programs. Most students do not take math courses if they are not required to.

Curriculum developers naturally feel defensive about the criticisms of the new math movement. They also feel frustration at their lack of success in implementing curriculum reform. Although members of mathematics education departments of universities are always devising innovations, few ever catch on. "Despite their fascination with every new fad, local school boards rarely change mathematics curriculums," Fey says. According to Fey, the past 20 years have served to demonstrate that curriculum developers and school systems move in separate orbits. One lesson of the past two decades is that those orbits will have to coalesce if major curriculum reforms are ever to be successfully implemented.—GINA BARI KOLATA

NCAT: Appropriate Technology with a Mission

"Appropriate technology" could be on its way to becoming a household term. The proponents of small, environmentally sound, human-centered technologies have found a Bible of sorts in E. F. Schu-Schumacher's book *Small Is Beautiful*, which has also been widely read by government officials including Jimmy Carter.

Now, appropriate technology is getting a small but significant boost from the federal government which has awarded $3 million to a new National Center for Appropriate Technology (NCAT), located in Butte, Montana.* The money comes from the Community Services Administration (CSA), the agency that has charge of some of the leftovers of the old Office of Economic Opportunity. NCAT hopes to serve as an information clearing-house for the thousands of small groups around the country that are experimenting with appropriate technologies: what makes it unique, however, is that its specific mission is to link these efforts with the needs of low-income people.

The people behind NCAT, many of whom come from a background of community activism, believe the time has come to bring appropriate technology out of the small, experimental places where it has been incubating for some years, and apply it where they believe it is most needed: in ameliorating the food, housing, and energy problems of the poor. They emphasize that what they are looking for is not the development of a "poor people's technology." Rather, they would like to see low-income people become leaders in the adoption of technologies upon which everyone must increasingly rely in the future.

Appropriate technology generally means technology that is small, easy to understand and maintain, cheap, dependent on local resources, and fitted to local needs. It makes heavy use of renewable resources, ranging from labor to garbage, and makes minimal demands on capital and on nonrenewable environmental and energy resources.

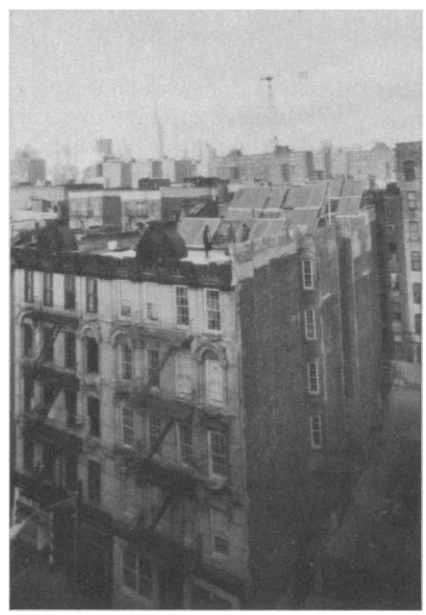
Common examples of such technologies are solar heat collectors, windmills, recycling of waste to produce methane and compost, composting toilets, urban greenhouses, and rooftop hydroponic gardens.

But the term is fast gaining connotations that go beyond development and dissemination of techniques and hardware. Nowadays, appropriate technology implies a constellation of values that emphasize self-reliance, political and economic decentralization, the reduction of peoples' dependency on large institutions over which they have no control, and the development of tools that enhance peoples' relationship with their work, rather than eliminate opportunities for individual creativity.

NCAT is engaged in a perilous undertaking. It involves mobilizing the most demoralized and resource-poor segment of the population, while at the same time developing working relationships between technical professionals and residents of poor communities. That means reorienting professionals to challenges that are more social than technical in nature. Scientists, after all, are fond of envisaging our future in terms of such things as orbiting space colonies (which architect Dennis Holloway, an NCAT board member, calls an extreme example of "inappropriate technology. . . . F--- the earth and then leave").

NCAT's location in Butte is owing to a convergence of circumstances. A few years ago R & D consultant Jerry Plunkett, who now heads the new Montana Energy and Magneto-Hydrodynamics Research Institute (MERDI), wanted to broaden the institute's scope to include alternative and small technologies. He got his senator, Mike Mansfield (who was Senate majority leader), interested in the idea. He later hooked up with people at CSA, who have been putting money into home insulation projects for poor people since the fuel crisis of 1973.

CSA eventually gave MERDI a planning grant to work out the design for an appropriate technology center. The planning committee took over a year to get the idea in final shape. There were great hagglings over the definitions of "low-income" people and of "appropriate technology" (for example, does this



Jon Naar Photo

The building at 519 East 11 Street, Manhattan, with solar collectors and a 2-kilowatt windmill on the roof.

*The U.S. government is slowly shifting some priorities in this direction, perhaps more so in the foreign aid area (where it is also referred to as intermediate technology). The Agency for International Development some years ago decided to shift its emphasis to rural development rather than high technology, and AID now has $20 million which is being put into a semiprivate corporation called Appropriate Technology International. The purpose of this group, according to Ted Owens at AID, will be to beef up local small technology enterprises wherever they can be found. Another glimmer is to be found at the Energy Research and Development Administration, which has a $10 million authorization to include an office of appropriate technology in its office of energy conservation. Maxine Savitz, director of this office, says it plans to do cooperative work with the NCAT. Finally, the National Science Foundation is conducting a study of appropriate technology.

term apply to solar collectors manufactured by Honeywell Corporation when the technology is appropriate but is produced by a large, high-technology "inappropriate" concern?). Some purists felt that having a center at all went against the doctrine of decentralization. The appropriate technologists and the community organizers on the committee suffered from a communications gap, according to board chairman, Milwaukee social worker Anthony Maggiore—the former, for example, had to drop some of their utopian visions and learn about grappling with the rude and intractable realities of poverty.

Finally, there was extensive debate over the center's relation to MERDI. Most of the planners did not like the idea of NCAT being part of MERDI, as Plunkett had envisaged, because they felt the institute was overly oriented to high technology and were put off by all the bankers and copper magnates on the board. Ultimately NCAT was planned as an organization independent of MERDI but with a contractual relationship to it.

The NCAT board will eventually have 27 members, including representatives from Community Action Programs (CAP's), representatives from all the usual downtrodden constituencies, technical people, and a smattering of "establishment" types.

If the members appointed so far are any indication, the leadership is unlikely to be co-opted by industrial tycoons. They include people such as Sam Love, environmentalist and energy consultant who predicted the energy crunch long before most; David Morris, codirector of the Institute for Local Self-Reliance in Washington, D.C.; Helga Olkowski of Berkeley, a pioneer in integrated (nonchemical) urban pest control; Alfred Navarro of the California farm cooperative movement; and Holloway, a University of Minnesota architect who is interested in "squatter architecture" and predicts that by 2000, 50 percent of the world population will be living in squatter communities.

The $3 million appropriation to CSA, engineered by Mansfield shortly before his departure from the Senate, is divided three ways. A little over $1 million is for grants ranging up to $50,000 from NCAT to CAP's, of which there are over 865, and Community Development Corporations. These will channel applications to NCAT for grants to inventors and community projects (the immediate priorities are insulation, particularly for mobile homes, and supplemental energy sources). One million dollars is for outreach, education, training of community workers in the uses of appropriate technology, a technical assistance hotline between NCAT and CAP's, and regional conferences.

Finally, there is an $800,000 contract for a "technical research staff" in MERDI that will do research and evaluation on small technologies. This might involve comparing different kinds of solar collectors, or delving into the cheapest methods of processing cellulose for building insulation. MERDI, for example, is currently developing a home furnace that is tiny, efficient, and capable of switching among coal, oil, and gas. MERDI will be in the position of supplying the quality control—everyone is concerned that new technologies be sound ones acceptable to the population as a whole, and not half-baked innovations that cast low-income people as guinea pigs in poorly thought out programs.

NCAT is still at the embryo stage, and there is not too much to be told yet about its mode of operation. It has an execu-

A New Center for the Humanities

The humanities have been sinking into kind of a funk over the past dozen years or so, and have suffered perhaps even more than other fields from fragmentation and the prevailing trend toward overspecialization. Despite the existence of the National Endowment for the Humanities (NEH), little federal money has been sent the humanists' way—rather it is to the sciences and social sciences that policy-makers look for guidance in approaching public issues.

Now, a prominent group of academicians is seeking to bring humanities back into the mainstream through the establishment of a National Humanities Center, to be built on Research Triangle Park in North Carolina. The new center is to be modeled, more or less, on the Center for Advanced Study in the Behavioral Sciences in Palo Alto, and the Princeton Center for Advanced Studies. The center, whose existence will be formalized at an April board meeting, will open its doors in September 1978. A $2-million building, financed by local contributions and foundation grants, is now under construction. The first president is to be Charles Frankel, professor of philosophy and public affairs at Columbia University. Planning was done by the American Academy of Arts and Sciences with a grant from the NEH.

The center wants to bring together humanists of all disciplines, including science, to enrich the stream of thinking that eventually finds its way into public policy-making. Some resident Fellows will be invited to work on their own projects. Other individuals will form interdisciplinary teams to apply themselves to projects thought up by the center. Examples of proposed topics are "The idea of the individual, 1700 to the present"; "the historical and cultural background of environmental and ecological problems," and "the state and future of clinical psychiatry."

The founders of the center believe it has much to contribute in bringing historical, ethical, and philosophical perspectives to bear on current issues. Frankel believes that "to some extent humanists have been dehumanizing themselves in an effort to ape the success of other fields"—to wit, the rage for quantification that has gripped the social sciences. It is time now, he says, for the humanities to be brought "off the defensive and out of retreat" and for other disciplines to benefit by their methodologies.

Scientists will be brought in on appropriate projects, such as the one on man and the environment. In addition, there is a project under discussion whereby postdoctoral scientists from the California Institute of Technology would spend half an academic year at the center.

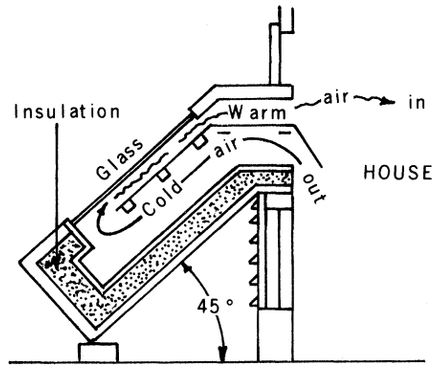
The advent of the center has been a source of great excitement in the tri-university area (Duke, North Carolina State University, and the University of North Carolina), according to executive director William J. Bennett. He says 12 other universities vied to be host of the center, but North Carolina seems to have offered the most in the way of financial, logistical, and moral support, as well as general "ambience."

The 30-member board is weighted with distinguished academics, including two scientists: Harvey Brooks of Harvard, and Caryl Haskins, former president of the Carnegie Institution. It also includes William Schuman, composer and president emeritus of New York's Lincoln Center; lawyer and diplomat Sol Linowitz; and John Chancellor of NBC.—C.H.

tive director, James Schmidt, a former CAP director, and is looking for office space to house an eventual staff of around 30. Outreach workers from the center will be planted in CAP offices and regional CSA offices around the country. The center plans soon to shower CAP's, appropriate technologists, and community groups with its Request for Proposal, and the first grant may be made as early as next month.

Aside from promoting appropriate inventions, just what sort of undertakings does NCAT hope to stimulate? Perhaps the best available example of the combination of community action, self-reliance, and appropriate use of technology in a poor community is supplied by the East 11th Street project in lower Manhattan. East 11th Street was born from a crisis, a not uncommon facilitator of new ideas.

According to Travis Price, who was on the NCAT planning committee and who has been advising this project, it all started when a dilapidated building was allegedly burnt out by the landlord who hoped to collect insurance money on a losing deal. It was a classic ghetto neighborhood, populated mostly by Puerto Ricans whose average annual income was $1500. A group of people on the block got together to buy the shell of the building before it was demolished by the city. This was 3½ years ago. After a year and a half of trying to get a mortgage (the area was "red-lined" and no bank would give them a loan) they got a loan from the city, and started rebuilding the thing themsleves. Price got involved somewhere along the way, and tried to help the group look for ways to reduce fuel bills. They finally obtained money from the CSA and the Department of Housing and Urban Development to install a windmill and solar collectors on the roof, and to insulate the building. Now, says Price, not only the building but the neighborhood is transformed. It is owned and maintained by its 30 tenants. Using "sweat equity"—labor instead of capital—construction costs have been 40 percent of what they would have been normally. The flat plate solar collectors have supplied 85 percent of hot water needs, and the windmill supplies virtually all the common electricity needs (in fact, says Price, they got into a fight with the power company because the windmill was feeding power back into the grid—the consumers were becoming producers! The dispute was eventually resolved with the help of lawyer and former U.S. Attorney General Ramsey Clark). Price says the project has had side effects throughout the community. A few years ago, the main "cottage industry" was stripping



Solar window heater.

cars. Now the strippers are working to rehabilitate several other buildings on the block.

The actual technology that has been used to transform this particular neighborhood involves nothing novel. In fact, as Price points out, "appropriate technology" in this case can be as simple a thing as using a roller brush instead of a paintbrush. He already looks to future developments, such as greenhouses (even without special heating, a greenhouse can prolong the growing season by a couple of months), hydroponic roof gardening, aquaculture (growing fish in the basement), and starting small companies to produce the relevant products. In the far future, he talks of such projects as establishing cooperative farming within a 50-mile range of the city so residents can bypass the local supermarket.

Appropriate technology is not going to be all that easy to sell. The country and its scientists are, after all, still in the grips of the idea that new, higher technologies—rather than simplification of life-styles—are what are needed to solve our problems. And there are countless institutional obstacles, ranging from federal R & D funding priorities to loan policies and building codes, to the wide-scale adoption of small technologies.

The NCAT idea should get a good boost from the impending visit to these shores of E. F. Schumacher himself. Among other engagements, Schumacher was scheduled to meet with NCAT people in Butte at a governors' conference to be held in late February; this month he is to lead a workshop, sponsored primarily by NCAT, at George Washington University in Washington, D.C.

No spokesman, however eloquent, is going to reorient this country's values to small is beautiful; however, as prices continue to climb and resources diminish, more and more people will find themselves resorting to appropriate technology, whether or not they call it that.—CONSTANCE HOLDEN

NIH Seeks Law on Gene-Splice Research

Federal regulation of gene-splicing research is now inevitable, and the National Institutes of Health will just have to try and settle for the best terms available. Conveyance of this message seemed to be the purpose of a high level meeting held last week at NIH for the deans of medical schools and other science leaders.

The NIH has long striven to keep its research guidelines voluntary. An interagency committee chaired by NIH director Donald Fredrickson succeeded in persuading all agencies, including even such unruly satrapies as the Departments of Defense and Agriculture, to promise they would adopt the NIH guidelines. But the pressure of events, such as public disquiet and the laws being passed elsewhere, has made the voluntary route untenable. The interagency committee has tentatively concluded that no member agency has existing powers to regulate gene-splicing research. (Some officials in EPA disagree, but EPA is unlikely to be able to wrest control of the issue from NIH.)

No one at last week's meeting disputed that NIH-sponsored legislation now is necessary, especially after being treated to a view of the teeth—$10,000 fines, liability without regard to fault—in the bill introduced by Senator Dale Bumpers of Arkansas. One speaker suggested that laws in just one country were inadequate: "What happens in a little lab in a South American country is ten times more important than all the labs on the East Coast." Another speaker replied that the United States could exert "tremendous moral power in doing our own thing right." Fredrickson, back from talks with Europeans on the issue, suggested that national authorities will have to draw up their own regulations and then hope for a coalescence of views.

The next step is for the interagency committee, probably in the next few weeks, to draw up at least the main elements of a bill, one of which would doubtless be to preempt all laws passed elsewhere. Would NIH have done better to create a law a year ago, before Mayor Vellucci and others had forced the issue? Perhaps, but the good will engendered by scientists' initiative will still ensure a sympathetic hearing for any NIH-sponsored bill from the House and Senate health committees.—NICHOLAS WADE