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COOPERATIVE LEARNING, SUCCESS FOR ALL, AND EVIDENCE - BASED REFORM IN EDUCATION

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Absract: This article argues that educational practice and policy should be based on evidence from rigorous experiments. Examples of cooperative learning and Success For All are given to illustrate how proven programs have been evaluated and broadly disseminated. Policy initiatives in the U.S. to promote use of proven programs are described. Evidence-based reform is possible in education, but it demands strong research and clear guidance for educators.

Key words: Evidence-based reform; Cooperative learning; Success For All; Experiments in education; Educational policy

Robert. E. Slavin

During the 20 th century, medicine, agriculture, technology and other fields embraced a simple but powerful idea: Use what works. They began to require that innovative medicines, seeds, and machines be put to the test before being widely adopted. The result was revolutionary progress in each of these fields, which continues today. Evidence-based reform in any area does not just protect the public from ineffective innovations; it also creates a dynamic of progressive improvement, in which many researchers and developers are working to replace today's best solutions with something even more effective, confident that the market will enthusiastically adopt proven innovations.

Before evidence became important in medicine, agriculture, and technology, products and treatments in each area were disseminated by marketing, word of mouth, and tradition. In the 19 th century, for example, there was already plenty of knowledge in medicine, but neither physicians nor the general public paid consistent attention to it. In the early 1900's, William Halsted, a medical researcher at Johns Hopkins University, spent thirty years trying, with limited success, to convince physicians to wash their hands before operations and use sterile procedures that had been validated in research going back to the 1860's.

The practice of education today is at much the same pre-scientific point as medicine was a hundred years ago. We have much knowledge in education, and educators do occasionally pay attention to it, as physicians did in 1908. However, there is limited research evaluating specific programs, practices, or materials, and that which does exist is rarely consequential in educators' decisions. As a result, important decisions about educational programs are likely to be made based on marketing, word of mouth, tradition, and politics. This not only fails to provide the best educational programs to vulnerable children, but it also removes any incentive for developers to create programs and technology that actually work better than current practices. The result is the famous pendulum of educational reform, in which new ideas appear, become widely used, and only then are evaluated. By the time the evaluation evidence is in, the market has already given up on the new idea, and has rushed off to the latest new idea (see Slavin, 1989). A pendulum swing describes innovation in all fields, such as art and fashion, in which taste rather than evidence drives consumer choices. Unfortunately, education is one such field.

This paper discusses a thirty-year program of research at Johns Hopkins University intended to create, evaluate, and disseminate effective programs and practices for schools to use to improve the achievement of their children, and to extend beyond this to help move education policies in the U.S. and throughout the world toward a focus on evidence as a basis for practice. Our experience forms an important basis for anticipating how evidence-based reform might proceed in the future.

Cooperative Learning

The initial focus of the Johns Hopkins research was cooperative learning. This refers to teaching

methods in which children work in small groups to help one another learn. In the Johns Hopkins models of cooperative learning, called Student Teams-Achievement Divisions (STAD) and Teams-Games-Tournaments (TGT), students work in 4-5 member teams in which teams receive recognition or other awards based on the learning of all team members (see Slavin, 1995, in press). As early as the late 1970s, research at Johns Hopkins University and elsewhere had established that cooperative learning increases student achievement if it incorporates two key elements: Group goals and individual accountability. That is, groups are rewarded based on the individual learning of all group members, not on a single group product (Slavin, in press; Webb & Palincsar, 1996). In groups organized in this way, it is in group members' interests to teach each other, assess each others' learning and ask for help from each other, and these are the behaviors that lead to learning gains (Webb & Palincsar, 1996).

In the early 1980s, research on cooperative learning accelerated, and new forms appeared. In our work at Johns Hopkins University, we created comprehensive curricula that married cooperative learning instructional practices with state of the art curricula, first in mathematics in a program called Team Accelerated Instruction (TAI) and then in a reading program called Cooperative Integrated Reading and Composition (CIRC). Large-scale evaluations of TAI (Slavin, Madden, & Leavey, 1984) and of CIRC (Stevens, Madden, Slavin, & Farnish, 1987; Stevens & Slavin, 1995) found positive effects of these programs on student achievement.

In addition to continuing research and development, our research center also began active dissemination of cooperative learning methods. Initially, we held large workshops for elementary and secondary teachers of all subjects. The workshops used simulations, in which participants learned cooperative learning by working in teams themselves. These were very popular and effective in communicating key concepts and procedures, but we were disappointed to find that transfer from the workshop to classroom practice did not always take place or did not last over time. Many teachers had difficulty adapting cooperative learning methods to their traditional textbooks and objectives. This was a main reason we began to create programs, such as TAI and CIRC, which were specific to particular subjects and grade levels and incorporated curriculum, instruction, and professional development in an integrated package. We found that teachers were more likely to implement and maintain cooperative learning programs that put together process and content.

In the mid-1980's, we created a whole-school cooperative learning model called the Cooperative Elementary School, in which teachers used TAI, CIRC, and other cooperative learning methods, phasing them in over time. A two-year experiment found positive achievement effects of this approach (Slavin, 1987). The schoolwide approach gave us an opportunity to organize school structures to support effective implementation and to deal with issues such as grouping, integration of students with learning difficulties, and teacher's learning communities, which could not be done when just a few teachers in each school implemented cooperative methods. We began to see that for profound and lasting reforms, the school, not the classroom, is the most effective unit of change.

Success for All

In the late 1980s, we were continuing our work on the Cooperative Elementary School, and were also carrying out a series of reviews of research on effective programs for students at risk (see Slavin, Karweit, & Madden, 1989), when we were approached by the Baltimore City school district and asked to create a model for inner-city elementary schools capable of ensuring that the children succeeded. We took on the challenge and added beginning reading, early childhood, parent involvement, and other elements to our Cooperative Elementary School model to form a program we called Success for All (Slavin & Madden, in press). Success for All was designed to use prevention and early, intensive intervention to ensure that all children in high-poverty schools got off to a good start, especially in reading, and then built on that start throughout the elementary grades.

Success for All was explicitly designed as a demonstration of what schools could look like if they used programs and practices proven to be effective in rigorous research in all aspects of their functioning (see Slavin, Madden, & Datnow, 2007). Beyond its

extensive use of cooperative learning, Success for All uses proactive classroom management and a rapid pace of instruction (Evertson, Emmer, & Worsham, 2003), systematic, synthetic phonics in the early grades (Adams, 1990; National Reading Panel, 2000), and metacognitive reading comprehension skills in the upper elementary and middle grades (Pressley, 2003). It uses one-to-one tutoring for struggling students (Wasik & Slavin, 1993), frequent, curriculum-based assessment (Fuchs, Fuchs, Hamlett, & Stecker, 1991), and a cross-grade grouping strategy called the Joplin Plan (Gutiérrez & Slavin, 1992). Each school has an on-site facilitator who uses coaching strategies adapted from Joyce & Showers (1995). Each of these elements was selected for the model after a careful and continuous review of scientific research in each area.

After the program itself was assembled and implemented, it has been evaluated in more than 50 experimental-control comparisons, 30 of which were third-party evaluations, and a national, randomized evaluation in 35 schools found positive effects on reading outcomes (Borman, Slavin, Cheung, Chamberlain, Madden, & Chambers, 2007). Reviews of research on comprehensive school reform have uniformly concluded that Success for All is one of just two programs with the strongest evidence of effectiveness (the other is Direct Instruction) (CSRQ, 2005; Borman, Hewes, Overman, & Brown, 2003; Herman, 1999). A longitudinal study followed Baltimore students in five Success for All and five control elementary schools to eighth grade, when they had been out of the program for at least three years. Former SFA students were still significantly higher in reading achievement, and were far less likely to have been retained or assigned to special education (Borman & Hewes, 2003).

Success for All has been widely disseminated. In 2007-08, it is in about 1200 elementary and middle schools in 47 states, serving mostly high-poverty urban and rural schools. It is generally used in the highest-poverty schools in a given district, rather than district-wide, but it is used throughout a few districts.

Our experience with Success for All strongly supports our belief that the school is the essential unit of change. Success for All becomes the core of what a school is about. Remarkably, as of the 2007-2008 school year, the median Success for All school has been using the program for 7 years. Some have done so for 15 years or more. These schools have kept the program through changes of principals, superintendents, teaching staffs, funding levels, federal, state, and district policies, and other disruptions that are all too common in high-poverty districts. There are schools that drop the program each year, but quite often they fight to maintain it in the face of budget cuts, hostile superintendents, or other threats. Because it is a schoolwide, comprehensive approach with a full-time facilitator, new staff are hired with the expectation that they will learn the program and then are given ample assistance to implement it. Professional development from the developer is ongoing indefinitely, supplementing internal coaching provided by facilitators and district personnel. A national network of Success for All schools holds annual conferences, distributes newsletters, and constantly develops and distributes new materials, training programs, software, and other innovations to keep the program fresh and respond to new findings from research, new policies and trends, and issues raised by the school personnel themselves, who are actively consulted by the national developers and leaders.

In recent years, Success for All has been successfully extended to middle schools (Chamberlain, Daniels, Madden, & Slavin, 2007) and has begun to incorporate embedded multimedia and other technology (Chambers et al., 2006).

Other Comprehensive School Reform Models

It is important to note that Success for All is not the only national network of comprehensive school reforms in the U.S. Especially under funding from the New American Schools Development Corporation (NASDC; see Stringfield, Ross, & Smith, 1996) as well as other funding sources, several national models began in the early 1990s and continue to work with significant networks of schools nationwide. Success for All is the largest, but other large networks include America's Choice (Supovitz, Poglinco, & Snyder, 2001), the School Development Project (Comer, Haynes, Joyner, Ben-Avie 1996), Modern Red Schoolhouse (Kilgore, Doyle, & Linkowsky, 1996), and Direct Instruction (Adams & Engelmann, 1996). Research on compre-

hensive school reforms has found a wide variety of models with moderate to strong evidence of effectiveness in rigorous evaluations (Comprehensive School Reform Quality Center, 2006a, b). Although their particulars differ considerably, all of these models arrived at a common set of understandings about how to make school level reform work on a large scale. All use school facilitators or coaches to provide on-site, ongoing assistance to teachers. All maintain active, national networks to constantly help their members improve their practices and exchange ideas with like-minded peers. Most (including Success for All) require school staffs to vote in favor of adopting programs, to ensure staff support. Most provide detailed student and teacher materials and student assessments to help schools implement comprehensive models with fidelity and effectiveness. All provide extensive, ongoing professional development.

During the Clinton Administration, in 1997-2001, the U.S. Department of Education developed a means of supporting scale-up of comprehensive school reform models. It provided competitive grants of at least $50,000 per year for up to 3 years to help schools adopt "proven, comprehensive" reform models. These Comprehensive School Reform (CSR) grants did not generally cover the full costs of the programs, forcing schools to use their own funding to supplement the costs. Schools received extra points on their applications if they were in high-poverty areas, so most funded schools were relatively impoverished.

The CSR funding program had an electric effect on school reform throughout the U.S. State departments of education and local agencies held "design fairs" in which school staffs could come and learn about various programs available to them. Ultimately, thousands of schools adopted CSR programs with the federal grants, but thousands more did so with their own funds, after learning about progamms through the CSR process. Estimates of the number of schools that used CSR models at the peak of this movement (in 2001) range from 6000 to 10,000. The Bush administration opposed CSR and ultimately pressured Congress to end it, but not before it demonstrated how research-proven programs could be developed, evaluated, and then disseminated on a substantial scale while maintaining quality and effectiveness (see Aladjem & Borman, 2006).

Evidence-Based Reform in Education

If education is to make significant progress in the 21 st century, it must embrace evidence-based reform. There is no other way forward. However, there are great obstacles to be overcome.

For evidence-based reform to prevail, three conditions must exist.

1. There must be a broad range of proven programs in every area of education, every subject and grade level. Evidence-based policies will not prevail if demanding strong evidence requires educators to use just one or two proven programs, or if no programs have strong evidence.

2. Trusted, impartial, educator-friendly reviews of research must be available, to enable educators and policymakers to know which specific programs and practices have been proven to work in rigorous evaluations.

3. Government agencies must provide incentives to schools to adopt proven programs.

The experience of cooperative learning, Success for All, and other comprehensive school reform programs provides a model for how each of these conditions can be fulfilled by the coordinated efforts of government, private funders, developers, researchers, and educators at all levels.

Building the Research Base for Effective Programs

Perhaps the most important requirement for evidence-based reform is the development of a substantial set of replicable programs and practices with strong evidence of effectiveness. Educators and policymakers must have a variety of programs they can choose among with confidence. This means that governments must fund a wide range of research and development projects designed to create innovations capable of significantly improving the outcomes of education at all levels and in all subjects.

The development process might use a series of "design competitions," in which government sets out

what it wants and then funds a variety of entities to develop and evaluate competing alternatives (Slavin, 1997). For example, a funding agency might ask Research & Developpment organizations to develop an approach to teaching algebra to pupils aged 14-16 capable of increasing their performance on national or international measures by at least 25% of a standard deviation. The most promising applicants could be chosen in a competition, and this number might be winnowed down over time if some designs turn out not to be effective or practical. The New American Schools Development Corporation (NASDC), funded by large corporations rather than government, did exactly this to create comprehensive school reform models in the 1990's (Kearns & Anderson, 1996). Initially, 11 design teams were chosen from almost 700 applications. Over time, four of the teams were dropped. Some of the remaining seven, plus a handful of similar programs funded in other ways, ultimately developed strong research bases (CSRQ, 2006a, b). As noted earlier, CSR models were used at their peak in more than 6000 schools in the U.S. (see Slavin, in press; Aladjem & Borman, 2006; Stringfield, Ross & Smith, 1996). Comprehensive school reform models such as Success for All (Slavin & Madden, 2001), America's Choice (Supovitz, Poglinco, & Snyder, 2001), Direct Instruction (Adams & Engelmann, 1996), Modern Red Schoolhouse (Kilgore et al., 1996), and the School Development Program (Comer, Haynes, Joyner, & Ben-Arie, 1996) have been extensively evaluated and found to be effective, and continue to be used in thousands of U.S. schools, even in the absence of government support.

The design competition process that produced comprehensive school reform models could be applied to any subject and grade level. Imagine design teams working on the design and evaluation of programs capable of accelerating achievement in beginning reading, upper elementary math, algebra, and physical science, programs for second language learners, dropout-prevention, early childhood, and so on. In each case the goal would be to build on the best that currently exists, and to end up with numerous programs, all of which have been proven to increase achievement by at least 25% of a standard deviation. These programs could be highly diverse. Some would involve technology, others not. Some would require extensive training, others less so. Some would challenge current conceptions of curriculum, others might be traditional. All that matters is that they are proven effective and are replicable in many schools.

A key issue in the design competition process is the design of the evaluation. Evaluations should use random assignment to conditions, should use national or state assessments as their outcome measures, and should be large enough (at least 10 schools) to avoid idiosyncrasies due to particular schools. The programs should be implemented under the realistic conditions that will exist in practice, without extra attention or non-replicable conditions. The evaluations may be done by developers or by third parties, but under close observation by the funding agency.

In the U.S., the Institute of Education Sciences (IES) is currently funding a broad array of development and evaluation activities that will ultimately add to the set of proven, replicable models, but due to the anemic funding provided to IES, this process is going too slowly. Governments in many countries could fund substantial research and development of effective programs with a tiny fraction of the money they spend on providing education. With sufficient support, researchers, developers, and entrepreneurs could develop and evaluate programs in every area of prekindergarten to secondary education within a period of five to ten years.

Reviewing What Works

Educators and policy makers need to have scientifically valid, fair, and clearly written summaries of the research evidence showing the effectiveness of education programs. Educators are extremely unlikely to take the time to try to weigh competing evidence from many evaluations. They need information they can rely on in a summative form, like *Consumer Reports* in the U.S. and *Which Car?* in Britain.

The U.S. Department of Education established a web site with this objective called the What Works Clearinghouse (WWC; see www.whatworksclearinghouse.gov). The WWC provides systematic reviews of research on programs for beginning reading, elementary and middle school mathematics, preschool programs, dropout prevention, and a few others. Unfortunately, the WWC uses procedures that are strict on random assignment and statistical

procedures but pay little attention to use of biased measures or small sample sizes, and as a result its highlighted programs tend to be supported by very small studies (often less than 50 students), very brief studies (often six weeks or less), and studies that use measures of the content taught in the experimental group but not the control group (see Slavin, 2008). With substantial revisions the WWC could still become the pre-eminent source of reviews, but at present it is not useful.

In addition to the What Works Clearinghouse, other web sites have sprung up to provide educator-friendly reviews of research on educational programs. The Best Evidence Encyclopedia (www.bestevidence.org), now housed both at Johns Hopkins University and the Institute for Effective Education at the University of York, summarizes reviews from all sources, in a "*Consumer Reports*" format, and contributes its own reviews. It currently has reviews on elementary and secondary mathematics, secondary reading, comprehensive school reform, computer-assisted instruction, and other topics.

The Comprehensive School Reform Quality Center (www.csrq.org) reviews research on comprehensive school reform models. Other web sites, such as the Promising Practices Network (www.promisingpractices.net) and Social Programs that Work (www.evidencebasedprograms.org) present education and social service programs with the highest level of evidence, from high-quality randomized experiments. The International Campbell Collaboration (www.campbellcollaboration.org) and Britain's EPPI Centre (www.EPPI.ioe.ac.uk) also provide scientific reviews in many areas of education. Although there are controversies and difficulties in program effectiveness reviews (see Slavin, 2008), this enterprise is moving forward rapidly on many fronts, and within a few years it is likely that there will be multiple high-quality, reliable reviews available to educators and policymakers.

Evidence-Based Policies

Ultimately, it is not enough to have many research-proven programs and trusted reviews of research. Education lacks a tradition of looking to evidence for program decisions, and without clear support from government, marketing will always trump evidence.

The U.S. Congress and both the Clinton and Bush administrations have tried to support research-proven practices. As noted earlier, the Comprehensive School Reform (CSR) competitive grants funded schools to adopt "proven, comprehensive" programs, but most schools used programs, lacking evidence or home-grown programs that had never even been piloted before. The Reading Excellence Act in the late 1990s promoted research-proven programs, and No Child Left Behind (NCLB), the Bush administration's main education plan, famously mentioned "scientifically based research" more than 100 times. Yet this language had little impact on practice; even in the Reading First program, a part of NCLB that had a particularly strong emphasis on "scientifically-based research," programs with strong evidence of effectiveness were *less* likely to be adopted in schools receiving Reading First funding than in similar high-poverty schools that did not receive Reading First funding (Moss et al., 2006). "Scientifically-based research" turned out to mean "includes some phonics and is published by a major publisher" (Grunwald, 2006, Manzo, 2006).

The problem with these efforts is that in each case, the legislation contained language supporting research-based practice, but it did not point schools to particular programs with strong evidence. As an analogy, imagine that the Food and Drug Administration (FDA) just said "use safe and effective medicines" instead of saying "Use penicillin. Don't use laetrile." As a result, publishers and program developers could and did claim research support and state and federal administrators could and did decide without any rationale what they considered to be "based on scientifically-based

> research." In practice, ambiguous language leaves the issue up to marketing and public relations, not to evidence.

In government policies to support the use of proven programs, it is essential to be clear about which programs have strong evidence of effectiveness. This will become possible in the near future because of the existence of reviews that use consistent standards of evidence, as discussed earlier.

Governments should provide incentives to use programs that have been proven to be effective. One mechanism would be to provide additional rating

points in grants for schools or districts applying to use proven programs. Providing additional points instead of requiring use of particular programs allows schools to use any program they think is best, but it clearly expresses a government preference for programs with strong evidence.

Consequences of Evidence-Based Reform

The consequences of evidence-based reform would be profound. If government policies began to favor programs with strong evidence, developers including publishers, software developers, university researchers, and entrepreneurs of all kinds would have an incentive to engage in serious development and evaluation efforts. Seeing the immediate impact of research and development, policy makers might provide substantially greater funding for these activities. Developers would have a reason to invest in more effective innovative strategies, knowing that if they turn out to be effective in rigorous evaluations, they will be successful in the marketplace.

Evidence-based reform would finally apply to education the process that led to dramatic developments in medicine, agriculture, and technology in the 20th century, where every solution that meets evidence standards supersedes less effective products, and a vast research and development enterprise works to improve on the best we have available today. Our experience with cooperative learning, Success for All, and other comprehensive reform models show what such an enterprise might look like, but similar initiatives need to be support in all subjects, all grade levels, and for all types of educational outcomes.

The winners in this would be millions of children, especially those who are least well served by the current system, the teachers who yearn for more effective tools to help them do their job well, and society as a whole, which would come to expect progress in education as confidently as it currently expects progress in other fields. Education research would gain the respect and the resources it has never had. Even the publishing companies that currently rely on marketing would benefit if they embrace innovation, as they would have the resources to do the necessary research and development, just as large drug companies benefit from evidence-based practice in medicine.

Recent developments in research and policy make it possible to finally put education on the road to genuine reform. The experience of cooperative learning, Success for All, and comprehensive school reform show that under the right conditions, proven, effective models of school and classroom reform can be developed, rigorously evaluated, and disseminated, benefitting hundreds of thousands of children. It remains for policymakers and our profession to take the necessary steps.

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