Huntsville, Alabama

A University-School District Partnership Creates a Multidistrict Program Step by Step

The Hands-on Activity Science Program is a joint venture of the University of Alabama at Huntsville and the following seven local school districts: Athens, Decatur, Fort Payne, Huntsville, Madison County, Morgan County, and Scottsboro. A total of 89 elementary schools, 1,665 teachers, and 41,850 students participate in the science program.

Planners of the Huntsville program have emphasized curriculum selection, professional development, and materials support. A module-based inquiry-centered science curriculum is in place, and program coordinators have worked hard to cultivate a cadre of leader master teachers. A consortium-based materials support center serving the seven participating school districts has also been established.

John Wright has had an eclectic career. A scientist, university professor, and former college president, he now has a new calling. As project investigator of the Hands-on Activity Science Program (HASP), a joint venture of the University of Alabama at Huntsville and seven school districts, Wright is a crusader in the nationwide effort to bring inquiry-centered science to elementary school children.

Fortunately, the project has received lots of help. HASP began as a partnership with the local chamber of commerce, the Marshall Space Flight Center, and the University of Alabama at Huntsville. Representatives from each of these groups met with school representatives to determine how they could improve the quality of precollege science education. The project received an initial boost when it obtained an Industry/School Partnership Grant from the National Science Foundation (NSF) in 1990. The collaboration was further strengthened by the formation of the Institute for Science Education, also in 1990. The institute is housed at the university.

The institute operates under the premise that the university will share its resources as part of its commitment to improving precollege science education. As Frank Franz, president of the University of Alabama at Huntsville, explains, "The Institute for Science Education provides a linkage between the university and K-12 education. The science program offers an important public service and engages the university with the community."

As an experienced administrator, Wright brings to the reform movement essential leadership qualities that enable him to build on a strong base of community and administrative support. "I was comfortable talking to superintendents and corporate executives," recalls Wright. "And we called the state Department of Education when we needed their support."

A Vision for Science Education Reform

The reason superintendents and state education officials found the HASP team so persuasive was that its members had articulated a vision for science

education reform. Attendance at the 1991 National Science Resources Center (NSRC) Elementary Science Leadership Institute was of key importance in the development of this vision. Knowledge acquired at the Institute irrevocably changed the course of Huntsville's program.

The Institute, Wright recalls, helped the team "reformulate and crystallize" its thinking. As a result, the team reevaluated some key parts of its action plan. "We originally saw hands-on science instruction as a way to supplement our science curriculum," Wright recalls. But the experience convinced Wright and his colleagues that effective science reform would require replacing the existing curriculum with an inquiry-centered science program.

The decision to change to an inquiry-centered program also meant another important step: developing a module-based curriculum program. Before they attended the NSRC's Leadership Institute, Wright and his colleagues from Huntsville were not aware that modules were available in the marketplace. In fact, they had assumed that they would have to create the modules themselves.

"We had already arranged for teams of scientists and teachers to begin working," recalls Arlene Childers, HASP associate director. But after reviewing materials at the Institute, the team went home and spent the year assisting school districts as they piloted modules in local classrooms. The program is now built around a combination of modules from the Science and Technology for Children (STC) program, Insights, and the Full Option Science System (FOSS) program.

Establishing the Materials Center

While teachers were developing the program's curriculum matrix, HASP team members were working on another key component of an effective elementary science program: a central materials center. To determine the most effective way to begin, the HASP team involved both teachers and engineers in the planning process. Teachers visited a materials center in Mesa, Arizona, and a team of engineers and teachers conducted a study on the best way to distribute and refurbish the materials. The consensus from both groups was that a central system was the most efficient way to deal with the materials component of HASP's elementary science program.

To implement this recommendation, HASP started a materials center in the Huntsville Chamber of Commerce building; later, the center moved to the university. While the university provided the space, Huntsville and Madison County agreed to use their districts' transportation systems to deliver modules to the schools. With that partnership in place, HASP adopted a consortium model. The program charges participating school districts approximately $6 per student per year to refurbish the kits. In addition, each participating school district pays a flat fee of $300 per teacher per year; this money is used to build the inventory of modules.

This system has been highly successful. The consortium has worked so well that five additional school districts- Decatur, Athens, Fort Payne, Scottsboro, and Morgan Counties- have joined since the materials center opened in 1991. "Establishing a materials center is a critical element that

people may wish to ignore," says Wright. "But it is crucial to the success of the program."

Creating a Cadre of Leader Master Teachers

As in many school districts engaged in reform throughout the country, professional development is a key element in HASP's elementary science program. HASP has enjoyed continuous support from NSF for its professional development programs. Between 1993 and 1995, HASP had a Teacher Enhancement Grant. The goal of this project was to train 126 Leader Master Teachers (LMTs) who would assume leadership roles in their schools. The teachers' training took place at a three-week summer institute and at sessions conducted midway through the teaching of a module. Topics covered at the training sessions included classroom management, science content related to the selected modules, constructivist learning theory and the learning cycle, and the use of questioning strategies designed to develop higher-order thinking skills.

"We had our first training in *The Life Cycle of Butterflies*, which created excitement for both teachers and kids," says Joy Drummond, a second-grade LMT in the Huntsville City Schools. "The kids were beside themselves, they loved it so much. Their enthusiasm captured the teachers' imaginations and made them excited as well."

In the early days of the program, familiarizing the teachers with the modules and generating excitement were the chief priorities. Tereasa Rollings, science coordinator from Madison County Schools and one of the original teacher trainers, recalls, "When the first group of teachers came to the initial training session, many lacked science content knowledge. They were particularly anxious about the physical science modules."

Time and experience with the modules have helped ease their concerns. After receiving intensive training, teachers have become much more comfortable teaching inquiry-centered science. Rollings notes that "teachers are using the new questioning strategies and the four-stage learning cycle in other areas of the curriculum. They have become used to children moving around the classroom and working together in cooperative groups. And teachers are discovering that integrating science with language arts and other curriculum areas gives them enough time to teach all the subjects."

Pam Patrick, an LMT at the kindergarten level in the Huntsville City Schools, uses science as the driving force in the overall curriculum. While her students studied the FOSS module *Wood*, they also read about trees and animals that live in the forest and discussed the work lumberjacks do. They even managed to talk about Smoky the Bear and the importance of protecting trees from forest fires.

But Patrick's all-time favorite experience with this module came at the end of the year. She bubbles over with enthusiasm as she describes how the module's final activity created a memorable conclusion to her students' kindergarten days: "At the end of the module, after studying different kinds of wood and their characteristics, the children applied what they had learned to make wood sculptures. We showed them how to hammer, and they would

still be hammering if we hadn't gotten out of school. When all the sculptures were completed, we invited parents and the rest of the school to come see them. The fifth-graders complained that they kindergarten children got to do all the fun stuff."

Yet in Patrick's school, older children have opportunities to show off, too. After fourth-graders finish building their flashlights during the STC *Electric Circuits* module, they come to the kindergarten class to show them how they work. In these ways, HASP has fostered communication among the different grade levels in the building.

The Struggle to Become Leaders

In addition to becoming proficient science teachers, HASP also expects the LMTs to become leaders in their own schools. Most schools have two or three LMTs, from K-1, grades 2-3, and grades 4-6. While most teachers find leading their peers to be a challenge, Drummond and her fellow LMTs have discovered two strategies that bring success- working closely with their principal and planning carefully.

"Our principal was supportive, and she showed her support by giving us faculty meeting time five or six times a year to give presentations on inquiry-centered science," says Drummond. "We also made ourselves available during the year to answer the teachers' questions."

Yet even with this support, Drummond admits that "teaching teachers is hard…. At first, the teachers didn't want to go through the whole module. They thought that doing one or two activities was enough." With more experience, however, teachers have come to see that the way to build a concept is by working though the whole module. And by completing all the modules each year at each grade level, teachers help children gain a strong foundation in science.

Patrick had a less positive experience. "We encountered resistance from the teachers," she says. "I think that was partially because we came on too strong at first. We gave teachers too much information too fast. The result was overload, and a desire on the part of their teachers to go back to their rooms and shut the door."

To try to rectify the situation, Patrick and her colleagues backed off during the 1994-95 school year and decided not to initiate any faculty discussions, though Patrick did continue to answer questions and help with materials problems. This approach seemed to work better. By the end of the school year, more than 75 percent of the teachers were using the modules.

"We learn and go as we can," says Patrick. "It is clear that the program has made a big difference in children's attitudes about science."

Future Plans for HASP

In 1995, HASP received a Local Systemic Change Initiative (LSCI) grant from NSF. Under it, HASP will work with five additional school districts and build on the experience gained over the past two years. Participating school districts will select teachers and release them from their teaching responsibilities for a period of time so that they can work with the Institute

for Science Education and train all the teachers in their districts. The program will further expand the number of school-based leaders.

While retaining successful components from the first grant, HASP has modified the program on the basis of the experiences of the past two years. For example, HASP learned that two years wasn't enough time to complete the needed reform. The LSCI will allow five years for professional development. Other realizations include the importance of cultivating teachers as leaders and the need to train principals so that they, too, can be advocates for the program.

"This is a rapidly changing field," says Wright. "We believe that HASP has demonstrated its utility, but it is a living model that improves through experience."

Lessons Learned

- A strong base of community support from local business and industry, local academic institutions, and the chamber of commerce can be extremely helpful.

- Teachers implementing reform activities need to be given administrative support. In many instances, principals may need training to help them understand the importance of identifying lead teachers who can collaborate with teachers new to inquiry-centered science.

- School districts should periodically revise their plans, incorporating the "lessons learned" into the program.