Thomas C. O'Brien

in

Handbook of Basic Issues and Choices,

USOE, National Institute of Education

March 1982

“What’s Basic? A Constructivist View”

Thomas C. O'Brien
Director, Teachers’ Center Project
Southern Illinois University at Edwardsville

Editors’ Note: Much research on child development has implications for how children learn and how they can be helped to learn. Thomas O’Brien draws upon that research, including the work of Piaget, to highlight factors to be considered in basic skills instruction. O’Brien emphasizes that individuals each have their own personal construction which determines what they see and learn and that learning involves revising of those constructions (or constructs). o’Brien also emphasizes the distinction between the learning of isolated facts and the learning of genera/ principles. He suggests that active participation in problem solving is the most effective way to he/p children revise their constructs. This concept of constructing personal structures of the world is consistent with the discussion of schema theory in the Tiemey and Pearson paper but draws upon a different research tradition.

Did you see the film Casablanca? Or The Deerhunter? Did you see them with a friend? My wife and I almost always come away from a film with different reactions. “It was about war,” she said of The Deerhunter. “It was about human nature,” I said. “It was about friendship,” she said. “It was historically inaccurate,” I said. To this day our impressions of this film differ, albeit with some points of agreement.

We do agree, however, about Casablanca. We saw the film for the third time recently. As usual, we agree that we saw very different films. Moreover, we agree that each of us saw a very different Casablanca from the Casablanca we remembered.

Issues to Consider in Thinking about Basics

Constructions

People do not merely store what they experience. We are not cameras or photocopy machines. What we-all do is interact with the world. We screen reality. We act on it. We interpret it. We modify and re-form it according to the networks of ideas we have already formed.

But the things of the world act on us, too. When we see Casablanca, for example. the old networks of ideas about government, about Humphrey Bogart, about war, change to incorporate the new information we engage. So it is with all our dealings with the world.

Such a view—a constructivist view—sees people as active, not passive, in dealing with reality. It sees knowledge as a construction, not an accumulation. It sees people not as controlled by stimuli but as controllers of the stimuli, in the sense that they select and interpret and re-form the stimuli. It sees ideas as complex networks growing and alive, not as straight lines. It sees people’s main intellectual activity as organizing, and it sees the organizing, from the newborn’s touching and seeing and sucking actions to the physicist’s elaborate equation making, as tending toward coherence, stability, economy, and generalizability. Finally, it sees the human mind as not satisfied when it has achieved coherence but as actively searching for and creating novelty to engage, dissonance to conquer, risk to take. The mind is an organism, not a mechanism.

It’s as though we should all, children especially, be seen as wearing sandwich boards saying “Under Construction,” or even better, “Under Construction—Self-Employed.” But that is not at all to say that parents and schools have no role to play. They provide the raw material—experience—from which the constructions are built. And they must match the building materials to the builder.

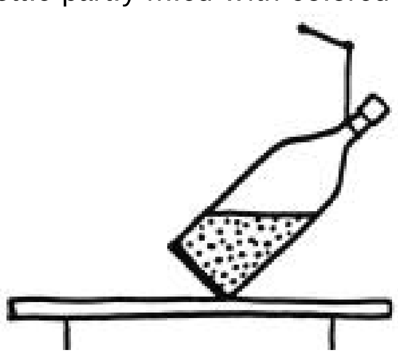
Developmental Aspects

When I was five years old, I made a tie rack for my father. The tie rack I would construct now would be very different. Similarly, the mental constructions one makes from age to age are very different. They are different in amount, of course—experience accumulates with age. But they are also different in kind, and it is this difference that has interested researchers over the past sixty years.

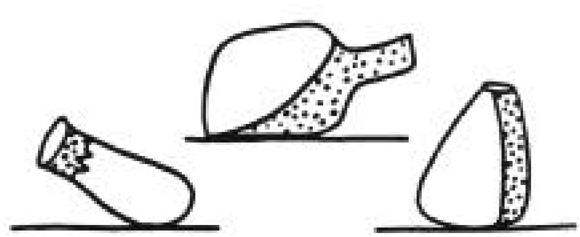
The research is far too lengthy and detailed to report here; one can only hint at its richness. The research ranges from the actions and coordinations of the newborn to the growth of language and organizing principles (number, time, causality, etc.) in young and school-aged children to the logical abilities of older adolescents. It generally concerns the questions, "What do people make of the world?" How do they organize the things of the world that they experience? How do they organize the things that they know already? And how does this organizing develop? Instead of asking about the effect of the stimulus on the organism (the usual question), the research asks about the effect of the organism on the stimulus.

The method- of research is often surprisingly simple. Much of the research involves careful observation of individuals as they solve problems. How does the infant reach for a rubber duck placed near his right hand when he already holds a rubber frog in his right hand and his left hand is free? He drops the frog and reaches for the duck with the right hand. Until about 6 months of age, infants rarely reach across the midline (Bruner, 1973, pp. 254-258). How does the child formulate the rules for a game of marbles? How does the seven year old infer how many candies are hidden if she saw ten originally, some were taken, and she now sees three? How do four year olds, seven year olds, and twelve year olds answer the question, "Why do clouds move?" How do the ten year old and the eighteen year old define "propaganda"?

The results are often striking. In one project (Inhelder, 1969) children aged five to six years were shown either a drawing of a bottle or an actual bottle partly filled with colored fluid.



An hour later, a week later, and six months later, they were asked to draw what they had seen. Commonly, children drew situations that they had not seen and could never have seen, because they could not exist in the real world.



Such findings (and they are abundant) make it clear that the mind is not a camera, that the mind selects, interprets, and reconstructs what comes to it in terms of its existing mental networks. Moreover, the findings show deveIoPmental change. In the research cited, 30 percent of children progressed at six months (without a new look at the bottle), 53 percent remained the same, and, in general, correct drawings after one week remained correct after six months.

Flow of Events

The research—sixty years worth in various cultures on a wide range of issues with the same general results—suggests that a construction is at once the coordination and elaboration of previous constructions and the springboard to future constructions. Some of the main events in the development of thinking are described below.

From roughly birth to twenty-four months, the child constructs and coordinates actions (looking, reaching, grasping, looking and reaching, etc.) that progress from being ends in themselves to being means to ends of purposeful behavior; begins symbolic and representational thought and action (imitation of people or objects no longer present, symbolic play, drawing, and language); and constructs one of the milestones of intellectual growth, the notion of object permanence. This notion that an object exists independent of a person's observations or activities is one of the fundamental supports of rational life. (Imagine what life would be like if objects were thought to lose their existence when we ceased contact with them.)

Just as the two year old is different from, not merely more than, the newborn, so is the six or seven year old qualitatively and quantitatively different from the two year old. From two to six years, the child constructs a wide variety of abilities, the most extraordinary of which is the acquisition, elaboration, and coordination of language and communication skills that enable him or her to interact more fully with the world. What an incredibly complex job this is!

But the child still has a long way to go. During the school years still new advances of fundamental importance take place. one of childhood's dominant characteristics is egocentrism, the view that one's concepts, percepts, and points of view are the only ones possible and thus are shared by the whole world. (Egocentrism is dominant in, but by no means confined to, childhood.) The following examples, both from research and from everyday life, should be familiar:

While driving to a picnic we get lost. The six year old points to the car in front of us. "Follow him," he says. "He's going to the picnic." "Why?" "Because we are."

Two children scrapping in the schoolyard are called by the teacher. Each tells her story. Each sees no sense at all in the other's story.

"Jane, do you have any sisters?" "Yes, Sue." "Does Sue have any sisters?" "No." or, "Do you have any enemies?" "Yes." "Are you an enemy?" "No."

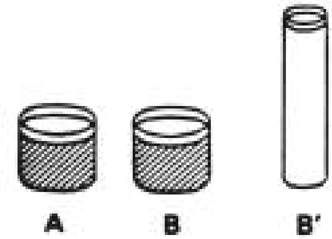
Second-grader John writes "John " at the top of all written school assignments, despite the fact that there are four children named John in the class. He knows who he is.

Egocentric monologue is "conversation" with no listener, no give-and-take, no communication.

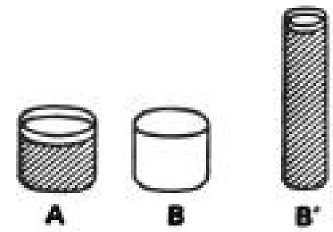
Egocentric dialogue is "conversation" with a listener but with referents clear only to the speaker. You telephone your friend and the friend's child answers. "Who is this?" you ask. "It's me." The child knows who he is, so obviously you must know, too.

It seems that young children are unable to consider a point of view other than their own. Later, they are able to admit an alternate point of view but are unable to coordinate it with their own. As they meet and engage various points of view, especially those moderately different from their own, children develop this coordination.

Coordination plays a dominant role in other affairs as well. It is not only concerned with one's view vs. others' views. A series of classic experiments shows this. Fill two jars with colored water as shown:



Then pour B into B' as shown and ask which jar has more.



As with the earlier construction of object invariance, over the elementary school years the child constructs the notion of the invariance of properties (in this case, volume) of objects. Younger children commonly say that B' has more, although they freely admit that when B' is poured back into B the volumes are the same. They tend to be dominated by how things look, to center on one dimension (here height) rather than to coordinate dimensions, and to have no sense of reversibility.

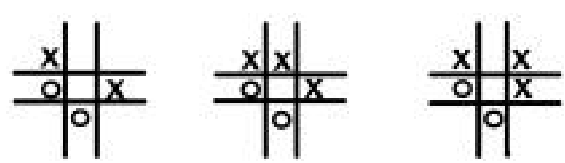
The following less formal observations of school-aged children are familiar to parents and teachers:

Hold up five fingers. Child counts, "one, two, three, [our, five." Hold up the same five [fingers and one finger of the other hand, and the child starts over again, "one, two, ..." Five is one issue, six is another.

Young children are often not willing to admit that a person can live in Chicago and in Illinois or that a person can be a doctor and a mother.

Playing tic-tac-toe, young children are often incapable of coordinating offense and defense. Further, children are often unable to attend to two alternatives simultaneously. X will often play as shown, ignoring the chance for a double kill.

Original situation Child Plays Rather than



Play "I Am Thinking of a Person," a version of Twenty Questions. At first, children's questions are likely to be unrelated to one another or inconsistent with available information. In time, children move [rom atomistic questions ("Is it Miss Jones?" "Is it Helen Smith?") to questions involving classification ("It is a male?") and which are consistent with previous information.

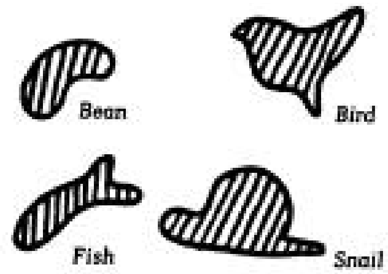
Play "I Am Thinking of a Number." The number is between 1 and 100, and children are allowed only questions such as "Is it greater than . . . ?" or "Is it less than . . . ?" Children will gradually construct transitivity; if the mystery number is known to be greater than 50, "Is it greater than 40?" is a wasted question.

The period of elementary school coincides with the child's construction of thought operations in which concept triumphs over percept, in which children decenter from their own point of view, and in which coordination of variables and the reversibility of arguments become established.

With adolescence begins the period of the possible. The child becomes increasingly able to deal with all the possible variables and combinations of variables in a given situation ("Here are five differently colored liquids. Two or more of the liquids can be combined. one combination of the liquids will be colorless. What combination?"). The child is also able to construct the scientist's all-things-but-one-being-equal argument and can transcend the immediate here-and-now by creating objects that cannot possibly exist. (In assessing the effects of variables influencing a pendulum—bob weight, string length, angle of arc, etc.—the adolescent can effectively create a zero-length pendulum string by running successive trials with different weights but with string length kept constant.)

Thinking does not stop developing in adolescence. Some researchers are at work on even higher levels of development. However, many adolescents are firmly rooted in concrete experience or are only at a beginning stage of the period just described. The "Four Island Problem," adapted here, was fully solved by only fourteen percent of high-school students (Karplus, 1970).

Pretend that you are going to take a vacation trip to some islands that are new to you. You are particularly interested in four islands: Bean Island, Bird Island, Fish Island, and Snail Island.



You have to determine whether you can travel between these islands by plane. You ask a travel agent first whether it is possible to travel by plane between Bean and Bird Islands. The travel agent says that (1) people can go by plane between Bean and Fish Islands, but he is not sure whether this is a direct route or a route with stopovers, and (21 people cannot go by plane between Bird and Snail Islands.

From this information you must determine whether you can fly between Bean and Bird Islands. The possible answers are "Yes, for sure," "No, for sure," and "I can't tell from the two clues."

You next ask the travel agent whether you can go by plane between Fish and Bird Islands. He gives you the two clues again and now adds that he can say for sure that people can go by plane between Bean and Bird Islands; again, he does not know whether this is a direct route or a route with stopovers. From this information, figure out if you can go between Fish and Bird Islands. The possible answers are "Yes, for sure," "No, for sure," and "I can't tell from the three clues."

Your third and last question is whether you con go between Fish and Snail Islands. Use the information you already have to answer this question. Again, the possible answers are "Yes, for sure," "No, for sure," and "I can't tell from the three clues."

Memory and Knowledge

An increasingly common view holds that there are different kinds of memory, for example, memory in the strict sense (I remember that George Washington was born in 1732) and memory in the wide sense (I remember that a jar's capacity is not determined merely by its height). In addition, there are different types of retrieval, for example, recognition (Didn't I see you at the picnic last week?), recall (Who was the twelfth president of the United States?), and reconstruction (31 x 20 is 62O, because 30 x 2O is 600 and 31 is one more than 3O).

Related to these distinctions is the distinction between knowledge in the narrow sense and knowledge in the broad sense. A child can "learn" number facts, for example, by rote and can probably, in the short term at least, recall them. It is unlikely, however, that the child will be able to reconstruct the number facts if her strict memory fails. (An almost universal teacher complaint is that children return from summer vacation remembering little of what they learned in June.)

On the other hand, if the child constructs number facts in a relational way (2 + 3 is 5 because 2 + 2 is 4 and 3 is one more than 2), she can reconstruct the 2 + 3 if need be. She can use memory in the wide sense to help. Moreover, knowing that 2 + 3 is constructible suggests that (1) knowledge is something other than random facts to be stored, (2) it is something one has control over, and (3) old knowledge is capable of being combined to make new knowledge.

Factors Leading to Intellectual Growth

Knowledge in the wide sense is a person's collection of organized processes brought to bear on the environment. Four factors contribute to knowledge development: maturation, experience and activity, social transmission, and self-regulation.

Maturation is necessary for development but is clearly not sufficient by itself. Not all eleven year olds (or two year olds or forty year olds) have the same quality or quantity of thinking.

Experience is a major factor, especially experience and activity involving manipulation and interaction with objects. (one definition of thinking is "interiorized action.") When a child sorts beads, for example, he is beginning the underpinnings of classifying. When he counts blocks in various configurations, he learns that the number of blocks is independent of a particular configuration. ('Why is so much of school work limited to paper-and-pencil tasks?)

Social transmission is important, especially as it involves give-and-take and genuine exchange of ideas, information, and viewpoints. In engaging points of view different from her own, the child alters her mental networks to incorporate the input.

Self-regulation, where the child (or the adult) engages a new situation, assimilates it, and accommodates his mental networks to it, is most central to learning. Intellectual development is a form of adaptation, and learning in the wide sense is provoked adaptation. The match-up (better, moderate mismatch) between the new situation and a person's present mental networks is critically important, as is the context in which the new situation occurs (Wason et al., 1972). This is where teachers and parents play their role, lest children be left to the random events of everyday life.

What Is Basic?

What, then, is basic in a child's school education? Perhaps it is helpful to distinguish between knowledge in the narrow sense and knowledge in the wide sense and to realize that the two can be mutually supportive. (They can also be mutually indifferent, even destructive.)

There are dangers at both extremes. Knowledge in the narrow sense can amount to lists of trivial or atomistic facts or to a surface layer of "right words" with few, if any, underpinnings. And the notion of knowledge in the wide sense can be so airy that it has no substance, gives no direction to educators, amounts to vague though well-intentioned generality.

I strongly recommend a wide view of what is basic. We should see self-regulation as basic. That is, children should be prepared to deal with the problems that arise in their world, even though much of their future world is unknown to us at present. Further, they should be self-sustaining. They should not wait for nutriment to come to them but should be able to find their own. They should, in general, develop an internal road map of the world that is coherent and stable and useful and open to new growth.

Perhaps the most ambitious attempt at redefining basics in the history of American education was the curricular revolution of the 1960s. The chief characteristic of the "new curricula" was an emphasis on the structure of the various content areas. This approach has been discarded for a variety of reasons (for example, teachers were rarely encouraged to engage the structure to make it their own, there was a wide gap between the adult content specialist's idea of a discipline's structure and the interests and mental networks of young children, and the "new curricula" reached children largely as knowledge in the narrow sense).

But structure should not be discarded, lest we have mere bits and tricks.

Robert B. Davis, in a 1967 introduction to the Madison Project, states a position in math education that captures the best of what the "new curricula" tried to do.

> If we devote grade 1 to addition facts up to 1O, grade 2 to addition facts up to 100, and so on, we are putting one foot in front of the other, left, right, left, right ... This approach is weak in power.
>
> If, instead, we seek those basic mathematical concepts, techniques, and attitudes which play important structural roles in the development of the subject, we have a far more powerful approach. Cartesian coordinates, introduced (say) at grade 2, give us an ability to relate any arithmetic or algebraic problem to a geometric one, and vice versa. For all the rest of our lives we shall be able to unify algebra and geometry into a single coherent subject. This is power.
>
> Once we learn such basic structural concepts as variable, function, mapping, and so on, we have a strong structural framework to which all of our subsequent mathematical learning can be related. This, again is power! Here we are building cognitive structures that can well serve as foundations for improved structures in the future. (p. 9)

A constructivist is likely to be more concerned with the child's construction of thinking abilities than with the discovery of the structure of content (or with the passive storage of structure). Perhaps Davis's statement should be revised as follows:

> If instead, we seek those basic operations, techniques, and attitudes that play important structural roles in the child's intellectual growth, we have a far more powerful approach. For the rest of his or her life, the child will be able to continue to build a coherent road map of reality, one that enables the child to construct and test relationships, to infer, and to withstand the seductive dominance of percept over concept (or propaganda over fact). This is power. once the child learns such basic operations as classifying, ordering, logically multiplying, inferring, and so on, he or she has a strong structural framework from which subsequent knowing can evolve. This, again, is power! Here we are building cognitive structures that can serve as wellsprings of improved and more complex structures in the future.
>
> In general, I suggest, the goal of education should be to cause intellectual growth, not merely to teach children the facts, rules, procedures, conventions, and nomenclature of narrow knowledge.
>
> What are the components of this intellectual growth? They include those operations listed above and, more generally, an ability to organize, to coordinate, to pull into coherence the disparate entities of environment, experience, and inference, and to regulate between one's internal networks and the demands of external reality. In classrooms this would call for children to be involved in issues that generate an ability to discern relevant from irrelevant; to distinguish between necessary and plausible and merely possible; to generate, to exhaust, to test, and to cancel alternatives; to know, given a situation, the necessary conditions and the sufficient conditions and the difference between necessary and sufficient; to solve problems and to generate new ones; and to inquire and to become self-sustaining in that inquiry.

To call for such an approach is to say that static knowledge—pat answers—will not suffice for children who will spend the greater part of their lives in the twentyfirst century, and whose children will be alive in the twentysecond century!

A constructivist approach is by no means at odds with traditional content areas, though it is at odds with the view that knowledge is static. The approach is widely, though unofficially (and often surreptitiously), espoused by American teachers, and it goes to the heart of what it is that really is basic in the education of children. Brearley captures this concept in the following words:

> The main work of the school is surely the fostering and developing of mental life, enabling children to experience more fully and consciously all that life has to offer. This large, overall aim is to be achieved by an infinity of steps small. The material we provide children can seldom be thought of as an end in itself but rather as a means through which effective thinking and feeling are fostered. (1969, p. 7)

See the classroom activities following the list of references.

References

Brearley, M., ed. *The Teaching of Young Children*. New York: Schocken Books, 1969.

Bruner, J. *Beyond the Information Given*. New York: W.W. Norton, 1973.

Davis, Robert B. *Exploration in Mathematics*. Palo Alto, California: Addison-Wesley, 196%

Inhelder, B. "Memory and Intelligence in the Child." In *Studies in Cognitive Development*, edited by D. Elkind and J. Flavell. New York: oxford University Press, 1969.

Karplus, R. "Intellectual Development beyond Elementary School." *School Science and Mathematics*,70 (May 1970): 398 t06.

Wason, P.C., et al. *The Psychology of Reasoning: Structure and Content*. Cambridge, Massachusetts: Harvard University Press, 1972.

Readings for Parents and Teachers

This is a brief list of books that teachers have found helpful. Because relatively little work has been done in other areas, these resources tend to be concerned with mathematics (very broadly defined) and with science.

Bates J., et al. *Developmental Math Cards*. Don Mills, Ontario, Canada: Addison-Wesley, Ltd., 1973.

Biggs, E.E. *Mathematics in Primary Schools*. Schools Council Curriculum Bulletin No. 1. London, England: Her Majesty's Stationery office, 1972.

Biggs, E.E., and MacLean, J.R. *Freedom to Learn*. Don Mills, ontario, Canada: Addison-Wesley, Ltd., 1969.

Barretta-Lorton, M. *Mathematics Their Way*. Reading, Massachusetts: Addison-Wesley Publishing Co.,1976.

Biological Science Curriculum Study. *Human Sciences Program*. Boulder, Colorado: Biological Sciences Curriculum Study, dates vary.

Coppele, C.; Sigel, I; and Saunders, R. *Educating the Young Thinker*. New York: D. Van Nostrand Co., 1980.

Educational Development Center, Inc. *Unified Science and Mathematics for Elementary Schools*. Newton, Massachusetts: Educational Development Center, Inc.

Lowery, L. *Learning About . . . Series*. Berkeley: University of California, 1974.

Ministry of Education. *Education in the Primary and Junior Divisions*, Toronto, Ontario, Canada: 1975.

Mountainview Center for Environmental Education. *Outlook* and various other publications. Boulder, Colorado: Mountainview Center.

Nuffield Foundation. *Nuffield Mathematics Project*. New York: John Wiley & Sons, dates vary.

O'Brien, T.C. *Solve It*. (Books I-5). Chicago, Illinois: Daigger/E~A, 1977.

O'Brien, T.C. *Wollygoggles and other Creatures and Puzzle Tables*. New Rochelle, New York: Cuisenaire Company of America, 198O.

Schools Council. *Science 5-13*. Milwaukee, Wisconsin: Purnell Reference Books, 1979.

Smock, C. *Mathemagenics Activity Program*. Athens, Georgia: Mathemagenics Activity Program, dates vary.

Stanfield, J. *Maths Adventure*. Chicago, Illinois: Daigger/ETA, 1973.

Walter, M. *Boxes,Squares, and other Things*. National Council of Teachers of Mathematics, 1970.

Whitney, H. *Mathematical Activities, Part A*. Princeton, New Jersey: Institute for Advanced Studies, 1974.

Background and Research

This is a brief list of books that teachers have found useful in explaining a constructivist point of view and in detailing the developmental research.

Elkind, D., and Flavell, J. (Eds.). *Studies in Cognitive Development*. New York: oxford University Press, 1969.

Flavell, J. *Cognitive Development*. Englewood Cliffs, New Jersey: Prentice Hall, Inc., 1977.

Furth, H. *Piaget for Teachers*. Englewood Cliffs, New Jersey: Prentice Hall, Inc., 197O.

Ginsburg, H. *Children's Arithmetic*. New York: D. Van Nostrand Co., 1977.

Ginsburg, H., and Opper, *S. Piaget's Theory of Intellectual Development*. Englewood Cliffs, New Jersey: Prentice Hall, Inc., 1979.

Hardeman, M. (Ed.). *Children's Ways of Knowing: Nathan Isaacs on Education, Psychology, and Piaget*. New York: Teachers College Press, 1974.

Lovell, K. The Growth of Basic Mathematical and Scientific Concepts in Children. London: University of London Press, Ltd., 1966.

Piaget, J. *Science of Education and the Psychology of the Child*. New York: Penguin Books, 1977.

Scientific American. *The Brain*. September 1979. (Special issue)

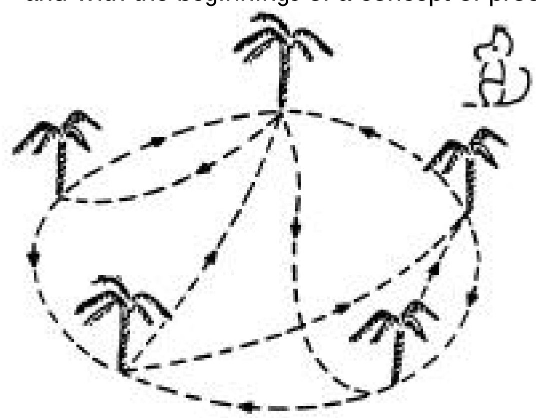
Sigel, I., and Cocking, R. *Cognitive Development [from Childhood to Adolescence: A Constructivist Perspective.* New York: Holt, Rinehart and Winston, 1977.

Society for Research in Child Development. *Child Development*. Chicago, Illinois: University of Chicago Press, dates vary.

Classroom Activities

Below are some locally developed classroom activities that show a constructivist point of view in action in that they call for the construction and testing of relations and alternatives. Do not merely read them. Do them, preferably with group discussion; then extend them or adapt them to local situations.

1. A monkey went from tree to tree as shown. Where did he start? Where did he finish? (Problems of this sort can lead to serious mathematical study. No less, they get children involved with trial and error as a problem-solving tactic, with alternative searching, and with the beginnings of a concept of proof.)



(By Dr. Jerzy Cwirko-Godycki, Warsaw, who used this problem at the Eighth Annual Teachers' Center Residential Course, August 1979.)

2. Can you change a bird into a horse? You can change a cat into a dog by going cat→cot→cog→ dog.) In changing a bird into a horse you can change or add one letter at a time. All the words you use must be real words. The dictionary is the referee. Here are some others to try:

cat→mouse dad→father love→despise mom→mother

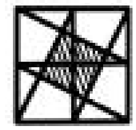
(By Teachers' Center participants from East St. Louis, Illinois. Included in SEEDBED, vol. 1, no. 2, available at cost, $1.OO, from the Teachers' Center Project.)

3. Here are some headings for lists:
   Things that fly
   Things used in cooking
   Things found in a kitchen
   Things associated with Christmas
   Things that are often hot
   Things used for transportation

Make up some headings like this. Then pair the children in your class. Give one heading to one of the children in each pair. His or her task is to name things that belong on the list (without using any word given in the heading). The second child's task is to guess what the heading is. Then children exchange roles with a new heading.

(By Teachers' Center participants from East St. Louis, Illinois. Included in SEEDBED, vol. 1, no. 2.)

4. Here is a figure drawn on inch-square graph paper. What is the area of the shaded square?



(By David S. Fielker, London, who used this problem at the Seventh Annual Teachers' Center Residential Course, August 1978.)

5. one child builds a building from blocks, one block at a time. The building is hidden from a second child. The first child gives a verbal description of his or her actions, and the second child's task is to construct an identical building. (The descriptions can also be given in writing.)

(From Elizabeth Thomas, East St. Louis, Illinois. Included in SEEDBED, vol. 1, no. 2.)

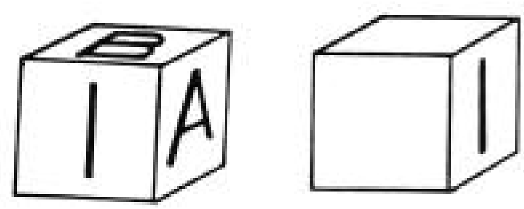
6. "There are lots of hice on my street." Strange sentence, isn't it? The plural of mouse is mice but the plural of house is not hice. Write some strange sentences of your own. Try them out on classmates and see if the children can figure them out.

(From TC. o'Brien, Solve It, Chicago: Daigger/ETA, 1977.)

7. Pretend that you have just moved into your neighborhood and want to be prepared for emergencies. What phone numbers would be useful to have? Get together with some friends and make up an emergency telephone directory.

(From 7:C. o'Brien, Solve It, Chicago: Daigger/ETA, 7977.)

8. The right cube is the same as the left cube, but the artist was in a hurry and didn't finish his work. Finish it for him.



(From TC. o'Brien, Solve It, Chicago: Daigger/ETA, 1977.)

9. "When children do write, they often feel that they're writing only for the teacher's approval or disapproval. The teacher doesn't read it. She only marks it,' said a second-grade Canadian child who had just written a beautiful story about a bird building a nest. Thus, children learn quickly that writing is a distasteful chore, not a chance to communicate ideas.

"The main job of a teacher concerned with children's writing is to invite 'the expressive mode.' It is important to create trust between writer and reader, something that is often accomplished when a child knows that what is written will be read, respected, and responded to. Children should be encouraged to take risks in their writing, not just produce ‘Dick and Jane’ sort of pap.

“Chlidren’s writing was successfully encouraged in Toronto schools by setting up a mailbox system, whereby children write notes to one another (and to the teacher) in some twenty-minute period during the day. The mail, addressed, is placed in a class mailbox and delivered, without the teacher’s inspection, at the end of the day. A situation like this will draw out the most reserved of children.

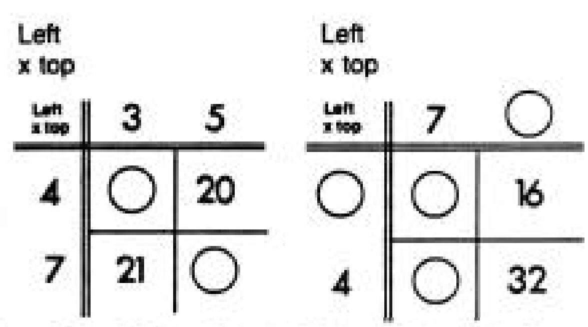
“Teachers are under constant pressure to make children conform to adult grammar rather than to encourage fluency of oral and written language. Correctness of grammar is important, but it should follow, not precede, fluency. Emphasis on grammar can stifle fluency completely.

“one way of encouraging correctness of grammar, as well as introducing new vocabulary and bringing about good writing habits (the fluent use of descriptors, etc.) is for teachers to read quality books to children at least half an hour each day. This is a must for Toronto teachers who work with me.

“Children can enrich themselves and one another by writing books for the school library. Artistically talented children can illustrate the books. The books, bound safely in hard cover, go into the library with a card catalog entry. To make the child-author know he’s succeeded, as well as to get the books more widely known, children’s books are farmed out occasionally to teachers in the school—not the child’s own teacher—whose job it is to read the book and write a short note saying something like, ‘I read your hockey book, John, and I like it very much.’ John will carry that note with him throughout the school year and the teacher will tell other children about John’s book.”

(From John H. Bates, Toronto, included in SEEDBED, vol. 1, no. 1.)

10. Here are two multiplication grids. Complete them.



(f
America, Inc., 1980.)