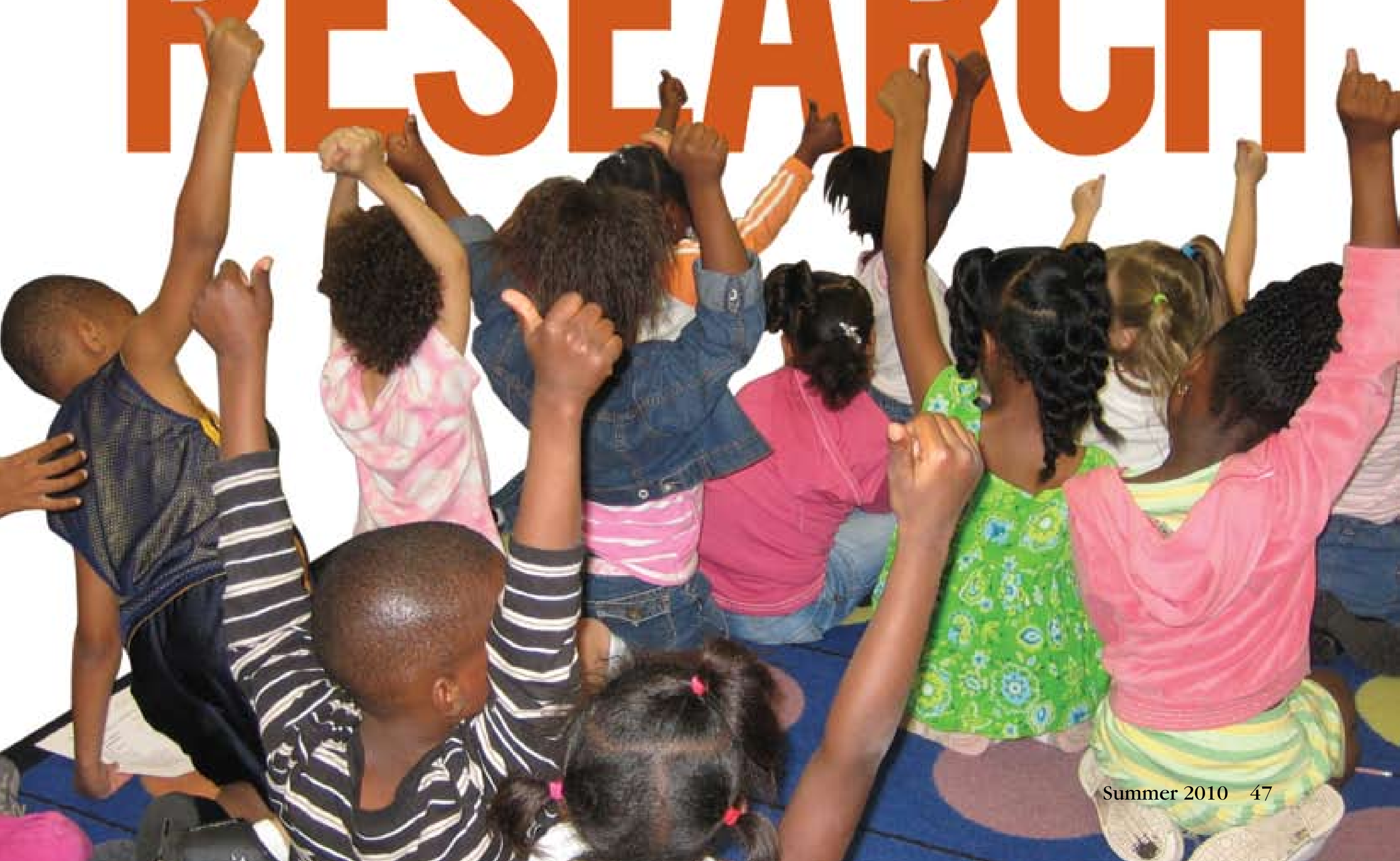
ACTION RESEARCH

How to create your own professional development experience

By Katie Lynn Milton-Brkich, Kristen Shumbera, and Becky Beran

Have you attended a professional development (PD) workshop that had nothing to do with the real world of your school or classroom? As three practicing elementary teachers (one fifth grade, one second grade, and one kindergarten), we decided we had experienced enough of these disconnected PDs and decided to structure our own. We did a year's worth of PD through a collaborative, cross-grade action research project that was both extremely applicable for improving our teaching and lots of fun!

Defined as "any systematic inquiry conducted by teachers . . . for the purpose of gathering information about how their particular schools operate, how they teach, and how their students learn" (Mertler, 2009, p. 4), *action research* is empowering and professional research done by teachers to inform and improve their own practices. Although there are many models of action research (Figures 1 and 2, p. 49 and p. 50; see Internet Resources), we chose to follow the model presented in *The Reflective Educator's Guide to Classroom Research* (Dana and Yendol-Hoppey 2009; Figure 3, p. 51). We'll share our experience with action research and our continual PD project.



Find Your Wondering

PHOTOGRAPHS COURTESY OF THE AUTHORS

Second-grade and kindergarten science buddies draw the water cycle.

Like many elementary schools in our state, science was not a staple subject because for years it had not been tested for school accountability. However, that has changed as the fifth-grade students' performance in science on the state standardized test is now factored into each elementary school's state-determined school grade. As teachers, our goals were twofold: to develop a culture of science learning across the entire school's population and to improve on our school's dismal science scores of previous years. In addition, we each had our own concerns about teaching science, including developing appropriate science activities, time allotment for teaching science, and our expansive K–5 science curriculum that covers a breadth of content at each grade and across grades.

The first step of action research is to find your wondering (Dana and Yendol-Hoppey 2009). Our wondering was "What would happen if we had our students teach each other science across grade levels?" We anticipated that the older students would be more likely to take ownership of their science content knowledge if they were required to teach it to younger students. Basing our project on our philosophy that "the best way to learn something is to teach it," we set out to involve our students in planning and implementing the buddy science project.

Find Support

Our project was encouraged through a partnership with a teacher support center based at the local university. As part of the partnership, teachers had the opportunity to do action research on a concept they were interested in implementing, but might not have had the necessary support otherwise. The center provided us with this support through an on-site facilitator, who was available during monthly meetings to help set up project data collection and analysis, to speak with our administrators about doing such a project, to answer questions as they arose, and to provide additional teacher resources as needed. Although action research projects can be done without the support of an outside university professor, in our case she was necessary for our principal to grant permission for us to try something so different and to deviate from the county-mandated scope and sequence—we've gone on to do separate action research projects on our own. We can do them without a support person, now that we have learned how to navigate those systems of power.

Considering our students' needs, we agreed to align our yearlong science curriculum, so that each class would be covering similar grade-appropriate content at the same time by focusing on content strands from the state-mandated curriculum benchmarks and grade-level expectations instead of textbook chapter sequences. We began with the physical and chemical science strands, as these were the areas our students seemed the most lacking. Over the course of the buddy science project, students had experiences with solids, liquids, dissolving, melting, gelatin, mixtures, and solutions. Later, they worked with the classification system of animals and animal habitats. They studied food chains, food webs, and life cycles. Earth's different forces, magnetism, and the water cycle were also explored across the grade levels.

Buddy Science Lessons

We preassigned science buddies based on our knowledge of our students, including their reading abilities, behavior, leadership, and listening skills. Ms. Milton, the fifth-grade teacher, had many more students than Ms. Beran, the second-grade teacher, so most of their buddy groups were one second grader with two fifth graders. Ms. Beran and Mrs. Shumbera, the kindergarten teacher, had the same number of students, so student buddies were paired.

Every Wednesday, two classes met and explored a concept together, with the older students guiding the learning of the younger students. First, Ms. Milton taught her students the content, and then together they designed a lesson to teach one of the concepts covered to the second graders. Ms. Milton gave guidance about what concepts were age-appropriate and developed the lesson completely after her students came up with the general plan. The first Wednesday, the fifth graders taught the lesson to the second graders, followed by Ms. Beran's continued instruction on the concept and related ideas for the remainder of the week. All three teachers would meet after the lesson to reflect by discussing what went well, what we would have liked to go differently, and how we could scaffold the idea down to kindergarten. The second Wednesday, Ms.

Beran would prepare her students for their buddy lesson, and then they would teach it. The buddies in grades K–2 and 2–5 worked well together. If there were initial problems, we mediated between students to find a solution or switched buddies. The combined classes ran like a big class of students in pairs or triplets at tables or on the floor conducting their investigations. The teachers circulated, asked probing questions, and answered student questions when the buddy team needed assistance.

After every buddy science lesson, the three teachers had a follow-up meeting to discuss the day's events and data. Data collected included: student activity and experimentation sheets, teacher observations, student quotations from buddy discussions, and (for the 5th–2nd pairs) reflection sheets completed by the older students about what they observed and experienced. These meetings were reflective, including pros and cons for the day's activity and time to look at the collected data to determine what could be assessed, how to follow up in the classroom, and how to grade the students.

All of the areas discussed in the follow-up meetings were important areas to reflect on, but it was easier to discuss and analyze the different areas when we considered the information simultaneously instead of individually. Having the opportunity to discuss successes and mishaps in an open, laid-back environment, and having others to bounce ideas and concerns off made these meetings essential to the overall process.

Assessment

Assessment of student learning was an ongoing process that took place during buddy science lessons and in each

Figure 1.

Types of action research.

	Individual teacher research	Collaborative action research	Schoolwide action research	Districtwide action research
Focus	• Single classroom issue	• Single classroom or several classrooms with common issue	• School issue, problem, or area of collective interest	• District issue • Organizational structures
Possible support needed	• Coach/mentor • Access to technology • Assistance with data organization and analysis	• Substitute teachers • Release time • Close link with administrators	• School commitment • Leadership • Communication • External partners	• District commitment • Facilitator • Recorder • Communication • External partners
Potential impact	• Curriculum • Instruction • Assessment	• Curriculum • Instruction • Assessment • Policy	• Potential to impact school restructuring and change • Policy • Parent involvement • Evaluation of programs	• Allocation of resources • Professional development activities • Organizational structures • Policy
Side effects	• Practice informed by data • Information not always shared	• Improved collegiality • Formation of partnerships	• Improved collegiality, collaboration, and communication • Team building • Disagreements on process	• Improved collegiality, collaboration, and communication • Team building • Disagreements on process • Shared vision

FROM FERRANCE, E. 2000. *ACTION RESEARCH*. PROVIDENCE, RI: NORTHEAST AND ISLANDS REGIONAL EDUCATIONAL LABORATORY AT BROWN UNIVERSITY.

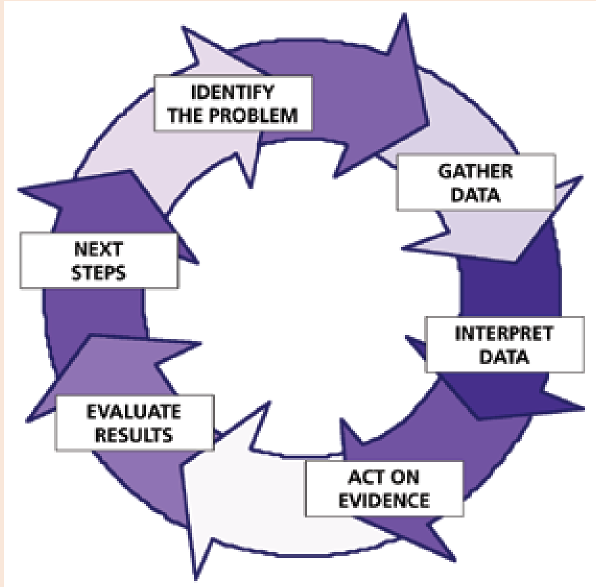
grade-level classroom. Because the work turned in was always a collaboration of the buddies, we never assigned individual grades based on the accuracy of the submitted work. Instead, we monitored participation during the meeting and completion of the required task afterward. For example, after the K–2 meeting about the water cycle, we checked that the buddies had completed their drawing of the water cycle stages, that the kindergarteners could explain the order using their water cycle bead bracelets, and that the K–2 buddy team could sing the water cycle song together.

In addition, in each classroom, assessment was based on individual performance throughout remaining science tasks pertaining to the different standards being taught. Students' ability to retain and use specific terms and methods taught during buddy science sessions were noted and monitored. Formal assessment occurred for second and fifth graders through traditional end-of-unit science tests and additionally for fifth graders on the end-of-year standardized state science assessment. The kindergarteners had few formal assessments, due to the age appropriateness of the curriculum. However, the school had adopted a program, which consisted of a teacher-led pencil-and-paper test. Mrs. Shumbera would ask a question and the students would pick the appropriate picture.

During buddy science lessons, we found the best way to assess student learning was to become observers taking in all that was happening and being said around us. We were able to observe and assess the second graders taking in the knowledge from their fifth grade buddies and transferring the information to their kindergarten buddies. We collected reflection sheets from the fifth graders, which aided us in assessing how the students felt their lesson had gone.

Figure 2.

The action research cycle.



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What We Learned

Throughout the year, we predicted we would see increased motivation and achievement levels. However, we did not realize how soon students would become excited about buddy science. Because students were so motivated, we used this excitement to promote curriculum concepts and classroom behaviors. For example, if a concept was one that would be taught to another grade level, Ms. Beran and Ms. Milton informed the students so they knew to pay attention to learn enough information to teach the concept to their younger partners. In addition, Buddy Science became a motivator for classroom behavior. Students were rarely upset about losing recess or another free period, but they definitely did not want to lose buddy science time.

To participate in scientific investigations, students needed a strong understanding of and disposition toward safety around the materials being used. For example, in the first round of buddy science sessions, students learned that unless otherwise directed, they should never put anything in their mouths—even if it looked like something they might normally drink or eat. The students also gained an increased understanding and retention of science safety rules. On work samples safety questions were often included (e.g., Did not try to taste the liquid? Yes/No, Correctly smelled liquid? Yes/No).

Students also learned about and practiced recording all of their observations during an experiment. Not only did students learn these things, but they were excited to use what they learned. This was seen in the first 5th–2nd buddy science pairing, when fifth graders taught the second graders the word *waft* and showed them how to use the technique when smelling something in the classroom.

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A fifth- and second-grade buddy pair sort pictures of animals' life cycles and put them in chronological order.

Figure 3.

The action research process.

1. Articulate a wondering
2. Collecting data to gain insights into the wondering
3. Analyzing data
4. Making improvements in practice based on findings
5. Sharing learning with others

FROM DANA, N.F., AND D.YENDOL-HOPPEY. 2009. *THE REFLECTIVE EDUCATOR'S GUIDE TO CLASSROOM RESEARCH: LEARNING TO TEACH AND TEACHING TO LEARN THROUGH PRACTITIONER INQUIRY*. THOUSAND OAKS, CA: CORWIN PRESS.

Although this was not the main point of the lesson, the second graders were so taken with this word and technique that they applied it to other science lessons and also taught their buddies the technique on a 2nd–K buddy science day without prompting or guidance.

Efficient and Effective PD

Action research allowed teachers to work together and learn from one another. Our initial concerns of time constraints, classroom management, and adequate assessment with science were not made worse by the project; instead, buddy science helped us each see that science education does not have to be a daunting process. Not only was it fun being given the chance to coteach with our colleagues and to participate in PD we designed and implemented ourselves, it was thrilling to see our students take ownership of their science learning.

After completing this yearlong project, we believe our action research project was the most efficient and effective PD in which we have ever participated. Throughout the process, we found several reasons why this project should be implemented in a variety of circumstances. We found that buddy science and participation in action research gave us an opportunity to collaborate and affect the achievement on multiple grade levels, not just the grade levels we individually taught. Additionally, we realized that action research could be done with any question or wondering that we had in our class and data we would want to collect to answer future wonderings. We believe this idea would be beneficial to all subject areas and suggest other teachers pursue opportunities to conduct action research as PD. Mrs. Shumbera and Ms. Beran remained at the school the year after this project and continued the buddy science project between grades K–2. Since then, they have moved to teach in other states, but continue to conduct a formal or informal action research project each year. ■

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References

Dana, N.F., and D.Yendol-Hoppey. 2009. *The reflective educator's guide to classroom research: Learning to teach and teaching to learn through practitioner inquiry.* Thousand Oaks, CA: Corwin Press.

Ferrance, E. 2000. *Action research*. Providence, RI: Northeast and Islands Regional Educational Laboratory at Brown University.

Mertler, C.A. 2009. *Action research: Teachers as researchers in the classroom*. Los Angeles: Sage.

Internet Resources

Center for School Improvement
http://education.ufl.edu/web/?pid=904

Action Research Journals
www.nefstem.org/action_research_journals.htm

Action Research at Queen's University
http://resources.educ.queensu.ca/ar

Themes in Education
www.alliance.brown.edu/pubs/themes_ed/act_research.pdf

NSTA Connection

For a sample lesson plan for the Science Buddies, visit *www.nsta.org/SC1007.*

Connecting to the Standards

This article relates to the following *National Science Education Standards* (NRC 1996):

Teaching Standards

Standard A:

Teachers of science plan an inquiry-based science program for their students. In doing this, teachers

- Work together as colleagues within and across disciplines and grade levels.

Standard B:

Teachers of science guide and facilitate learning. In doing this, teachers

- Orchestrate discourse among students about scientific ideas.

Professional Development Standards

Standard A:

Professional development for teachers of science requires learning essential science content through the perspectives and methods of inquiry.

National Research Council (NRC). 1996. *National science education standards*. Washington, DC: National Academies Press.