Direct Instruction: What the Research Says

Prepared by the Education Consumers Foundation

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RESEARCH ON DIRECT INSTRUCTION

Meta-Analyses and Synthesis of Research

Over the last 25 years several researchers have reviewed and summarized the vast literature on Direct Instruction, many using meta-analysis. Meta-analysis is the statistical analysis of a group of previous studies pertaining to a given intervention. The effect size for a teaching methodology reflects the gain in learning produced by the methodology expressed in standard deviation units. Effect sizes are typically based on comparisons to previous outcomes with the same group or outcomes attained during the same time period by a comparison group. An effect of 0.25 or greater is generally said to represent an educationally significant gain or difference.

Adams, G., & Engelmann, S. (1996). *Research on Direct Instruction: 25 years beyond DISTAR*. Seattle, WA: Educational Achievement Systems.

Adams and Engelmann's meta-analysis of 34 selected studies found an average effect size of 0.97 per variable studied for Direct Instruction—an indication that it was highly effective.

Borman, G.D., Hewes, G.M., Overman, L.T., & Brown, S. (2003). Comprehensive school reform and achievement: A meta-analysis. *Review of Educational Research, 73(2)*, 125-230.

Borman, Hewes, Overman, and Brown examined studies pertaining to 29 comprehensive school reform models. Among the interventions categorized as having the "strongest evidence of effectiveness" (Direct Instruction, School Development Program, and Success for All), Direct Instruction was found to have the largest average effect size (0.21) and to be grounded in the greatest number of studies—49 studies containing a total of 182 comparisons. The remaining interventions were generally based on less rigorous evidence and fewer studies, and were found to produce widely varying effect sizes.

Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. London and New York: Routledge.

Hattie synthesized the results of previous meta-analyses of various factors that have been investigated with regard to effects on student achievement. Direct Instruction was found to be one of the most effective teaching strategies. Four meta-analyses that included DI were examined. Across 304 studies, 597 effects, and over 42,000 students, he found an average effect size of 0.59 with similar positive results (0.99) for both regular and special education students.

Przychodzin-Havis, A. M., Marchand-Martella, N. E., Martella, R. C., & Azim, D. (2004). Direct Instruction mathematics programs: An overview and research summary. *Journal of Direct Instruction, 4(1)*, 53-84.

The authors reviewed twelve studies of Direct Instruction in mathematics and found significant results favoring DI in eleven of the twelve.

Przychodzin-Havis, A. M., Marchand-Martella, N. E., Martella, R. C., Miller, D. A., Warner, L., Leonard, B., & Chapman, S. (2005). An analysis of Corrective Reading research. *Journal of Direct Instruction, 5(1)*, 37-65.

The authors reviewed 28 studies and found positive results for Direct Instruction, Corrective Reading in 26 of them.

Schieffer, C., Marchand-Martella, N. E., Martella, R. C., Simonsen, F. L., & Waldron-Soler, K. M. (2002). An analysis of the Reading Mastery program: Effective components and research review. *Journal of Direct Instruction, 2(2)*, 87-119.

A comprehensive research review of 25 published studies and two large-scale research reviews found results strongly favoring Direct Instruction's Reading Mastery program. Two thirds of the studies reported significant results favoring Reading Mastery/DISTAR Reading, one fifth reported no significant differences, and approximately one seventh (14%) had findings that favored the comparison programs.

What Works Clearinghouse. (2007). *Beginning reading topic report*. Washington, DC: U.S. Department of Education. Retrieved September 20, 2011, from http://bit.ly/rHCevF

In contrast to the several syntheses and meta-analyses noted above, the Institute of Education Science's What Works Clearinghouse (WWC) concluded that there was insufficient evidence to determine whether Direct Instruction was an effective method for teaching beginning reading. The WWC arrived at its conclusion by ruling that almost all of the published studies on beginning reading instruction (not just studies pertaining to DI) were insufficiently rigorous to be included in the WWC review. Of the 887 studies pertaining to beginning reading instruction, only 27 were deemed to have fully met WWC standards. None were studies of Direct Instruction. Among the studies excluded was the federal government's own 10-year-long comparison of all major approaches to teaching at-risk children—the Follow Through project (see chart on page 6 and discussion on pp. 4-5). Follow Through (1965-1975), the largest and most comprehensive study of its kind, was disqualified because it was conducted earlier than 1985. The WWC review is generally viewed as a misstep in the ongoing evolution of the WWC as a resource for educators. WWC's reviews provide little useful guidance as to how educators might choose among the widely used reading programs that are supported by published studies that WWC deems to be technically inadequate. References to the changes that have taken place in the WWC assessment processes and critiques of the WWC assessment of beginning reading programs—too numerous to list here—are available through the Education Consumers Foundation at http://bit.ly/tM1CMH.

White, W. A. T. (1988). A meta-analysis of the effects of Direct Instruction in special education. *Education and Treatment of Children, 11(4)*, 364-374.

White's (1988) meta-analysis of studies using Direct Instruction with special education populations found an average effect size of 0.84. This study included 12 of the same studies considered in the Adams and Engelmann study, listed above, as well as 13 additional studies, but the results were similar.

Syntheses of Research on Reading Instruction

Two major reviews of reading research sponsored by the federal government do not endorse any specific reading instruction programs; however, they do validate the efficacy of the various practices that are included in Direct Instruction reading programs.

National Reading Panel (2000). ***Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction*****. Retrieved from http://1.usa.gov/sOnDsl**

Based on a three-year assessment of thousands of studies, a panel of experts convened by the National Institute of Child Health and Human Development found that effective reading programs have certain key features, all of which are core aspects of Direct Instruction. These include systematic and explicit instruction in phonics and phonemic awareness and the use of decodable text and oral practice formats. The report found that repetition and multiple exposures to vocabulary items are important and it confirmed the validity of certain DI techniques to improve comprehension. These include question-answering, in which the reader answers questions posed by the teacher and is given immediate feedback as to correctness, and summarization, where readers are taught to integrate ideas and generalize from the text information.

Snow, C. E., Burns, M. S., & Griffin, P. (Eds.). (1998). ***Preventing reading difficulties in young children*****. Washington, DC: National Academy Press.**

The National Reading Council (NRC) report reviewed all of the major studies on reading instruction going back to Chall's 1967 classic, *Learning to Read, The Great Debate*. It affirmed the effectiveness of systematic, code-emphasis programs of direct instruction. In particular, it affirmed the findings of the federal Follow Through project, which had concluded that DI was the only approach, among 22 studied, that accelerated reading achievement in at-risk children. Moreover, the NRC report noted that studies completed subsequent to Follow Through confirmed that the impact of DI on student achievement was long-lasting. In addition, it recommended "Explicit instruction that directs children's attention to the sound structure of oral language and to the connections between speech sounds and spellings" (p. 6). It noted the importance of student motivation and of teaching background knowledge, vocabulary, and "the syntax and rhetorical structures of written language" (p. 6) and recommended "direct instruction about comprehension strategies such as summarizing, predicting, and monitoring" (p. 6)—all features of Engelmann's Direct Instruction.

Project Follow Through: U.S. Office of Education, 1967-1977

Stebbins, L. B., St. Pierre, R. G., Proper, E. C., Anderson, R. B., & Cerva, T. R. (1977). ***Education as experimentation: A planned variation model (Vol IV-A)*****. Cambridge, MA: Abt Associates. Retrieved from: http://1.usa.gov/v9BJJm**

Kennedy, M. M. (1978). ***Findings from the Follow Through planned variation study*****. U.S. Office of Education. Retrieved from: http://bit.ly/sPE65E**

The Follow Through project was designed to be a horse race in which different models for teaching at-risk children would compete under equitable, exacting conditions to see which, if any, would produce

student achievement outcomes superior to the norm for at-risk children. Multiple models of teaching were implemented in 51 school districts over a 10-year period. It was the largest educational experiment ever undertaken, and Direct Instruction was the clear winner among the 9 models that completed the project (see page 6).

For reasons having to do primarily with educational politics, the Follow Through results were never clearly communicated to school districts and Direct Instruction never received the credit it deserved as a vastly superior methodology for improving basic skills with at-risk children. To the contrary, the low-performing models were provided additional funding on the grounds that they had a greater need for improvement, and a number of them were repackaged and remain in use today.

The controversy pertaining to the dissemination of the Follow Through outcomes is discussed in the following references:

Carnine, D. W. (1983). Government discrimination against effective educational practices. *Proceedings of the Subcommittee on Human Resources Hearing on Follow Through Amendments of 198*, 99-103. Wash. D. C.: U. S. Government Printing Office.

Carnine, D. W. (1984). The federal commitment to excellence: Do as I say, not as I do. *Educational Leadership*, 4, 87-88.

Grossen, B. (Ed.). (1996). Focus: What was that Project Follow Through? *Effective School Practices, 15*(1). See especially,

Watkins, C. L., Follow Through: Why didn't we? and Adams, G., Project Follow Through: In-depth and beyond. Retrieved from: http://bit.ly/sdEdHP

Engelmann, S. (2007). *Teaching needy kids in our backward system: 42 years of trying*. Eugene, Oregon: ADI Press.

Recent Studies of Direct Instruction

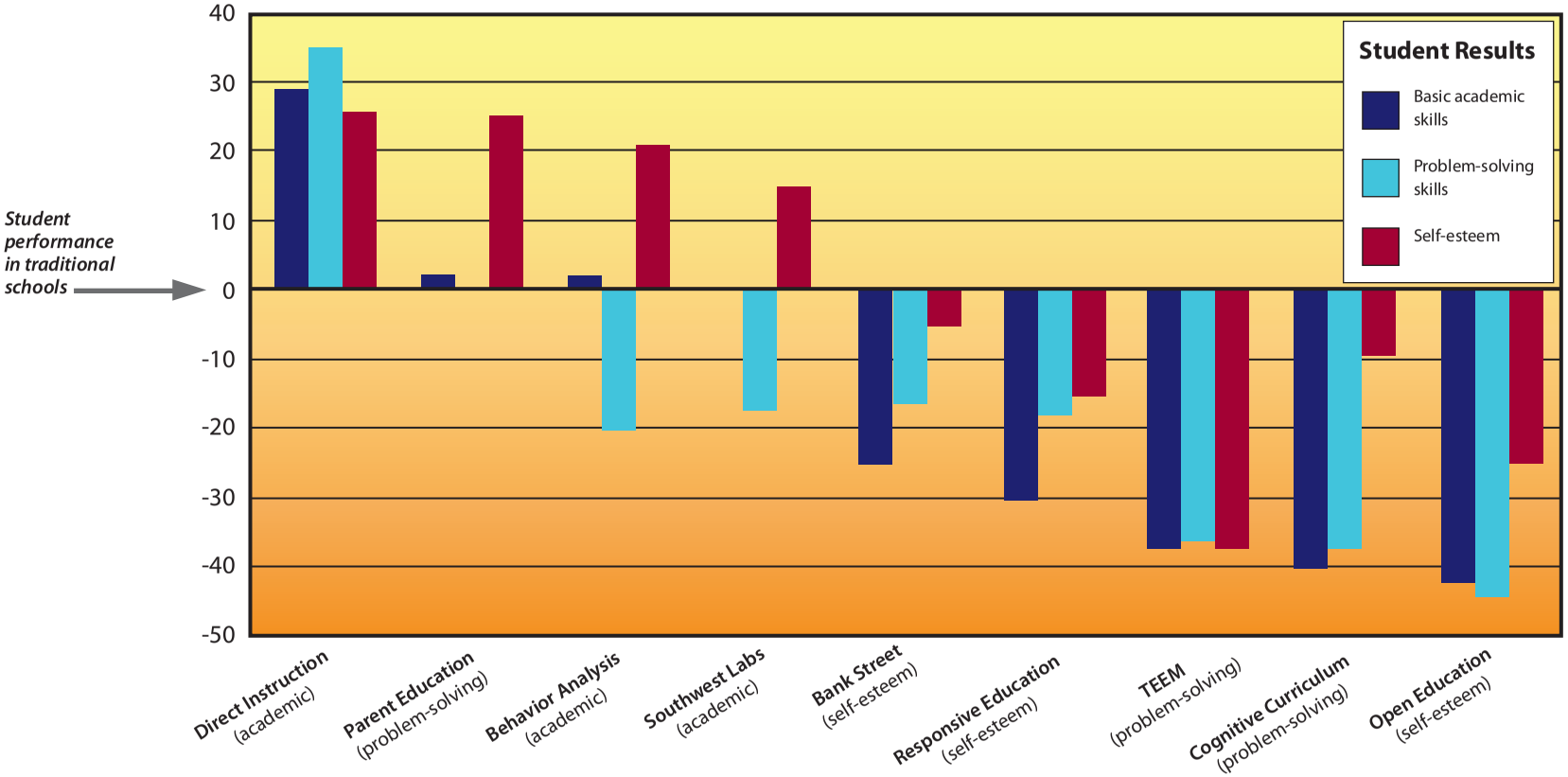
The meta-analyses and reviews of literature described above provide accumulated evidence of many different studies of Direct Instruction. All of the studies confirm that the effects of DI are positive and strong. Similar results appear with recent work. The examples below involve reading and mathematics, general education and special education students, rural and urban settings, and studies that span one year and those that look at multiple years. All of the results have effect sizes very similar to those found in the meta-analyses.

Carlson, C.D., & Francis, D.J. (2003). Increasing the reading achievement of at-risk children through direct instruction: Evaluation of the Rodeo Institute for Teacher Excellence (RITE). *Journal of Education for Students Placed At Risk, 7(2)*, 141-166.

In one of the largest multi-year studies of its type, Carlson and Francis examined the effects of the Direct Instruction-based Rodeo Institute for Teacher Excellence (RITE) program on reading achievement of K-2 students. Effects were measured both yearly and longitudinally across three years. Results indicated that students enrolled in the RITE program consistently outperformed comparison students on standardized reading measures. The study also found that the greater the number of years that students participated in RITE, the more they outperformed comparison students—an indication that the intervention was not

Project Follow Through, 1967 - 1977

Nine models of teaching K-3 compared in history's largest educational experiment



Findings:

- Nine models grouped into 3 broad teaching approaches: Academic focus, problem solving focus, or self-esteem focus.
- Three categories of results were measured: Basic academic skills, problem-solving skills, and changes in self-esteem.
- Direct Instruction produced the best results in all areas: Basic skills, problem solving, & self-esteem.
- Most other models were less effective than traditional schooling, yet many remain in use today!

transitory or weak on any of the levels of the program. The study involved 9300 students and 277 teachers. All of the outcome measures favored the RITE students, with differences between the intervention and comparison groups growing progressively from K through 2.

Crowe, E. C., Connor, C. M., & Petscher, Y. (2009). Examining the core: Relations among reading curricula, poverty, and first through third grade reading achievement. *Journal of School Psychology, 47*, 187-214.

Crowe, Connor, and Petscher compared growth in oral reading skills over one year for students using six different reading curricula: Open Court, Reading Mastery, Harcourt, Houghton Mifflin, Scott Foresman, and Success for All. Over 30,000 students from the state of Florida were included in the analysis. The researchers found that students studying with Reading Mastery had greater growth than students in other curricula, and the effect size for Reading Mastery versus other curricula in first grade was 0.44.

Kamps, D., Abbott, M., Greenwood, C., Wills, H., Veerkamp, M., & Kaufman, J. (2008). Effects of small-group reading instruction and curriculum differences for students most at risk in kindergarten: Two-year results for secondary- and tertiary-level interventions. *Journal of Learning Disabilities, 41(2)*, 101-114.

This study focused on 87 students believed to be at risk for reading failure based on demographic characteristics and skills at entry to school. Participants received small-group reading intervention during first and second grades in either Reading Mastery, Early Interventions in Reading, Read Well, or Programmed Reading. Over time students in Reading Mastery had significantly stronger gains (effect size=0.51-0.66) relative to the other three programs.

Stockard, J. (2010). Promoting reading achievement and countering the "Fourth-Grade Slump": The impact of Direct Instruction on reading achievement in fifth grade. *Journal of Education for Students Placed at Risk, 15*, 218-240.

Previous research has documented a substantial decline in standardized test scores of children from low-income backgrounds relative to more advantaged peers in later elementary grades—the so-called "fourth-grade slump." This investigation examined changes in reading achievement from first to fifth grade for students in a large urban school system with a high proportion of economically disadvantaged students. Students were taught reading by Direct Instruction (DI), Open Court, or a mixture of other curricula selected by the individual school. At the outset of the study, the first grade students in the DI schools had lower vocabulary and comprehension scores than students in either of the other two treatment groups. By fifth grade, however, the DI students had the highest vocabulary and comprehension averages—averages that exceeded the fifth grade national average. These impressive results, "suggest that the [DI] curriculum has long-term impacts and, at least for students in this high-poverty school system, can help counter the well documented tendency for declining achievement over time" (p. 234).

Stockard, J. (2010). Improving elementary level mathematics achievement in a large urban district: The effects of Direct Instruction in the Baltimore City Public School System. *Journal of Direct Instruction, 10*, 1-16.

From 1998 to 2003, selected schools in the Baltimore City Public School System (BCPSS) taught mathematics using Direct Instruction. This report compared math achievement for schools using DI with similar

schools in the system. First grade students who received Direct Instruction had significantly higher levels of achievement on the Comprehensive Test of Basic Skills (CTBS) subtests of mathematics computations (effect size = .25) and mathematics concepts and applications (effect size = .32; n > 40,000). Among the students who began first grade in the BCPSS and remained in the same schools five years later as fifth graders (n> 4,000), those who had received Direct Instruction as first graders had significantly higher scores on the measure of mathematics concepts and applications than students attending the other schools.

Stockard, J. (2011). Increasing reading skills in rural areas: An analysis of three school districts. *Journal of Research in Rural Education, 26(8)*, 1-19. Retrieved from http://bit.ly/sDz8ZT

In a study of 1600 students attending schools in rural Midwestern districts, Stockard examined the changes in reading skills brought about by the Direct Instruction Reading Mastery program. Students who received the DI curriculum from the beginning of kindergarten (full exposure cohorts) were compared to those who began the curriculum in later grades. Those in the full exposure cohorts had significantly higher reading skills than students in the other cohorts, and their scores were at or above national averages. In the one district for which scores on a statewide reading assessment were available, the percentage of students scoring at a high level went from well below the state average to above the state average in the five years of the study (effect size = .31).

CONTROVERSIAL FINDINGS

Citing an individual study to prove that Direct Instruction doesn't work is like citing a rainstorm in Tucson to prove that southern Arizona isn't a desert. The preponderance of evidence shows otherwise. Hundreds of studies over 40 years have shown DI to be highly beneficial for a broad range of students; however, there have been two reports of negative findings that appear to show the contrary, and one of them has been sensationalized in the media. Neither report is credible and both have been discounted, but both are addressed below in the interest of providing a full account of the evidence pertaining to DI.

Schweinhart, L. J., Weikart, D. P., Larner, M. B. (1986). Consequences of three preschool curriculum models through age 15. *Early Childhood Research Quarterly, 1(1)*, 15-45.

Schweinhart, Weikart, and Larner suggested that the higher rate of juvenile delinquency found in a group of 15-year-olds was the consequence of their exposure to Direct Instruction as 4-year-olds. A nine-page article contesting these findings was published in a later issue of the same journal. (See Gersten, R., 1986. Response to "Consequences of three preschool curriculum models through age 15." *Early Childhood Research Quarterly, 1*, 293-302.)

Schweinhart and his colleagues compared 3 groups of 18 youth who had attended a DI program, the author's Perry Preschool/High Scope program, or a traditional nursery school. They found a marginally higher percentage of self-reported juvenile delinquency among the alumni of the DI group.

No study prior to or following the Schweinhart, Weikart, and Larner report found a similar result. To the contrary, a 2002 study of long-term outcomes for 171 children who had been randomly assigned to either a DI or cognitively-oriented preschool found no differences in juvenile delinquency between the two groups at age 15. (See Mills, P. E., Cole, K. N., Jenkins, J. R., & Dale, P. S., 2002, Fall. Early exposure to Direct Instruction and subsequent juvenile delinquency: A prospective examination. E*xceptional Children, 69[1]*, 85-96. Retrieved from http://bit.ly/tf8ByF)

The Schweinhart, Weikart, and Larner article might have been ignored had it not been for a New York Times article that highlighted its findings. (See Hechinger, F. M., 1986, April 22. Preschool programs. *The New York Times*. Retrieved from http://nyti.ms/ubzGIt) Columnist Fred Hechinger quoted High/Scope Foundation President and co-author David Weikart regarding the "dangers" of DI and its "pressure cooker" approach. The High/Scope preschool model was Direct Instruction's principal competitor for federal funding at the time. Following Hechinger's report, the Schweinhart, Weikart, and Larner study was cited hundreds of times in the academic literature, and today it generates thousands of hits on Google. For many readers, their only exposure to the term *Direct Instruction* has been in conjunction with the Hechinger article and its fallout. The fact that the study by Mills, Cole, Jenkins, and Dale was unable to replicate the findings of Schweinhart, Weikart, and Larner has received little media attention.

Ryder, R.J., Sekulski, J., & Silberg, A. (2003). *Results of Direct Instruction reading program evaluation longitudinal results: First through third grade 2000-2003*. Milwaukee, WI: School of Education.

Another report that has received much media attention claimed that DI was less effective than "traditional instruction" in teaching reading to first through third-grade students in two Wisconsin districts, one

urban, one suburban, over a three-year period. This study, too, might have received little scholarly attention had the authors not held a press conference to announce their findings and promote them in the media.

The study had been requested by a state legislator and was funded by a state grant. Its administration was plagued with problems from the start. The first author took over the project after the principal investigator resigned. Only 80 of 224 students enrolled in Year 1 of the study remained at the end, and because of administrative changes made during the course of the study, no one knew for sure how many, if any, received DI exclusively throughout the course of the three-year investigation.

Published online in January, 2004, the Ryder, Sekulski, and Silberg study was attacked by scholars within days of its publication. A peer reviewed response was published later in the same year. (See Adams, G. L., & Slocum, T. A. [with Railsback, G.L., Gallagher, S.A., McCright, S.A., Uchytil, R.A., Conlon, W.W., & Davis, J.T.], [2004]. A critical review of Randall Ryder 's report of Direct Instruction reading in two Wisconsin school districts. *Journal of Direct Instruction, 4[2],*111-127.) Citing a host of problems, the authors asked ". . . how a report with so many serious flaws could be published and taken seriously by the educational community" (p. 126). They also called for a review by the American Educational Research Association.

A subsequent peer-reviewed report based on the same data was published by Ryder, Burton, and Silberg in 2006. (See Ryder, R. J., Burton, J. L., & Silberg, A. [2006]. Longitudinal study of Direct Instruction effects from first through third grades. *Journal of Educational Research, 99 [3],* 179-191.) It reached somewhat different statistical conclusions than those stated in the original online version but suffered from most of the same flaws that were in the original report.

The most serious problem was a lack of clarity with respect to exactly what treatment was received by the various groups of students. In the urban school system, the DI group included a school that used Reading Mastery and another school that "used a mixed-method approach in which teachers determined the extent to which DI and other instructional methods were used" (Ryder et al., 2006, p. 182). In other words, only some of the students in the "DI" group were fully exposed to the program. Neither the printed nor the online report stated separately the results obtained for students with varying levels of exposure or provided details on the mix of programs that was used.

The treatment received by students in the suburban schools was similarly unclear. "DI was implemented as a compensatory model specifically for students who scored low on their first grade screening….Thus, students who received DI in [the district] were exposed to their general education classroom's primary reading curricula…in addition to the DI instruction" (p. 182). The fact that the DI group had many more "lower achieving" students yet had greater average gains and higher scores than the higher achieving students in the control group could be taken as evidence of DI's effectiveness, not its lack of efficacy.

In a letter published in the journal *Education Week* in 2004, DI expert and University of Wisconsin professor Sara Tarver described other problems with the study's design and implementation. Tarver had been asked by DI publisher SRA/McGraw Hill to discuss the proposal with Ryder and his colleagues following the resignation of the project's initial principal investigator. Tarver found that the training that would be given to the Direct Instruction teachers was poorly conceived, incorrectly planned, and hence would render the study an invalid test of Direct Instruction. (See Tarver, S. G. [2004]. February 25. Direct Instruction: Criticism of a Wisconsin study [Letter to the editor]. *Education Week, 23*[24], 38.)