

LOGIC AND CRITICAL READING

WILLAVENE WOLF

Associate Professor of Education
The Ohio State University, Columbus

THE curriculum in the elementary schools has often been limited to the memorization and recall of subject matter. Attention has seldom been given to the evaluation of ideas. Often children are not required to do much evaluative thinking until they enter college. Here they are sometimes suddenly confronted with such tasks as writing essays involving the contrasting of two authors' opinions, making judgments about the trustworthiness of various statements, and determining whether an author's conclusion is really justified on the basis of the evidence he provides.

Why do educators wait until so late in the student's educational career to introduce such types of thinking? Perhaps one reason has been Piaget's early theories which state that children cannot do certain kinds of reasoning until at least the ages of 11 or 12.¹ Or, perhaps teachers in the elementary grades

are so involved with basic skills that they leave the teaching of critical thinking for teachers in the later grades. Yet another reason may be an assumption by educators that children will develop their thinking powers naturally as a result of maturation and that such skills do not need to be taught. Some researchers^{2, 3} have shown that this latter assumption has not proven to be correct. The investigator of one study, for example, found that high school graduates did not display any more ability in interpreting meaning and reacting with sound judgment to ideas read than did elementary school graduates.⁴

With the recent explosion in the area of mass media, including television, radio and printed materials, it is imperative that children learn how to select

² Bernice Rogers. "Directed and Undirected Critical Reading Responses of High School Students." Unpublished doctoral dissertation, Department of Education, University of Chicago, 1960.

³ William S. Gray and Bernice Rogers. *Maturity in Reading*. Chicago: The University of Chicago Press, 1956.

⁴ *Ibid.*

¹ Jean Piaget. *The Psychology of Intelligence*. Translated by Malcolm Piercy and E. E. Berlyne. New York: Harcourt, Brace & World, Inc., 1950.

and evaluate ideas rather than to absorb them without question. This is particularly important with relation to printed materials, since print seems to lend credence to ideas.

One way children can learn to evaluate informational and argumentative materials is through instruction in logic. Logic can be defined as the study of reasoning. It involves systematic and critical thinking. Here *critical* means making favorable as well as unfavorable judgments based upon a knowledge of principles and standards appropriate to a given subject matter.

Just as a book reviewer gives both the positive and negative points of a book and substantiates his judgment with reasons, so must the critical reader. Thus, a reader, who is trying to improve his thinking about the printed page, must have in mind some criteria for discriminating sound reasoning from unsound reasoning.

Concepts of Logic for Elementary School Children

There are two kinds of logical reasoning that have been distinguished: deductive and inductive.

Deductive Reasoning. Deductive logic involves the drawing out of those implicit beliefs which must be accepted if certain other beliefs are accepted. It shows what necessarily follows from the endorsement of a given set of ideas. When it is impossible for the premises to be true without the conclusion being true, an argument is called valid, *i.e.*, it is internally consistent. No information other than that contained in the reasons is used in a conclusive argument. An argument that is conclusive is said to be a

deduction and, in a sound deduction, the conclusion is said to follow from the premises.

Checking the reasoning of printed materials is often difficult because the arguments presented there usually take much for granted. Many premises are merely assumed and need to be made explicit before the reader can evaluate them. Also, the logical process is usually implied and seldom stated as such in printed material. Hence, it is often necessary to change the wording of the original statements in order to construct the major and minor premises. In doing this, the reader must be careful not to change the thought of the author.

Although logic has commonly been regarded as a subject restricted to college classes, the staff of the *Critical Reading Project*⁵ at The Ohio State University took the position that many aspects of logic as applied to reading can be taught in the elementary school. They presented the following elements of deductive reasoning to elementary school subjects:

1. How a deductive argument is developed, including practice with syllogisms
2. Converting statements in print into logical form
3. Recognizing various authors' use of all, some and none statements
4. Identifying hidden assumptions
5. Recognizing groups and subgroups in classification

⁵ This research is being performed pursuant to a contract with the Office of Education, U.S. Department of Health, Education, and Welfare, under the provisions of the Cooperative Research Program. Principal investigators, other than the author, are Charlotte Huck and Martha King.

6. Determining whether various deductions are valid.

In the initial lessons, examples were taken from the children's own experiences. Concepts were introduced gradually. For example, children practiced drawing conclusions from two given premises before they were required to find hidden assumptions. Most of the materials had to be developed specifically for the project since materials employing deductive reasoning were virtually unavailable for the lower grade levels.

Inductive Reasoning. If either of the premises of an argument is false or even questionable, no amount of deductive logic can guarantee the truth of the conclusion. Hence sound reasoning depends upon both valid relationships and reliable premises. Inductive logic concerns the means of attaining reliable beliefs or checking the reliability of statements.

In evaluating printed material there are various ways to discriminate between reliable and unreliable testimony. For example, the reader should learn to examine the way the author has used words and to identify techniques often used by authors to influence thought and action. Sometimes the reader can detect unsound statements simply by outlining the argument. Other ways to detect unreliable testimony are to determine if the author has competence in the field in which he is writing, to note the source of the article and to check whether the statements would be corroborated in other sources.

The Critical Reading research team at The Ohio State University attempted to discover the capability of children in the following aspects of reliability:

1. Recognizing the difference between fact and opinion

2. Detecting fallacies such as hasty, unrepresentative and faulty causal generalizations; post hoc reasoning; faulty analogies; false dilemmas; all-or-nothing mistakes; and composition and division

3. Recognizing propaganda devices that employ various fallacies such as bandwagon, testimonial, transfer and card-stacking

4. Determining when words are too vague

5. Establishing the reliability of various sources and authorities.

Generally, teachers reported that reliability was easier to teach than validity of arguments, particularly when examples were drawn from the children's own experiences, and that detection of some fallacies in materials was possible at all grade levels.

Testing Children's Ability To Use Logic

Can children in the first through sixth grades be taught how to use logic in evaluating materials? In order to answer this question, a section on logic was included in the Critical Reading Tests developed at The Ohio State University, normed on a national sample and used as the Criterion Measure in the research project. Separate tests were developed for the primary and intermediate grades. The test questions on logic required the children to draw conclusions from given premises; to find hidden assumptions; to understand the meaning of *all*, *some* and *none* statements; to detect various kinds of fallacies and, in general, to be able to apply

certain rules of logic to printed material. After a pretest, children who were subjects for the research were given lessons in logic and other critical reading skills for several months and then post-tested.

In grades three through six, children were given lengthy instruction and practice in both deductive and inductive logic. Although a few lessons on deduction were included also in the first and second grades, the teaching of logic was confined mainly to evaluating the trustworthiness of statements. It was found that children at all the grade levels made significant gains over the control groups in their logic scores. Seemingly, the easiest and most transferable concept at all grade levels was that of identifying a generalization. By the end of the year, even first grade children were saying to their teachers, "No, Mrs. Jones, we are not all talking. Jimmy isn't talking. Sue isn't talking. I'm not talking. . . ."

Children observed in one second grade classroom were almost 100 percent correct in their identification of generalized statements given by the teacher. For example, when the teacher wrote on the board, "All old people wear glasses," one youngster replied, "That's an untrue generalization. My grandmother doesn't wear glasses and she's old." Children had most difficulty identifying untrue generalizations when the generalization agreed with their beliefs. For example, "All policemen are brave," was not ques-

tioned, even with persistence by the teacher.

In the realm of deduction, children had the most difficulty working with valid syllogisms that had untrue major premises. If the first major premise read, "All girls are smart," most of the boys preferred to discuss the reliability of the statement rather than accepting it as true in order to check the validity of the entire argument.

In interviews, teachers emphasized several points of good instruction applicable to the teaching of logic in reading, such as: (a) using good examples as well as bad in teaching reliability; (b) requiring children to apply the concepts to the printed material soon after they were taught; (c) involving the children actively in writing activities along with reading; (d) introducing concepts gradually throughout the year and keeping the lessons brief; and (e) requiring children to tell why they believe an author's reasoning is sound or unsound rather than responding simply "yes" or "no."

Further analysis of the research data is presently under way and may provide answers to such questions as which logic skills can be taught at the various grade levels and what the relationship is between selected subject characteristics and their logic scores. Numerous other questions, including what techniques are best for teaching logic, still remain unanswered. ☞



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