

On Common Ground

Strengthening Teaching through School-University Partnership

YALE-NEW HAVEN TEACHERS INSTITUTE

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WILLIAM H. JOHNSON, DR. GEORGE WASHINGTON CARVER, CA. 1945

Partnerships in Science and Technology

The New High School Reform Movement

Partnership between the universities and the public schools is not new in American history. Reform of the schools has often been led by university leaders. For example, in 1890, President Charles W. Eliot of Harvard University, using his great prestige, complained that three-fourths

About Partnership

by Fred M. Hechinger

of the population had no access to secondary education and he made public school reform a major task of the university. Many colleges at the time had to offer remedial education courses. Eliot called for more high schools offering greater access to more students and higher standards for all high schools.

Almost 80 years later, in 1959, another president of Harvard became the lead reformer of public school change. James Bryant Conant ignored both the post-Sputnik charges that American education had become a wasteland and the counter claims that schools were better than ever and needed only to be given more money to solve all their remaining problems. Schools, Conant said, would have to offer comprehensive programs, aimed at satisfying those who were preparing for college as well as those who needed “marketable skills” with which to earn a living upon graduation. Social democracy, which seemed to Conant the modern mantle of America’s republican heritage, would best be achieved by having young people from “a wide variety of backgrounds and of great variety of talents mingle within the same school.”

Both leaders, Conant and Eliot, as well as other university reformers of the public schools, have done a great service in calling public attention to problems in elementary and secondary education. They did, however, overlook the actual needs of real children. They had tried to reform the systems without dealing directly with the problems of those served—the students. In the 1950s, Conant had accurately charged that the junior high school did not serve those needs. It was, he found, actually a replica of the senior high school.

He reported that these schools cared more for marching bands than about the actual needs of young students.

Now in the late 1980s, the Carnegie Corporation of New York trained its attention on those needs. Its report, *Turning Points*, transformed the junior high school into a middle school, which tried to make it its main purpose to insure all the young adolescents would find themselves in schools in which they knew the teachers and the teachers knew them.

This would be accomplished by dividing schools into small units of no more than 150 students, each of them taught by a team of either four or five teachers, representing English, social studies, science, and mathematics. The team would be entirely responsible for the education of this relatively small group of children.

This obviously raised the question: What happens to these youngsters once they reach high school? Would they be entering large institutions and moving from class to class, taught by different teachers and become essentially anonymous units? Adolescents, like adults, behave at their worst when they are anonymous, when nobody knows or cares for them.

Carnegie is currently looking at ways to reform the senior high school. While the outcome of this reform proposal may not be an exact replica of the foundation’s *Turning*

Points, some of the middle school experience may be helpful in reforming the high schools. Changes will not be easy. High schools are strongly embedded in the autonomy of the separate disciplines. The idea of interdisciplinary teaming will not be readily accepted.

This could be a special opportunity for the Yale-New Haven Teachers Institute to move into the forefront of the new high school reform movement. As it has pioneered in developing the relationship between university professors and public school teachers, it might now be ready to enlarge its experience to the relationship between university faculties and high school teachers. Eliot and Conant, after all, led the movement to greater access by more young people to high school education, and thereby to access to higher education and to the work force. Now, universities can again show their great strength in shaping the future of the high schools.

University faculties have already experimented with the idea of interdisciplinary teaching; they could now offer their experience to leading high school instructors and demonstrate the concept of teaming and a closer relationship between teachers and students.

As Harvard took the lead in the two previous school reform efforts, Yale now could have the opportunity to pioneer in reforms for the next century’s schools.

About the cover illustration:

The artistic achievement of the black American artist, William H. Johnson (1902-70), has only recently been recognized. Born and raised in South Carolina, Johnson studied art in New York. Recognition of his talent brought support that enabled him to continue his studies in France. He lived and painted in a largely Expressionistic style in Europe for most of the period 1926-38, primarily in Scandinavia with his wife, Holcha Krake, a Danish textile artist. With the approach of World War II Johnson settled in New York where his style underwent a radical transformation. Influenced by such artists as Horace Pippin and Jacob Lawrence, he developed a flat, brilliantly colored man-

ner, and turned in subject matter to “painting my people.” In simplified, animated forms he depicted the everyday life of blacks in Harlem and South Carolina. He created a memorable series of paintings of black soldiers and nurses during World War II. As the war ended, Johnson began a series of African-American history called *Fighters for Freedom* which included this image of scenes from the life of Dr. George Washington Carver. In explaining his new American style, he wrote, “My aim is to express in a natural way what I feel, what is in me, both rhythmically and spiritually, all that which in time has been saved up in my family of primitiveness and tradition, and which is now concentrated in me.”

—Jules D. Prown

Partnerships in Science and Technology

Contents

- | | | | |
|----|--|----|---|
| 2 | About Partnership: The New High School Reform Movement
Fred M. Hechinger | 15 | Obstacles to a Technological Revolution
John Merrow |
| 4 | On Common Ground: Science, Technology and Teaching
Thomas R. Whitaker | 16 | A Partnership Supporting Computers in the Schools: Lessons from Portugal
Stephen C. Ehrmann |
| 6 | Educating Students for the 21st Century
Bruce M. Alberts and Jan Tuomi | 18 | Artifacts of Technology as an Educational Resource
Robert G. Wheeler |
| | Responses to Alberts and Tuomi | | |
| 8 | Science Kits as Instruction Tools
Sharon Olguin | 19 | Fragmented School Reform and Effective Partnerships
Carlos Mora |
| 9 | A Central Role for Science Education Partnerships
Eloy Rodriguez | | Book Review |
| 10 | The National Science Foundation and Systemic Reform
Janice Earle and Julia C. Wan | 21 | Toni Marie Massaro's <i>Constitutional Literacy: A Core Curriculum for a Multicultural Nation</i>
Robert A. Burt |
| 12 | Voices from the Classroom
Thomas R. Whitaker | 22 | Response to Robert Reich
Collaboration Across the Community College
Carole F. Edmonds |

Credits: Cover Illustration: William H. Johnson. *Dr. George Washington Carver*. ca. 1945. Oil on fiberboard. 35 1/2" x 28 1/2". National Museum of American Art. Gift of the Harmon Foundation. **Page 5:** Charles Willson Peale. *The Artist in His Museum*. 1822. Oil on canvas. 103 3/4" x 79 7/8". Pennsylvania Academy of Fine Arts. Gift of Mrs. Sarah Harrison. **Page 9:** Josef Albers. *Homage to the Square*. 1967. Oil on masonite. 24" x 24." The Josef Albers Foundation. **Page 13:** Jacob Lawrence. "In the North the Negro had better educational facilities." Panel 58 from *The Migration Series*. 1940-41; text and title revised by the artist, 1993. Tempera on gesso on composition board. 12" x 18". The Museum of Modern Art. New York. Gift of Mrs. David Levy. **Page 15:** Thomas Eakins. *Drawing of Gears*. ca. 1860. Pencil on paper. 11 7/16" x 16 7/8". Hirshhorn Museum and Sculpture Garden. Smithsonian Institution. Gift of Joseph H. Hirshhorn. 1966. Photographer Lee Stalworth. **Page 16:** Jasper Johns. *0-9*. 1959. Encaustic and collage on canvas. 20 1/8" x 35". © Jasper Johns/Licensed by VAGA, New York, 1995. **Page 21:** John Frederick Peto. *Nine Books*. ca. 1890-1900. Oil on composition board. 15.6 cm. x 23.4 cm. Yale University Art Gallery. Gift of Mr. and Mrs. Charles F. Montgomery, M.A. (Hon.) 1970. **Page 24:** Diego Rivera. *Detroit Industry, North Wall* (detail). 1932-1933. Fresco. The Detroit Institute of Arts. Gift of Edsel B. Ford.

On Common Ground: Science, Technology and Teaching

By Thomas R. Whitaker

On the facing page the American painter and inventor, C. W. Peale, portrays himself lifting the curtain upon the grand project of his later years, a museum of natural history. Let us here echo his gesture, in a modest way, by lifting the curtain upon a number of *On Common Ground* devoted to science and technology. Our first three numbers have emphasized some broader contexts of partnerships between schools and universities: federal-state relationships, the historical perspective, and the world of work. We now engage more closely some of the problems and opportunities that such partnerships must confront in the classroom.

The Essays: Some Connections

- How can school-university partnerships contribute to science education in the elementary grades? Bruce M. Alberts and Jan Tuomi recount how a partnership between the San Francisco public schools and the University of California at San Francisco (UCSF) has led to the replacing of science textbooks with hands-on science materials. They point to several important aspects of this program, including dialogue with the school district leadership, and close working relationships between school teachers and members of the UCSF community. The “key” to this effort, however, has been the identification of outstanding instructional materials—in effect, science kits. An earlier version of this essay provoked a very lively discussion at the January meeting of the Editorial Board. A number of reservations were expressed about its approach to science in the elementary grades. May kits provide too “ready-made” and “self-contained” an experience? Do they help teachers to relate science to other aspects of a holistic elementary school program? Would the students’ inquiry and problem-solving be furthered by having them prepare their own kits, which might also relate to other aspects of the curriculum? Might the teachers then become more deeply involved in the process of curriculum construction? These questions, of course, raise larger issues of curriculum design and professional

development in the elementary schools. The Board thought it useful, therefore, to solicit some responses to that essay from other points of view.

- Our first respondent, Sharon Olguin, trains teachers in the Albuquerque Public Schools/University of New Mexico Collaborative. She agrees with Alberts and Tuomi about the need for an experiential approach to science instruction. She argues, however, that science kits are too easily used in ways that do not significantly advance the students’ skills in problem-solving and critical evaluation, that the kits too often seem to relieve the teachers from responsibility for their own continuing education, and that sets of fairly expensive and quickly expended materials do not constitute the most efficient use of a school’s limited financial resources.
- Our second respondent, Eloy Rodriguez, established the “Kids Investigating and Discovering Science” program at the University of California, Irvine, in partnership with the Santa Ana Unified School District. The successful science teaching in that program for low-income Latino youngsters, he tells us, depends upon a network of interpersonal collaboration. Parents, becoming participatory partners, serve as teaching assistants and homework mentors. Minority faculty from the university become role models and mentors, for the school children and also for the minority graduate and undergraduate students who work with the K-12 teachers. Through such means, the university campus has become “a truly common ground for fostering the love and learning of science.”
- How has the National Science Foundation been assisting university-school partnerships in science, mathematics, and technology? Janice Earle and Julia C. Wan describe how the Statewide Systemic Initiatives Program (SSI) has encouraged the creation and strengthening of partnerships. They also point to four states—Montana, Ohio, Connecticut, and Louisiana—as examples of SSI programs that are oriented toward several types of cur-

ricular reform, teacher preparation and development, and the improvement of teaching methods.

- Can smaller and poorer nations teach us a good deal about creative and cost-effective partnerships? Stephen C. Ehrmann argues, on the basis of his experience in Portugal, that they surely can. He describes Project Minerva, which was designed to foster broader use of computing in the Portuguese schools. This project involved a “distributed leadership structure,” with three partners: the Ministry of Education, the universities, and the schools. Each had its own area of leadership in a reform effort sparked by technological innovation but extending into other areas of the curriculum.
- What obstacles do we confront when seeking to introduce into our own public schools what is now our society’s central tool for communicating and creating knowledge? In a sobering essay on that question, John Merrow identifies three major obstacles: inappropriate teaching methods, stereotyping of students, and obsolete facilities. Unless these are overcome, he argues, the gulf in our society between the “haves” and the “have nots” will grow yet wider—a prospect that should frighten us all.
- Teachers also need to be alert to technological resources beyond the walls of the classroom. Robert Wheeler suggests how they can make use of artifacts in their localities as means of conveying the excitement of scientific inquiry. Wheeler’s emphasis on links that connect science, technological invention, and economic processes in the larger society also illustrates the broadly interdisciplinary focus that he has found useful when leading a seminar on “Electricity,” in the Yale-New Haven Teachers Institute, for teachers drawn from several different fields.
- Two other essayists in this number of *On Common Ground* address more general problems of curricular reform—and each is concerned with the coherence of our educational efforts. Carlos Mora, who directs the Partnership for Minority Student Achievement in New Haven, reminds us

of the dangers of fragmented reform efforts and suggests that “empowerment” and “constructive accountability” may provide a basis for better coordination and more fruitful decision-making. Carole F. Edmonds, Dean of Arts and Sciences at Kellogg Community College in Battle Creek, Michigan, is responding to Robert Reich’s essay in our last number, on the role of the community colleges in providing new paths to the middle class. She calls attention to the need for more collaboration among the quite various programs *within* the community college—and she describes how her college has met this challenge.

- Our regular columnist, Fred Hechinger, delivers a related challenge to Yale—and by implication to all universities. Can university faculties that have experimented with interdisciplinary teaching now offer their experience to leading high school instructors and demonstrate the concept of such team teaching? If so, they may move into the forefront of the new high school reform movement.
- We also inaugurate in this number two “departments” that, we hope, will make at least occasional appearances in these pages. One is a place for book reviews. Toni Marie Massaro’s *Constitutional Literacy: A Core Curriculum for a Multicultural Nation* spells out one way of balancing the demands of unity and diversity in our school curricula by “teaching the conflicts” in the area of constitutional law. (The phrase, and the pedagogical approach to which it refers, comes from the work of Gerald Graff, Professor of English at the University of Chicago.) Massaro’s book is here reviewed by Robert A. Burt, from the Law School at Yale, who has led seminars on constitutional law for the Yale-New Haven Teachers Institute, and whose own recent book is entitled *The Constitution in Conflict*.
- The other department, “Voices from the Classroom,” will provide space for a variety of contributions from the schools. On this occasion, we offer excerpts from a conversation with three classroom teachers who have recently joined our Editorial

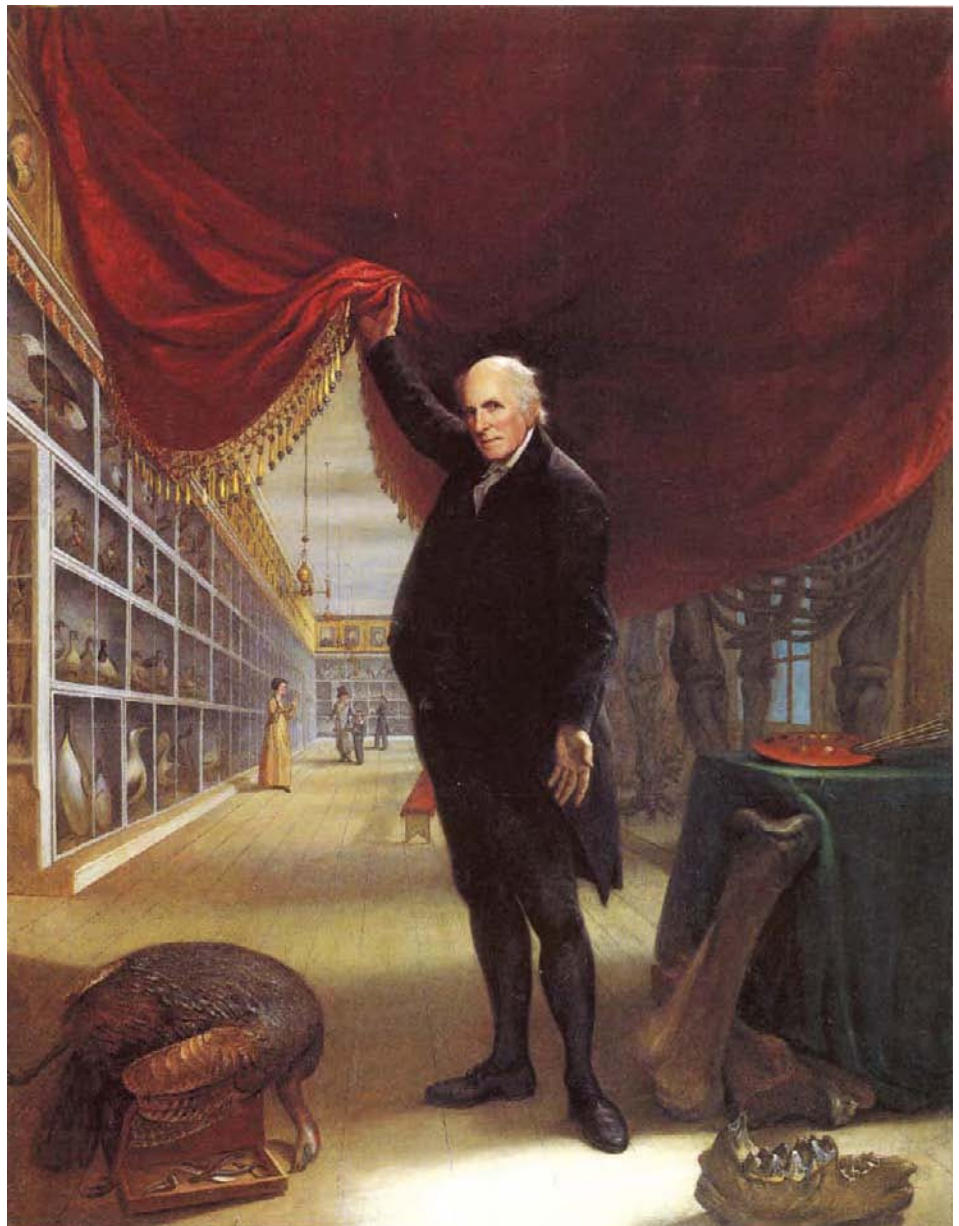
Board: Sharon Floyd, Sharon Olguin, and Patricia King. They speak of their experiences in collaborative projects, and they express their views on the potential usefulness of *On Common Ground*.

The Images: Some Perspectives

The images in this number complement the essays in a variety of ways. Several of them quite explicitly provide artistic and his-

torical perspectives on certain aspects of science, technology and teaching.

C. W. Peale’s *The Artist in His Museum*, on this page, celebrates the artist’s own remarkably various career, which had taken him from painting (he was the most notable portrait painter of the American Revolution) and invention (he designed a truss bridge, for example, and a fireplace that consumed its own smoke) on to the study of natural history. He became an avid collector of birds, *(continued on page 13)*



CHARLES WILLSON PEALE, *THE ARTIST IN HIS MUSEUM*, 1822

Educating Students for the 21st Century

By Bruce M. Alberts and Jan Tuomi

The accelerating impact of science and technology on the lives of Americans makes a basic understanding of science and mathematics an essential part of any education for the 21st century. In the 1980s researchers alarmed the nation with reports on the low level of scientific and technical literacy among high school graduates. In response, Americans began new education initiatives, such as the 1989 summit with former President Bush and the nation's governors outlining education goals for the nation, many state and local education coalitions, the National Science Foundation's systemic reform initiatives, and the production of new instructional materials and benchmarks for science literacy. In addition, later this year, the National Science Education Standards will be published by the National Research Council.

Despite this progress, science is still greatly undervalued in our schools. Science is too often treated as an optional activity, rather than as a core subject. Moreover, the nature of classroom science must change. Science educators must move away from the mindless memorization of science terms now plaguing many classrooms. Classrooms should offer children experiential opportunities to learn basic scientific concepts and to develop and carry out systematic processes for solving scientific problems. Further, science education must start during the early years of schooling, when children still display their natural curiosity and excitement for learning. We must highlight science as an inquiry activity and cease the drill and rote learning approaches that have caused so many of our students to lose interest in school science.

Teacher-Scientist Partnerships

The scientific, engineering and medical communities have not contributed a great

Bruce M. Alberts is President of the National Academy of Sciences in Washington, D.C. Jan Tuomi is Director of Regional Initiatives in Science Education (RISE) at the National Research Council in Washington, D.C.

deal to school reform. However, a number of individuals have demonstrated the potential to help catalyze widespread improvement in science classrooms by building partnerships with their colleagues in K-12 education. Through partnerships, these professionals learn about obstacles to improving science education in America's classrooms, and they learn how to best apply their varied talents toward creating lasting change.

On the basis of our own experience in partnerships between scientists and engineers and K-12 educators, we recommend focusing partnership activities on teacher professional development activities that support the implementation of a modular science curriculum. We have worked to establish such a partnership between the University of California San Francisco (UCSF) and the San Francisco Unified School District (SFUSD) over the last five years.

San Francisco is a city rich in science and technology resources. At UCSF, scientists, doctors and graduate students carry out cutting-edge research and apply scientific knowledge and new technologies to widespread societal challenges. Many UCSF employees have children in the SFUSD, and so are familiar with the quality and quantity of science education their children receive in the city's public schools. Many of these parents had voiced concern over the years, but few had found effective pathways to involvement that could significantly improve science instruction or resources.

San Francisco Schools

In 1990, most elementary teachers taught little or no science; instead, the focus of their activities was on reading and math. Classrooms received only textbooks from the school district. Some teachers collected science activities from workshops or summer institutes, and produced their own materials. While many active programs existed to improve elementary science education, these efforts did not reach the city's classrooms in a consistent and equitable way. Most importantly, valuable programs were never successfully integrated into the infrastruc-

ture of the school district.

Today, after four years of intense partnership activity between the school district and the scientific community, the school district supplies every school with four science modules per grade-level per year. They also send materials from a district materials center that refurbishes materials for each teacher's use. All teachers have had an introduction to the new hands-on curriculum and to strategies for using the units successfully.

Why are the teachers paying more attention to science as an integral part of the classroom experience? First, the teachers now receive the kinds of resources needed to implement a successful science lesson, including materials, teachers' manuals, lesson plans, and suggestions for curriculum integration. Grade-level meetings address ongoing implementation concerns and provide mentoring for less experienced teachers. Finally, district principals and parents actively support the teachers in their work.

Scientists from UCSF and other community institutions contribute to the effort primarily by participating in the teachers' professional development activities. Approximately twenty scientists, for example, worked with teachers to plan about 30 days of staff development activities per year. Scientists acted as examples of authentic scientific inquiry, sources of content knowledge and research expertise, and liaisons to science university labs and clinics. They also helped design extensions to the curriculum and worked with the district in developing their long-term strategic plan for science education. Equally important, the scientists became active advocates of high quality science education in their community.

Lessons Learned

How did this transformation take place? Will it last? How would we advise others to go about setting up a partnership between scientists and educators? We believe that the following ingredients greatly improve the likelihood of success in science education partnerships.

Start in Elementary Schools

The natural response of a scientist who wants to help improve science teaching in our schools is to concentrate at the high school level. Here, the science is taught in the academic disciplines that scientists are used to—biology, chemistry, physics, earth sciences. Many of us with experience in school systems have come to the conclusion that the major revolution called for in science education is best accomplished by starting in what at first seemed to us to be a very alien world—the elementary school. The advantages of focusing our limited resources on elementary science include the fact that many of our best teachers are found in these schools. Moreover, elementary teachers work with the same group of students all day; this allows them to schedule the time required for a meaningful science inquiry experience. At this level, engaging science explorations will foster positive student attitudes toward science from the start of the students' academic careers.

Engage District Administration

It is critical for partnership participants to engage the school district leadership in a dialogue about their current science curriculum and future plans. Ultimately, it is the district managers and school principals who must provide the professional support teachers need to experiment with new instructional techniques. The success of our partnership has depended on our ability to foster enthusiastic support from school district administrators.

Instructional Materials are Key

Identifying the best instructional materials available is critical to the success or failure of any partnership. If instructional materials are ill-conceived, shallow or incomplete, professional development activities organized around these materials are likely to be similarly flawed. Well-developed instructional materials often inspire the same level of fascinated inquiry in teacher workshops

that they do in the classroom, and help provide models for teachers of well-designed science lessons. Materials that have been carefully field-tested will help newcomers avoid common pitfalls in materials management and instruction, which helps maintain teacher enthusiasm for the effort as a whole. Currently, research-based curricula exist that have been tested extensively in diverse classrooms. These curricula are designed to foster conceptual understanding over a period of several weeks. SFUSD adopted the following two programs: *Full Option Science System* and *Insights*.

Beyond identifying specific curriculum units, partnership participants must develop a common vision of science teaching and learning. The National Science Education Standards will provide a valuable new tool to help develop this vision, build local consensus, and guide plans to align teaching, learning and assessment. This overall vision helps keep activities focused on improving science education through the difficult periods that come with any long-term effort.

Provide for the Professional Development of Teachers

To foster excellence in science learning, merely advocating specific curricular units is not enough to support reform. The partnership effort must also provide professional development that helps teachers understand scientific inquiry. As teachers begin working with the curriculum units, they expand their repertoire of instructional strategies and gain deeper insight into their students' conceptual development. The teachers learn to enjoy—not fear—science teaching, and become more adept with using a variety of hands-on materials. Teachers are quickly inspired by their students' positive reactions to hands-on science. Soon, the teachers are ready to explore more in-depth studies of scientific inquiry, the role of the teacher as facilitator, curriculum integration, and student assessment. With mastery of science content and pedagogy, teachers may develop individual, student-centered innovations to enhance commercial curriculum kits.

The long-term goal of a professional development program should be to reach all teachers in the region—a goal that requires a well-planned, step-by-step dissemination plan. Our strategy for building this capacity was to prepare a core group of lead teachers. These teachers provide feedback from principals and their colleagues on what works in the schools.

Build a Regional Infrastructure

To ensure lasting change, the school district must supply classroom materials and continual professional development. This requires reallocating resources to design and implement a materials distribution system, to provide release time for teachers to work and plan with colleagues, and to build the infrastructure needed to support ongoing improvement of science education.

To support science education improvement, community stakeholders need to become informed about the goals and activities of area partnerships. Moreover, they might need to change their on-going programs to avoid duplication of effort and optimize the use of resources.

Create Long-term Community Support

Strategic efforts in school districts often fail due to the transitional nature of school district employment: superintendents often have a short tenure, school board members and state politicians fail at reelection, and local school district employees change jobs. Local technical professionals, who are knowledgeable about the state of science education in their local area, can provide the stable platform needed for a continuous improvement process.

Local efforts will not succeed without support from a community that values science education. Scientists can provide this kind of supportive voice. United in our conviction that children need quality science education to lead productive and satisfying lives, we must do our best to give them the chance to succeed. 🌱

Responses to Bruce M. Alberts and Jan Tuomi's article appear on pages eight and nine.

Responses to Alberts and Tuomi

Science Kits as Instruction Tools

By Sharon Olguin

Across the country many school districts have moved toward the adoption of science kits as an approach for teaching science. Implementation of science kits as tools for instruction is seen as a means for more inclusion of science in the curriculum. The issue of science kits for instructional purposes was a focus for discussion at a recent board meeting for *On Common Ground*. The group shared a common belief about the importance of science instruction and children's natural curiosity about their world. Discussion, however, was centered around the ways in which science kits are being developed and implemented.

Children are instinctively curious and always on a quest for finding answers to their questions. Given that they naturally want to learn, it is my belief that the elementary classroom is the obvious place to introduce the scientific processes that will help them understand their world. This is a philosophical belief that I hold to be important. However, my experiences have led me to some conclusions that differ with those expressed in the article, "Educating Students for the 21st Century," written by Bruce M. Roberts and Jan Tuomi. Science kits have been adopted by many of the schools in the Albuquerque Public School district where I am employed. They are often seen as replacement for the science curriculum. The kits are designed to teach a particular concept and are provisioned with the necessary materials for implementation. As a way of facilitating implementation, the kits are also delivered to the classroom teacher's door. The teacher simply has to use the kit to teach science. For many teachers this ready-made curricu-

Sharon Olguin is a Clinical Supervisor for the Albuquerque Public School/University of New Mexico Career Development Program.

lum is the only way their students will be exposed to science concepts. They embrace the idea willingly and allow someone else to assume the responsibility for science instruction. The materials are simply placed in the room and children are given time to explore them.

All too often this is believed to be science instruction. The children's natural curiosity and innate interest in science leads them to explore the materials and come to some understandings. The teacher is comfortable that science is being taught and is released from the responsibility of developing a broader understanding of science as a discipline.

This approach raises many questions. I will address some of them here. It is true that science kits offer opportunities for

If the teacher does nothing to enhance the kit's implementation, children fail to develop the skills necessary for becoming problem solvers.

hands-on experiences; frequently, however, there is no connection made to their relevance in the bigger scheme of children's experiences. Attention is not paid to the development of science concepts or to the processes necessary to solve problems systematically using the scientific process. This lack of connectedness means that the learner may have had a fun experience but quickly moves on to something new. Each event occurs in isolation.

The teacher, assuming the kit will do the teaching, has no investment in furthering the learner's understanding. This is especially true if the teacher has not developed knowledge about the concept being presented in the kit. Adopting this approach means that the teacher has no responsibility to continued learning. Science instruction, although no longer presented as the memorization of scientific terms, has been reduced to its simplest form.

This style of instruction appears to be based on ease of gathering and convenience of storing materials. Complexity of the materials is therefore compromised. If the teacher does nothing to enhance the kit's implementation with additional materials and resources, the children fail to develop the skills necessary for becoming problem solvers and critical evaluators. Their thinking maintains itself at the comprehension level. This certainly moves us no closer to reaching the standards set forth in the Goals 2000 legislation.

An additional concern is the financial cost for developing kits. Most of the supplies included with the kits are consumable and fairly expensive, and the cost of the kits to the schools is inflated in order to pay someone to purchase, compile, replenish, store

(in some situations) and distribute the kits. This additional expense reduces the dollar amount that could have been spent on the purchase of non-consumable items. When purchased, non-consumable items such as books, microscopes, flasks, dissecting tools, etc., become available for all children to use in the future. A yearly

addition of further resources for science instruction could prove more beneficial and move the learner and teacher to a more complex understanding of science as a discipline.

I agree that an experiential approach to science instruction begun in the elementary classroom is necessary. As teachers we can also take advantage of the notion that children are natural scientists and have it serve as an invitation to develop a rich environment for science instruction.

I question the practice of using science kits in isolation because they assume that the teacher has neither knowledge of the content nor desire to become more informed. It leads me to wonder: if the responsibility for replenishing kits were returned to teachers, would their use serve as a model for expanding science and making it an integral part of the curriculum, or would science instruction again receive less emphasis? 🌱

A Central Role for Science Education Partnerships

By Eloy Rodriguez

I want to add a number of conclusions about effective science education partnerships to the excellent article by Bruce M. Alberts and Jan Tuomi. The conclusions derive from my very rewarding experiences establishing the “Kids Investigating and Discovering Science” (KIDS) program at the University of California, Irvine (UCI).

I targeted the Santa Ana Unified School District which has an enrollment of over 49,000 students of whom 92 percent are minority and 64 percent are limited-English proficient—the greatest concentration of such students in California.

With colleagues at UCI, I began the KIDS program five years ago to provide Latino children from low-income families with an engaging and challenging university-based science “camp.” The focus of the program was project-based learning on topics at the forefront of biology, especially field biology. We wanted the children to be able to actually believe themselves to be young scientists. They wore white laboratory coats and worked side-by-side with teachers, research faculty, undergraduate and graduate students. In this respect, this was truly an intergenerational model of teaching and learning. We made our laboratories and field research sites places where children from kindergarten through middle school could discover and investigate the mysteries of science. The campus became a place in which low-income children could pose, investigate and answer fundamental questions on such

Eloy Rodriguez is James A. Perkins Professor of Environmental Studies at Cornell University.

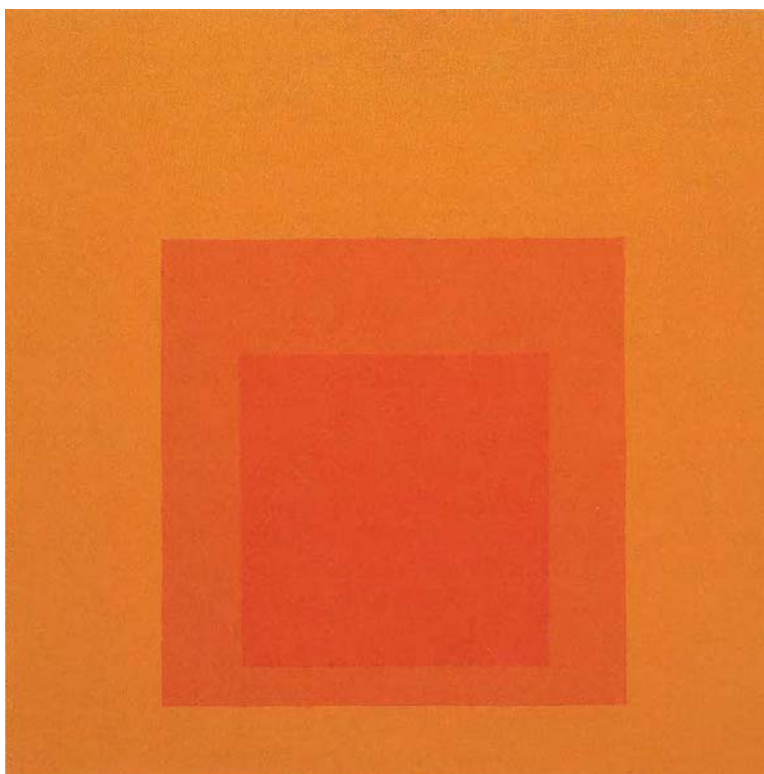
topics as function, adaptation, evolution, gravity, sound, inertia, force, velocity and acceleration in an environmental framework with enthusiastic parents, compassionate student assistants and gifted bilingual teachers from the school district. Bilingualism was crucial for the success of this program since the majority of KIDS students and parents only spoke Spanish.

But the true partnership was that of the KIDS program and the parents. This belief sprung from my own experience. My educa-

tioned impact on the children’s learning and interest in science. A clear indicator of success was the students’ improvement in their grades at their “normal” school (a term students used to separate KIDS-UCI from their school) and comments from the parents indicating that the students were more involved in their studies.

Our basic goal for the KIDS program has been to foster the development of a generation of youngsters who learn to think and understand the importance of education in

order to go to college and pursue a career in the sciences. KIDS is a year round science partnership between UCI and the Santa Ana Unified School District. In the summer, children from the Santa Ana schools come to the campus where they become part of a research university. The effects of this approach have been profound. Outstanding Santa Ana teachers who have worked with us in designing and carrying out the program are the children’s teachers during the academic year. They tell us such things as “The KIDS students . . . value learning about science and see it as very important, fun and challenging” . . . “Both boys and girls have begun to see themselves as scientists” . . . “I am constantly confronted by the KIDS students with their ques-



JOSEPH ALBERS, *HOMAGE TO THE SQUARE*, 1967

tional success in a poor south Texas school was largely due to my mother’s active involvement in PTA and teacher/parent conferences. Therefore, the program emphasized and insisted that parents be made participatory partners in this unique endeavor.

University faculty, graduate and undergraduate students, parents, teachers and principals all consider KIDS to be a great success. Evaluation data show this to be true. We have seen that a partnership between the campus and K-12 schools can enable minority children to experience the joy and excitement of science and can have an enor-

mous impact on the children’s learning and interest in science.”

Distinguished minority faculty serve as role models and mentors to the school children and to minority graduate and undergraduate students who work alongside K-12 teachers in the program. The KIDS children typically have their first minority scientist role models in the University faculty and students. Faculty visit the children’s schools during the academic year, and undergraduates serve as tutors at KIDS schools, continuing to serve as significant role models.

(continued on page 14)

The National Science Foundation and Systemic Reform

By Janice Earle and Julia C. Wan

The National Science Foundation's (NSF) Statewide Systemic Initiatives (SSI) Program represents a new federal strategy for NSF. Previously, NSF funded individual program components but these components did not address issues of systemic reform such as comprehensiveness, scale and sustainability. A primary operating assumption in systemic programs is that a tighter and more coherent alignment of state policies and resources will produce improved instruction in science and mathematics with subsequent improvements in student achievement. In order to create alignment, several of the significant components of the system must be examined and modified. For example, the SSI states have worked with curriculum through creating or revising state curriculum frameworks that are based on national standards, and creating or disseminating new materials. Some states are revising assessment and accountability programs. All SSI states are working on professional development programs for teachers and administrators. Others focus on policy alignment through changes in teacher certification, state graduation requirements, and pre-service education programs.

A primary goal of the SSI is high quality science, mathematics, and technology (SMT) education for ALL students. This means making the education "systems" more equitable in terms of learning opportunities and in terms of who takes (and succeeds in) advanced science and mathematics courses. The under-participation of certain groups of students in advanced science, mathematics, and technology education is well documented. The SSI seeks to effect change in student participation and performance by

Janice Earle is Program Director of the Statewide Systemic Initiatives Program at the National Science Foundation. Julia C. Wan, who previously held that position, is now the Director of the Center for Excellence in Science and Mathematics Education at the California State University at Fullerton.

transforming school curriculum, classroom instruction, and teacher education, and by increasing parental support so that ALL students have opportunities suited to their needs to learn science, mathematics, and technology education. This includes benchmarks for curriculum, assessment, professional development, management and governance, policies, partnerships, articulation, and evaluation which have been developed by the states to guide this effort.

What Strategies are States Using to Implement SSI?

One key SSI strategy is the creation or strengthening of partnerships. Successful systemic reform requires the collaboration of educators at all levels, state and local policymakers, business and industry, parents, and the community at large.

Strong connections and articulation between K-12 and higher education are critical elements in SMT education reform. The crucial roles that higher education can play in K-12 reform fall into three categories: (1) the professional community from the disciplines can provide up-to-date content expertise in the development of curriculum frameworks, instructional materials, and standards implementation; (2) the science and mathematics education researchers can provide knowledge on pedagogy and developmentally appropriate concepts in curriculum and instruction; and (3) science and mathematics educators are key players in teacher pre-service and in-service development. The following examples illustrate how four SSI states are creating partnerships for reform.

Expertise in Curriculum, Instructional Materials, and Standards

Montana's SSI is a partnership of the Montana Council of Teachers of Mathematics, the University of Montana and Montana State, and the Department of Public Instruction. The SSI's primary area of focus has been the development of a 9-12 mathematics curriculum that uses an integrated, in-

terdisciplinary approach. Integrated mathematics means integration across mathematics topics, integration with other disciplines (arts and sciences), and integration with technology. This initiative is led by two mathematics professors, one from each of the two major state universities, working collaboratively with a team of high school mathematics teachers. Teaching modules for grades 9 and 10 have been created, field-tested, revised, and reviewed by national experts. This curriculum has been used in more than a quarter of the state's ninth grade classrooms to date. Tenth-grade materials are now being piloted and revised, and the eleventh- and twelfth-grade materials are being written.

The Montana SSI goal is that this curriculum will change mathematics in a majority of the state's high schools. Eventually, this curriculum will be commercially available nationwide.

Montana is also revising teacher certification standards for mathematics, to align them with the changes in the mathematics curriculum promoted by the SSI.

Mathematics and Science Pedagogy

A cornerstone of Ohio's SSI is a program of intensive, six-week summer institutes for middle school teachers that focus on inquiry teaching. Courses are offered in Physics, Life Science, and Mathematics by Inquiry, supplemented by academic year professional development seminars. The summer institutes are developed and conducted by higher education faculty at Miami University and Ohio State University. To date, almost 700 middle school teachers have participated in the program. Observers in these teachers' classrooms describe less use of texts, and high rates of questioning, use of student journals, active teaching, checking for understanding, and letting students analyze findings rather than having teachers explain everything.

Recent reports show that other universities (11 institutions of higher education in partnership with the Ohio SSI) have math-

ematics and science faculty attending the inquiry courses with middle school teachers.

These universities are now attempting to implement inquiry courses in their own institutions. These courses are aimed at future teachers. Faculty have struggled with implementing these ideas in their institutions, and comment particularly on the dilemma of “breadth versus depth” (hands-on approaches mean you cover less content, but the content is better understood by students). While these courses are now electives, they are undergoing an approval review process, and it is anticipated that the inquiry courses in mathematics, physics and life sciences will be available for all pre-service teachers.

Teacher Pre-service and In-service

Connecticut and Louisiana are examples of SSI states that have strengthened pre-service and in-service delivery as part of the states’ systemic reform plan.

Connecticut has increasingly focused on institutions of higher education, beginning modestly in 1991 to foster “dialogues” between those in the K-12 system and in institutions of higher education. Out of these dialogues grew partnerships to establish “co-teaching” in over 20 locations. Co-teaching involves having K-12 teachers work in colleges and universities co-teaching methods courses. Mathematics and science professors become actively engaged in elementary and secondary schools.

Following the dialogues, a grants program was instituted. Currently, Southern Connecticut State University, Quinnipiac College, Connecticut College, Western Connecticut State University, St. Joseph College, Central Connecticut State University, and the University of Connecticut have all received funds to work closely with K-12

schools and to modify courses at the undergraduate level. The Institutes of Higher Education (IHEs) that train over 90 percent of the state’s teachers have restructured student teaching experiences, provided resources for a mathematics and science resource center, and institutionalized co-teach-

Successful systemic reform requires the collaboration of educators at all levels, state and local policymakers, business and industry, parents, and the community at large.

ing. Another program at Wesleyan University provides intensive professional development to middle school mathematics and science teachers. Half of the teachers in this program come from Connecticut’s high poverty, high need districts.

Another example of a strong K-12 and higher education partnership in systemic reform is the Louisiana Statewide Systemic Initiative. The Louisiana Board of Regents for Higher Education is the lead institution for the Initiative, which had professional development of grades 4-8 science and mathematics teachers as a major focus.

The professional development model is based on: (1) specifically designed course content with emphasis on reasoning, investigating, and practical understanding of concepts; (2) recruitment of 30 mathematics and/or science teachers in pairs from schools for each workshop or institute; (3) summer and/or academic-year institutes providing 120-180 hours of concentrated, integrated exposure to grade-level relevant content and methods; (4) academic-year follow-up activities including classroom visits and day-long workshops; (5) \$300 allotment per teacher for classroom materials; (6) graduate credit for successful participation in the project; and (7) stipends of \$60 per day for program participants.

The Louisiana professional development

activities described above are jointly planned and implemented by mathematicians/scientists, mathematics/science educators, and teacher leaders as site coordinators. Site coordinators are the bridge connecting summer workshops and classroom instruction. They are chosen from K-12 and higher education for their extensive classroom experience and knowledge of curriculum and assessment.

Louisiana SSI professional development projects are awarded competitively to universities, based on recommendations of out-of-state expert panels. In the past three years seventy-four projects, involving most of the private and public universities in Louisiana, have been implemented and over 2,400 classroom teachers have participated in these intensive, in-depth teacher in-service activities.

Summary

Although the SSIs are still in the middle of implementing their initiatives, we take note of the following preliminary observations on the contributions of strong K-12 and higher education partnerships:

1. The partnerships strengthen K-12 programs because they bring the expertise of faculty in mathematics, science and pedagogy to the reform efforts;
2. Teacher preparation and development programs are improved because of the perspective and active involvement of K-12 teachers;
3. Mathematics and science professors have become more reflective of their own teaching practices and are using new pedagogy with their students;
4. The synergy of the partnerships has accelerated each state’s progress toward reform, through providing a common vision and agenda for improvement and developing strategies that will make the reform sustainable. 🌱

Voices from the Classroom

By Thomas R. Whitaker

We are delighted to announce that our Editorial Board now includes three more classroom teachers. Sharon Floyd, an English teacher from Saginaw High School in Saginaw, Michigan has worked on projects with the University of Michigan's Center for Educational Improvement through Collaboration. Patricia King, a guidance counselor and teacher from New Hanover-Upper Frederick Elementary School in Boyertown, Pennsylvania, has been active in collaborative projects in the Lehigh Valley. Sharon Olguin is a clinical supervisor for the Career Development Program of the Albuquerque Public Schools/University of New Mexico Collaborative.

During the January meeting of the Editorial Board in Santa Fe, we asked these teachers to say something about their experience in collaborative projects and about the potential usefulness of *On Common Ground*. Here are some excerpts from our conversation:

MANUEL GÓMEZ: What for you has been the value of working in cooperation with university colleagues, or other colleagues in the community, or fellow teachers?

SHARON FLOYD: Working in collaborative projects has given me confidence to deal with an emerging curriculum. Right now I'm involved in a project titled "Write for your life," which deals with health issues that students face. My curriculum emerges from the topic that interested my students most, teen violence. That's a nationwide issue that has impacted on all our lives in one way or another. In such a collaborative project we don't try to make the issue fit the material that we already had. With the support of the university, we frame the issue and then find the material. Collaborative projects have also taught me that it's OK to be different, to try something in a non-traditional way. I might do the same thing three different ways trying to reach all my students. They have also introduced me to team teaching, and to working with people from outside the school. That's another plus. We have also, because of collaboration, be-

gun to work with writing across the curriculum in science and math, and other people on our staff now look to us to help them generate writing in various classrooms.

PATRICIA KING: As the guidance counselor, I had the job of setting up an effective instructional support team in our building and deciding how we were going to run it. With a lot of help from the principal and our wonderful reading specialist, we sat down and tried to decide how to proceed. We decided that we were all in it together and we moved along. Some of the other schools in our district moved more quickly, through administrative decisions. But we chose to move more slowly and bring everybody on board as we went. And by far the most valuable experience for us was having Elaine Moe from Lehigh come in to work with us and make suggestions. The way ideas are presented to the teachers can make all the difference as to how effective a project will be. And so can the support of the school administration.

SHARON OLGUIN: My experience with collaboration began with my work on my master's degree in a collaborative program. What I discovered then was that I never wanted not to be part of some collaboration. Teaching in itself is isolating, but in collaborative relationships you can have continued dialogue about curricular issues, and about children and their needs. Collaborative experiences have also given me greater autonomy, and a feeling of empowerment. They have helped me toward my goal of being a reflective practitioner and lifelong learner. My present work involves responding on a weekly basis to our interns' journals, and I'm continually impressed by their commitment to teaching and their understanding of, or questions about, pedagogy and philosophical beliefs. This process is mutually enriching. I have also assumed the role of being a messenger to the general public, helping them to understand the changing nature of education today.

MANUEL GÓMEZ: You speak of experiencing greater autonomy as a result of collaborative activity. Can you explain that paradox? Perhaps if traditionalist teachers, or those who are fearful of collaboration,

could see how greater autonomy can result, they might be more eager to engage in such efforts.

SHARON OLGUIN: Dr. Auger from our university has looked at that issue in this way: He suggests that as children we're dependent on our parents, and as we grow up we become independent, and then in our further experiences we move toward interdependence. We share that paradigm with our students. As they move into teaching, they're dependent on us as the deliverers of information, and they move to independence as they can deliver instruction on their own, but the ultimate goal is that move towards interdependence which is really very freeing.

PATRICIA KING: Also important here is the leadership within the school, the tone the principal sets. If the principal really believes in collaboration and in empowering teachers to be active participants in their school, that starts to come about. If it's nurtured and valued, teachers begin to buy into it. But another problem is that often we're not given the time to collaborate with one another or with anyone else.

SHARON FLOYD: I agree. Many people don't want to become involved because of the time factor. They view it as a separate planning session when you're already teaching three or four English classes. But because this is something that you're collaborating on, then they want released time. When we started out we had released time to collaborate. But it didn't last. Right now we have a project that is not working in our school with collaboration that's supposed to be going on between an English teacher and a history teacher, but because they don't have released time they refuse to do it.

JAY ROBINSON: I guess this does get to a question I wonder if you'd comment on. Much of the argument for collaboration rests on the assumption that teacher voices will then be given more strength in the kinds of discussions that really count. I'm thinking particularly about discussions that would lead to real structural change in the schools. Do you feel that's happening?

SHARON OLGUIN: I think in part in our district that it is happening. We have

Whitaker: Science, Technology

many principals like Charles Serns who are really listening to their teachers, and asking them what their needs are and what kinds of change would benefit their students, and trying to respond to that. I don't know that it extends itself beyond a particular school site and its administrator, however.

PATRICIA KING: You know, I sit here and think Albuquerque, New Mexico, and East Greenville, Pennsylvania, are very far apart but we're so very close in other ways. I would say the same thing. We move toward site-based management. There are some wonderful things going on, and my elementary school is a good example. We have a very supportive principal who listens to the teachers, goes to the central administration and fights for his teachers and their ideas and what we need in our school to make special education, for instance, more effective. But in some other places the principal may work less well with the teachers.

JAMES VIVIAN: Could you comment on ways in which *On Common Ground* can serve teachers, or ways in which it can give a stronger voice to some of the matters you've been raising here?

SHARON OLGUIN: I was struck by the global view of collaboration. I realized that my vision of collaboration had been very narrow—limited to my school district and the university. But in reading the articles I really appreciated being given a perspective that is broad and interdisciplinary. I also want to comment on the inclusion of the art, and the connections to art that are brought forth in the articles. This periodical is a powerful voice moving towards what we need—to look at art as a tool for continued learning. We're finding that art is always the first thing that's done away with because there isn't any funding, and I've recently developed a very different understanding about art. One of the students I supervised was an artist, who was integrating art into his classroom—a classroom with six different cultures and lots of low esteem. What I saw happen through his use of art as an instructional tool was a great improvement in their self esteem and also a real control and understanding in the field of art.

JAMES VIVIAN then asked: "How can

On Common Ground give teachers more of a voice to reach the audience of college and university presidents, chief state school officers, corporate and foundation heads, and the like—those who may be important agents of change?" And the responses of SHARON FLOYD, PATRICIA KING and SHARON OLGUIN all pointed in the same direction: "I think that if there is an opportunity to let teachers submit manuscripts talking about their collaborative experiences. . ." "As well as their needs. . ." "Yes, yes. The pros and cons of collaborative experiences. . ." "Voicing the impacts it's had on their professional lives. . ." "I think sometimes administrations, and maybe universities, don't understand what's going on inside of the teacher trying to make it day to day and work effectively in a public school situation."

Can this piece, "Voices from the Classroom," become a regular feature of *On Common Ground*? The answer, we think, lies in your hands. Our three new board members thought it would be especially helpful to our readers—both to those who work in the classroom and to those who don't—if teachers could provide testimonials about the collaborative experiences that have powerfully influenced their own practice. Let us hear from you!

(continued from page 5)

mammals, reptiles, and insects, organizing his collection in accord with the scientific principles of the day. And through twenty years of labor, he created the first serious museum of natural history in the western hemisphere. That museum sponsored the first American scientific dig, which excavated a fossil skeleton of a mastodon—a process that Peale recorded in another notable painting.

In *The Migration Series*, Jacob Lawrence traces the great migration between 1916 and 1930 that took more than one million African-Americans to the North. Panel 58, which we include on this page with "Voices from the Classroom," carries as its text: "In the North the African American had more educational opportunities." At age twenty-three, Lawrence had already married tempera technique with a synthetic cubist style. In this panel the jagged rhythms and bold symmetries provide a rather syncopated harmony with the arithmetic sequence that the girls are writing on the board. As Lawrence later said about this cycle: "I tried to create a staccato-like rhythm over and over and over again with the shapes as they move. . . I build on the geometry and I love it." And yet he so strongly identified with the figura-

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JACOB LAWRENCE, PANEL 58, *THE MIGRATION SERIES*, 1940-41

Whitaker: Science, Technology

(continued from previous page)

tive elements that he could also say: “I don’t think in terms of history in that series. I think in terms of contemporary life. . . If it was a portrait, it was a portrait of myself, a portrait of my family, a portrait of my peers.”

On our front cover, William H. Johnson’s *Dr. George Washington Carver* pays homage to the great African-American scientist who was also an inventor of new agricultural products, a teacher at Iowa State College and Tuskegee Institute, and an artist in several media. By developing products from peanuts, sweet potatoes, and pecans, as well as cotton, Carver effectively revolutionized the agriculture of the South. Johnson’s painting, which employs his late style of “conscious naiveté,” orders in a single brilliant design a multiplicity of scientific, technological, and economic relationships, glimpsed in part through moments in Carver’s life.

On our back cover, a detail from Diego Rivera’s fresco cycle, *Detroit Industry*, focuses on the manufacture of the engine and transmission of the 1932 Ford V-8. The entire mural project, on several walls at the Detroit Institute of Arts, places the automotive industry in a broad mythological, historical, geographical, and geological context. In this panel, however, the workers are given the faces of Rivera’s assistants and Detroit acquaintances. Rivera thus offers a secular and pan-American answer to the cosmic scope, universal history, and contemporary details often found in the frescoes of European churches.

Other images in this number may seem to have abstracted science, technology and teaching from any historical context. But they teach us in other ways, leading us into a realm where design and color have merged with the depiction of a technological, geometrical, or arithmetic “subject.”

That is true even of Thomas Eakins’ *Drawing of Gears* (page 15), an academic exercise carried out by a student at Central High School in Philadelphia who later became a major American painter. Here the beauty of the geometrical forms that are essential to the mechanical transmission of energy seems at one with the beauty of graphic design.

Josef Albers’ *Homage to the Square* (page 9) is one of many such works painted during the latter part of his life by this teacher at the Yale University School of Art and Architecture. They were part of his study of the “saturation of colors” and the mutability of color perception, topics treated in his book, *Interaction of Color*. This painting proposes a realm in which science and art overlap or merge—a realm of ambiguity and mystery, where luminosity is a transcendent energy.

In Jasper Johns’ *0-9* (page 16) on the other hand, the ambiguities are more jarringly insistent. Arithmetical symbols and aesthetic form here seem at odds—and yet in harmony. They are mutually obscuring and mutually confirming. To look intently at this image is to be shuttled endlessly back and forth between digits and design.

Finally, we include with the “Book Review” (page 21) a work by John Frederick Peto, for whom books often provided the occasion for eloquent formal designs. *Nine Books* was given to the Yale Art Gallery by Charles F. Montgomery, late Professor of Art History at Yale, and the Curator of the Garvan and Related Collections of American Art. Had it not been for his untimely death in 1978, Montgomery would have led the first Yale-New Haven Teachers Institute seminar on American Art.

More on the Arts in Our Next Number

There are strong arguments for the importance of the arts in the educational process. Judging from the recent decisions of many school administrators, those arguments have not been heard. Herbert Read’s *Education Through Art*, first published a half-century ago by Faber and Faber (3rd ed., 1961), is a classic in this field from which we still have much to learn.

Our next number will focus on this topic. It will include, among others: Scott Massey on “The Arts as Knowing,” Elliot W. Eisner on “Why the Arts are Marginalized in Our Schools,” James Gray and Richard Sterling on “The National Writing Project,” and Marty Trujillo on “Saint Joseph Ballet’s Program for Inner-City Children.” 🌱

Rodriguez: Central Role

(continued from page nine)

I also want to re-emphasize the critical importance of parents as partners. Parents serve as volunteer homework mentors and others are paid to assist in teaching, mentoring and to serve as staff. Parent programs are offered at school sites in the community daily after the summer camp ends. The activities strengthen parents’ skills in supporting their children’s learning. Principals at the children’s schools tell us that, “These have become some of our most active parents at school. They are eager to share their hopes and their plans for their students to attend college. . . . Most of our KIDS parents are participating in our Parent Institute for Quality Education.”

Finally, I want to underscore the value of building on an existing regional infrastructure that has solid community support, if one exists. An important factor contributing to the rapid and continuing success of KIDS is that it has been implemented in conjunction with the Student/Teacher Education Partnership (STEP). This is a collaborative effort involving the predominantly minority Santa Ana School District—the largest in Orange County—and other institutions of higher education and school districts in the region. STEP, which has been in existence for close to fifteen years, is nationally recognized as a model of school-college collaboration. It has had support at the highest levels, including UCI’s Chancellor and the Santa Ana Unified School District’s Superintendent.

Notable effects of the KIDS science partnership have occurred in the children’s school-year experiences. Teachers tell us, “Many of the KIDS students have become the ‘leaders’ in their classrooms in the area of science and problem solving.” Principals tell us, “Due to the fact that four of our teachers have been KIDS teachers we’ve been ‘infected’ with KIDS philosophy and focus on inquiry.” It can and does work school-wide across all areas of the curriculum.

I urge colleagues at other colleges and universities to collaborate with school districts in creating similar programs enabling children to participate in the campus scientific life. In these partnerships, the campus becomes a truly common ground for fostering the love and learning of science. 🌱

Obstacles to a Technological Revolution

By John Merrow

Our society uses the computer as its central tool for communicating and creating knowledge. Public schools do not. Most public schools misuse computers, and some cannot use them at all. Three significant obstacles stand in the way of the technological revolution schools desperately need: inappropriate teaching methods, stereotyping of students, and obsolete facilities.

“We have to teach children about computers. After all, computers are the future.” The teacher’s voice trembled slightly, and for a minute I was afraid she was going to cry. We were sitting in her fifth-grade classroom in an elementary school in Queens, finishing an interview for a PBS documentary on technology. Her emotion notwithstanding, her comments were misguided in two important ways.

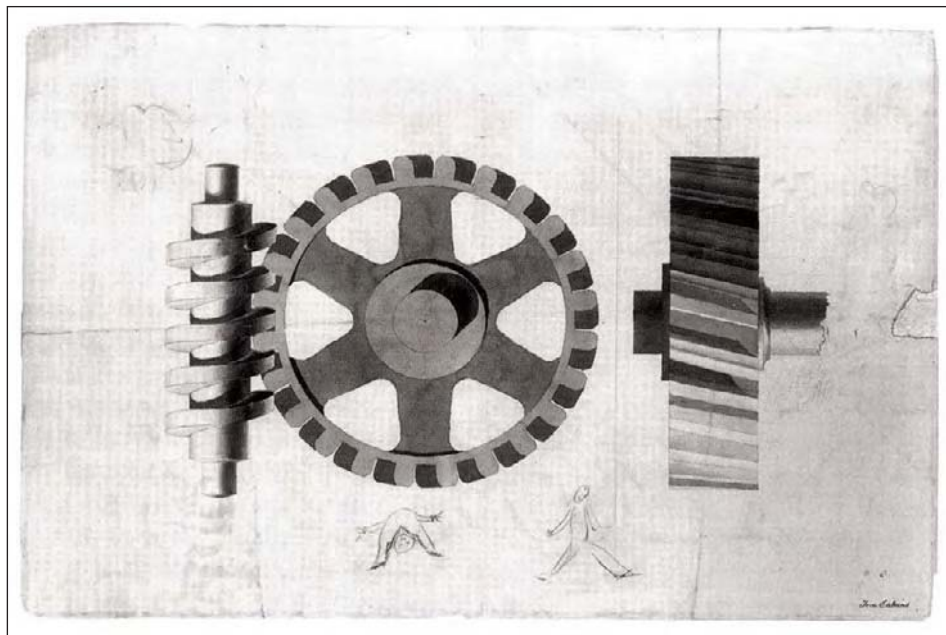
First, I doubt if she has to teach her students about computers; in all likelihood they already know more about modern technology than she does. That “bank deposit” approach to teaching (teacher as ‘depositor’ of knowledge into students) may have been appropriate years ago, but it is certainly obsolete today—particularly where technology is concerned.

She was upset because her class’s ambitious project, a multi-media yearbook, was stalled in mid-stream, because the itinerant instructor who had been visiting her school regularly had been laid off. The teacher felt abandoned. “I know there’s lots of information, like the folk songs the children recorded at home, in this computer, but I don’t know how to get it. And now I’ll never learn.”

Sadly, it had not occurred to her to ask her students, because that’s not the way she had been taught to teach. But teachers won’t survive, and school will become increasingly irrelevant, if teachers don’t change their style of teaching.

Her second statement, ‘Computers are the future’ is also incorrect. Computers are the present, and that’s a fact. The high-tech, information age parade is well under way.

John Merrow is Anchor and Executive Editor of the Public Television Series “The Merrow Report.”



THOMAS EAKINS, DRAWING OF GEARS, 1860

We’re living in the digital age now—can you even remember when you had to wait in line at the bank to get some cash? Everywhere we go today. . . offices, shops, hotels, the supermarket, the drycleaner and banks, technology is there.

Schools haven’t joined the parade. For years they’ve used computers as a management tool, largely ignoring its remarkable capacity for creating knowledge and stimulating learning.

Most teachers—like that fifth-grade teacher—do not know the world of computers, because from the very beginning, schools have kept computers in the administrators’ offices and in special “laboratories.” That unfortunate policy has kept teachers away from technology, keeping them technologically illiterate.

Even today, schools provide little in the way of help for teachers who are unfamiliar with computers. Fewer than half of the schools in this country report having a basic computer class available for teachers, but formal training isn’t essential if teachers see themselves as learners. Jill Livoti had had almost no exposure to computers when she was hired to teach at a middle school in Columbia, South Carolina, last year. Her principal told her, “relax; let the kids show you.” She describes what happened.

“When we started on our first computer project, I said, ‘I’m not all that familiar with this, so if you have some ideas please come to me and we will work something out.’”

And her students, how have they reacted? “They love the fact that I don’t know too much about it, because they love to teach me, and it’s fun for me because they really are good teachers. Some kids aren’t as strong on the computer as others, and it helps those kids to see that I’m learning too. It’s not as intimidating for them.”

Livoti is comfortable with the idea of teacher-as-learner. “I think it’s important for children to know that a teacher doesn’t know everything,” she says. With technology changing and knowledge expanding, teachers have to understand that there is absolutely nothing wrong with not knowing. What’s sinful is not seeking to know, or not caring.

A second obstacle that must be overcome is the persistent stereotyping of children that has led to very different uses of technology for poor and well-to-do children.

Basically, schools use technology to control poor kids. Many schools in poor neighborhoods have computer laboratories

(continued on page seventeen)

A Partnership Supporting Computers in the Schools: Lessons from Portugal

By Stephen C. Ehrmann

Reform efforts in large, rich nations can be splintered into competing camps, each with an issue, constituency, and not enough money. Perhaps we should look to smaller, poorer nations if we want to learn about creativity, cost-effectiveness, and truly effective partnerships. I was recently privileged to be the United States representative in a team of four evaluators invited by Portugal and the Organization for Economic Cooperation and Development (OECD) to assess a recently concluded Portuguese program called Project Minerva. Minerva's purpose was to foster broader use of computing in Portuguese schools. The project had lasted seven good years. Portugal was bringing it to a close, taking stock, and thinking about what to do next.

Minerva was a college-school-government partnership, initiated by college faculty, funded by an equally imaginative government agency, and staffed largely by school teachers. Its goal was to get computers into the schools and, far more important, to help teachers improve formal and informal learning by exploiting the new machines.

To give you a taste of Minerva's achievement, here's one case of many that we included in our report.¹

The coordinator of a computer center serving several rural Portuguese schools told our team, "Last year one school did a project on 'How did our grandparents live?' They collected all kinds of information, including recipes about what their grandparents ate. One of the boys said, 'We have so many recipes, we can do a cookbook!' Alentej has a very distinctive cooking style, but there has never been a cookbook about the cooking of this region. Our book will be produced next June, and distributed by schools all over Portugal. The children are now in a different school but they come back to our center regularly and ask about their book.

¹This and several other sections of this article are adapted from our report, Report of the Minerva Project Evaluators, 1994, (JSBN 972-614-271-7), available from the Organization of Economic Cooperation and Development, rue Andre Pascal, 75775 PARIS CEDEX 16, France. The authors are Monique Grandbastien, Stephen C. Ehrmann, Bridget Somekh, and Rick Withers.

When it is published, there will be a party. The boys will wear ties, and the girls will wear their smart dresses. The children were 9 and 10 years old, and they will have written something people all over Portugal will read."

This anecdote illustrates several features of Minerva—the role of the computer in enabling a broader pattern of curricular change (desktop publishing enabled but did not encompass this exciting project), collaboration and sharing of resources, and the reforming power of the children's own energy drawn from their encounter with the world outside the school. Several features of Minerva are not apparent from the story, however, among them the roles of the university, school, and governmental partners.

The design of Minerva had an elegant geometric simplicity. Visualize a triangle with the Ministry of Education at one vertex, the universities at a second, and the schools at the third. Minerva had a distributed leadership structure: you can turn the triangle so that any vertex is on top—each of the three partners could be seen as the true leader of Minerva.

For example, the Ministry of Education provided not only funds but also a central point of reference and leadership. Although Minerva was invented by university faculty from several institutions who then ap-

proached the government for funding, and although its first director was in a university, its later directors were Ministry officials. The Ministry allocated ("seconded") teachers to Minerva (all teachers are paid by the central government) and also paid the bills for training, equipment (including a computer each year for the participating schools), university staff, publications, and other expenses.

The universities were equally the leaders of Minerva. Each participating university controlled the use of the resources for its area, and was responsible for the quality of the operation. Each university selected its schools (often around fifty of them) from a number of applicants, and tailored services to their needs and the university's special capabilities. For example, a university might specialize to a degree in the development of courseware, while another might specialize in services for special education; all universities, however, had to provide a base of general services for their schools. In the beginning, the universities organized only training courses and support to teachers. As their staff of seconded teachers (often around 20 of them) became more knowledgeable about computers, they also offered subject-oriented seminars and other services.

The schools were equally the leaders of Minerva. At its peak, almost 1200 schools



JASPER JOHNS, 0-9, 1959

were participating. Their “seconded” teachers shaped and delivered the services offered by the universities. Some of the key government officials in the Ministry were themselves seconded teachers. Also of course the schools decided what ultimately was to be done with the opportunities created for them by Minerva.

Each group had its own distinctive rewards (i.e., incentives) which helped to power and stabilize this distributed leadership.

The Ministry could display visible, valuable national leadership.

The universities’ education faculty could gain entrance to the schools for their research. Minerva influenced the in-service and even the pre-service offerings at a number of universities and colleges. Faculty from departments other than education could play a role in improving schooling (and thus the qualifications of students seeking entry to their institution) and could develop courseware for use in schools.

The schools had the greatest incentives to lead and collaborate. They could get computers, extensive training for their teachers, and opportunities to advance the broader education reform agenda in Portugal. The seconded teachers benefited professionally, from what they learned in doing their work and, for some, graduate study.

Each university operation (called a “node”) and its cluster of schools was mainly on its own, and appreciated its loose interdependence with the other nodes. As one school teacher said of the seconded teacher at a nearby computer learning center, “If I don’t know, I go to Amelia. If Amelia doesn’t know, she goes to [her node]. If [her node] doesn’t know, there are other nodes. There is quite a network, through the computer bulletin board system, through workshops offered by other nodes.” Three times during Minerva’s history there were national meetings. More frequently contact came in meetings with a defined purpose (e.g. discussing Logo) that were sponsored by one or more nodes and, sometimes, by associations. When one node offered a workshop, sometimes teachers from other regions of the country would also attend, especially if the

workshop dealt with specialized topics. Because of the linchpin role played by seconded teachers, and because of the strength and confidence that came from a distributed leadership structure in which no party was subordinated, Minerva participants could collaborate across what traditionally have been almost insurmountable organizational barriers in Portugal.

Our team concluded that the distributed leadership structure at the heart of Project Minerva was a great success, worthy of close study by Portugal and other nations. I think it has some special lessons for the United States.

1) Portugal was able to create a national school-college-government partnership to deal with a serious, long-term educational problem. The United States has not yet shown itself capable of doing that.

2) Minerva demonstrated that such a partnership could function with a relatively non-hierarchical, distributed leadership structure, one in which each of the three major parties could be seen as the leader and key driving force behind the whole.

3) Minerva also showed that it is foolish to divide the reform effort into “technology initiatives” and “normal initiatives.” Minerva was not a computer literacy project. Computers were the key enabling factor but the range of benefits ran far beyond the immediate uses of the machines. For the schools, let the Alentej cookbook stand as the symbol of what Minerva can accomplish. For the universities, let the enlivening of their teachers education programs stand as a symbol of their broader benefits. For the government, so recently an autocracy, the triumph was in supporting and, in its later years, directing a program that was a model of distributed leadership.

In these days when any initiative seems too expensive to a government agency, a university, or a school, let Portugal stand as a symbol of what our poor country might yet accomplish. ☺

Stephen C. Ehrmann is the Manager of the Educational Strategies Program for The Annenberg/CPB Projects (e-mail:ehrmann@soul.cpb.org).

Merrow: Obstacles

(continued from page 15)

equipped with drill-and-practice tutorial programs called Integrated Learning Systems. Students sit in front of these computers and follow the programmed routine, typing in answers to problems like “12+4-2=?” Critics call this the “drill and kill” approach, and it would be hard to find a student who would disagree.

In contrast, in many suburban schools, students are likely to be able to manipulate computers, databases, spreadsheets, and drawing programs—which allow them to create. They are able to express themselves and their thoughts, and then share that information with each other.

In other words, middle class kids are using technology in ways that will make them controllers of their lives, while poor children are being denied that power. Practices like these serve to divide our society. They also contradict our American myth of public education as the great equalizer, the road to advancement.

Outsiders often assume that lack of money is a major obstacle to a technological revolution in schools, but that is not correct. Last year schools spent \$2.4 billion on technology—computers, laser discs, CD-ROM drives and the like. Advance planning must not be our educators’ strong suit, because all too often someone discovers that they can’t run their new equipment without blowing a fuse or burning down the building.

Sad to say, school buildings themselves are a major obstacle: 31 percent of our public schools were built before World War II. Another 43 percent went up almost overnight during the baby boom of the ’50s and ’60s. These are yesterday’s buildings, but they’re trying to run today’s technology.

When the two worlds meet, bad things can happen. Clark High School in New Orleans caught fire and burned last April when the demand for power to run the new computers caused a short circuit. In New Orleans, which has 124 public schools, the average school is 55 years old, and their basic wiring inside can’t satisfy technology’s thirst for electricity. In fact, only 10 of that city’s public schools are properly wired for, and equipped with, today’s technology.

(continued on page 22)

Artifacts of Technology as an Educational Resource

By Robert G. Wheeler

[Editor's note: Robert Wheeler's seminar on "Electricity," offered by the Yale-New Haven Teachers Institute in 1989, included teachers of science, life science, mathematics, home economics, business, and accounting. Each Fellow was therefore challenged to find an important relation between the topic of the seminar and his or her academic subject. And Professor Wheeler was challenged to make his approach to the topic as interdisciplinary as might be feasible. The curriculum units written during the seminar ranged from "Teaching Basic Electricity" and "Changes in Lifestyle Due to Electricity" to "Operating Electric Kitchen Appliances," "The Fax Systems: A Bright Outlook for Business Communications," "How Computers have Simplified Accounting," and "Boolean Algebra and its Application to Problem Solving." Professor Wheeler has continued to reflect on the pedagogical problems posed by such a broadly focused seminar.]

My concern as a seminar leader in the Teachers Institute is to explore ways of conveying the knowledge and excitement of science and technology to the Fellows. A "hands-on" approach, using experiment and demonstration, is one way of conveying realistically the nature and methods of science. In these days of scarce resources, however, the Fellows may find it difficult to transfer such experiences to their classrooms. We should therefore seek interesting examples from which we can draw scientific generalizations that are broadly applicable. Such examples can often be found among the technological artifacts in the students' own locality. Let me illustrate with one about which I learned last summer—an artifact that would be very useful in the study of light and radio.

In Marion, Massachusetts, on the western shores of Buzzard's Bay, there existed, from shortly before the First World War until a decade after the Second, a forest of 400-foot-high towers supporting a radio antenna. Here Guglielmo Marconi had constructed one of the Marconi Company's eleven wire-

Robert G. Wheeler is Professor of Applied Physics and Physics at the Becton Center at Yale University.

less transmitting stations to provide worldwide communications. During the First World War the U. S. Navy appropriated the station for the nation's defense, and in 1919 it formed a part of the assets of the new company called the Radio Corporation of American (RCA).

The Marion installation operated at two different wave-lengths: 11,620 and 13,420 meters. The frequencies were therefore very low, about 26,000 and 22,000 hertz (cycles per second) respectively. (The numerical product of wave-length and frequency is the speed of light.) These low frequencies were chosen in order to enable trans-Atlantic transmission. Nature has provided, in the surface of the ocean and the ionosphere above, two facing mirrors, each capable of reflecting electromagnetic waves with minimal loss. A small bit of geometry and geography permits one to find that for trans-Atlantic radio communications (from Marion to Land's End) there have to be four bounces of the waves, since the ionosphere is about 100 kilometers above the earth's surface. This layer is composed of a very low density of electrons and ions which itself has a natural frequency of oscillation, the plasma frequency (about a million hertz.) As long as the radio wave frequency is less than this plasma frequency, the ionosphere reflects the radio wave. For frequencies higher than the plasma frequency, the mirror ceases to work but instead lets the radio wave leak out into space.

Another reason for the very low frequencies was the need for high radio frequency (r.f.) power. The first wireless technologies were not very efficient; in particular the receivers were quite sensitive. For Marconi's system the transmitters radiated 200,000 watts of r.f. power—a level that could only be attained by interrupting high voltage electrical discharges. By opening and closing these spark gaps, the Morse code of dots and dashes could be impressed or modulated upon the waves. What is the visible consequence of operating a station with such low frequencies and long wave-lengths? In order to send radio waves efficiently into the atmosphere, an antenna needs to be a quarter of the wave-length. The elder residents of Marion still speak in awe of the rows of

towers from which the mile-long horizontal antenna was arrayed.

The Marion station had its main impact during the twenties, when it competed successfully with the older trans-Atlantic cable. Because its capital costs were much less than those of the undersea cable, it was immediately of economic importance. From it, for example, the Wall Streeters of the day obtained the London prices before the stock trading opened in New York. A number of fortunes were based on this timely information. As the next decade arrived, RCA expanded their services to include voice transmission. By then, vacuum tube electronics had led to more sensitive receivers. These new stations operated at a higher frequency than Marion so that voice frequencies could more easily be impressed upon the radio wave, yet not so high a frequency that the ionosphere would cease to function as a mirror.

What general point is here most relevant to a seminar on light and radio? Simply this: in all instances of electromagnetic reflection, the physics remains the same though the numbers are different. Mirrors only work when electric charges are able to move under the influence of the oscillating electric field associated with the wave. The frequency above which electromagnetic waves are transmitted rather than reflected varies with the square root of the density of free electric charges. Thus the ionosphere, which has a low charge density, is a reflector of long waves; while aluminum metal, which has a very high charge density, can also reflect light, whose wave-length is very small. High frequencies also have a technological advantage. The higher the frequency of the electromagnetic wave, the greater the possible rate of modulation. As a result, more simultaneous channels become available with a single transmitter station, which decreases the cost for each channel. As we have proceeded to use higher frequencies for worldwide communications, we have had to replace nature's mirrors with active reflectors or re-broadcasting stations placed upon satellites, which are much above the ionosphere. Through all these technological changes, however, the physics remains the same. 🌐

Fragmented School Reform and Effective Partnerships

By Carlos Mora

Schools have been victimized by a multitude of well-meaning individuals, agencies and foundations—each inspired by a private view of education reform or school improvement. School reform programs may not be compatible and thus may pull teachers and students in different directions. The observation that teachers are overwhelmed by multiple—and many times incompatible—reform efforts is not new. Tyack and Tobin (1994) quote a New York teacher from the 1940s who, referring to a reform of that time, said: “Last year it was the socialization recitation, or the Gary Plan, or dramatization, or correlation; this year it is motivation, silent reading, or the Dalton Plan. Each is taken up in turn, indiscriminately adopted, presently elbowed out to make room for the next newcomer; and yet we are not saved. The old problems remain.”

The Federal Government is aware of the dangers of fragmented reform efforts. In a recent report, the U.S. Department of Education’s Office of Educational Research and Improvement Program (OERI) warns that their conjoint efforts with the National Science Foundation “must not fragment Federal reform efforts through the creation of a multitude of ‘systemic reform’ activities. All resources going to a state should be focused on support for a single, comprehensive strategy to attain the National Education Goals.” In an article written for the inaugural issue of *On Common Ground*, Secretary of Education Riley asserts that fragmentation is also present in staff development activities. “Too frequently, professional development activities have been ‘one shot,’ offer limited follow up, and are isolated from school and district goals. This has been true of many federally funded professional development activities as well.”

Due to the sources of funding, urban schools are more vulnerable to the onslaught of uncoordinated reform than rural or suburban schools. For example, New Haven

schools receive close to 87 percent of their funding from external sources while only 13 percent is raised from local sources. The 1995-96 New Haven schools budget includes \$20 million in grants and \$101 million in state aid, while local revenues amount to \$23 million. The grant money supports 135 different programs, covering a wide area of subjects from curriculum-based (e.g., improving math and science education through systemic change), to community-based (e.g., adult education for the homeless). Each one of those grants embodies a preferred mode of school reform, including priorities, reporting requirements, professional development, classroom activities, and so forth. A wealthy suburban district receives less money from outside sources, but at the same time is burdened with fewer mandates.

Uncoordinated efforts create a climate incompatible with organizational goals. The lack of consistency in action and unity in purpose creates frequent opportunities for conflicts, misunderstandings, and antagonisms. Teachers and administrators in schools become less productive because part of their time and energy is spent resolving conflicts or clarifying misunderstandings. An obvious response would be to coordinate the reform efforts. In fact, this has been recommended by several observers, including the federal government. As quoted above, OERI suggested that the grants—at least theirs—should support a “single, comprehensive strategy.” But it is difficult to bring the current situation into a house of order.

Why is it so difficult to coordinate reform efforts? Obviously, the complexity of the education system makes coordination difficult. But that argument is not sufficient, since many other complex systems exhibit good coordination.

Unfortunately, we do not have a general theory of education, powerful enough to cover several areas including learning, teaching and school administration; instead, we have short-range “theories”—or fields of inquiry—that illuminate a limited area but are not sufficient to establish connections with other areas. A general theory of education would yield two immediate ben-

efits: (a) it would filter out reform plans incompatible with the theory, (b) it would make clear how the different areas are connected, thus facilitating the consistency and unity of reforms.

The absence of a general theory may be a transitory or a permanent feature of our capacity to understand complex social systems. Maybe one day it will be developed. In the meantime, we have isolated areas of inquiry, but this is no different from the historical development of science. The eminent physicist Victor Weisskopf (1977) noted that scientific inquiry began by asking limited questions. “Instead of searching for the whole truth, people began to examine definable and clearly separable phenomena. They asked not What is matter? and What is life? but How does blood flow in the blood vessels? . . . In time this restraint was rewarded as the answers to limited questions became more and more general.”

Two promising fields of inquiry in education are empowerment and accountability. Empowerment has been a popular component of many organizational transformation programs implemented over the last decade by business and industry in the Western world. The goal of empowerment is to bring first-line managers and employees closer to the decision-making process. The strategy seems to be working.

Numerous studies in the business literature document a strong relationship between increases in productivity and quality on the one hand, and increased workers’ empowerment. In education, the goal of empowerment is to move to the school building most of the decision making power previously assigned to the central office. It also seems to be a winning strategy for schools (cf. “The Milwaukee Experiment,” *Business Week*, April 17, 1995).

For over a decade now, the New Haven schools have experimented with a very effective model of empowerment: the Comer model. The Comer model is predicated on a school-based organization called the School Planning and Management Team (SPMT). The SPMTs are organized around

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Carlos Mora is the Director of Partnership for Minority Student Achievement-New Haven (PMSA).

Mora: Fragmented School Reform

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psychological and academic needs of the school community. However, the fact that at the present time the SPMT does not have a budget for operations limits the extent of empowerment.

Another example of empowerment is provided by the Yale-New Haven Teacher Institute. The Institute is a teacher-based program that offers both resources and training for teachers to express their contributions to curriculum development. The productivity of the Institute, as measured by the quality and quantity of curriculum units developed over the years, is a testimonial of its effectiveness. At the present time the Institute is developing a database of curriculum units developed by fellow New Haven teachers. The intent is to make the database available through the Internet and train teachers so that they are able to use this vast resource.

The effectiveness of empowerment is a reflection of the quality of decisions made by teachers and school administrators who have had neither training nor experience as decision makers before. What decision tools should be available to them in order to discharge their new responsibilities with a fair probability of success? Although we don't have a definite answer to that question yet, it is possible to identify some basic tools that need close attention.

Database of available resources. This may include curriculum materials, training programs, assessment kits, student enrichment activities, university and/or business partnerships, and so forth. The database should identify basic attributes of the resource such as cost, source, availability, training requirements, duration, and references.

Selection criteria. This may include a voting system, a checklist of minimum requirements, a plan for resource utilization, or a combination of these and other selection criteria.

Budgeting and resource allocation. This will include a diagnosis of the current slack in human and material resources.

Program implementation and monitoring. This will be covered under constructive accountability.

Accountability is another popular topic in the current debate over school reform. The American public is concerned with the cost and quality of public education and that concern is being expressed in the political arena. Legislation calling for standardized testing, minimum graduation requirements, endorsed diplomas, teacher certification, school report cards, and district profiles has been adopted by most states.

Operationally, accountability is based on measurement models that define the object of accountability. For example, interest in student outcomes leads to the development of standardized tests or other measures of student performance. Information systems are needed to collect and analyze measurement data and disseminate results. The informational infrastructure created by the measurement models and information systems could be used to convey a constructive facet to accountability. Constructive accountability must be based on a model of information utilization for early detection of problems, timely suggestions for improvement, participatory decision making, and consistent recognition of good performance.

An example of university-school partnership forged around constructive accountability is voluntary accreditation. In 1871, The University of Michigan initiated a program of school accreditation whose original purpose was to "examine" schools instead of individual applicants. Applicants who graduated from accredited schools were granted admission without further tests. That created a great incentive for local schools to become accredited and Michigan began receiving correspondence from schools interested in its accreditation program. A few years later James Angell, then President of The University of Michigan, hosted a meeting of presidents of midwest universities interested in the accreditation program. That meeting resulted in the foundation of the North Central Association of Colleges and Schools (NCA), a regional accreditation association that expanded over the years and today includes nineteen states plus the Navajo Nation and the Department of Defense dependent schools.

In spite of the fact that the automatic admission status granted to otherwise qualified applicants from accredited schools has been eliminated, schools continue to express great interest in voluntary accreditation. Today, the accreditation process is based on a set of minimum standards or indicators of total school quality. The accreditation process generates data which can be used (and in fact is typically used) for school improvement.

Although the public at large may only be interested in a pass/fail verdict, universities can help schools further develop the informational infrastructure of accountability systems so that the information can be used to inform decisions in the context of school improvement. This possibility is not restricted to school accreditation. Student achievement, teacher certification and re-certification, graduation requirements and the like, are all examples of accountability objects that can be treated in a similar manner.

We hope that with the information provided by a system of constructive accountability and the power needed to make decisions based on that information, school-based organizations like SPMTs will be able to impart order to the many reform programs and make sure that their energies converge at all those points where teaching meets learning. 🌱

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Book Review

Toni Marie Massaro, *Constitutional Literacy: A Core Curriculum for a Multicultural Nation* (Durham, N.C.: Duke University Press, 1993), 200 pages, \$24.95; Reviewed by Robert A. Burt, Alexander M. Bickel Professor of Law, Yale University.

Recent debates about American culture have been waged in sharply dichotomous terms: whether we are fundamentally unified or fundamentally diverse, a “melting-pot” or a multi-cultural “mosaic.” During the past decade, conservative critics have lamented the absence of cultural unity and have advocated, as a supposed remedy for this absence, that our public schools teach a nationalized “core curriculum” of great books that illuminate superior values. This call to intellectual arms has attracted considerable popular attention. In 1987 two books espousing related versions of this theme became national best-sellers: *Cultural Literacy*, by E. D. Hirsch of the University of Virginia, and *The Closing of the American Mind* by Allan Bloom of the University of Chicago; and political leaders prominent in the Reagan and Bush administrations were quick to embrace this theme and their professorial exponents.

Toni Marie Massaro, a professor of law at the University of Arizona, gives a paradoxical spin to this debate. There should be a core national curriculum, Massaro asserts, but it should not purport to promote unified cultural values; the core curriculum should instead “teach the conflicts”—that is, it should identify the persistent tensions between unity and diversity in American cultural life and should offer students a coherent intellectual framework for thinking about these tensions without insisting that they choose one side over the other. Massaro proposes that instruction in constitutional law would be the best vehicle for providing a specifically focused content to this curriculum.

In the first part of her book, Massaro sets the contemporary debate into the context of educational controversies that have raged for at least a hundred years in this country—the “competing pulls,” as she puts it, “of common culturalism and multiculturalism [that] have caused educational policies to

swing toward and away from the poles of strong, national assimilation and strong, local pluralism” (p. 22). At the end of this survey, Massaro concludes that “any national core curriculum must reflect both the core curricularists’ interest in cultural solidarity and their critics’ interest in cultural pluralism, because both interests are integral to our national constitutional character” (p. 65).

In the second part of her book, Massaro suggests the way that teaching constitutional law, at varying levels of sophistication and complexity from sixth grade upwards, could accomplish this curricular integration of the competing themes of unity and diversity. Massaro maintains that constitutional law is a good, and even a preferable, curricular instrument because Americans historically have tended to define themselves in its terminology. She correctly observes that public debates on issues of unity vs. diversity “typically occur against the backdrop of our constitutional commitments—using constitutional language as our common vocabulary”—in matters such as secularism vs. religious expression in public institutions, unrestrained vs. restricted expression in the media and other public forums, and claims regarding use vs. misuse of race, gender, disability or sexual identity categorizations (p. 70).

Massaro’s discussion of specific Supreme Court decisions addressing these various matters is the most useful part of her book. She presents these decisions clearly and accessibly for lay readers, and in doing so, she demonstrates the feasibility of her claim that classroom discussions of constitutional law can serve the educational purposes that she has proposed. At the same time, however, Massaro’s specific case discussions underscore the difficulty in achieving her proclaimed goal of merely “teaching the con-

flicts” without pushing students toward some pedagogically preferred resolution of these conflicts. Massaro works hard to be scrupulously fair-minded in her presentations, and attentive to the complexity of the competing social goals in controversies such as public support for religious preferences in educational institutions or school censorship of student speech or claims for racial- or gender-based affirmative action policies in educational institutions. But Massaro has a clear ideological commitment in these matters—a complex, even paradoxical conviction that constitutional doctrine should give essentially equal respect to the “competing parts of the American personality: a liberal instinct to permit dissent and escape from common standards [and] an assimilationist instinct to enforce common standards” (p. 101).

This position mirrors Massaro’s pedagogic commitment to teaching rather than resolving these conflicts. In substantive constitutional law, this position leads Massaro to prefer some Supreme Court decisions to others; thus, in discussing recent cases that uphold school censorship of student speech and newspapers, Massaro sharply observes that the “current Court, led by the statism of Justice Scalia, seems profoundly unconcerned about protecting the liberal instinct from overweening assimilationist forces” (p. 101). However persuasive this criticism might be, it would not sit comfortably within the non-directive pedagogy that Massaro appears to espouse in her core curriculum design.

But Massaro is not guilty of inconsistency here. There is a deeper consistency in her own thinking that she does not adequately acknowledge. The deeper consistency is that, from her perspective, the Supreme Court is obliged to teach the same lesson to the nation at large that she proposes for its school curriculum—the lesson that equal respect is required for the demands both of diversity and of unity in our culture. Maintaining balance between these contradictory impulses is itself a substantive position which is both difficult to accomplish and inevitably controversial in its specific, practical applications. Accordingly, Massaro’s proposed curriculum is not, as the first part of her book might appear to suggest, a non-

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JOHN FREDERICK PETO, *NINE BOOKS*, CA. 1890-1900

Burt: Massarro's *Constitutional Literacy*

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judgmental middle ground between the contemporary avatars of cultural unity and diversity. There is no escape from making value judgments on these matters, whether in deciding court cases or designing curricula.

By the end of her book, Massaro admits as much, and she explicitly justifies her proposal to “teach the conflicts” as a way of giving heightened visibility to multicultural perspectives which—as she views the present moment—are threatened with suppression by the most vocal contemporary proponents for a national core curriculum. I myself am persuaded of the virtue of Massaro’s proposed curriculum. But it does not strengthen her case to deny that, in our current mood of “culture clash,” many triumphalist advocates will disagree.

Merrow: Obstacles

(continued from page 17)

Recent federal legislation will provide money for facilities repair and upgrading, but the amount set aside, \$100 million, is woefully short of what’s needed—billions, not millions.

In the past, schools have resisted technology successfully, but that’s no longer possible. Our children swim in a sea of technology outside of school. If schools resist technology and its opportunities, young people will simply turn off. That means more discipline problems, a higher dropout rate, and greater waste of human potential. In other words, schools must adapt, or they will die a lingering death.

“Adapt or die” may seem harsh, but it’s not the grimmest prospect. Today’s technology is truly democratic: the computer doesn’t know whether the person sitting at the keyboard is rich or poor, male or female, black, brown or white . . . only how competent that individual is. If your schools don’t give all young people a fair chance to become competent, then the gulf between the “haves” and the “have nots” will grow wider. That prospect should frighten us all. . . and persuade us to help teachers and schools transform themselves.

Response to Robert Reich

Collaboration Across the Community College

By Carole F. Edmonds

Secretary of Labor Robert Reich’s article “Creating New Paths to the Middle Class” in the Fall 1994 issue of *On Common Ground* calls for new paths to the middle class and rightly points to community colleges as institutions uniquely positioned to help Americans reach their career goals. As Reich notes, community colleges serve Americans of all ages and backgrounds from those who are over thirty and seeking retraining after losing a job to traditional-age college students getting the first half of the courses towards a bachelor’s degree to persons with degrees seeking new directions.

Linkages with business and industry to insure the appropriateness of course work and establish cooperative work experiences for students and collaboration with secondary schools is extensive and on-going at community colleges across the country. Certainly that is the case at Kellogg Community College. Collaboration is occurring at every level of education and among levels. At the community college, however, we need not only to collaborate with the K-12s and the universities, but also across the college. My college, like many community colleges, is considered comprehensive; that is, we offer associate degrees for students planning to go to work directly after they complete their community college study and for students who plan to transfer to universities. While faculty seem to work together across programs of study—certainly nursing students take composition courses and there is general education in every program—the linkages are often a mile wide and an inch deep.

Students and faculty often talk about getting general education courses “out of the way” so they can get to the “real” courses in their specialty areas of drafting or nursing or computer repair. Furthermore, faculty in spe-

cialty areas usually speak of the humanities, in particular, as being part of curricula for students planning to transfer to universities and “nice” if they fit in the occupational curriculum (which they do not because there are already too many requirements).

For years that is how the discussion went at Kellogg Community College. Then in 1993, we developed a proposal, funded by the National Endowment for the Humanities, which brought occupational program faculty and transfer program faculty together to study primary texts from European American, African American, Native American and Asian American traditions and required all participating faculty to integrate the texts in their courses.

The design of the project was simple: six faculty members—three who taught occupational courses (nursing, drafting, and business) and three who taught liberal arts courses (English, music, and history) would meet together for a semester to read the same texts and discuss them with each other and with visiting scholars. At the end of the project, they would produce an annotated bibliography that would be useful to their colleagues throughout the college and they would integrate some of the texts they had read into their own courses. During the discussions, they would focus on the theme of work which would provide a starting point equally accessible to occupational and liberal arts faculty.

What actually happened was more collaborative and stimulating than any of us had anticipated or even dared to hope for. First, work was just the starting point of conversations about the readings that were far ranging and thoughtful. For instance, in discussing Thoreau’s *Walden*, the drafting instructor said that he was going to use a passage in his classes which talked about Thoreau taking the time to spend half a day just looking at the world outside his door. The instructor commented that students needed to develop their creativity by looking up from their computer screens and contemplating possibilities, just staring out the window. Then he asked the nursing instructor if that was important in nursing, and she said, “No, there

Carole Finley Edmonds is Dean of Arts and Sciences at Kellogg Community College in Battle Creek, Michigan.

just isn't time." He then described an experience with the birth of his daughter when there happened to be no other babies born on that night and the nurse had had time to come in and hold the baby and he knew she was experiencing the miracle of birth just as he was. The conversation moved on, but at the next session, the nursing instructor said that she wanted to share something. She said that she had repeated the comment about time to celebrate the wonder of life as part of nursing with her colleagues in the nursing department. They had decided that in some way they had to be sure their students experienced that joy and excitement as part of their nursing education.

Other moments of discovery occurred at almost every session, sometimes induced by the provocative and helpful comments of visiting scholars, such as Xiao-huang Yin from Harvard University, who opened up a whole world of Asian American texts, but who charmed the faculty by providing many practical suggestions about how the texts might be used in freshman/sophomore level classes, even providing the entire syllabus and reading list from his courses. His openness and that of the other visiting university scholars, plus their interest in how our faculty read the texts and how they saw them as working in their courses built new bridges of collaboration across types of institutions at the same time that our music instructor and drafting instructor gained new respect for each other, coming to anticipate the group's discussions eagerly and stopping each other in the hall to share information about a new article or book read. Conversations ranged from the relationship of Toni Morrison's *Song of Solomon* to West African religions that opened up new vistas for the history instructor to the ways Native Americans and African Americans use design that the drafting instructor planned to incorporate into projects for his product design students.

Sometimes the moments of sharing were personal, as when an African American instructor shared the similarities between the experiences described in Ralph Ellison's *Invisible Man* to his own life, right down to having been offered a scholarship to the same predominantly black college. Another time, the conversation focused on the description of a mother's death in a text and the recent death of the mother of one of the faculty members. All of these conversations could occur in groups that did not cross the lines of occupational and liberal arts faculty at a community college; however, because the conversations were both personal and professional, because they jumped from pedagogy to interpretation to personal experience, they created a bonding that was both personal and professional. The remarks of the instructors at the end of the project

At the community college we need not only collaborate with the K-12s and the universities, but also across the college. While faculty seem to work together, the linkages are often a mile wide and an inch deep.

in response to the question "What is the major benefit you received from participation in this project?" were telling. They said: "(1) Deepened my appreciation and understanding of diverse cultures. (2) Shared a growth process with colleagues I did not know"; "The major benefit for me was an increased awareness of how the humanities are so much a part of everything we do. A part of this benefit was the relationships that were developed by participating in this project"; "Working with people from other areas. Exposure to literature I probably wouldn't have read;" "The motivation to read more history and literature provided by the grant and the discussion with colleagues. It was particularly interesting to hear people's reactions from different fields/occupations/curricula/degrees. I received a more diverse outlook."

Collaboration on the NEH project brought faculty together in ways that developed their appreciation not only of the texts read and the visiting university scholars but also of each other's strengths and insights. They are continuing to work together. One exciting outcome has been the development of a new NEH-funded project to engage twenty faculty members from different subject areas in two month-long summer institutes focusing on Native American history and literature in 1995 and African American history and literature in 1996. Participating faculty are from English, communications, allied health, technology, music, sociology, biology, and art. There is also a librarian this time.

Secretary of Labor Reich is absolutely right in targeting community colleges as places where Americans can receive education leading them to careers which will provide a middle class standard of living. He is also right in pointing to the need for lifelong learning and the enrichment which a broad education makes possible. By bringing faculty from different departments and from occupational and liberal arts curricula together to study and to talk to each other about primary texts, not only will the courses be enriched by the multiple voices of Toni Morrison or Louise Erdrich or Benjamin Franklin, but students will see that teachers talk to each other and see connections between nursing and English or music and history. Connected learning is vital to students—and to faculty. We cannot assume that the connections will just happen without structured opportunities to make them happen. That's what the NEH projects are doing for Kellogg Community College. Further, the administration and faculty see these projects as a beginning and are eager to collaborate in other ways and to encourage similar projects at other community colleges. 🌱

On Common Ground

Strengthening Teaching through School-University Partnership

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Yale-New Haven Teachers Institute
Box 203563 Yale Station
New Haven, Connecticut 06520-3563

Phone: (203) 432-1080
Fax: (203) 432-1084
E-mail: Common_Ground@yale.edu
World Wide Web: <http://www.cis.yale.edu/ynhti>

Executive Editor, James R. Vivian
Production Associate, Margaret M. Davey

The Yale-New Haven Teachers Institute is an educational partnership between Yale University and the New Haven Public Schools designed to strengthen teaching and learning in local schools and, by example, in schools across the country. Through the Institute, teachers from the University and the Schools work together in a collegial relationship. Founded in 1978, the Institute is the first program of its type to be established permanently as a unit of a university.

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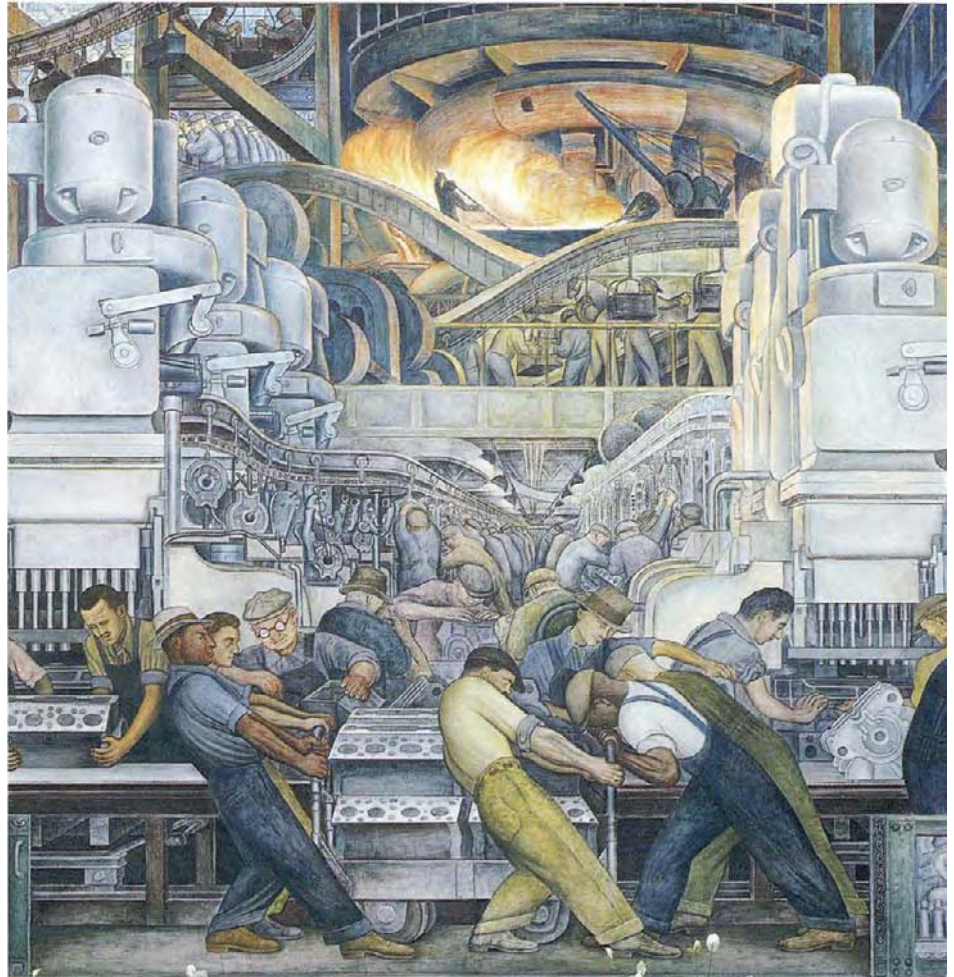
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Yale-New Haven Teachers Institute
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