

Education That Works: The Child is Always Right, Introduction

Edward L. Anderson, Ph.D.

In the last three decades researchers have discovered many basic principles of effective learning. Using these insights, we have taught the 3 Rs to all pre-K to 6th grade children and to illiterate adults and we have demonstrated remediation of low-achieving students at all levels; yet these methods are opposed, have not been adopted and our schools continue to fail!

Traditional approaches to education see the teacher or textbook as a broadcaster presenting information to student receivers. While successful with many students, these methods fail to produce uniformly good students and fail miserably with a large minority. These failures are rationalized by deficiencies in the student: inadequate preparation, broader social forces, broken families or just being a “slow learner.” But this is “heads I win, tails you lose.” If they learn, our educational system did it; if they don’t, it’s the student’s fault.

In business, “the customer is always right.” If customers don’t return, we don’t try to change them; we find out how we can do better! What would happen if we assumed the *student* is always right? That it’s the teaching not the students that needs revision?

For thirty years, an unheralded group of “behavior analysts” have been doing just that!

Education That Works: The Child is Always Right, Part Two How do we test for teaching effectiveness?

Edward L. Anderson, Ph.D.

In business, “the customer is always right.” If customers don’t return, we don’t try to change them; we find out how we can do better! What would happen if we assumed the *student* is always right? That it’s the teaching not the students that needs revision?

For thirty years, an unheralded group of “behavior analysts” have been doing just that! Their research has demonstrated that all students (“special ed,” low IQ, disadvantaged, non-English speaking, many problem behavior students, most “slow learners” and many “Attention Deficit Hyperactivity Disorder” (ADHD) children) can learn at roughly the same

rate, *though they begin and end at different levels*. In spite of these results educators still assert that student background, preparation, and even a good self-image are *pre-requisite* to learning!

These methods have taught both *disadvantaged* and well-prepared children *over two grades in one year and illiterate adults two grades in 20 hours*. Later I'll prove these statements, but for now, let's just accept them while we pursue two broader questions: ***How do we test for teaching effectiveness?***

How do we test for teaching effectiveness?

The commonly proposed remedies have not worked. We *have* data on the effects of reduced class size, using magnet schools, and spending more money on facilities and teacher pay. They didn't work! In spite of their value they, of themselves, cannot improve American education. Only a scientific approach to teaching can, and only if we are ready to accept the results that science gives us.

Today, untested new ideas come from nowhere: There were never any long term data that justified the massive, near-instant switch to "open classrooms" twenty years ago. Old ideas keep reappearing; the "look-say" approach to reading replaced "phonics" in my youth, but it has now reappeared as "whole language." Santayana was right; unlike real sciences, education repeats the past.

So how can we separate the wheat from the chaff? Julie Vargas at West Virginia University gives us tests to apply to proposals that purport to improve educational effectiveness. There is a hierarchy of five levels:

- **Level 1. Test your students.** This so-called "post" measurement will at least tell you how good your students are now, relative to national averages. Schools should have these results available.
- **Level 2. Pre and post measures.** Has the change been already demonstrated to be effective, using measurements made both before and after the intervention? This will document gain, if any. While essential, note that you will have learned nothing about whether a different intervention would have been better or poorer.
- **Level 3. Comparison.** Compare pre- and post-tests in the new program against those of students not in the program. Is there substantial superiority?
- **Level 4. Cost effectiveness.** Students may learn better but the increased gain per student must be worth the money. But note that using cost per student may not be as meaningful as cost per

successful student. \$8,000/year spent on each student is really \$16,000 if only half learn. This is much more expensive than \$9000/year if every student graduates.

- **Level 5. Evidence of long term impact on society**, usually in dollar costs or savings due to lower costs of special education, public assistance, and/or crime. It is probably premature to apply this test under present conditions where not even the first three tests are common.

The U.S. Department of Education itself pays only lip service to evaluation. In its booklet “*Schools that Work*,” 23 exemplar programs are discussed. Of 23 descriptions, only 4 reach even Level 2, pre- and post-test measurement! Of the remaining 19, 9 programs give some kind of post-test measures, but 10 give no data whatsoever! None give evidence at Levels 4 or 5. Far from showing what works, the booklet gives the impression that enthusiasm, rather than results, is what the government endorses.

Note how little in teaching has scientific merit. We honor “exemplary teachers”, but testimonials don’t meet scientific proof standards! Have their classes been tested against others, even in the same school? And how can ephemeral skills be taught to other teachers? Transferring their skills implies a definable, organized, and universally reproducible set of principles that *all* teachers can master; in short, a “technology.” Could we all become good comedians by hearing even several lectures from Bob Hope? No.

Textbook selection procedures are themselves a scandal. Less than two percent of curricula have been tested prior to adoption to see how effective they actually are with students!

California and Texas, because of their size, determine by their selection what texts will be published *and hence*, effectively, the curricula for much of the nation. Groups of curricula experts define what the programs should teach and a formal competition is set up in which publishers are given perhaps a year to develop materials designed to win. There obviously is no time for pre-testing! The famous physicist Richard Feynman, in his biography, tells of his disgust when serving on one of the evaluation panels. He surreptitiously prepared two books with all blank pages. Both were evaluated as above average.

California’s Educational Code (its law!) states that effectiveness shall be considered as a factor in selection of curricula, yet in a recent competition to select language arts curriculum materials, California rejected as ineligible a behavior analysis program that demonstrably had taught *all* students basic language arts effectively for over twenty-five years.

The program, Direct Instruction (“DI”), was the only program in 5,000 submissions that had *any* data on how well students learned from the submitted materials. It was at Level 4, showing superiority to all other methods, *and* cost effectiveness. The author of the program, Siegfried Engelmann of the University of Oregon, sued the state over the rejection of his materials. He won in lower court, the state appealed, and Engelmann won again, the appeals court agreeing that California had violated its own law. Rather than reconsider his materials, the state Department of Education persuaded the legislature (without public hearings) to pass a bill suspending the law.(1,2)

In 1990-91, San Diego dropped a reading program that showed average success in favor of one more congruent with the district’s philosophy.(3) In the seven years before the new program, over 55% of first-graders tested above national norms in reading. After the new program, “Whole Language,” was introduced, only 26% of first-graders tested above national norms. The schools created thousands of disadvantaged kids in one year. How will they ever be able to catch them up, even if they go back to the old, only average program?

Note that merely testing to Level 3 would have exposed this program’s deficiencies. But the new program fits most educators’ theoretical ideology and, two years later, is still in use.

Chester Finn, a former Assistant Secretary of Education, observed that

“three promising educational reform ideas are under siege in Washington: national school standards, exams keyed to these standards, and the use of exam results... Trying to cut their supply lines are an army of education establishmentarians, academics and congressmen.”

Education That Works:
The Child is Always Right, Part Three
Why haven't effective methods been adopted?

Edward L. Anderson, Ph.D.

Now, our second question: *Why don't people want what demonstrably works?* Howard Sloane of the Cambridge Center for Behavioral Studies has analyzed the problem this way.

Firstly: Fear. Effective programs all have clear goals. They define what the student is expected to accomplish by any given time and how this can be evaluated. Teachers, schools, districts and states will be held accountable for these goals and found wanting. And teachers know that *today's* methods won't work for many students in spite of how hard they try!

Secondly: Philosophy. The establishment is committed to the unproven idea that learning is a “developmental process”; that only at the right stage are individuals able to learn certain things regardless of the quality of instruction. We agree that children can’t learn addition in their first month, but we have proven that they can learn much earlier than has been assumed. But educators are so *philosophically* sure of their position, *they’ve never tried* to push the limits.

Goals, standards and assessment of progress are said to be “unfair” to many children because schools often use these tools to make judgmental comparisons that destroy self image. As you will see, we now know that proper testing is precisely what is needed to optimally teach. The way we test is not invidious, and it permits us to raise the lower level students to the highest standards rather than consign them to darkness as schools do now.

Thirdly: Work. The truth must be told. Good teaching is harder than mediocre teaching. Teaching based on the developmental philosophy merely requires that appropriate material be “presented.” The student then learns or doesn’t. It’s not the teacher’s problem. But if the methods really work, good teaching demands that the teacher take responsibility. Teachers are not paid enough for the hard work of good teaching, but ironically, good teaching might make the public more willing to pay good salaries.

Additionally, school administrators often feel they are paid, not to become first in the state academically, but rather to keep order, assuage parents and not make waves.

Rita Kramer, a prominent education writer, in her recent book, *Ed School Follies: The Miseducation of America’s Teachers* (4) visited 15 Schools of Education: Columbia, Michigan, UCLA, and less well known schools. She attended and recorded classes, and talked extensively to professors and students.

She summarizes her findings like this:

“Everywhere I found idealistic people eager to do good. And everywhere I found them being told that the way to do good was to prepare themselves to cure a sick society. Almost nowhere did I find a sense that any kind of knowledge is valuable in itself or more valuable than any other... Among teacher educators today, the goal of schooling is not... to be instructional, let alone intellectual, but (rather) political. The aim is not to produce individuals capable of effort and mastery, but to make sure everyone gets a passing grade. The school is to be remade into a

republic of feelings—as distinct from a republic of learning—where everyone can feel he deserves an A.”

Continuing, she says:

“Where the goal of the teacher is to promote self-esteem in everyone in equal measure, performance will no longer count for much. Nor will it matter much what is taught.”

Educators, when presented with Engelmann’s results, respond either that they don’t believe them or they don’t apply to our schools because “our children are different.” Like most Americans, they do not understand the methods that science uses to verify performance in technical fields. They draw unwarranted conclusions from mere anecdotes and are unable to tell bad experiments from good experiments designed by experts. This problem is compounded; education has increasingly drawn the less qualified college students and their own education has required less liberal arts and scientific content.

What Engelmann accomplishes in teaching is dismissed as “merely skills training,” exactly what Kramer warns us about; education for feelings not mastery! Obviously, there is more to education than skills training, and these programs also teach great literature, concept formation and many other things. But even if they didn’t, wouldn’t it be better to teach at least the basic skills to all kids rather than use methods that can’t do even this?

Like Aristotle, most people do not understand that structured observation is the only scientific test of truth. He believed that he could sit in his armchair and deduce the laws of nature, leading to his conclusion that the world is made of earth, air, fire and water. Bertrand Russell had a derisive comment on this approach to science. He pointed out that Aristotle went to his grave believing that women have more teeth than men, an error he could have corrected by asking Mrs. Aristotle to open her mouth.

American educators still operate in the Aristotelian mode! They are more interested in the hypothetical stages of learning, a *process*, than what in fact, the students learn, an *outcome*. And they discover these stages as Aristotle did, by theorizing about them, rather than directly observing what works and then using that information as feedback to test possible changes, all in a never ending cycle of improvement.

California actually called Engelmann's program an example of what good education *shouldn't* be: they called it "rote" instruction, which their *philosophy* tells them is bad. But is there a parent who hasn't used rote instruction? Did you not all teach your children how to count this way or learn the alphabet by singing a rote song? Those examples are rote and yet they clearly work!

Don't get me wrong! Engelmann's program is not rote and our experiments tell us that in more advanced instruction rote doesn't work, but *not working* should be the criterion for rejection not armchair philosophy. Armchair philosophers don't build our airplanes or our bridges, but they do build our educational structure.

The Child is always right. If he or she isn't learning, it's our job to observe that outcome and use that knowledge to improve our skills. This is the way every other advance in knowledge is made, why not in education?

With this background, we can now talk about the main issue:

Education That Works:
The Child is Always Right, Part Four
What Has the Child Taught Us in Thirty Years?

Edward L. Anderson, Ph.D.

Let's be scientists and do an experiment. When teaching the difference between "straight and curved," we would all try to use examples. Question: Should nonexamples also be used or will they confuse? Experiment: Teach thirty kids each way and see who learns best. Answer: Use nonexamples. Question: Should the nonexample be very similar to the example and thus possibly confusing or very clearly not an example? Answer: Similar! It turns out that discriminating the tiny difference is precisely what must be learned *if* the concept is to be truly mastered!

Hundreds of experiments like these have been performed. What are the principles that have been uncovered? There are seven winners: *No ambiguity, Small steps, Fluency, Feedback, Reinforcement, Generativity, and Mastery.*⁽⁵⁾

1. No ambiguity: Every word of instruction (literally) must be tested, rewritten and retested at each stage on naive students until ambiguity has been eliminated as demonstrated by first-time learning by 80-90% of the students. Research shows that any ambiguity in communication will later appear as a student error. To this end, detailed, written scripts are used in teaching.

The teacher or an assistant reads from these scripts to groups of students, in the process asking them scripted questions rapidly enough to get instant unison responses from the entire group, about 12 responses per minute. Those who lag even slightly thereby pinpoint their specific weakness, which is immediately corrected in one-on-one contact.

Avoidance of ambiguity is so important that even those who wrote the scripts read from them themselves rather than risk untested words or phrases that might lead to ambiguity. As in biology, mutations are seldom of value.

2. Small Steps. Because of the requirement that there must be almost perfect learning after one presentation, new material must be introduced in carefully sequenced, very small steps. Errors are minimized because each student is initially placed and then moves continuously on a micro-level scale in which each level is only slightly more difficult than the last.

In passing, notice that these groupings are a far cry from “tracking” which is based on a gross cut—“he belongs in third grade math and she in fifth”—which categorizes a student for a full year *if not forever*; something clearly undesirable. In the elementary school I am describing, our students will constantly move between very fluid groups in each subject meeting in corners or in different rooms. The groupings change each day based on progress. Because each level is a minor increment and achieved easily, a child can be exposed to perhaps 50 levels in a school year. About 15% of the school day is spent like this.

In contrast, California requires that students be placed together, leading to classes in which 25 kids are being taught the same material, even though some may be well behind the others at any given time. The intent is praiseworthy – to prevent invidious comparison and damage to the child’s self-image. We agree with the intent! A continuous record of failure relative to one’s peers is indeed destructive to one’s development. It is a certain recipe for continued failure of the lower-level students, which in turn increases the likelihood of misbehavior, boredom, and eventual drop out. Unfortunately, California argues that our approach also violates their tracking criterion!

In passing, I notice that no one objects to tracking when the subject is athletics rather than intellectual achievement. When I was young I was tracked off of varsity teams and no

one worried about inequitable treatment or damage to my ego. Those who oppose tracking still accept athletics.

If 80-90% of the group don't learn on the first try, then, learning from the student, we cut the step in half, making two steps rather than one. If necessary, we'll divide again until our 90% first-time learning criterion is met. In math, for example, there are nearly 300 individual steps beginning at learning to count and ending at pre-algebra functions.

Note that the 90% criterion is used as a test of the program design. The student must shortly become both fluent and 100% accurate.

The result of this process is that every student is continuously successful! This continuous success has been shown – guess what? – to improve the student's "self-image" as demonstrated by standard measurements. Rather than deducing *philosophically* that good "self-image" is a *prerequisite* to learning success (as is commonly asserted today) we see that self-image may instead be the *result* of a continuous record of success. Even an armchair philosopher would guess that this is more likely than vice versa.

3. Fluency. The lay term that defines mastery. With it we recognize that the ability to rapidly and spontaneously recall, organize, and respond is a better sign of proficiency than hesitating or slow behavior, even if accurate. Think of fluency in typing. It is defined by rapidity, few mistakes, and automatic, unthinking response!

Children have taught us that fluency is both required for mastery and a critical test of learning success. A new step should only be presented after the current step becomes fluent, with the student giving rapid, frequent, and correct responses to all questions. We now know that accuracy, or percent correct, *independent of rate of response*, is an insufficient measure of learning; both accuracy and speed are essential.

We get fluent responses from all students by working first in groups with the teacher and then singly and in pairs to increase the rate of responding. Every student answers hundreds of pre-tested simple questions, in some cases using something like flash cards, and in others repeated practice with peers or monitors to increase the rate at which the student can, for example, count or set up word problems. About 70% of the school day is spent building fluency and homework is now totally unnecessary in elementary situations.

The data from these fluency exercises are recorded daily in each subject by the student, not the teacher, on an ingenious “Standard Celeration Chart.” This self-charting can begin even in kindergarten! The importance of this daily progress check, called “Precision Teaching,” cannot be overestimated.

The charts are designed so that both the student and the teacher can tell at a glance if a difficulty has appeared by the end of each day. This permits immediate remediation by the teacher on a specific skill rather than delay until a very gross test, a weekly exam or a mid term, reveals some gross difficulty. (If a problem goes unresolved, learning is impaired because the student hasn't mastered the hierarchical skills prerequisite to the current material.) Testing and evaluation takes about 10% of the school day and recording and charting about 5%.

When we say fluent, we mean it! Fluency for legibly writing the numbers 0 to 9 is 160-180/minute. Few readers of this article can do this this well! My own rate of writing is about 120/minute, not 180. For single digit answers to single digit addition and subtraction problems, the rate is 80-100/minute. Our third graders perform at these levels!

Contrast this with teaching methods used today. The teacher may ask for an answer once a week. Usually those who are asked are already the most advanced students. The others are embarrassed and will waste time in giving wrong answers, so teachers avoid questioning precisely those who need the practice. Instead, answers are sought through occasional homework which requires perhaps ten to forty responses rather than hundreds. And those having difficulty often don't do homework.

Note that attaining fluency also makes unnecessary today's practice of “recycling”: the reteaching of the same skill, in perhaps third, fifth, and seventh grade. Instead the program structure guarantees that skills are mastered and never get rusty.

4. Feedback. Each individual's program must be modifiable on a daily basis using the information from the Standard Celeration Charts. The teacher's role is now that of diagnostician, a manager of learning. Like a doctor, he or she decides what is wrong and then applies a treatment from a systematic bag of skills.

5. Reinforcement. Good performance is constantly reinforced with praise and points toward individual and group rewards: stars, early recess etc. Unexpectedly, the curves that gradually appear as entries are made on Standard Celeration Charts create special shapes which the kids recognize. They invent fun fanciful names for these shapes and look for them and compare them. You compete with yourself to get a more desirable “jaws” curve than the dreaded “snowplow.” Again, the students taught us that doing their own charts, *in itself* leads to better performance. We didn’t predict it. The child is always right!

Gradually, of course, the extrinsic rewards which are used to encourage mastery of difficult basic tools—did you enjoy learning math tables?—give way to the “internalized” rewards from reading itself.

Note that this competition is *not* destructive. One student doesn’t “win,” leaving the others angry or frustrated. Everyone wins because the system *is designed* to force that result!

6. Generativity. Teaching time is precious, but several researchers have found that as little as 20 minutes per school day is spent in actual instruction. Several new tricks raise this time substantially.

But the kids taught us something else totally unexpected and of critical importance; a truly mastered repertoire (see later) unexpectedly creates out-of-context skills which previously had to be individually taught. This so-called “generativity” causes something new in teaching, “curriculum leaps.” For example, learning mathematical manipulations – how to add and subtract – is much easier than setting up word problems. As we all remember, it’s an entirely different skill! The kids taught us that when they learned whole number manipulation to fluency, then word problems with only whole numbers to fluency, we could then teach fraction manipulation to fluency, and find it unnecessary to teach fraction word problems separately. Students solved these problems perfectly the first time: They made a curriculum leap!

7. “Learning mastery.” Our definition is *even more demanding* than current school usage. We, of course, get superior performance immediately following instruction; that’s the 90%. But we then apply harder standards described by the acronym “R E A P S” which means verifying *Retention* after one month without further instruction; verifying student *Endurance*, the ability to resist distraction by performing continuously on-task for twenty minutes in the

face of distraction (even with many ADHD kids); and demonstrating *Application* of the material to new situations; all to previously set *Performance Standards*.

We have defined all of these objectives ahead of time and we measure outcomes with tests, interviews and portfolio entries which must be completed both independently and fluently. Lastly, we use nationally standardized achievement tests to verify performance.

And now the results. These are programs that really work; three related strategies, each using all or part of our seven new principles:

[Direct Instruction](#)

[Precision Teaching](#)

[The Morningside Model](#)

Education That Works:
The Child is Always Right, Part Five
Direct Instruction

Edward L. Anderson, Ph.D.

Engelmann, in the 1960s, made the basic discoveries that led to Direct Instruction (DI), an entire six year curriculum presented in well-defined and carefully sequenced steps with immediate feedback and reinforcement for correct responses. DI demonstrated the critical nature of explicit, unambiguous teaching of rules and strategies and the importance of both a large number of responses and flexibility in permitting individualization of programs.

Ballantyne School, El Cajon CA: Third Grade

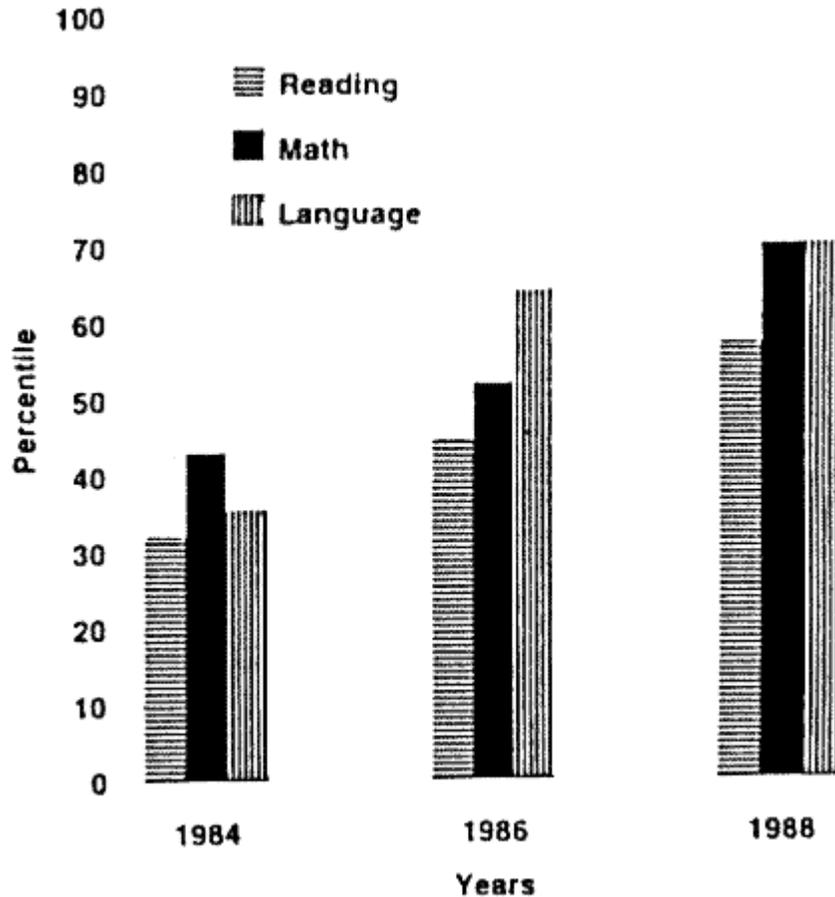
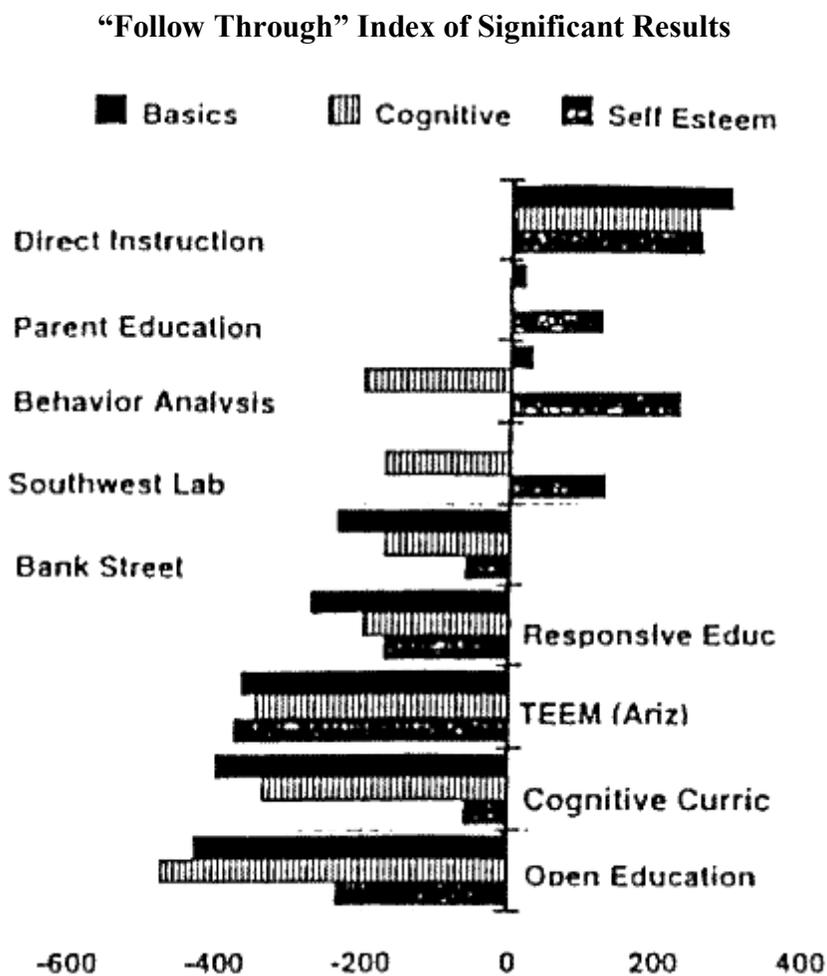


Figure 1

Figure 1 shows changes in third grade scores at the Ballantyne School, El Cajon, CA after adopting Direct Instruction in 1984. Reading percentiles improved from 32nd to 58th, math from 42nd to 70th and language from 35th to 70th. These are major changes!

DI was tested in “Project Follow Through,” a U.S. Office of Education funded Level 3 experiment to compare the effectiveness of nine different teaching models in Head Start education. It ran nine years, from 1968 through 1977, involved over 75 schools and followed thousands of students in successive waves from prekindergarten to fifth grade.⁽⁶⁾ Said to be “the largest social experiment ever performed,” it cost close to \$1 billion.⁽⁷⁾ Schools in each program model were matched for nearly identical pupil characteristics with “comparison groups” which continued whatever teaching methods were already in use. These were the groups against which each model’s classes would be compared.

Figure 2, “Follow Through” Index of Significant Results, shows a vertical, zero line. It represents the average of the “comparison groups.” The further to the right the bar goes from the centerline, the higher the proportion of sites in which that model showed both educationally and statistically significant effects. Bars going to the left show negative results. Direct Instruction clearly did best and some models did *even poorer than the comparison group*.⁽⁸⁾



Basics = word knowledge, spelling, language, Math computation
 Cognitive = reading comprehension, math concepts, math problems

Figure 2

We have discussed *Direct Instruction*. *Parent Education* was an extension of a home-based, highly individualized program. *Behavior Analysis* used reinforcement and a structured

curriculum but not the complete DI program. *Southwest Lab* used programmed curricula for bilingual children, emphasizing language development. *Bank Street* aimed the development of the whole child, targeting self-image, creativity, coping skills and use of language. *Responsive Education* aimed at development of problem-solving skills, sensory discrimination and self-confidence. *TEEM* targeted broad intellectual skills and positive attitudes toward school. *Cognitive Curriculum* was based on Piaget's theories. Children scheduled their own activities and teachers acted as catalysts rather than instructors. *Open Education* used the famous "open classroom" in development of self-respect, imagination and openness to change.

The bars show results for *Basics*, that is, reading words, word knowledge, spelling, language, and math computation; *Cognitive*, which is reading comprehension, math concepts and math problems; and *Self-Esteem*.

Figure 3 "Follow Through" Evaluation, shows the percentiles attained by the end of the third grade in four areas.⁽⁹⁾ The centerline represents the 20th percentile, the expected performance of the disadvantaged children. Note again that no model performed as well as Direct Instruction. Cognitive Curriculum and Open Education, *the child-centered philosophies most favored today*, performed *poorer* than the already disastrous 20th percentile!

"Follow Through" Evaluation

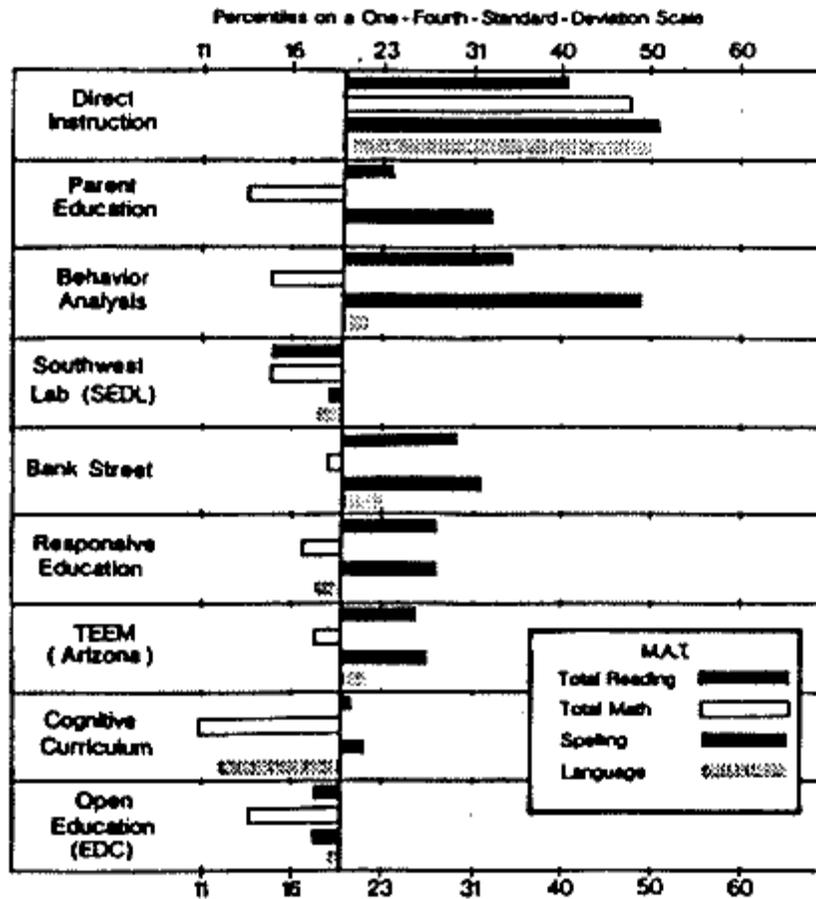


Figure 3

Competing against these eight other instructional models, DI scored first in the teaching of reading, arithmetic, spelling, language, basic skills, academic cognitive skills and, unexpectedly, positive self-image. This latter even against models which had improvement of the student's self-image as key to the learning process.

It ranked first in urban sites, and with kids for whom English was a second language. It was especially effective with average background kids who had started the program in kindergarten. They were reading at third grade level at the end of first grade. Children with IQs from 70 to above 130 learned at approximately the *same rate*. The lower the IQ, the lower the base, and the lower the level achieved over the four years of instruction, but *they gain nearly as much*. Their IQs also improved. Might more time with the lower achievers narrow the IQ and background gap?

Despite these results, in an action unexplained to this day, all models were certified as *equally* effective by the Office of Education.

Reanalysis^(10,11) of the basic data has confirmed the original conclusions regarding Direct Instruction, but since then these older results have been superseded by 15 more years of DI research and demonstration. By 1981, the last of twelve DI Follow Through projects was demonstrated as effective. Eleven had 8 to 10 years of data on successive groups of children-replication over time. Schools were from large cities (New York, San Diego, St. Louis); middle sized cities (Flint, MI; Dayton, OH; E. St. Louis, IL); rural white communities (Flippin, AR; Smithville, TN); a rural black community (Williamsburg, SC); Hispanic communities (Uvalde, TX; E. Las Vegas, NM); and a Native American community (Cherokee, NC). All projects were certified as exemplary in reading and mathematics for the primary grades.

Among others, the East Las Vegas, NM, program has continued. Though it's students are of Hispanic background with English as a second language, the school is at the top of New Mexico's schools on standardized tests given, of course, in *English*. Unfortunately, over 100 other DI programs have been dropped: "this isn't the way we do things!" Nevertheless, additional thousands of students have been taught using DI and hundreds are in DI programs today. They show the same teaching effectiveness and, as you will see, modifications to the Direct Instruction base may be doing even better.

Contrary to some current opinion, at least some benefits of Head Start persisted. Students with three or four years of DI maintained their advantage in fifth and sixth grades.⁽¹²⁾ Similarly, DI students maintained an advantage in junior and senior high school as evidenced by achievement tests, graduation rates, and college applications and acceptances.⁽¹³⁾

The use of DI by the Wesley Elementary School in Houston, TX, was featured on "Prime Time Live."⁽¹⁴⁾ You see educationally disadvantaged ghetto kids reading and discussing Macbeth, in the original, in fifth grade. Unfortunately, most of the show was devoted to the continued opposition to the program by school administrators; for example, private funds had to be found to buy maps because third graders "weren't ready for maps."

Beyond elementary skills, DI has been extended to geometry, literary analysis, chemistry, critical thinking, social studies, US history and music, though with many fewer

demonstrations. DI has been highly successful with the developmentally disabled, with hundreds of replications and thousands of students. Unpublished, preliminary data show that the methods are also very effective with the educationally gifted.

Education That Works:
The Child is Always Right, Part Six
Precision Teaching

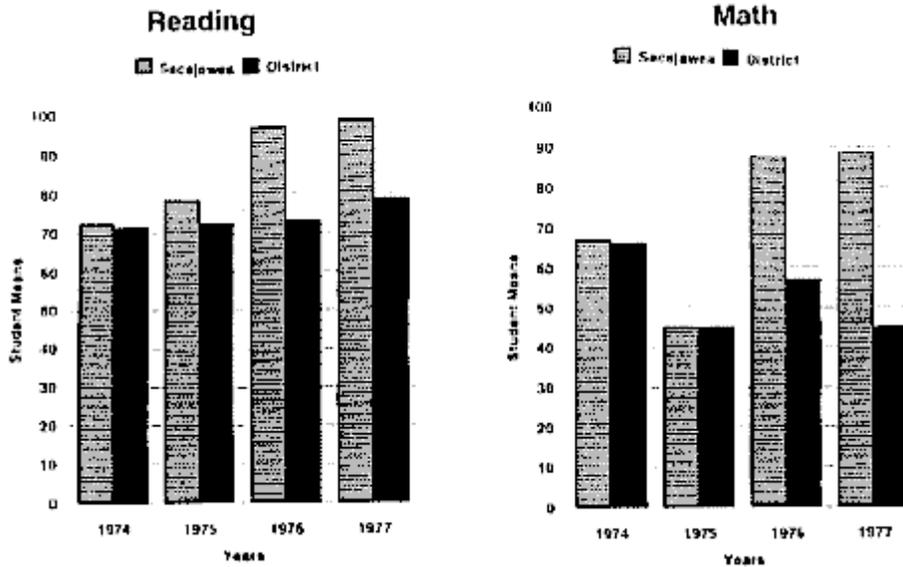
Edward L. Anderson, Ph.D.

Independently, inspired by a fundamental principle that rate of performance is critical to any discussion of behavior, Precision Teaching (PT) was developed by Odgen Lindsley of the University of Kansas. He and his co-workers have watched the children elaborate on the importance of fluency *per se* for over twenty years.^(15,16)

Unlike Direct Instruction, Precision Teaching does not use special curricular materials, but is superimposed on whatever curriculum is in use. As we have seen, students chart their rates and/or their corrects and incorrects each day. They work with teachers in adjusting the instruction to achieve a weekly doubling of performance in each subject until the appropriate fluency standard is achieved. Precision Teaching independently implies that essentially all physiologically-whole students can achieve weekly doubling, though students will start with different base performances. Once again, *all* students can learn!

The Sacajawea School in Great Falls, Montana used an early version of this simple technique.⁽¹⁷⁾

Iowa Test of Basic Skills



Figures 4 and 5

Figure 4 shows a 25 percentile point differential in reading relative to the six other schools in the district, all with similar students. Figure 5 shows a 43 point differential in math. These results put the students in the 95th percentile in both subjects, the top 5% of the students in the US! Data had been gathered through Level 4 and showed high cost effectiveness! A new principal then let the program die and Sacajawea returned to the same programs the other schools were using.

PT is being used by thousands of students in other schools today.

**Education That Works:
The Child is Always Right, Part Seven
The “Morningside Model”**

Edward L. Anderson, Ph.D.

Established in 1980, Morningside Academy in Seattle combines PT with DI while incorporating all seven research results. The math program has the very small steps that I mentioned earlier. During the past eleven years, Morningside has taught well over 300 children, most diagnosed as learning disabled, who had never gained more than half a grade in an academic year. Many had behavior problems as well. *They gained an average of two to three grade levels per year in each of reading, math and language.*⁽¹⁸⁾ (Parents get their money back if this goal is not met. There has never been a refund.) No homework is required.

Table 1 shows the grade gains achieved in one year by Morningside students in Reading, Language Arts, and Math. The most important data is in the Bold-faced type.

Morningside Children's Grade Gains

Year	Number of Students	Reading		Language Arts		Math	
		Mean Grades Gained	Standard Deviation	Mean Grades Gained	Standard Deviation	Mean Grades Gained	Standard Deviation
1981-82	11	2.4	0.51	1.6	0.56	2.1	0.97
1982-83	43	2.3	0.57	1.9	0.73	1.9	0.65
1983-84	75	2.4	0.86	1.9	0.65	2.0	0.73
1984-85	54	2.5	0.75	2.7	0.97	2.2	0.56
1985-86	28	2.0	0.72	3.0	0.83	2.5	0.62
1986-87	24	2.3	0.84	2.3	0.70	1.9	0.77
1987-88	27	2.3	0.70	3.5	0.84	2.2	0.83
1988-89	32	2.5	0.83	3.0	0.72	2.7	0.70
1989-90*	11	2.8	0.77	3.3	0.75	2.4	0.84
1990-91*	21	2.2	0.62	3.8	0.86	3.9	0.72

*Metropolitan Achievement Tests (MAT6) 1989-91.

Others; California Achievement Tests

Table 1

Oddly, one of the objections most often heard to this kind of success is that “It may work for low achievers, but our kids are different.” This is roughly equivalent to qualifying a doctor to do heart transplants but not hangnails.

**Education That Works:
The Child is Always Right, Part Eight
Literacy**

Edward L. Anderson, Ph.D.

The New York Times recently reported the results of a four-year Federal study of literacy in America. It stated,

“While only 10 % of Americans say that they have difficulty reading and writing, the usual test of literacy, nearly half of the nation’s 191 million adult citizens are not proficient enough in English to write a letter about a billing error or to calculate the length of a bus trip from a published schedule.”

Morningside techniques have been used with illiterate adults in the workplace. Teaching adults should be easier; they are presumably more motivated and their existing vocabulary and verbal skills are closely related to the job of reading. Closely related, but clearly quite different.

At-risk adults in the program advanced *two academic years for each 20 hours of instruction* using the Morningside Model; ten times faster than the U.S. government standard of one grade advance per year of instruction. Contract payments were performance-based, that is, paid only for students who progressed at least two grade levels in two skills, chosen from reading, math and writing.

The first group, 32 African-American males, who were government defined as “at risk,” aged 16-26 years, entered with skills between second and eighth grade. Many were homeless, had criminal records, and, in a few cases, were in and out of jail during the course of the program. They were given street cleaning jobs in the morning to learn job-related skills such as attendance, cooperation, and productivity. They attended Morningside in the afternoon, Monday through Friday, from 1 to 3 pm. Twenty-nine of the 32 students successfully completed the program, exiting with skills at or above the eighth-grade level literacy standard.

Figure 6 shows the progress of four representative adults in the literacy program. The horizontal axis is the number of hours spent in school. The vertical axis is the number of months of achieved academic progress. The lower, dotted, line shows the rate at which the individual had previously learned, found by plotting his tested entry level against the number of years he had spent in previous schools. The dashed line shows the gains the government would pay for one month’s progress for each month taught.

The heavy black line indicates actual gains at Morningside.

Progress of Four Illiterate Adults at Morningside

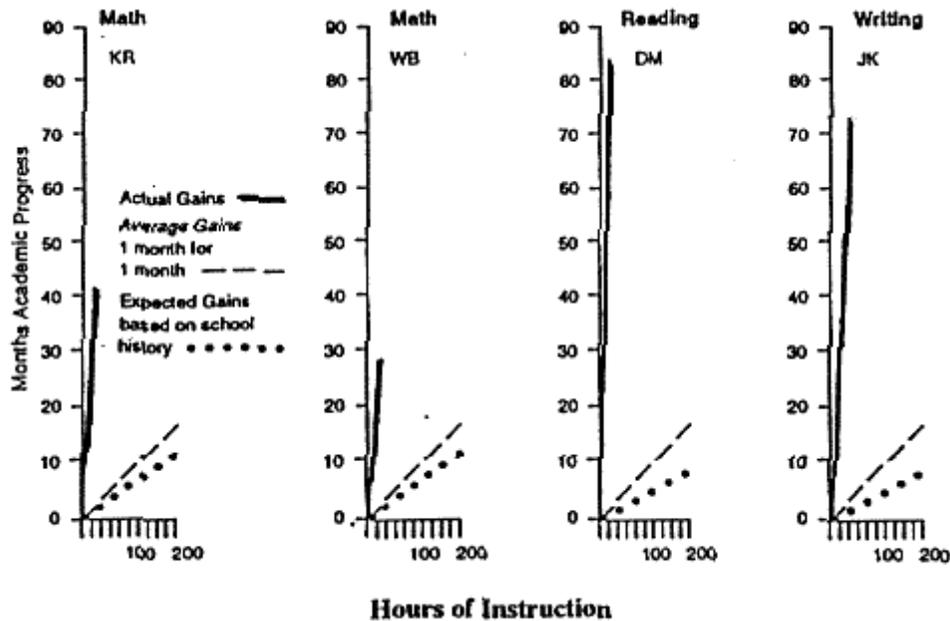


Figure 6

In the last two years, both programs have been replicated and extended at Malcolm X College in Chicago with inner city youth and certified high school graduates who enter college with average 6th grade reading and 4th grade math skills.⁽¹⁸⁾ After one year of training they are carrying Malcolm X's regular classes. It is so successful that all entering academically deficient students will now be required to take these courses and an additional "thinking skills" program, the objective of which is to turn these students into not just graduates but at least "B" average graduates. Results from the first two years imply that this goal will be met, but more time is needed to scientifically justify the claim.

Six elementary schools in the same Chicago neighborhood, one of the worst slums in America as described in the best seller "*There Are No Children Here*," have begun using DI. First year results were evaluated by the University of Illinois Reading Center and found very favorable, but again, not over a long enough period to justify scientific publication. We believe what we say about high standards of proof before publicity and use!

Additional costs have been minimal at both the college and elementary level, primarily the costs of the new curriculum materials and intensive 10 day training courses for the teachers. Because the techniques are so different, a temporary cost is that of continued support of the teachers, especially during the first year.

I have had to omit several other highly successful, demonstrated programs.

Education That Works:
The Child is Always Right, Part Nine
Conclusion

Edward L. Anderson, Ph.D.

In summary, the message is clear! We have sufficient *proven* knowledge to make major educational improvement now! The Mattawan (Mich) Consolidated School District (K-12; enrollment 2,700), even today 517th lowest of 524 in per-student expenditures, went from the bottom tenth of Michigan districts to the top tenth in academic achievement in fifteen years. Student attitudes and social behavior improved as did parental satisfaction. Some classes use Direct Instruction, some don't. The improvements came because they constantly measured student outcomes and made changes based on these results.⁽¹⁹⁾

Julie Vargas tells us how to test educational claims. If we use so-called "improved" teaching methods *only after* they have been verified by *scientific comparisons* that *prove* them superior we can stop quackery in the schools and guarantee eventual attainment of our educational goals. Because we have not demanded these proofs, education in America is failing. Until we do, we will continue to fail

Quoting a famous philosopher, "We have met the enemy, and it is us."

Education That Works:
The Child is Always Right, References

- (1) Engelmann v. State Board of Education. Superior Court of Sacramento County, No.361906, 2.
- (2) Engelmann v.State Board of Education. 2 Cal. App 4th 47;-Cal.Rptr.2nd-[Dec. 1991]
- (3) San Diego Union. (1/10/92)
- (4) Kramer, Rita. (1991). *Ed School Follies: The Miseducation of Americas Teachers*. Free Press, Macmillan.
- (5) Johnson, K. R., & Layng, T. V. Joe (1993). Breaking the structuralist barrier. *American Psychologist*, 47 1475-1490.
- (6) Stebbins, L.B., SL Pierre, R.G., Proper, E.D., Anderson, R.B. & Cerva, T.R.(1977). *Education as Experimentation: A Planned Variation Model (Vol. IV-A): An Evaluation of Follow Through*. Cambridge, MA: Abt Associates.

- ⁽⁷⁾ Watkins, C. L. (1997). *"Project Follow Through": A case study of contingencies governing instructional practices of the educational establishment*. Cambridge, MA: Cambridge Center for Behavioral Studies.
- ⁽⁸⁾ Engelmann, S., & Carnine, D. (1982). *Theory of Instruction: Principles and applications*, pp. 355-359. New York: Irvington Publishers
- ⁽⁹⁾ Kinder, D., & Carnine, D. (1991). Direct instruction: What it is and what it is becoming. *Journal of Behavioral Education, 1*(2), 193-213.
- ⁽¹⁰⁾ Bereiter, C., & Kurland, M. (1981). A constructive look at Follow Through Results. *Interchange, 12*, 1-22.
- ⁽¹¹⁾ Gersten, R. (1984). Follow Through revisited: Reflections on the site variability issue. *Educational Evaluation and Policy Analysis, 6*, 411-423.
- ⁽¹²⁾ Becker, W.C., & Gersten, R. (1982). A follow-up of Follow Through: The later effects of the Direct Instruction model on children in the fifth and sixth grades. *American Educational Research Journal, 19*, 75-92.
- ⁽¹³⁾ Gersten, R., & Keating, T. (1987). Improving high school performance of "at-risk" students: A study of long-term benefits of Direct Instruction. *Educational Leadership, 44*(6), 28-31.
- ⁽¹⁴⁾ ABC-TV: Prime Time Live broadcasts: 6/6/91 & 11/26/91.
- ⁽¹⁵⁾ Lindsley, R. (1991). Precision Teaching's unique legacy from B.F. Skinner *Journal of Behavioral Education, 1*(2), 253-266.
- ⁽¹⁶⁾ Binder, C., & Watkins, C. (1990). Precision Teaching and Direct Instruction: Measurably superior instructional technology in schools. *Performance Improvement Quarterly, 3*(4), 74-96.
- ⁽¹⁷⁾ Beck, R. (1979). Report for the Office of Education: *Joint Dissemination Review Panel*. (submitted by Great Falls, MT Public Schools).
- ⁽¹⁸⁾ Johnson, K. R., & Layng, T. V. Joe. (1994). The Morningside Model of generative instruction. In *Behavior Analysis in Education: Focus on Measurably Superior Education*. Brooks/Cole Publishing Company.
- ⁽¹⁹⁾ Farris, H. E., Carnine, D. W., & Silbert, J. (Dec., 1993). Learning is our business. *The American School Board Journal*.