

WCER RESEARCH highlights

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Improving Children's Cognitive and Social Competencies

Generally speaking, children in higher quality child care programs perform better on measures of social, language, and cognitive development than children who attend poorer quality settings.

But there is considerable variability across the U.S. in state-regulated child care standards. A recent study by UW-Madison education professor Deborah Vandell and colleagues provides the first empirical evidence of a mediated path from child care structure to child outcomes (see Figure 1). The study provides support for policies that establish higher standards for caregiver training and child-staff ratios.

Vandell and colleagues looked at the quality of care for children at age 4-1/2, a time when the greatest proportion of children are in care. Their study examined all types of child care, from center-based care to home care to relative care. The resulting report focuses on 813 children who were in 10 or more hours per week of observable child care at age 4-1/2 and had been in the same setting for at least 6 months.

Maternal care giving is strongest predictor

The study demonstrated that the quality of maternal care giving is the strongest predictor of children's cognitive competence. It is also the strongest predictor of caregivers' ratings of children's social competence.

The study found that the quality of nonmaternal care giving is also associated with children's cognitive competence and caregivers' ratings of social competence—that is, better trained caregivers were observed to have better interactions with children and lower child-to-caregiver ratios seem to lead to more positive interactions. The quality of nonmaternal care giving was found to be negatively associated with the number of problems caregivers reported for children and positively associated with cognitive performance. In other words, the better the care, the fewer the behavior problems and the higher the cognitive performance.

The assessments of child care quality included eight qualitative ratings. Four measures assessed the caregivers' relationship with the children

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FROM THE DIRECTOR

Strength of Research

Perhaps the major strength of WCER's research is the breadth of expertise held by our principal investigators and the wide range of educational issues they and their sponsors choose to examine.

Our research covers everything from learners and the learning process through instruction, leadership and innovation, the organizational perspective, community contexts, policy reforms, and examination of the research process itself.

WCER's breadth of focus is reflected in this issue of Research Highlights, with stories about recent and continuing work on designing technology-rich learning environments, preparing teachers for diversity, evaluating the quality of child care programs, randomized trials and evidence-based interventions, and evaluations of a National Science Foundation initiative.

As always, you're invited to explore these areas in more detail at our web site, www.wcer.wisc.edu.

In addition, WCER offers an email newsletter, WCER Today, which provides monthly summaries of recent research findings in all these areas. Its international readership represent 340 educational organizations, research centers, governmental agencies, professional groups, and media outlets. If you'd like to receive a sample issue of this free publication, contact the editor at pbaker@wisc.edu.

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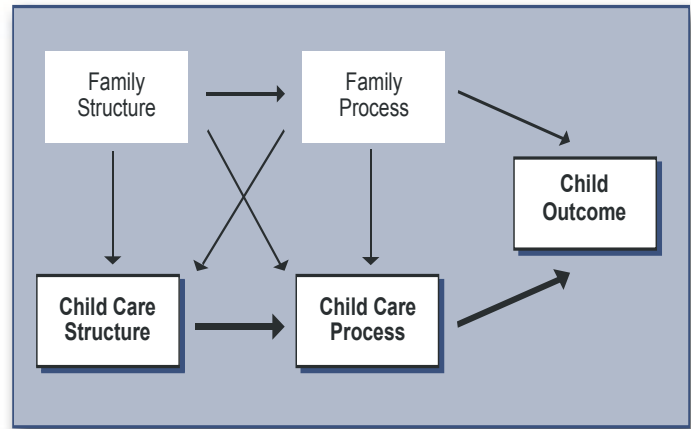


Figure 1. A generalized child-care effects model. The mediated path tested in the current study is shown in boldface.

(for example, caregivers' level of attention or detachment; caregivers' stimulation of children's cognitive development). The remaining measures assessed the classroom setting (for example, level of activity; degree of control; emotional climate).

The study also assessed children's family backgrounds, including mother's level of education and an income-to-needs ratio.

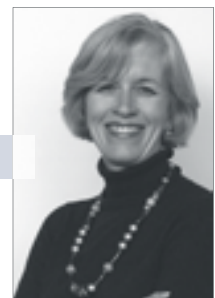
Because there is considerable variability across the U.S. in state-regulated child care standards, Vandell says, these findings should be useful for advocates of improved regulations.

For more information, visit Vandell's project Web site www.wcer.wisc.edu/childcare/.

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Funding for this research was provided by the National Institute of Child Health and Human Development (NICHD).

Deborah Vandell





Statewide Efforts Can Improve Student Achievement

Students are learning more challenging mathematics and science content, thanks to the National Science Foundation's Statewide Systemic Initiatives (SSI) program.

A team headed by WCER researcher Norman Webb and Horizon Research, Inc. colleague Iris Weiss recently concluded their study of the SSI program, which began in the early 1990s. The pilot program enabled 25 states and Puerto Rico to help students improve their learning of challenging mathematics and science content by making simultaneous changes in many areas of education—for example, organizational structure and decision making, curriculum content and learning goals, facilities and equipment, and assessment of student achievement.

Webb and Weiss evaluated the impact of SSI on student achievement and the lessons that could be learned from implementing such a program. They found that student achievement varied across states with SSI awards, apparently due to factors such as prior conditions in education and accountability systems and the duration of NSF funding.

The study reached three main conclusions—technical dimensions of developing capacity and maintaining quality, political dimensions of developing guidance and incentives, and interactions with funders. An example from each area included:

1. A technical lesson: It was vital to build flexibility into the SSI program so that information produced by research, evaluation, and monitoring could be used effectively.
2. A political lesson: Creating partnerships with policy organizations helped establish a supportive context for reform.
3. A lesson on interactions with funders: SSI researchers and funders needed to develop a shared understanding of the reform strategies as they fit local contexts.

The study's findings generally agree with theories of systemic reform. For example, the effectiveness of state assessments and accountability policies appears to be a strong factor in improved student performance. State policies aligned with

the goals of a systemic initiative can result in substantial gains in student achievement in a relatively short time when accompanied by a strong statewide infrastructure that supports teachers and schools as they change their practices.

Multiple components in concert

More specifically, Webb and Weiss found that:

1. Statewide student achievement gains over 4 years were more likely when reform efforts targeted state policy as much as, or more than, teachers' classroom practice.
2. Statewide assessment policies and practices constituted important components of systemic reform. The existence of a state assessment program seemed to be related to statewide achievement gains, particularly when criterion-referenced tests were used.
3. When state policies did not support SSI goals, reform efforts appeared to be compromised or even undermined.
4. When assessments were aligned with SSI goals, reform-related instructional practices increased. When they were not aligned, reform-related instructional practices decreased or did not change.
5. In all SSI states, the alignment of state policies and assessments with the SSI goals appeared to be an important influence on statewide student achievement.



Norman Webb



Iris Weiss

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David W. Shaffer



Professions are Models for Student Learning

Technology makes it possible for students to do things they could never do before, says David Williamson Shaffer, an assistant professor of learning science at UW-Madison. A key question in Shaffer's research is: Can new technologies be used to promote learning in new and more powerful ways?

To answer this question, Shaffer's Epistemologies of Practice research group in the Department of Educational Psychology develops and studies innovative after school, weekend, and summer programs in which students learn about mathematics, science, and civics by working as architects, mediators, engineers, urban planners, and journalists.

For the Wisconsin Science Journal, students come for after school and Saturday enrichment classes and work as Web-based journalists to learn about the impact of science and technology on their community. In the Digital Zoo, students work as engineers to learn physics by building cyberspace towers and virtual creatures. In Madison 2020, students work as urban planners, using a geographic information system to redesign Madison's State Street and learn about urban ecology.

Along the way, these young people from neighborhoods across Madison develop skills and understanding that will help prepare them for life in a knowledge-based economy and society.

Shaffer explains that the traditional model of education for the past century was shaped by an industrial economy. Industrial schools, with fixed class periods marked by bells, repetition, and rote memorization, were designed to prepare students for life as factory workers and citizens in an industrial society.

But the industrial economy has given way to a service and knowledge-based economy, built on emerging information technologies.

In the search for an educational model better suited for a knowledge economy, Shaffer focuses on professions such as law, medicine, engineering, architecture, and journalism, whose practitioners work with complex ideas through projects that matter in the community.

From studying how professionals work and learn, Shaffer developed a teaching and learning paradigm that challenges students to think in action, like professionals, reflecting on what they do and sharing observations with peers and mentors. "Just like professionals, middle and high school students can

think and learn through reflective practice," says Shaffer. "It is a critical life skill and is part of all complex learning—cognitive, practical, and civic."

Shaffer's projects explore how computers and other new media can make it possible for K-12 students to learn the way the "pros" do—a reinvigoration of John Dewey's vision of bringing the life of the child into the life of the school.

The Wisconsin Science Journal works with small groups of students in after school and Saturday enrichment programs. With help from UW-Madison journalism students and professor Lewis Friedland, and reporters from the *Wisconsin State Journal* and *Isthmus* newspaper, the Wisconsin Science Journal students learn journalism skills and produce a feature section about science and technology for a community news Web site.

"These students pick things up more quickly than some UW journalism students!" says Nick Wolfmeyer, a UW journalism major working on the project.

Studies such as these are showing that working as professionals helps students to think differently about their world, Shaffer says. "Classes teach students to think in the context of traditional academic disciplines," he explains. "The professions also develop coherent ways of thinking. But the work of journalists, doctors, and engineers is grounded in real problems that kids care about."

As a result, the "new urban professionals" of the Wisconsin Science Journal, the Digital Zoo, and Madison 2020 are learning about technology, about their community, and about themselves in new and powerful ways.

Shaffer sees this as the first step in a fundamental restructuring of education. Rather than a curriculum based on mathematics, science, history, and language arts, he suggests, we might imagine a system in which students learn to think as doctors, lawyers, architects, and other knowledge workers. "It's not that we want to train students as professionals in the traditional sense of vocational education," Shaffer says. "But working as professionals helps students learn in ways that are meaningful and motivating - and that will prepare them for life in the modern world."

For more information see the EoP web site
<http://coweb.wcer.wisc.edu/eop/> or contact Shaffer at dws@education.wisc.edu





Preparing Teachers for Diversity

Which teachers are most likely to be assigned to the nation's most challenging urban schools? Young, inexperienced ones.

It doesn't seem to make sense. Medicine, law, architecture, and other professions have well-established systems of clinical preparation that support novices as they grow into greater responsibilities and more complex work.

Yet few new teachers in urban schools receive adequate training as they enter the profession. They face large numbers of students who are poor, who come from varied racial and ethnic families, and who speak a first language other than English.

In response to this crisis, UW-Madison education professor Gloria Ladson-Billings and colleagues developed Teach for Diversity (TFD), a graduate program for aspiring teachers who wish to teach in diverse racial, ethnic, and socioeconomic settings.

New teachers are among the more vulnerable professionals in schools, says Ladson-Billings, and they need to be nurtured and supported. Despite their youthful and idealistic enthusiasm, most new teachers are frightened and overwhelmed by the demands of teaching, she says. They need well-planned and well-implemented professional development that helps them learn about their work as they take their first, tentative steps in the profession.

Teach for Diversity resulted from concerns Ladson-Billings and colleagues had about students' lack of clear understanding of the intellectual lives of teachers and lack of commitment to principles of human diversity, equity, and social justice. A second concern was the fragmentation of preservice teachers' academic and professional course work. A third concern was the gap between course work and field experiences.

The program was an initiative of the Elementary Education Program of the Department of Curriculum and Instruction at UW-Madison, and had wide support from the faculty. Ladson-Billings shared program direction responsibilities with UW-Madison education professor Mary Louise Gomez.

Three cohorts of students have completed the TFD program. Here's what Ladson-Billings and colleagues have learned:

1. Prospective teachers working in diverse communities need opportunities to learn about the students in the context of the community. Students' success at home and in the community rarely reflects itself in school tasks. The TFD

students came to form different opinions about students' strengths and capabilities by participating in community-based programs like day camps and neighborhood centers.

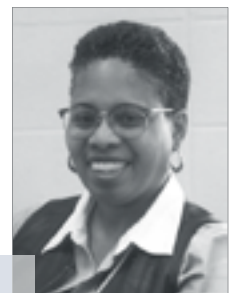
2. Prospective teachers working in diverse community schools need an opportunity to apprentice with skilled cooperating teachers. Their placement with knowledgeable, experienced teachers gives them the opportunity to try new things in a supportive context.
3. Prospective teachers working in diverse community schools need opportunities to ask many questions about teachers and teaching.
4. Prospective teachers need the opportunity to do serious intellectual work. Ladson-Billings and colleagues emphasized to TFD participants that intellectual work was a major part of the enterprise. Participants were required to use, test, and challenge theory as they improved their practice.

Despite the excellent students recruited into the program, Ladson-Billings and colleagues continued to struggle with helping the students become well-prepared beginning teachers. Some students initially lacked an appreciation for the complexity of teaching. But before long, they understood that teaching is a demanding and stressful job. They learned that the responsibilities of teaching extend beyond teacher and student to include parents, communities, colleagues, and supervisors.

A program like TFD cannot cover all of the challenges prospective teachers face, says Ladson-Billings. Neither can such a program overcome the limitations of institutions like schools, universities, and state departments of education. But even with its shortcomings, TFD offers some promise for thinking creatively about teacher education.

Teacher education cannot reform itself by itself. It needs help from constituents across the educational landscape. It also needs help from an undervalued source—novice teachers.

For more information, see Ladson-Billings's *Crossing Over to Canaan: The Journey of New Teachers in Diverse Classrooms* (Jossey-Bass, 2001) and *The Dreamkeepers: Successful Teachers of African American Children* (Jossey-Bass, 1994). Ladson-Billings can be reached at gjladson@wisc.edu



Gloria Ladson-Billings





Experiments Important Part of Research Mix

Politicians are calling loudly for educational improvement, and many insist that more testing and more accountability will usher in an era of improved student achievement.

UW–Madison education professor Geoffrey Borman agrees, to a point.

Developing and improving programs and practices in U.S. schools and classrooms, he says, will also require research methods that:

1. Separate fact from advocacy,
2. Provide the most believable results, and
3. Answer with confidence the question, “What works?”

To answer the question, “What works?” the U.S. Department of Education’s Institute of Education Sciences (IES) is pressing educators to adopt randomized experiments as the preferred research method. The IES aims to advance the field of education research, making it more rigorous in support of evidence-based education.

Borman notes that randomized experiments have become the standard for testing and developing innovations in many fields, most notably medicine. Yet experiments have been used infrequently in education research. Why is this?

For one thing, the work of classroom teachers is not usually driven by scientific knowledge of the efficacy of their practices, Borman says. Instead, it tends to be reinforced by psychic rewards that teachers feel when they reach their students. As a result, key instructional decisions in the classroom are driven and perpetuated by highly subjective criteria that often have no foundation in evidence on what works.

And in a larger context, schooling occurs within a complex system including federal policies, state mandates, district policies, and school-level leadership. How can one improve, or even study, such a complicated system by focusing on the relatively simple causal connections suggested by experimental designs?

A blessing and a curse

The field of education research itself is highly diversified. Borman says this is both a blessing and a curse: It is a blessing in that the various research methods and perspectives create a rich, vibrant, and democratic discourse about what really matters in education and what should be done to improve it.

It is a curse because all too often the diversity in education research is perceived as confusion and contradiction. As a result, little consensus emerges about what needs improvement and how we should go about doing it.

What distinguishes a true experiment from other research methods is the random assignment of different treatments to the individuals or groups of students involved in the study. Another component of the randomized experiment is that it involves conscious manipulation of the environment.

For example, the researcher chooses at random to provide one group of students the opportunity to participate in a pilot test of a new mathematics curriculum while the other group does not receive the innovation. At the end of the trial, students are assessed, and the scores for those from the pilot program are compared to those of students who did not participate. The true impact of the new math curriculum can then be evaluated. A study such as this rules out the bane of social science research—selectivity—that is caused when one compares schools, teachers, or students who actively choose the mathematics curriculum to a similar group that did not choose it. In this study, it is not clear whether the motivation to choose the new curriculum or the effectiveness of the curriculum itself was the true “cause” of any improvements one might find.



Geoffrey Borman

Resistance to experiments

But some writers don't consider randomization practical in education research. Randomized experiments don't fit with their view of schools as complex social organizations. Complex organizations seem to respond better to the tools of management consulting than to those of science. As a result, researchers doing true experiments in education usually work in the disciplines of public health, psychology, economics, and policy sciences.

Random assignments often require teachers and administrators to give evaluators some authority over curriculum, student placements, or pedagogical technique. Yet most educators resist surrendering authority to people they don't consider professionally competent to judge their work.

Educators, parents, and students have political clout. If someone is suspicious of the ethics or general merits of random assignment, these groups have formal and informal channels through which to register their opposition.

If randomization is to be more widely accepted and implemented in education, Borman offers these suggestions:

1. The ethical and political dilemma of withholding services must be addressed.
2. Randomized field trials must be adapted to fit the messy and complex world of schools and classrooms.
3. A stronger centralized federal role is needed to foster and sustain experimentation and improvement of educational practices.

Some options

In many circumstances, Borman says, mixed-method designs can combine the strengths of randomized experiments with qualitative research to uncover the actual school and classroom processes and practices that underlie causal effects. This combination of findings is likely to provide practitioners and policy makers better information about how to improve practice.



Randomized experiments composed of relatively large and heterogeneous samples of schools and districts allow evaluators to test causal effects over a range of contexts. These studies can address empirically the extent to which treatment effects generalize across diverse settings and can generate causal conclusions that are sensitive to context.

Policy makers and practitioners should demand the best evidence on the effects of educational interventions, Borman says. As researchers in nearly every other discipline, and especially in medicine, already acknowledge, the experiment is the best method for establishing the causal effects of innovations. However, randomized experiments are not replacements for the variety of other methods in education research.

Material in this article originally appeared in different form in the Peabody Journal of Education, vol. 77, no. 4, pp. 7-27.

Funding for Borman's research was provided by the U.S. Office of Educational Research and Improvement/OERI (now IES) and the Smith-Richardson Foundation's Children and Families at Risk Program.



STATEWIDE EFFORTS CAN IMPROVE STUDENT ACHIEVEMENT (continued from page 3...)



The close fit between improved performance and SSI funding (in the context of state support for SSI goals) suggests that change is most effective when multiple components are addressed in concert. The SSIs had the most effect when they served as catalysts for other state reform efforts.

Reform can result in substantial achievement gains in a relatively short time when state policies are aligned with the goals of a systemic initiative, and when state infrastructure supports teachers and schools as they change their practices.

Although it is important to consider the technical issues concerning a program's functioning, Weiss says, it's also essential to address state political decisions and consider negotiations with the funder. It takes all elements to garner the support necessary to sustain an effort long enough to achieve a measurable improvement in student learning.

To read the entire report, see the Technical Reports page of Webb's site: http://facstaff.wcer.wisc.edu/normw/technical_reports%20Page%201.htm

Iris Weiss can be reached at Horizon Research, www.horizon-research.com.



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