependent.

We have defined key ideas for each age and grade level and have recommended ways to integrate important information and competencies from the traditional academic disciplines into each of these themes. For example, individuality, change, patterns, relationships, cycles, and environment are key ideas for young children in the early grades (Grades K to 2), while conflict, communication, cooperation, interaction, and structures are important ideas to internalize during the middle elementary years (Grades 3 to 5). Middle school students (Grades 6 to 8) need to understand concepts such as culture, extinction, exploration, diversity, and systems. Secondary students (Grades 9 to 12) need to struggle with ethics, beauty, harmony, invention, and interdependence. They also must revisit all the other themes with an emphasis on development of competencies needed for life success.

Learning Environment

The environment influences growth, but does not dictate how the growth will occur. Using the metaphor of the tree, we can see that if a tree does not have enough water, it will not grow as much as it will with plenty of water. On the other hand, if it has too much water, it also may die because of its leaves rotting. However, trees are capable of making adaptations to changing conditions. For example, in the fall and winter, deciduous trees shed their leaves and become dormant to survive lower temperatures. When they do not get enough water, they often will shed their leaves, enabling their precious water supply to be used by the main trunk—the part necessary for survival. The same is true with people. If the environment is too strong (as with too much or too little water), the environment will dominate the adaptation, but if it is more neutral (as with regular rain and drought cycles) the person will grow normally and make her own adaptations. Remember, though, that humans have a wider range of adaptive capabilities, and may also be more sensitive to environmental conditions.

The learning environment has two major components: **physical** and **dynamic**. The physical environment includes color, shape, temperature, light, sound, textures, and materials. The physical environment includes buildings, playgrounds, trees and other natural things as well as the way the teacher sets up the classroom, organizes the chairs, puts posters on the walls, and organizes input or stimuli. The dynamic environment includes the teaching methods and processes as well as the ways teachers interact with children. The activities the teacher organizes, the questions she asks, the reinforcement or punishment methods used, and the classroom management techniques are part of the dynamic environment.

How to Make Learning Miracles Happen

We think the best way to make learning miracles happen is to set up a learning center (as big a room as possible) with a “corner” or special place for each of the human abilities except social and spiritual. Put in a

creative, empathic, knowledgeable teacher/guide, include both individual and group activities that are challenging and engaging; bring in the children, and let them explore and discover! Sounds simple, doesn't it? Actually, it is, once you get it all set up. It's fun, too, for both the teacher and the children! We are working on manuals and examples to provide guidance to everyone who wants to make learning a miracle happen. Here is a general description of a center.

Overview of the General Plan

In each corner, put materials that children can use independently, materials that are flexible and have much potential to excite curious minds—materials that can be used to challenge children at many different levels of ability. The materials must be well-chosen and durable. The learning spaces for each “corner” need to be large enough to accommodate 5 or 6 students at a time without being crowded. Children need places to work and talk with others as well as places to work alone.

In the center of the room, put general tools such as computers, video equipment, audio recorders/players, and printers. In this center, also include a space where students can gather to have group activities and to talk about projects. A round space is preferred since it will facilitate student interaction. Around the periphery of this round space, put containers that can hold individual cards with activities for children to do. These cards are re-usable and color-coded, and they contain suggestions for problem solving activities to be done either alone, with a partner, or with a group of students.

The problem solving activities are related to both the competencies and the human abilities. The children will solve problems that are well-defined as well as problems that are “fuzzy and undefined.” The challenges included in the cards are designed to develop the children's general capacities of creativity, intuition, reasoning, and metacognition as well as their competencies (e.g., individuality, change, relationships, conflict, structures, exploration, systems, ethics, harmony) and their learning processes (e.g., observing, feeling, connecting, composing, transposing, remembering, sensing, inventing). In other words, these activity cards are designed to integrate the outer surface elements of the prism of learning with the inner axis of the prism—the spectrum of human abilities.

If the center is in a school, the children from each classroom come to the center with their class and their teacher. Usually, a group activity is planned at the beginning. This activity usually involves social or spiritual abilities, but can also be designed for other purposes: to help children learn some concept, to exercise a particular learning process, to introduce them to new materials or to materials they have not been using, or to serve another important purpose identified by the teacher(s). Group activities are limited to 10 or 15 minutes except in special instances.

Most of the children's time needs to be spent on self-selected activities. They need to be free to explore and discover in all the centers, and to spend an extended time in the problem solving activities that are of most interest to them. So, after the group activity, students may choose a corner. They go to a central place and take a marker or a card with the name of the corner where they will spend their time.

Near the end of the time that students will be in the center, bring all the students together. All students then record what they did during their time at the center. If they have pictures of products they developed, they put these in the portfolio, and they write or draw about their experiences. The teacher may also ask them to reflect on certain aspects of their participation or performance.

Assessment and Evaluation

Learning about the strengths and abilities of the children is an important part of making miracles happen. The assessment serves several purposes: to find out how to guide or assist children while they are in the center, to help children and their parents choose and organize learning experiences that will develop the children's natural abilities, and help everyone to teach each child more effectively.

The classroom teacher, teaching assistants, and the teachers in the center will use specially-designed checklists to observe each child as they participate in the activities in the center. These checklists include problem solving behaviors and characteristics of the things children produce. Observation must happen over a long period of time, be done with reliable and valid instruments, with a wide “lens,” and with multiple procedures and observers. Teachers use a system of rotation in which they make a special effort to observe a certain number of children each day. The number observed each day is determined by the number of students they see, and must allow them to observe each child at least 2 times each term. Teachers also will note special performances or products made by anyone, regardless of whether the child was one of the students to be observed that day.

A second aspect of assessment is a special assessment day. For one or two weeks each year, all students who use the center will participate in specially-designed assessment activities. One interesting, engaging activity will be set up in each corner. An adult who is interested in that corner or has high abilities in it—and who has practiced observing the activity—will be in the corner to observe the children as they participate in the activity. Observers will watch, take notes, and take photographs of the children's products. They will collect and photograph products such as artwork, written and oral stories, and other creations. Children will rotate through the centers. After all children of a particular group or grade level have been assessed, the observers will complete checklists of abilities and assign ratings to show each child's pattern of abilities.

A third aspect of assessment is examination of the students' portfolios. This includes their drawings, records of which corners they visited and the activities they did while there, and their reflections on their performance. Also included is a student self-assessment in each of the areas of human ability. At least once each term, students need to be asked to complete this self-evaluation.

Finally, teachers in the center compile the assessment information from all sources and have a conference to decide what they believe to be the most important abilities of each child. They also identify areas of challenge that may interfere with development or expression of the child's abilities. If additional assistance or another perspective is needed, they may invite an expert in the particular human abilities being examined or another person familiar with the child to join the conference. The teachers compile all information using the checklists and report forms, and schedule a conference with parents and teachers to discuss what they have learned about the child.

Authors' Note:

This new model was created by combining the research and development on two successful programs: DISCOVER and the Exploring Centers. DISCOVER originated in the United States and was created by June Maker and the Exploring Centers originated in Thailand and were created by Usanee Anuruthwong. Use of both has been expanded to other countries. However, we believe we have created a much more valid and practical model by combining two programs with a compatible philosophy and different strengths. Individuals interested in learning more about the two models that were combined are encouraged to read the publications and/or visit the web sites listed below.

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