



# WCER Highlights

WISCONSIN CENTER FOR EDUCATION RESEARCH • SCHOOL OF EDUCATION • UNIVERSITY OF WISCONSIN-MADISON

## After-school programs vary in quality



Nonprofit programs and programs located in elementary schools generally provide a better quality environment, both physical and affective.

At a time when as many as 75% of mothers of school-age children are employed, it's important to know about the quality of their children's child care arrangements. UW-Madison researchers conducting a study of after-school programs have found that knowing what *kind* of program the child attends can provide clues about the quality of care the child receives.

Children attending after-school programs operated by for-profit agencies, for example, generally have more unoccupied time, spend more time watching television and videos, and spend more time not interacting with anyone, when compared with children attending nonprofit programs. For-profit programs also tend to have fewer positive interactions between staff and children and offer fewer programming alternatives, when compared with nonprofit programs. Parents of children attending for-profit programs report lower satisfaction with those programs, compared with nonprofit programs located in schools and those operated by community centers.

These are some of the results reported by investigators at the Wisconsin Center for Education Research, where Deborah Vandell and her colleagues are conducting a study of 150 children enrolled in 38 formal after-school programs. Study Coordinator Kim Pierce says these programs vary in location (elementary school, day care center, or com-

WCER Highlights



SUMMER 1995  
Vol. 7, No. 2

**4** Math collaboratives help teachers

**6** Study evaluates infant care



Children in small programs spend more time interacting with each other.

munity center) and in auspice (nonprofit or proprietary). The study receives funding from the National Institute of Child Health and Human Development (NICHD), U.S. Department of Health and Human Services.

Researchers assess after-school program quality in terms of:

- tone and quality of interactions between children and staff;
- caregiver skill;
- presence of age-appropriate programming and activities;
- level of child satisfaction;
- flexibility of programming and child choice of activities; and
- regulatable characteristics such as staff-to-child ratios, levels of staff education and training, and space available for activities.

Until now there has been little systematic research on the nature of children's experiences in formal after-school programs, and the importance of the assumed indicators of quality has not been documented.

After-school programs located in schools, especially those being operated by external agencies such as the YMCA, are becoming increasingly common, Vandell says. The NICHD study finds that school-based programs, compared with day-care center programs, are associated with greater flexibility in accommodating children's wishes. They offer more activities and require children to spend less time waiting in line to do things. Programs in community centers, relative to other programs, tend to encourage children to spend more time in academic activities. Community center programs generally have fewer activities to offer, however, are not as well equipped, and have less space.

## Regulatable elements vary

Knowing the kind of program a child attends (e.g., for-profit or nonprofit) offers clues about the quality of care provided. Program quality also varies across elements that are potentially regulatable, such as program size and caregiver education levels. Here researchers also found important differences.

**Size.** The study compares quality of care across programs with 1 to 20 children, 21 to 40 children, and 41 to 60 children. Children in small programs have more positive interactions with caregivers, such as talking and laughing, compared with children in larger programs. Children in small programs also spend more time interacting with each other.

**Child-to-staff ratios.** The study compares quality of care across child-to-staff ratios of up to 8 to 1, up to 13 to 1, and more than 13 to 1. Larger child-to-staff ratios are associated with children spending more time waiting in line, and with caregivers showing poorer behavior management skills and less positive regard for children.

**Caregiver education.** Higher levels of caregiver education are related to fewer negative interactions between caregivers and children and greater parent satisfaction with care.

## Objectives of the NICHD study:

1. to examine the extent to which the caregiving environment, caregiver skill, children's activities and interactions with others, and child and parent satisfaction with care differ by program type and program regulatables;
2. to examine associations between program regulatables, interactions among children, and interactions between children and caregivers; and
3. to identify the specific variables associated with child and parent satisfaction with after-school programs.



Study Coordinator Kim Pierce says that children in smaller programs have more positive interactions with caregivers.

**Caregiver experience.** An intermediate amount of caregiver experience is most beneficial for children in terms of program flexibility and caregiver style ratings. Specifically, caregivers with 25 to 36 months' experience scored higher on behavior management skills and positive regard for children than did caregivers with less than 25 months' experience and those with more than 37 months' experience.

## Child and parent satisfaction

Children and parents report satisfaction with after-school programs according to different criteria. Children report more satisfaction with programs when they spend more time positively interacting with caregivers and cleaning up; they report less satisfaction when there is more interaction with peers and more physical activity. Parents report more satisfaction overall with programs when children spend more time playing card games and



board games, and less satisfaction when children engage in fantasy play.

Study Coordinator Kim Pierce notes that after-school care programs generally focus on recreation, with an emphasis on supervision. Non-profit programs and programs located in elementary schools generally provide a better quality environment, both physical and affective. While community center programs offer a lesser quality physical environment and fewer activity choices than other programs, they offer a better affective environment.

The study is continuing until the children are in fifth grade. Longitudinal data should help answer questions about whether family demographic and psychological characteristics are associated with the use of different after-school arrangements, and about whether family or child characteristics moderate the effects of after-school arrangements.

For more information contact Vandell at (608) 263-1565; e-mail [dvandell@macc.wisc.edu](mailto:dvandell@macc.wisc.edu).

## Rating the programs

Researchers observe children three times in their care programs for 20-minute time segments over a three-month period, giving particular attention to the child's activity, who the child interacts with, and the tone of the interactions (positive/neutral or negative).

Observers rate caregiver skill according to three measures: behavior management skills and techniques, positive regard for children, and negative regard for children.

Program environment is ranked according to program flexibility (the extent to which children are allowed autonomy in choosing activities to participate in) and available activities (the range of developmentally appropriate activities offered to children). Observers also score the availability of physical space, materials, and equipment.

Observers measure children's satisfaction with care according to the children's general satisfaction and the support they receive from caregivers. Parents' overall satisfaction is measured according to a five-point scale.

Children report more satisfaction with programs when they spend more time positively interacting with caregivers.

## Mathematics collaboratives empower teachers

These teachers are taking risks and acting on faith. They're found in cities around the country, in experimental communities devoted to improving mathematics education in urban schools. These teachers collaborate with business people, higher education staff, school district administrators, and persons from other agencies, to improve and reform mathematics education.

Their communities are collectively known as the Urban Mathematics Collaborative. The UMC is a decade-old initiative that began as an experiment operating on the principle that mathematics teachers can serve as both the objects of change and the agents of change. It was founded in 1985 on the conviction that a concerted effort to improve the lot of urban mathematics teachers would lead to improved mathematics learning for their students.

In 1985 and 1990 The Ford Foundation issued grants to agencies in 11 cities—Cleveland, Ohio; Durham, N.C.; Los Angeles, Calif.; Memphis, Tenn.; Minneapolis–St. Paul, Minn.; New Orleans, La.; Philadelphia and Pittsburgh, Pa.; St. Louis, Mo.; and San Diego and San Francisco, Calif. Since 1990, five more cities have established collaboratives: New York, N.Y.; Dayton, Ohio; Columbus, Ga.; Worcester, Mass.; and Milwaukee, Wis.

WCER Senior Scientist Norman Webb directed case studies of Urban Math Collaboratives as an innovation by focusing on five of these collaboratives: Columbus, Los Angeles, Memphis, Milwaukee, and Philadelphia. Webb and his team sought to pinpoint what mathematics collabora-

tives can offer teachers and organizations seeking to reform mathematics education. Funding for Webb's study comes from the National Center for Improving Science Education, the National Science Foundation, and the U.S. Department of Education. The project is in cooperation with the Organization for Economic Cooperation and Development, which is coordinating case studies of innovation in 12 other countries.

### Three domains of teacher change

Associate Researcher Dan Heck assists with the UW-Madison study of the collaboratives. As the individual collaboratives and the national UMC project have evolved, Heck says, teachers have changed and have created change in three domains of mathematics teaching: in their knowledge and beliefs, in their classroom practices, and in their professional involvement.

Teachers' knowledge and beliefs are fundamental to the efforts of the collaboratives. Teachers share their knowledge and beliefs about students, as student populations change and students' mathematical needs change. Teachers share knowledge and beliefs about mathematics, as evolving technology demands teaching new topics in mathematics and new ways of thinking about mathematics. Teachers subsequently reconsider their roles and responsibilities—in their classroom, their school, their district, and the larger mathematics education profession, as they share in testimonials below.

What teachers learn in their collaboratives spurs change in their classroom practices. Additional professional growth occurs in teachers' professional involvement. Professional networking helps teachers solve problems and create new forms of support for mathematics education. Collaborative teachers begin to exercise leadership in the form of authoritative, informed, and reflective decision making in the classroom, in the school, in the district, and in the larger mathematics education profession.

### Elements of teachers' professional growth

The changes the collaboratives foster among teachers, and changes that teachers themselves make, can be considered along seven elements of professional growth, says Heck.

- When teachers recognize that current practices or policies do not allow them to achieve their



Collaboratives provide teachers with dependable moral and intellectual support.



goals, disequilibrium occurs. The research team observed a middle school teacher in Georgia, for example, who began to incorporate problem solving into her classroom instruction prior to the organization of the local collaborative. But the students didn't take this curricular change seriously because the tests did not reflect these changes. The teacher's peers in the collaborative provided ideas and support that have helped her integrate problem solving into her classroom content, instruction, and assessment.

- Collaboratives facilitate teachers' exposure to new ideas and developments in mathematics education and their ability to use them. A Milwaukee middle-grades teacher said that her exposure to new ideas in a collaborative-sponsored summer internship at a local business "made me more aware of industry's need for certain things in mathematics. Since the internship, I have been concentrating on *communication* of mathematics. And my slogan has become that students should be able to write math, speak math, and communicate math effectively. I didn't have that focus before."
- Collaborative teachers see new ideas used in environments similar to their own and discover how to apply them. A middle-grades teacher in Georgia described the importance of such an "existence proof" in her decision to use student portfolios in her assessment system. "Until you hear another teacher say, 'This is what I did,' and then show you an example of it from a classroom, it doesn't seem to become real for you. So, it just seemed real to me [when that happened]. I thought, 'Well, I can do this.'"
- When a teacher experiences an idea or technique in an authentic setting, similar to her own classroom, modeling occurs. Modeling facilitates the transfer of the idea or practice to one's own setting. A middle-grades teacher in Memphis said that modeling changed her perception of cooperative learning. "I didn't buy into the group work until I actually experienced it and now I'm a firm believer in it. I was at [the collaborative's summer mathematics camp for teachers] and I've taught 25 years [but] until then I'd never really [tried group work]. Of course I'd heard about it, but I was there and I experienced it and then I knew the benefit from the group activities and what I actually learned from the other members of my group. . . . We were put in that experience mode and I was willing to try it."
- Collaboratives provide many means of support—financial, technical, and material—but more significantly, teachers receive ongoing, dependable moral and intellectual support from one another

through collaboration. A Philadelphia high school teacher said, "I make sure I do all the [problems] before I present them to [my students]. If I really have that much of a problem, then I usually call [other teachers] . . . and talk to them. [We] almost go through the same process the kids are going through. . . . You have to have someone you can bounce off of. . . . We find in the little groups that we have . . . [that] it gives you an idea of what your



Associate Researcher Dan Heck says the collaboratives promote change along seven elements of professional growth.

- Collaborative teachers engage in experimentation—informed and deliberate engagement of uncertainties and risks for the sake of improving mathematics education. A Los Angeles high school teacher said the local collaborative has helped teachers at her school experiment with new roles and responsibilities as educators. "We wrote [a departmental] grant [in order to join the collaborative]. We said, 'Look, we've got all these complaints. But what is it that we can do?' And I think that was the beauty of [the collaborative's departmental grants]. What can you do with what you have? And I think that opened the dialogue that got us closer, got us talking. And that really made all the difference in the world in that department. . . . We realized, 'Let's not be complainers. There are things that we can change.'" This mathematics department brought a multi-year, multithousand-dollar California Academic Partnership grant to the school. The funds helped reform the school's mathematics program to prepare more students to enroll in college with a strong mathematics background.
- Collaborative teachers are reflective: they work together to examine ideas, share experiences, and deliberate the merits of change. A high school teacher in Georgia offered this example of how reflection in the context of the collaborative has supported change in her classroom: "It gives you a little more self-assurance to go forward when you have people to fall back on to say, 'Wait a minute; this was disastrous; help me out. Was it me? Was it my kids? Was it my presentation? Or was this set up not to make it?' . . . The collaborative, yes, there is the

*continued on page 8*

## Study measures quality of infant care



Caregivers in the home provide the highest quality care for infants.

Most parents consider themselves sensitive to their infants' needs. Parents who place their infants in day care expect the caregivers to be equally as sensitive.

But according to a nationwide study involving researchers at UW–Madison, about 23 percent of infant care providers give “highly” sensitive infant care, while 50 percent of them provide only “moderately” sensitive care, and 20 percent are “emotionally detached” from the infants under their care.

The study also reports that high quality infant care is more likely to occur with small numbers of children in the child care arrangement, with small child-to-adult ratios, and when caregivers have less authoritarian beliefs about child rearing.

With funding from the National Institute of Child Health and Human Development (NICHD), University of Wisconsin–Madison Education Professor Deborah Vandell directs one of 10 sites studying 1,350 children. Vandell and her colleagues are observing children born in Dane County, Wisconsin, and now living in Madison and nearby areas. The other sites for studies are Little Rock, Ark.; Irvine, Calif.; Lawrence, Kans.; Boston, Mass.; Morgantown, N.C.; Philadelphia and Pittsburgh, Pa.; Charlottesville, Va.; and Seattle, Wash.

The NICHD study, one of the first of its kind, not only analyzes what happens to infants during

care, but also enumerates the elements of the best kind of care. The researchers use a comprehensive battery of measures to record detailed information about the infants, their families, and their child care arrangements. The infants receive care in a wide range of settings, including child care homes, day care centers, and care by a parent, grandparents, or others in the home.

### More demand for child care

What actually happens to infants in day care? What elements of care make a difference in the quality of infant care? These are important questions for parents and prospective parents to consider. Over the past 20 years, the number of infants placed in child care during the first year of life has dramatically increased. And there is a higher demand in the U.S. for infant care than in some European countries, where employers allow parents extended time off from work, says Study Coordinator Anne Stright. While some European employers grant extended parental leave (up to one year), many U.S. employers allow the mother only six weeks off for parental leave.

Children who enter child care as very young infants tend to come from families who depend more heavily on maternal incomes, according to the study. In families that use more hours of infant child care, the mothers tend to have less education, work more hours, and believe that maternal employment has positive effects on child development.



The quality of infant care affects children in later stages of development.



Almost 40 percent of the infants studied received child care more than 30 hours per week by age three months. Half of the infants received child care for 30 hours or more by age six months. By the age of 12 months, 80 percent of the infants received regularly scheduled child care for at least a few hours each week, and one-third of the children had been in at least three different child care arrangements.

The study finds that fathers, grandparents, and other caregivers in the home provide the highest quality caregiving for infants, in part because these caregivers have smaller numbers of children to manage.

Researchers observed 576 of the 1,350 infants across two half-days in their child care settings to determine the extent to which they received sensitive, positive, stimulating care that can foster development. Forty percent of the infants were the only child in their care setting, and 30 percent of them were in small groups of two to three children. But eight percent of the infants were in groups of more than eight children, and the remaining 22% were in groups of four to seven infants.

Low child-to-staff ratios are related to more sensitive and positive interactions with the caregiver, yet an infant-to-caregiver ratio as low as three-to-one can overwhelm a caregiver, points out Study Coordinator Anne Stright. "She is burping one, feeding one, and diapering one; putting one down, and getting one up. . . . She does this continually, and rarely has time to just sit and hold one. She spends most of her time just caring for their immediate needs."

State-level agencies, such as Wisconsin's Office of Child Care and the Legislature, establish guidelines for infant care, including child-to-caregiver ratios. The allowable number of children per caregiver

depends on the type of care, whether a day care center, for example, or family child care. In part because of the relatively large number of infants they enroll, child care centers as a whole provide the lowest quality caregiving, the study finds.

Besides measuring the number of infants in any group, observers also look for caregivers' sensitivity to children, both when they're crying and when they're happy. Does the caregiver ignore contented infants or spend time with them? Does the caregiver engage the infants' attention? Is the caregiver's emotional affect positive or flat?



Study Director Deborah Vandell measures caregivers' sensitivity to children

*continued on page 8*

## WCER home to new Institute

More students will have more opportunity to learn useful science, mathematics, engineering, and technology as a result of research and development to be conducted by the newly funded National Institute for Science Education (NISE), based at the Wisconsin Center for Education Research.

The five-year \$10 million institute, funded by the National Science Foundation, will launch a new approach to the continuous improvement of teaching of science, mathematics, engineering and technology (SMET). Operated as a partnership among the UW-Madison, the National Science Foundation (NSF), and the National Center for Improving Science Education in Washington, DC, the Institute is co-directed by WCER Director Andrew Porter and UW-Madison Professor of Electrical and Computer Engineering and Chemistry Denice Denton.

Porter says that, while the American educational system has delivered an outstanding preparation for lifelong learning to some students from the middle and upper classes, virtually all students from low-income and minority groups have been inadequately prepared in the science-related areas. The NISE will work to ensure that all students receive the best possible education. It will seek to improve science-related teaching from kindergarten through graduate school, so that all students, upon leaving the educational system, will be scientifically literate and able to make informed decisions about the SMET-related matters that they encounter in their daily lives.

Porter says, "We expect that new communities of scholarship and practice will be established, where scientists, education researchers, and education practitioners will collaborate to attack the enduring problems of science-related education that have resisted solutions from more narrow approaches."

Denton will manage day-to-day activities and serve as the primary point of communication between the NISE and NSF. Porter will ensure that all NISE work is appropriately evaluated, will maintain the highest standards of quality, and will oversee NISE's dissemination strategies. The NISE management team will consist of researchers, developers, a K-12 teacher and a representative of business and industry.

A 24-person National Advisory Board will guide NISE work, and professional societies and research institutions will collaborate.



## WCER HIGHLIGHTS STAFF

Director Andrew Porter  
Editor Paul Baker  
Editorial Consultant Deborah Stewart  
Artist Laura Moberly  
Office of University Publications

*WCER Highlights* is published three times a year by the Wisconsin Center for Education Research, School of Education, University of Wisconsin–Madison. WCER is funded through a variety of federal, state and private sources, including the U.S. Department of Education and UW–Madison. The opinions expressed in this publication do not necessarily reflect the position, policy, or endorsement of the funding agencies. Fourth-class, bulk-rate postage is paid at UW–Madison, Madison, WI. Send changes of address to WCER, UW–Madison School of Education, 1025 West Johnson Street, Madison, Wisconsin 53706 or call (608) 263–4200. Include the address label from this issue.

No copyright is claimed on the contents of *WCER Highlights*. In reproducing articles, please use the following credit: "Reprinted with permission from *WCER Highlights*, published by the Wisconsin Center for Education Research, UW–Madison School of Education." If you reprint, please send a copy to *Highlights*.

The text of *WCER Highlights* is available electronically on "WisInfo," the University of Wisconsin's Gopher server. Use your Gopher client software to find the University of Wisconsin, or Telnet to wisinfo.wisc.edu. Then select "News Releases/ Announcements, Newsletters, and Newspapers." Then select "Newsletters and Other Special Interest Publications." Then select "Wisc Center for Education Research Highlights."

ISSN 1073–1822  
Vol. 7, No. 2  
Summer 1995

### Mathematics collaboratives *continued from page 5*

building here; yes, there is the staff here; and there are the resources. But probably the bigger part of the collaborative is the teachers and the folks that show up and are around . . . to talk and to bounce ideas. And that to me is the big connection."

Each collaborative, and each teacher's experience of his or her collaborative, is unique, says Heck. Depending on the nature of each change and the individuals concerned, different elements of professional growth assume varying importance. But for many teachers, the collaboratives have provided a vehicle for locating and employing elements of growth—the elements they need to make the changes they believe will provide better mathematics education to students in urban schools.

For more information, contact Heck at (608) 263–4244; e-mail [djheck@mac.wisc.edu](mailto:djheck@mac.wisc.edu).

### Infant care study *continued from page 7*

As the NICHD study continues, it measures how these important characteristics of infant care affect children in later stages of their development, at ages 15, 24, and 36 months.

For more information, contact Deborah Vandell at (608) 263-1565; e-mail [dvandell@mac.wisc.edu](mailto:dvandell@mac.wisc.edu).



Wisconsin Center for Education Research  
School of Education  
University of Wisconsin–Madison  
1025 West Johnson Street  
Madison, WI 53706

Address correction requested

Nonprofit  
Organization  
U.S. POSTAGE  
PAID  
Madison, Wisconsin  
Permit No. 1622