Intelligence and Thinking Skills

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Philip H. Winne writes in “interchange” with John McPeck, Jack Martin, James Sanders, and Alan Slemon whose article “Aerobics for the Mind?” appears in this issue of Interchange (pp. 35–38).

The topic of thinking skills is newsworthy. In the last few years, there has been a flurry of criticisms about schools' failures to teach students how to think (e.g., Perkins, 1985), a spate of overgenerous presumptions about benefits that would accrue upon redressing these reported inadequacies (e.g., Bereiter, 1984), and, perhaps most notable, expansive funding of research into thinking skills and various programs that purport to teach them (e.g., Chipman, Segal, & Glaser, 1985). These facts attest to a need for clear and constructive analysis of what thinking skills are and whether there is potential to better them through instruction.

It is in this context that McPeck, Martin, Sanders, and Slemon raise questions about intelligence, thinking skills, and education. The specific object of their focus is an article by Herrnstein, Nickerson, de Sanchéz, and Swets (1986) entitled “Teaching Thinking Skills.” Herrnstein and colleagues were part of a team that designed, implemented, and evaluated what is arguably the world’s most ambitious attempt to teach thinking skills. McPeck et al. observe a need to “disclose and comment upon some of the confusions, both conceptual and empirical, that confront this revised concept of intelligence which Herrnstein and his colleagues have embraced” (p. 35).

In an atmosphere of active interest among teachers, strong political pressures, heated scientific controversies, and lots of funding, it is refreshing to read direct criticisms, as opposed to faint praise, about “what’s hot.” McPeck et al.’s directness also serves well in examining their facts and arguments, a task which I undertake in the spirit of scholarship.

My examination unfolds in four sections. First, I recap Herrnstein et al.’s report to provide for those who have not read it a context for this interchange. Second, I address empirical issues that bear on the question of whether Herrnstein et al.’s program in thinking skills boosted students’ intelligence. In this analysis, I try to show that empirical confusions which McPeck et al. wrote about are not muddles. Third, I confront several of McPeck et al.’s claims about what thinking skills are and their relation to schooling. Again, I attempt to demonstrate that what they consider to be confusions are not. Finally, I address core issues that I believe to be critical in achieving a clear understanding about intelligence, thinking skills, and the possibility of instructing both.

What Herrnstein and Colleagues Did and Found

The Venezuelan government engaged scholars at Harvard University (Herrnstein and colleagues) and consultants at Bolt Beranek and Newman to develop and evaluate a national course in thinking skills.
The course was designed to enhance performance on a wide variety of tasks that require careful observation and classification, deductive or inductive reasoning, critical use of language, hypothesis generation and testing, problem solving, inventiveness, and decision making. The focus was on cognitive skills that apply to learning and intellectual performance independently of subject matter, rather than conventional academic content. Skills that can reasonably be considered to be components of intelligence and that are sufficiently well defined to lend themselves to explicit instruction were the targets of the course. (Herrnstein et al., 1986, p. 1279)

Seventh-grade children attending six barrio schools in Barquisimeto, Venezuela participated. The children's parents were minimally educated and of a low socio-economic level. In three experimental schools, 12 classes (four per school; N = 463) received 56 lessons over the course of the 1982–1983 school year. Lessons delivered in “study hall” periods (Swets, Herrnstein, Nickerson, & Getty, 1988) by specially trained teachers and, occasionally, by Ministry staff added about 15 percent to the students' total instructional time allocated to the regular school curriculum (Herrnstein et al., 1986, p. 1286; Herrnstein et al., 1988). Instruction in 12 classes from the three matched control schools (N = 432) was “as usual” except for observations by the project's staff.

Measures of the Program's Effects
All students were administered four types of measures (in Spanish) before and after the treatment period. Details about these measures are important because they constitute means for assessing what students learned in the course. In turn, this bears directly on empirical issues raised by McPeck et al.

Fluid intelligence. The Cattell Culture Fair Intelligence Test (Cattell & Cattell, 1961) “is meant to measure ‘fluid g’ ” (Herrnstein et al., 1986, p. 1284). Cattell (1971) describes this construct as follows:

Fluid ability, by contrast [to crystallized ability], appears to operate whenever the sheer perception of complex relations is involved. It thus shows up in tests where borrowing from stored, crystallized, judgmental skills brings no advantage. . . . In short, fluid intelligence, gf, is an expression of the level of complexity of relationships which an individual can perceive and act upon when he does not have recourse to answers to such complex issues already stored in memory. (pp. 98–99)

Herrnstein et al. (1986) describe the tests in a footnote:

Each form contains four subtests, in which only pictorial shapes and figures are used to complete a series, classify figures, complete a matrix, and infer rules. (p. 1282)

Omnibus intelligence. Two standardized test batteries measured “crystallized g,” an equally pervasive mental capacity that depends on fluid g but also reflects the effects of learning and is captured by more conventional omnibus measures of intelligence such as the [Otis-Lennon] and [General Abilities Test]” (Herrnstein et al., 1986, p. 1284). The history of the name of the Otis-Lennon School Ability Test (Otis & Lennon, 1977) also reflects this claim.

The difference between the terms aptitude and intelligence is not at all clear. . . . Test publishers . . . have modified the titles of their tests, moving in general way from the terms intelligence and aptitude and toward the use of the term ability. For example, the Otis-Lennon School Ability Test was previously referred to as the Otis-Lennon Mental Ability Test. (Mehrens & Lehmann, 1987, pp. 172–173)

The General Abilities Test (Manuel, 1962a) combined eight subtests from various sources: three from the Guidance Testing Associates’ Tests of General Ability (Manuel, 1962a) and three from their Tests of Reading (Manuel, 1962b); one from the Puerto Rican Department of Education's Test of General Ability; and one developed