Vocational and Academic Teachers Work Together

Math meets business, language arts connects with technology, and economics links with science in these collaborative projects.

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Today in many high schools, education is like an egg with two yolks: one academic and the other vocational. In an attempt to integrate these two curriculums, we initiated a project through which the teachers from these two educational areas interacted and reinforced each other. The twin curricular areas remain at the two high schools we chose for our project—Humboldt High School in St. Paul, Minnesota, and New Richmond High School in New Richmond, Wisconsin—but the communication among participants led them to see possibilities in their subjects they had never considered.

Connecting Disciplines

During our summer training workshops, academic and vocational teachers, administrators, and counselors got better acquainted as professionals and began to develop interdisciplinary curricular interventions for the fall term. We encouraged the teachers to follow an action research strategy (Kemmis and McTaggart 1982) and to think about how they would complete statements such as:

- I would like to improve _____.
- Some students are unhappy about _____.
- I am perplexed by _____.
- _____ is a source of irritation.
- _____ is an idea I would like to try.

Each school worked with its strengths: in the case of Humboldt, the cosmopolitan atmosphere of a school in a large metropolitan area; and in the case of New Richmond, the strong sense of community found in a rural district. As the teachers worked together on their projects, they devised several strategies to spark interaction among separate specialties.

The decision about which approach to take belonged solely to the teachers and administrators who carried out the work in their classes and schools. Their decisions were based on their perceptions of the high school's goals, the students' needs, and their experience with interdisciplinary teaching.

Agriculture and Biology Exchange Classes

At New Richmond, biology and agriculture teachers exchanged classrooms and students for one week. Agriculture students, who had previously only heard about tissue culturing, observed and

FIGURE 1

INTERDISCIPLINARY CURRICULUMS

Teachers developed interdisciplinary curriculums using a variety of theoretical approaches. Each approach made sense for the particular situation, the students, and the talents of the teachers.

Reinforced curriculum typically uses supplemental materials in short, intense lessons as a way to remediate or enrich the content of an existing class. Including biotechnology tissue cultures in agriculture classes is an example of this approach.

Correlated curriculum refers to two or more teachers making connections between subjects more explicit in order to encourage student understanding. This approach retains the usual divisions between subjects and is best illustrated in the Frisbee Golf Feasibility Study.

Fused curriculum results when a new subject is created from content, materials, and applications for two or more subjects. The food science course that may emerge from the collaboration of teachers of home economics (foods) and general science and mathematics would be an example of a fused curriculum.

Broad field curriculum is a synthesized branch of knowledge that builds on a number of content areas that relate to a common goal. The ACME intervention, which involves home economics, industrial technology, economics, and guidance, has the potential to evolve into a broad field curriculum for work readiness.

Core curriculum organizes knowledge and learning according to problems identified by either the teachers or the students. The ACME project builds on a teacher preplanned problem.[1]

[1] J. Plihal, M. A. Johnson, C. Bentley, C. Morgaine, and T. Liang, (1991). *Integration of Vocational and Academic Education: Theory and Practice*. (Berkeley: University of California, National Center for Research in Vocational Education)

participated in culturing carrot tissue and Venus fly traps. They discussed the ethical issues and the economic considerations of biotechnology.

In turn, general biology students studied water quality with the agriculture teacher. Using "hands-on, minds-on" learning methods more typical of the vocational classroom, biology students visited a watershed, hosted university groundwater experts, and discussed controversial local issues, such as which local companies were discharging dangerous wastes into their river.

In the week the agriculture and biology teachers spent working together, they learned a lot about "what was on the other side of the wall" that seems to separate the vocational and academic departments. Together, the teachers decided to spearhead two new initiatives: a new agriculture/science curriculum in a new greenhouse, and a K-12 environmental education program.

Mixing Students with Multiple Talents through Academic Technology

At Humboldt, the industrial technology teacher used an active outreach strategy to interest and help teachers and students who were unfamiliar with the graphic arts curriculum.

As in many high schools, the Macintosh computer laboratory at Humboldt serves as a town commons, that is, a place for many to meet and share. The industrial technology teacher asked college preparatory English and geometry teachers to bring their students into the laboratory to be peer-tutored by the intermediate and advanced graphic arts students. He asked the teacher of the gifted and talented students to share current technological resources with the graphic arts students.

The English students were very successful in learning to use the word processing software and computers to produce their projects. But the geometry teacher realized that his students lacked the prerequisite readiness to use the laboratory. He has decided that the next time they work together, he will install *The Geometric Supposer* program on the system, and the industrial technology teacher will help prepare the students to use the laboratory.

Frisbee Golf Feasibility Study

Our first incidence of curriculum correlation occurred when the applied mathematics teacher at New Richmond approached the business management teacher about conducting a joint feasibility study. The focus was on the viability of a proposed Frisbee golf course, which the teachers felt had potential for providing needed recreational outlets for high school students in the community.

Should the community build a Frisbee golf course? Math and business students examined the question from several angles.

The unit emphasized statistical applications and analysis. Students collected two types of data. Using a Frisbee accuracy range, they gathered data for different distances and angles for the course and effects of student characteristics such as left/right handedness, age, and grade level. They also conducted market research with fellow students. Students entered the data into the database and graphing functions of AppleWorks™. With the computer at the intersection, mathematics students took the direction of learning the statistical concepts, and the business management students moved in the direction of analysis. The final products were videotaped impact statements and a decision not to build a Frisbee golf course. At the end, one student commented, "I learned that a lot of planning goes into new businesses."

Studying World Protein Distribution

At Humboldt, a teaching team from home economics and general mathematics/general science gave us a second example of correlated curriculum. These two teachers wanted their students to learn more about percentages in mathematics, the protein content in meats, and the protein distribution throughout the world's population. The teachers mixed their students, moved into each other's traditional territory (the mini-auditorium and the foods laboratory), and shared resources (food, beakers, scales, balances, and microwave ovens). Recognizing that the food science industry is a major source of employment for the graduates of Humboldt, the teachers became aware of the potential for developing a fused food science course.

The teachers also began to recognize the value that a social studies teacher might bring to the collaboration. Reflective questions (Does it seem fair? How do you feel about it?) lead naturally into social studies. Getting the most out of collaboration between academic and vocational teachers can have modest beginnings; complexity then comes naturally in a stepwise fashion. The teachers became mindful of when it would be wise to add a new curricular voice to the project.

The ACME Crew Project

The ACME Crew project was perhaps our most exciting case of a problem-centered, core curriculum approach to instruction. Starting with a scenario about a family furniture business that was losing market share to cheap imported furniture, the ACME crew—

students from economics, wood technology, and family and consumer economics classes—researched, developed, produced, and marketed a new line of locker shelves as a way to save the company.

Teachers acted as business consultants, helping the ACME crew deal with such practical problems of work life as compensation, equity, performance review, risk-taking, and cooperation. These teachers came to appreciate the challenge this approach presented to their teaching philosophies. One commented, "Kids are asking real questions. It will be hard for some teachers to let go and let kids seek and discover knowledge."

At the end of their nine-week project, all participants realized that the real world of work contains many challenging and unanswered problems. And both students and teachers found their images of certain students were challenged. One teacher commented that although "some of the student leaders in this project are kind of outlaws in the school, I was very impressed by the responsibility and enthusiasm they displayed in the core leadership team."

Assessing the Project Activities

We observed classes and talked with students, teachers, administrators, and counselors to assess the projects.

As students talked about what they had learned, we heard about the usefulness of inferential statistics in planning a new venture, the troubled relationship between green lawns and groundwater quality, and the enjoyment they found in working together in teams and making consequential business decisions. They had made connections between subjects!

The students were aware that the interdisciplinary collaboration between their vocational and academic teachers resulted in new and different lesson formats, and they were positive about the changes. Student interest was sparked, and students were motivated to work hard on their projects. Students from the academic classes found participating in such experiences as using the automobile shop, operating the graphics technology, or experimenting with the equipment from the foods laboratory especially inspiring and motivating.

Our interviews with teachers revealed that communications among colleagues at the two high schools changed dramatically. As a result, they had many comments:

Students from economics, wood technology and family economics researched, produced, and marketed a new line of locker shelves.

- "I have a better idea of what others are doing."
- "Look what we can do when we get together!"
- "At first, they asked me what I was doing in the math department. Now they're used to seeing me."
- "Before, I would have stayed in my room and graded papers, but now I walk down to his room to talk about our work."

Teachers also talked about new content and their excitement at venturing into new areas with the support of their colleagues:

- "This is all new to me . . . designing abstract geometric concepts on Macintosh computers."
- "This was the first time I'd tried tissue culturing in the class. I just picked up some of this material in summer school."

Teachers found that they organized and presented information differently as a result of collaboration:

- "I had taught groundwater quality before, but never with the water conservation people as resources."
- "I had never taught these library reference skills in industrial technology before."

An Uncommon Education

Participants came away from this project with new ideas for research and development and a desire to continue developing models for interdisciplinary collaboration between academic and vocational classes.

Collaborative work between academic and vocational teachers does not mean they will turn their backs on or ignore skills specific to each area. Rather, teachers and students, by working together, can sort out what is important in the curriculum for the students' futures. In so doing, they will create richer learning processes, higher educational aims, and, ultimately, an uncommon education. □

References

Kemmis, S., and R. McTaggart. (1982). *The Action Research Planner*. Waurn Ponds, Victoria: Deakin University Press.

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