School Improvement Research Series

Research You Can Use

Snapshot #38

Integrating Middle School Curriculum Around Real-World Issues

Waldo Middle School
Salem, Oregon

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Research Findings

Engaging students in real-world problem solving as they acquire the skills and knowledge needed for success in work and life is as important for middle school students as it is for those in high school. Among the many personal transitions middle school students make is that they begin to think about school as preparation for life. Helping students see the connections between school and life can be accomplished by an interdisciplinary curriculum rooted in real-world topics that are exciting and timely. Learning can be further enhanced through a performance orientation that allows students to practice and be assessed on important work and life skills. This approach represents a blending of curricular and instructional practices that research has shown increase student engagement and learning. According to Effective School Practices: A Research Synthesis/1995 Update (Cotton 1995), these practices include:

1.1.2 Teachers provide instruction that integrates traditional subjects as appropriate.

Teachers

a. Use thematic units as the organizing principle for instruction in agreed-upon areas.

c. Engage students in projects requiring knowledge and skill across several traditional content areas.

d. Make use of other resources, including hands-on material, in addition to textbooks.

f. Use performance assessments that allow students to demonstrate knowledge and skills from several traditional subject-matter areas.

1.3.7 Teachers integrate workplace readiness skills into content-area instruction.

Teachers

b. Focus on developing the higher-order skills required in the modern workplace—problem-solving and decision-making skills, learning strategies, and creative thinking.

e. Assign tasks like those carried out by people in real work settings.

f. Function as facilitators and coaches rather than lecturers or order-givers, giving older students much of the responsibility for their own learning.

j. Select workplace problems to illustrate how basic academic skills are applied in real-world settings.

1.6.2 Teachers make use of alternative assessments as well as traditional tests.

Teachers

c. Begin by using alternative assessments on a small scale. They recognize that the best assessments are developed over time and with repeated use.

2.1.3 Administrators and teachers integrate the curriculum, as appropriate.

Administrators

a. Explore the feasibility of integrating traditional subject-area content around broad themes, and identify areas where this approach is appropriate.

c. Make other resources available for use in integrated curriculum units in addition to textbooks.

d. Pursue curriculum integration gradually, so that staff can make adjustments, gain feelings of ownership, and evaluate the success of each effort.

2.1.4 Administrators and teachers provide computer technology for instructional support and workplace simulation.

Administrators

c. Provide computer activities that simulate workplace conditions and tasks to build employability skills for all students.

d. Make use of computers and word processing software to foster the development of writing skills.

Situation

Waldo Middle School is located in the capital city of Salem, Oregon. The sprawling blue-gray and red-brick building is "home" to just over 1,000 students in grades 6-8, about one-quarter of whom are Hispanic or members of other minority groups. The school is nestled within a

residential neighborhood of older homes, and the portable classrooms behind the school reflect a growing and changing population. One significant change is an increasing number of poor and minority students—a change that will accelerate as school boundary shifts raise the percentage of students on free and reduced lunch from about 60 percent to an expected 75 percent.

Waldo is part of the largely urban Salem-Keizer School District, which has been engaged in the process of school and districtwide improvement for the past decade. The district operates from a conviction that all students can learn successfully and has established a set of 21st century student learning goals that are well reflected in Waldo's own philosophy and goals. A dominant part of Waldo's approach is to provide students with an education that is tied to their lives and life skills, including the application and use of technology. The school boasts that over 90 percent of its students work with technology as part of their instructional program.

Waldo has been committed to the process of school improvement for some time, beginning with its implementation of the Northwest Regional Educational Laboratory's Onward to Excellence (OTE) program about eight years ago. Through the OTE process, the school formed a school improvement leadership team, developed profiles of student performance, set improvement goals based on profile data, and used research-based practices to improve learning for all students. While Waldo no longer views itself as an "OTE school," it has internalized many of the OTE principles and practices, including reviewing research, profiling student performance, and making use of site-based leadership that involves staff and community members.

Waldo and the entire Salem-Keizer District, have been revising curriculum, instruction, and assessment in response to Oregon's sweeping education legislation (House Bill 3565), which calls for a restructuring of schools to better prepare today's children for work and life in the 21st century. This requires rethinking curriculum and instruction so that learning is organized around application of knowledge and skills, rather than merely accumulating credits in isolated subjects and disciplines. It also necessitates more authentic, performance-based assessments around specific learning outcomes. In addition to the push from the state, the Salem-Keizer district established its own 21st century student learning goals and has been working for the past several years to improve alignment of curriculum, instruction, and assessment with these goals.

Context

The seventh grade Endangered Species project at Waldo Middle School is a model of how schools can develop, experiment with, and refine a more integrated and performance-based approach to teaching and assessment, with technology at the center. Administrators and teachers at Waldo have been developing an integrated curriculum, hands-on and technology-driven instruction, community learning, and alternative assessments for several years.

The Endangered Species project is the brainchild of a highly motivated and creative teacher named Mike Weddle, but it is far from a solo performance. The project has been a true collaborative effort involving the school's leadership team, faculty members across a number of disciplines, and professional scientists and other community members who have provided input and participated directly in instruction and assessment. The project was pilot tested in the spring of 1994 and completed its first full year of implementation during the 1994-95 school year.

The project has four components, three of which have undergone considerable development.

The three established components are:

1. Integrating the seventh grade curriculum in life sciences, writing, computers, math, and social studies around a contemporary, real-world issue that engages students (i.e., endangered animals).

2. Applying technology and pursuing other hands-on learning experiences in ways that relate to real problems and tasks which people face in the world of work.

3. Linking with the community to provide rich information resources, community learning, and a sense of realism to the project.

The fourth component, which is still in the experimental phase, is conducting student performance assessments in the areas of applied math and science, technology use, collaboration, and communication (speaking, writing, and visual forms).

The Endangered Species project runs for eight weeks and is offered twice per year to accommodate two groups of seventh grade students. The eight weeks are organized into a coordinated sequence of activities across a number of discipline-based courses, primarily life sciences, writing, and computers. To a lesser extent, content is also integrated into math, social science, and art courses. Students still attend their regular classes during the eight weeks, but their teachers collaborate on a sequential curriculum that begins with students learning about endangered species and conducting individual research; continues with small groups of students developing their recovery plans and multimedia presentations of the plans; and culminates in formal presentations to a panel of zoo experts and faculty, who evaluate and critique the student work.

Current Practice:
The Endangered Species Project

Phase 1: Student Research and Paper

The project begins in life sciences class where students learn about endangered species—a topic which seems to excite many students because of children's natural love of animals and because it is a timely environmental issue. Students conduct individual research on a particular animal, choosing from a list of 25 endangered species. In their research, they draw from a rich set of materials and from experts in the field. Thus, a student might first gather information from the CD-ROM, *Encyclopedia of US Endangered Species*; a recent copy of the periodical, *Wildlife Conservation* (a good example of a journal that is appropriate for a seventh grade reader); and other library resources.

As the project progresses, students interact with biologists and conservationists from regional zoos and from around the country who have agreed to participate as expert resources. They communicate by voice, Internet, and in person. One group working on the Florida panther, for example, held conference calls with a leading conservation biologist in Florida, who is actively involved in saving the state's endangered panther population. He provided information and advice as the students developed their recovery plan. Another resource is an Internet user group of conservation scientists called CONSLINK, which students can connect to via the school's computers.

An important part of the groundwork for this project was building a rich resource base, which was accomplished with a lot of effort by the lead teacher and a small external foundation grant. The resources include CDs on animals, habitats, and endangered species; conservation and nature journals that provide technical information at an appropriate level for middle-school readers; and other specialized resources which are not typically available in general school libraries. Many letters were sent and personal contacts made with zoos, wildlife parks, and leading individuals in the field to develop a network of regional and worldwide experts for the project to utilize. Without these rich resources, the course would lack the depth and realism it has achieved.

After conducting research, students are given an individual writing task as part of their English class. As they complete their initial research, each student writes a report that describes the animal, its species and family, habitat, behavior, how it became endangered, and current conservation efforts. They work with members of their group to develop and write up a recovery plan on a word processor in computer class.

One student's portfolio included a well-written piece about three single-spaced pages long with a bibliography. The English teacher requires students to stress concepts in their writing rather than facts; copying definitions or sentences from a book is not acceptable. Students need to show they understand the definitions and concepts and write in a persuasive manner with an introduction that "grabs" the reader and a strong argument for their recovery plan at the end.

While students are researching and writing during the early part of the project, they are learning about the environmental and political issues surrounding endangered species in social studies. In math, the teacher explains how probability relates to genetic variability, which is a key concept in explaining and preventing species extinction. Early in their projects, students attend a "Safari Day," in which local zoo experts visit the school and talk about animal groups and their habitats in a mini-fair format.

Phase 2: Developing a "Recovery Plan"

In the second phase of the course students work in small groups to develop a recovery plan for their endangered animal. Students self-select into these groups based on the animal of interest. This gives students choice, an important ingredient in engaged learning.

About two weeks before presentation day, student groups were observed working in their life sciences and computer classes on their recovery plans. Life sciences class was a buzz of activity, as students worked in groups of three to five individuals with a combination of excitement and anxiety as the deadline drew nearer. Groups were huddled over large sheets of butcher paper that showed lists of ideas or rough drawings of habitat theme parks for their animals. The teacher roamed from group to group asking questions about progress and about the specifics of the plan. She also prodded them to plan a timeline and a division of labor to complete the work. Students were given a worksheet list of possible tasks so that each student could sign up for one or more tasks. The list included computer tasks, such as designing a three-dimensional image of the park or an informational brochure, and non-computer tasks, such as building a real model or drawing a poster. Students must divide the work, and each person is expected to make an individual contribution to the team effort.

In the Florida panther group, students disagreed over how large the habitat should be, how much roaming range the animal needs, and how to arrange the space. One student asked the another, "What does the research say about roaming range?" At that point, the teacher came by

and suggested they investigate what wildlife parks do and talked about the concept of "shift cages" which zoos sometimes use. The students decided that during their next conference call with their Florida consultant, they would ask for some expert advice. They were engaged in problem solving.

Students are challenged to design a recovery plan that can take the form of a habitat theme park (like Seaworld), a plan to preserve the animal in its natural habitat, or developing a captive breeding program within an existing zoo. A popular choice is the habitat theme park, but it is not enough to simply design a fantasy theme park. Cost, available land, and other real-life constraints must be considered in the design. In computer class, for example, students are given the unit price of concrete, fencing material, and trees, and then use spreadsheets to develop a construction budget. They also need to figure out how to raise the revenue—a challenge which the students typically approach through a fundraising plan, charging admission, and concession sales. Of course, the park must also include a scientifically defensible plan for animal breeding and recovery.

In computer class, students were using a variety of software, including word processing, spreadsheets, hyper-text stacks, and computer-aided design. Many students were producing computer models of their theme parks using Swivel-3D software by which one takes a quick visual tour from different angles and perspectives. Accompanying these computer drawings were hyper-text stacks that allow quick retrieval of information by clicking on highlighted text with the computer mouse. These and other computer products become part of the student presentations.

Phase 3: Presentations to the "Board of Directors"

The project culminates with a group presentation of the recovery plan to a hypothetical zoo "board of directors." An entire day is set aside for presentations so that regional zoo experts can participate. On the day of the observation, members of the Metro Washington Park Zoo (Portland, Oregon) and the Point Defiance Zoo and Aquarium (Tacoma, Washington) were sitting on the board of directors along with a well-respected scientist named Ray Erickson. After a full career in conservation biology, Erickson retired in Salem and is now an active community participant in the Endangered Species project. Using zoo professionals and scientists adds credibility and realism to the project and, of course, shows students that careers do indeed exist in this area.

Each student group gives a 15-minute presentation to the hypothetical board made up of the zoo professionals and teachers. The students must present and defend their plan, convincing the board that the proposal deserves funding. The panel asks questions and offers a critique at the end, and a teacher who worked closely with the group completes a performance evaluation sheet. (Parents may also attend the presentations; additionally, there is a practice night to which parents are invited.)

Ten presentations were observed. In a typical presentation, students took turns talking from prepared notes on index cards and used a number of visual aids. They talked about the animal, its habitat, its current status and recovery efforts, and then gave a detailed presentation and defense of their recovery plan, which often took the form of a habitat theme park. Through these presentations, students demonstrated their skills in writing, computers, art/design, problem solving, and public speaking. Many groups developed brochures or informational pamphlets to promote their wildlife parks, some done on word processors with sophisticated computer graphics and color maps, and others done more simply by hand. Slides and video clips were

often woven in to provide background about the animal and habitat. Some groups demonstrated computer hypercard stacks by which a visitor to the park could "point and click" on an exhibit terminal to find information about animals and park exhibits (as people do today in modern museums). Some students showed off their computer expertise, while others showed what they could do with hand-built models or drawings. Some of the displays were very intricate and others very simple.

Students had to persuade the panel by talking about such things as the needs of a particular species and how their plan promotes animal health and breeding. In the case of a theme park, students talked about how the park would attract customers and raise revenue, and the acquisition of land and breeding stock. The zoo experts often asked tough questions, although they also offered advice at the end of presentations. The questions from the panel tested students on their knowledge of animal behavior and on the thoroughness with which they had thought through their plan. One zoo expert saw his role as providing "a reality check for students without too much reality"— in other words, challenging students to consider the real issues, but doing so without making students feel hopeless about saving their species.

The Performance Assessment

The staff at Waldo are currently in the process of developing performance assessments around the Endangered Species project that focus on five areas: 1) applying concepts of conservation biology in the recovery plan, 2) collaborating with the group to share knowledge and develop the recovery plan, 3) word processing the research paper, 4) presenting the recovery plan, and 5) developing support materials using a computer and other media. Staff members are developing rubrics for these areas. Each student is rated individually. Thus, a teacher rater must observe the group and individual contributions throughout the entire project to be able to make individual student ratings at the end. Students also develop individual portfolios from their products, including their writing samples, computer products, etc. This facet of the project is still in the developmental phase, and the staff do not yet feel that they have achieved reliable and valid performance assessments.

Anecdotal Evidence: Staff, Student, and Observer Perceptions

While conducting the observations at Waldo, some staff members and students were asked to share their perceptions of the project. In general, staff members were excited about this project and felt that this integrated approach would be made easier as the school moves to block scheduling in the near future. When asked to relate some anecdotal evidence about the program's effectiveness, teachers mentioned several things: Students are generally very engaged in this class. It is a contemporary topic and a vehicle for achieving a deeper understanding of a real-life problem. Students talk about their projects a lot—even in relation to things they see and hear outside of school, such as nature shows on the Discovery Channel or things they might come across in National Geographic.

The class also teaches responsibility: Teams have to manage and work together on their projects. The use of professional scientists allows students see that real people are working on these issues and that such jobs require a foundation of knowledge and skills. One challenge is

that some students and groups will need more time than others, and this means providing some flexibility (i.e., finding extra time during or after school for some groups to complete their projects).

Many of the students interviewed were also excited by the project. They value the approach of making learning more real and, at the very least, they recognized this class as something really different and more interesting than the standard curriculum. Some students described the experience as difficult and stressful at times, but they also noted that it was worth it in the end, because it provided a sense of accomplishment and real learning. The only complaint heard was that, in some groups, one or two students in the group were doing most of the work.

Finally, one issue that struck this observer is the need for a grouping strategy between student choice and creating heterogeneous learning groups. Allowing students to self-select into groups by the animals that interest them is a good tactic for increasing student engagement and giving middle school students some reasonable control over their learning. Yet, in the seventh grade class observed, students seemed to segregate themselves into girl groups, boy groups, and to some extent by race (i.e., two of the groups were made up predominantly of minority students). Judging from the final presentations, there might have been some unintentional separation into high- ability and low-ability groups, since some presentations were really outstanding, while others reflected less effort and lower quality work. This observation is offered as a caveat since the research also makes it clear that cooperative learning and heterogeneous groups help ensure that all students learn. A real challenge is giving students the choice they need to feel ownership for their projects, while also trying to create more heterogeneous, mixed-ability groups This is a challenge which the staff at Waldo continues to work on as the project evolves.

Continuous Improvement

While everyone at Waldo feels they have a good thing going with the Endangered Species project, it is a fledgling effort at the time of this writing, and the teaching staff is continuing to fine-tune it in order to make a good thing even better. As mentioned above, one organizational change that facilitates this thematic approach is block scheduling, which Waldo will be implementing in the near future. With the block scheduling, for example, life sciences will extend for a full semester instead of eight weeks. This will allow more time to set the stage with a firmer grounding in life sciences concepts before students embark on their intensive eight-week endangered species projects.

A second challenge is the need for continued upgrading of information resources in a topic area such as endangered species, where the scientific knowledge and social/political discourse is continuously evolving. The project will be making more use of World Wide Web sites on the Internet to keep current on new knowledge and changes in the field. The number of Web sites related to endangered species is mushrooming, and many of these sites will be added to the information base for student research.

Finally, teachers participating in the project are always looking for ways to improve their practice. One example of this is the continuing effort to fully integrate valid and reliable performance assessments into the project. Another offshoot is a community service learning component in which students who complete the endangered species work volunteer as guides in the participating zoos. They receive further training about an animal of interest at the zoo and then act as guides for visiting elementary students. Finally, teachers continue to work

collaboratively to addresses the complex challenges of an integrated, thematic curriculum.

The project can be expected to continue growing as a highly engaging and meaningful learning experience for middle school students. Those desiring more information about Waldo's Endangered Species project may contact Mike Weddle, Waldo Middle School, 2805 Lansing Avenue NE, Salem, OR 97303-1599, (503) 399-3215.