

Science Education Redivivus?

Congress pushes proposals to improve math, science teaching, but the scale and complexity of the problem may exceed sputnik days

A \$400 million-plus measure to improve mathematics and science education in U.S. schools is moving rapidly through the House of Representatives. Similar legislation has been proposed in the Senate, although the Republican majority there is likely to be more influenced by Administration efforts to restrain nonmilitary expenditures. This Congress, however, is expected to act to revive a substantial federal role in supporting math and science instruction in the nation's schools.

The current response is being likened to the reaction to the launching of sputnik a quarter century ago. But circumstances today differ in ways that may make it more difficult to solve the problems that inspire the current legislation.

The economic and political status of U.S. schools have changed markedly. Post-sputnik school systems were in the midst of a cycle of expansion caused by the postwar baby boom. Education had a strong constituency willing to vote for bond issues to build more classrooms and to support rising budgets required to hire more teachers. Colleges and universities operated booming teacher training programs and offered graduate study in education linked to professional advancement and higher pay. Leading scientists, concerned about the poor preparation of students turning up in their classes, were active in dynamic curriculum reform efforts supported by the National Science Foundation (NSF) and Office of Education.

In the 1960's, school enrollments continued to be high, but the decline in the birthrate dictated the future demographics of education. Political activism generated by the civil rights movement and opposition to the Vietnam war altered the educational atmosphere, and social legislation associated with the Great Society imposed new responsibilities on the schools. The new priorities were mandated at a time when federal funding for math, science, and foreign language programs was in decline.

In the 1970's, state and local education funding encountered strong competition from other public programs. The so-called property tax revolt had a heavy impact on many school systems. Managing enrollment declines in a period of inflation and recession proved difficult

and many school districts were disrupted by conflicts over busing, discipline problems, and controversies over such issues as school prayer and creationism.

The impetus of the curriculum reform movement was largely spent. Some programs were criticized as having been elitist—successful with a minority of talented students but unsuited to the majority. Academic stars withdrew from curriculum reform efforts and, by and large, have not returned. The broadening of NSF curriculum revision activities into the social and behavioral sciences pro-



Representative Don Fuqua

Mended a jurisdictional fence

duced the controversy over the MACOS (Man: A Course of Study) program, which is widely regarded as having contributed materially to the Reagan Administration decision to dismantle the NSF education directorate.

Teachers generally shared the advances in pay and status enjoyed by public employees in the growth era of the 1960's but subsequently lost ground as school systems were forced to retrench in the face of inflation, tightening resources, and falling enrollments. Science and mathematics teachers found employment in schools less attractive as opportunities expanded in technical fields in business and industry. Women with math and science backgrounds, particularly, found options open to them in industry and the professions that even a decade earlier were not available.

Against this background, it is evident that H.R. 1310 will not cure all the ills of science education. Even \$400 million pales in the perspective of the roughly \$117 billion spent annually on U.S. pub-

lic schools. Proponents of the bill at the House Science and Technology Committee markup session on 22 February repeatedly described H.R. 1310 as a needed "first step." Even that first step, however, may be impeded by the jurisdictional pitfalls in the path of such legislation.

The bill, H.R. 1310, is the product of negotiations to avoid a boundary fight between the House Education and Labor Committee, which has jurisdiction over the Department of Education (ED), and the Science and Technology Committee, which oversees NSF. The bill combines measures produced by each committee.

In the last Congress, a science education bill was introduced by Science and Technology Committee chairman Representative Don Fuqua (D-Fla.), apparently as a sort of test model for legislation on the subject. When the bill went to the Education and Labor Committee which shares jurisdiction in the field, however, that committee's chairman, Representative Carl D. Perkins (D-Ky.), added considerable legislative freight to the bill and took the occasion to rake NSF over the coals for shabby treatment of education.

The two chairmen subsequently agreed on a strategy for the new Congress of linking together bills from the two committees, avoiding intrusions on each other's turf, and bringing the package speedily to the floor. The action was strongly encouraged by the House Democratic leadership, which evidently finds appealing the prospect of topping President Reagan's own plan for a \$75 million science education program to which he gave priority in his budget (*Science*, 11 February, p. 748).

In its present form, H.R. 1310 provides that the largest portion of funds—\$250 million—be distributed to the states by ED in the form of grants based on numbers of school-age children. The funds could be used fairly flexibly for planning, training, and improvement of science education. Another \$50 million would be disbursed by ED at the post-secondary level. Some \$20 million of this would be earmarked for teacher scholarships and \$17.5 million for summer institutes to train teachers.

Under the other major section, NSF would administer a \$100-million-a-year

fund to provide grants to colleges and universities on a competitive basis to upgrade teaching in math, science, and foreign languages. The emphasis would be on training and retaining faculty in shortage areas of science and engineering. Grants would require matching funds. The House Science and Technology Committee in its markup of the bill sought to shift some authority to NSF from ED and, for example, doubled the \$17.5 million for summer institutes. Differences in the two committee versions will presumably be reconciled by the Rules Committee.

The bill is expected to come to the floor as early as 3 March and, by virtue of the leadership's blessing and the Democratic voting majority, win passage substantially in the form in which it emerged from committee.

In the Senate, it is likely that the pace will slow. Jurisdictional issues loom larger there and contributing factors are what one Senate staffer sums up as "costs and egos." Science education is viewed as a popular cause and proposals by a number of senators have been put forward or are in the works. Most visible now is a measure dubbed the Education and Economic Security Act (S. 530) introduced by Senator Claiborne Pell (D-R.I.). The bill, which calls for a range of programs to improve math, science, foreign language, and vocational education, amounts to what one staff member described as a "statement of philosophical objectives" rather than a bill in final form. The measure has a phalanx of Democratic cosponsors and a dash of bipartisan support in the backing of Senator Robert Stafford (R-Vt.), chairman of the Senate Committee on Labor and Human Resources subcommittee which handles education legislation. Stafford, however, may find himself upstaged by the chairman of the full Labor and Human Resources Committee, Orrin G. Hatch (R-Utah). Hatch and Senator Slade Gorton (R-Wash.), who heads the Commerce subcommittee that shares jurisdiction over NSF, both have said that they will weigh in with their own proposals in what may become a crowded field. Likely to increase the heat of competition is the continuing friction over jurisdiction over NSF between Hatch's committee and Gorton's subcommittee. Attempts are being made to relieve the tensions, but action on science education could be delayed.

Fuzziness in lines of authority between NSF and ED are also a source of concern. NSF was recently the recipient of a warning shot from Senator Jake Garn (R-Utah), chairman of the appro-

priations subcommittee for NSF. In a letter to NSF director Edward A. Knapp, Garn criticized the agency's plans for spending the \$15 million for science and math education inserted in the current budget. He wrote that he was disappointed that NSF had offered a narrowly conceived plan for a teacher training program in a way to "preclude consideration of the broader objectives of a national science education program." Garn, however, made a major point of his displeasure that ED and NSF had not defined clear areas of responsibility for themselves, and he provided examples of what he thought these responsibilities for NSF should be.

Hatch has scheduled hearings for the second week in March. Progress on the measure after that is hard to predict,

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since the issue could be caught up in the impending congressional struggle to contain the budget deficit.

The NSF portion of the House bill and its anticipated counterpart in the Senate faces some unusual complications. Because the Administration last year dismantled the agency's education directorate, there is, at least formally, no staff to administer precollege education programs.

At this point, NSF is dutifully espousing the Administration plan for the \$75 million program called for in the President's budget. Questioned about NSF's capacity to administer a bigger education program, NSF director Knapp, at a posture hearing before the House Science and Technology Committee on 23 February, indicated that the agency would have to reconsider its position if a major program were enacted.

In danger of being overtaken by events is the National Science Board Commission on Precollege Education and Science formed last year to come up with recommendations for a new dispensation for NSF in science education. Scheduled to report before the end of the year, the commission counsel could come too late to influence this round of action.

A general jurisdictional problem for federal education legislation arises from the constitutional allocation of major responsibility for education to state and local authorities. Federal action is barred

on what many regard as crucial factors in the problems of math and science education. The federal government has no leverage, for example, on the length of the school day or school year or the use of part-time teachers. Similarly out of bounds are the math and science requirements for school graduation and for college admissions. And only very indirect encouragement can be provided for such things as the use of new technology for teaching science and math.

Federal influence is decidedly limited in what is seen by many as the key issue in the math and science fields—teacher pay. At the science committee markup session Representative Judd Gregg (R-N.H.) questioned whether H.R. 1310 deals effectively with the central problem of teacher pay. His colleague Representative F. James Sensenbrenner (R-Wis.) sharpened the point by saying he was "afraid that the federal government might be paying to upgrade science and mathematics teachers (thus) making it possible for them to leave teaching for better jobs."

The subject of teacher salaries has traditionally been too hot to handle in discussions of federal aid to education. Conservatives have opposed use of federal funds for teacher pay as a drain on the Treasury and as opening the way to federal control. Teachers unions have argued vehemently against the use of federal funds to pay salary differentials for teachers in shortage areas on the grounds they cite against merit pay.

House veteran Paul Simon (D-Ill.) confirmed that teacher pay "raises real political problems." A member of the Education and Labor Committee, Simon also joined the Science and Technology Committee at the start of this Congress and has served as an effective agent of shuttle diplomacy between the two committees. Simon acknowledged that teacher pay is a "critical area," but warned that "it raises the red flag."

Another sort of concern is raised by employment of the matching principle for grants awarded by NSF. The device has the advantage of doubling the impact of the program and engaging the participation of private organizations, notably industry. But some observers say the mechanism raises questions of equity, since affluent, well-managed school systems are likely to benefit while those who need help most may be bypassed.

The pros and cons of the matching formula underline the basic dilemma of U.S. education: real progress toward solving national problems requires, for good and ill, effective local policy and adequate local means.—JOHN WALSH