fessionals to identify deficiencies in service and seek out research and development which will continually contribute to their efforts to serve society well.

References and Notes

1. P. Handler, *Science* **157**, 1140 (1967).
2. G. H. Daniels, *ibid.* **156**, 1699 (1967).
3. H. Brooks, *ibid.*, p. 1706.
4. L. A. DuBridge, *ibid.* **157**, 648 (1967).
5. M. D. Reagan, *ibid.* **155**, 1383 (1967).
6. E. G. Guba and D. L. Clark, *An Examination of Potential Change Roles in Education* (Airlie House, Va.), p. 8 (mimeographed).
7. *Children and Their Primary Schools: A Report of the Central Advisory Council for Education* (Her Majesty's Stationery Office, London, 1967), vol. 2, pp. 180 and 188.
8. Robert Glaser has suggested that I make explicit the assumption that in education a breed of developers and technicians exists, and that researchers, developers, and school administrators are presently skilled and courageous enough to identify and fulfill research and developments requirements (as Glaser put it to me, superhuman enough to know when and how to initiate development, how to set up performance specifications, and possessing both the courage and political climate which will permit iterative experimentation and not just a "safe improvement"). Those assumptions are present not because I think conditions in the field fully warrant them, but because assuming that such conditions should be present seems to me to be useful.
9. This example is, of course, clearly an idealized concept. It is instructive to keep the model in mind as one looks back over the past 4 years at the tremendous developing interest in the establishment of early childhood educational programs. While it is certainly difficult if not impossible to establish an individual cause for such a complex phenomenon, it is significant that Benjamin Bloom published his volume, *Stability and Change in Human Characteristics* (Wiley, New York, 1964), just at the time the Office of Economic Opportunity was beginning its planning toward the development of programs to fight the war against poverty. The significant thing about Bloom's book was that while his conclusions firmly underscored the importance of the early years in the development of cognitive skills, he also observed that there had been little actual experimentation designed to create environments to enhance such skill development. I think Bloom's argument can be interpreted as a call for rigorous efforts designed to produce environments and instructional programs which have the effect of enhancing human capabilities. The problem, however, is that which exists in all social domains. There are large numbers of children *now* whom we cannot afford to ignore, and the consequence has been the attempt to create operating early childhood programs based on those convincing research findings without first having gone through a developmental stage. The result has been a somewhat marginal impact on the target population despite the clear implications of the research summarized by Bloom.
10. The initiator and performer are, of course, not necessarily one and the same person or institution. The actual initiator of the research project might be a school man, a developer, a researcher, or a research administrator. The performer of that research effort may or may not have the same ultimate purpose as the initiator, in mind, as he undertakes the activity. Thus, for example, it would be perfectly possible for a research administrator to stimulate a series of research activities relating to reading, which he views as applied research necessary for a development effort to build improved reading curricula, while the performer of that research sees it as a basic research effort in perception or the psychomotor skills associated with reading.
11. This view fits fairly well with one part of Harvey Brooks's analysis of the distinctions between basic and applied research (*3*), when he noted that "as definite categories, [the terms] basic and applied tend to be meaningless, but as positions on a scale within a given environment they probably do have some significance." The principal shortcoming with Brooks' analysis in my view is that it proceeds almost entirely on the presumption that the distinction can be resolved by approaching it in some way from the researcher's point of view. My experience in the administration of research, as the model presented in this paper clearly indicates, leads me to believe that the researcher's view is only one of several which must be taken into account in attempting any analysis of the distinction between basic and applied research. The presence of rather different criteria and alternative vantage points convinces me that Reagan's argument for abandoning the distinction within research is much more persuasive as is the suggestion that the critical categorization is that between research and development.

12. I thank E. Svenson for his formative critique of the ideas found in this paper. Also, this paper was written in the author's private capacity with no official support or endorsement by the U.S. Office of Education.

NEWS AND COMMENT

Student Power: Demands for Change at Stony Brook's "Talk-In"

"The question is—is there a commitment to change here? If there isn't, we will have an explosion which will make Columbia look like a piker."—Student's statement during 3 days of public discussion at Stony Brook last week.

Stony Brook, N.Y. Angry rhetoric and, increasingly, angry actions are becoming the staples of university life. On 29 October, students at many universities observed a "time-out" called by the National Student Association to discuss the student movement and the "base and repressive" features of national politics and of the nation's universities. Last week the New York State University center at Stony Brook on Long Island held 3 days (22 to 24 October) of "intensive self-study" during which all classes were called off to enable students, faculty, and administration to discuss Stony Brook's future.

In part, the 3-day moratorium on classes at Stony Brook was a result of conditions peculiar to this university and of a continuing and perhaps worsening crisis of confidence on the part of many students concerning the university's administration. But, in a larger sense, the crisis at Stony Brook seems similar to that afflicting universities across the country.

In interviews with students, professors, and administrators, a major explanation given for student discontent is that those holding political and other forms of authority have been discredited. In the minds of students and their elders, the Vietnam war is a principal reason for this discrediting of figures of authority and for student unrest. Today's undergraduates are, politically, children of the Lyndon B. Johnson era. Most came to political consciousness during his administration and during the Vietnam war. For them, the previous President is a figure of the distant past. Many of today's undergraduates were in junior high school when John F. Kennedy was assassinated.

In the words of one senior here, "Vietnam hangs over me like the blade of the guillotine." For many men it poses the unattractive alternatives of exile, prison, or being sent to fight in a war which they regard as immoral. The edict earlier this year that graduate students would no longer be given draft deferment has increased the pressure and reduced the chance of escaping service in Vietnam. In recent weeks, draft notices have begun to descend on graduate students at Stony Brook. Prior generations of university students were able to cope with academic or personal pressures by leaving the university for a term or two; today's male students face Vietnam if they take a leave of absence. The Vietnam war has given an impetus to student criticism of universities accepting Defense Department research, criticism which would otherwise have been unlikely to have attained such momentum.

Students and faculty at the State University of New York center at Stony Brook discuss ways to promote change in the university.

Recent political events have also antagonized students. The denial of the Democratic nomination to Senator Eugene J. McCarthy, the beating of antiwar demonstrators by the Chicago police, and the unpopular nominations of Humphrey and Nixon make students question the legitimacy of those who wield political power in this country and of the system that allows such power. Since many faculty members and administrators share the students' revulsion against the Vietnam war and against the political leaders who support it, they are hardly in a position to convince students that they are wrong.

The "Pot Bust"

Another factor which divides students from those in authority is the divergence in attitudes toward the use of drugs, especially marijuana. The most divisive event at Stony Brook in recent months was a massive raid by the Suffolk County police on 16 January (*Science*, 9 February). This raid has subjected many students to legal action and embarrassment and has resulted in legal harassment for faculty members, conditions which have not yet been finally resolved. Stony Brook students assume that the raid was carried out for reasons of local political aggrandizement. Even worse for their morale, they expect that another such raid will come any day. (Some students even talk about using guerrilla tactics against police if they raid the campus again.)

In the opinion of many students, the university administration did not sufficiently stand up for their interests in the painful clash with the police. These students regard the police raid as only the most glaring example of several incidents in which, they say, the administration was more sensitive to outside pressures than to the interests of students. (It should be pointed out that the Stony Brook administration was not forewarned of the January raid, and that any university administration seems to lose campus support whenever outside police make an armed foray into a university.)

In the aftermath of the police raid, relations between students and administration have grown worse. An administrator who spoke up for the students on the drug issue was moved to another position. On 1 August, President John S. Toll appointed a Vice President for Student Affairs. This new vice president, David F. Trask, was appointed without consultation of the students, and, in Stony Brook's embittered atmosphere, he soon found his position untenable and resigned on 8 October. Partly in response to this dramatic resignation, the faculty executive committee and the faculty assembly passed a motion to suspend classes for 3 days for a period of self-examination. The memory of April events at Columbia University is fresh in the minds of university administrators these days, and the smarter ones know that they must act quickly before crises mushroom to unmanageable proportions. In the words of Herbert Weisinger, the new dean of the graduate school at Stony Brook, "Everybody had a sense that unless we got together and talked there would be a clash."

In the past, many of the complaints at Stony Brook have been of the "bread and butter" variety. Stony Brook, which, along with Albany, Buffalo, and Binghamton, is one of the four major centers of the New York state system, is a young university and has many of the problems which face rapidly expanding institutions. Students have complained of the mud on campus, the lack of lighting, and the absence of adequate janitorial services. A particular source of student discontent has been "tripling" in dormitory rooms designed as doubles, and what some students regard as evasive statements by the administration on this subject.

Further complaints result from Stony Brook's location, in a semi-rural area 50 miles northeast of New York City. Although this site provides the summertime recreational opportunities of nearby Long Island Sound, it also suffers from a dearth of off-campus recreational and housing facilities for students. People at the university feel that the local community has been hostile to the university and its needs. A considerable number of faculty members commute from New York City, thus often lessening their contact with students. Because of inadequate library facilities at the university, many faculty members regularly make the 3-hour round trip into New York City to do their research.

Some undergraduates complain that they are being sacrificed to the graduate programs and, if they are students in the social sciences or humanities, that the natural sciences are given too much attention and money at Stony Brook. In a statement circulated at the time of the 3-day moratorium, the Stony Brook chapter of the Students for a Democratic Society (SDS is not strong at Stony Brook) asserted: "It is obvious from the lack of facilities for humanities (especially art and music) and social sciences that there is a disproportionate emphasis on making the university the 'Cal-Tech of the East.' Was this a student decision? Why should this be so?" While it is true that Stony Brook, because of the proximity of Brookhaven National Laboratory and because of other factors, was originally meant to emphasize the natural sciences, its mandate for the past few years has been to develop a comprehensive university center.

The Quality of Life

The major areas of student concerns that were discussed in the 3 days were issues relating to the quality of academic life at Stony Brook. (The issue of quality of life in the larger community was also raised at several points. Physicist Robert Weinberg received a huge round of applause when he said: "If we taught engineers ecology, maybe they wouldn't be in such a hurry to destroy our natural resources.") The thrust of the discussions during the 3 days was future-oriented. President Toll, a physicist, was taken off a panel on university governance, as one student leader explained it, so that future

change could be discussed, rather than have "students line up in lines 10 miles long" to criticize past administration mistakes.

In an interview, graduate dean Weisinger said that many of Stony Brook's students had come from sheltered and regimented homes where parents were always hustling them off to classes in music, dancing, or Hebrew and stressing the importance of high grades. "Students want to break open from these parental constraints," Weisinger commented.

In watching the discussions at Stony Brook and talking to the students, it seemed that the generational battle between children and their parents is being fought out in the universities. Disillusioned by what they consider their parents' insensitivity to an evil world, students come to universities hoping to find people and ideas in which they can believe. Instead, they find the same bland accommodation which their parents have made. They cannot change their parents, but many are resolved to change the "evil" university system which is close at hand. They are determined to change what they regard as the cavalier decisions being made about the course of their lives. And, with each new show of student unity at any particular university, their conviction that change is possible grows.

Weisinger and Sidney Gelber, the new Provost for Arts and Humanities, are regarded as advocates for change in the university. Gelber is given credit for originating the idea of having the university suspend classes for 3 days to discuss its future. In an interview, Gelber said he believes that undergraduates are telling university officials, "Don't make us professional too soon; these are the only four years we have in life to develop serious intellectual concerns." These students, the children of a prosperous society, want to take more risks and make more of their own choices, Gelber believes. "Students want to express their own individuality," he says; "The hunger of the individual for a sense of power over his own life is now so strong that all structures are suspect."

Stony Brook, with only 6000 students, is hardly one of the nation's largest institutions, but the students' demand to be treated as an individual with individual needs was strong throughout the discussions. Students and faculty members alike objected to viewing students as if they were at the university merely to provide sanction for the university's research activities, or as if they were integers to fill New York's needs for doctors, teachers, scientists, and engineers. "We want to be involved in building a great university," Donald H. Rubin, former president of the student body, explained; "we don't want to be considered the waste products of the university."

The 3-day session was held in the middle of the week so as to encourage maximum participation by the university community. As might have been expected, however, many of the students regarded it as a good excuse for a holiday. The maximum estimate of the number of participants was 2000. The attenders included most of the activist students on campus. The conveners of the conference were pleased that a large proportion of faculty members participated.

On the first day of the discussions, two all-university meetings were held, featuring panels of faculty members, students, and administrators. The first discussion was entitled "The Contemporary University: Its Goals and Purposes"; the afternoon session was called "Stony Brook: Its Mandate."

Budget Cuts: Talk of Legal Remedies

An irate mathematics department at the University of California's Berkeley campus is attempting to forestall deep spending cuts imposed on research grants by threatening to support legal action against the university.

John W. Addison, department chairman, told *Science* the university, in allocating federal budget reductions, had imposed a 55 percent cut on projected expenditures from National Science Foundation grants in his department for fiscal year 1969. He said the size of the cut would make it impossible for his department to honor numerous "firm" commitments to faculty and students which had been made on the assumption that these people would be wholly or partially supported by NSF funds.

The commitments include such things as telling graduate students they would be hired as research assistants, telling foreign academics they would be taken on as visiting professors, and assuring faculty members they could take sabbaticals or spend full time on research. Addison said some of the commitments are in writing and some were made verbally, but the department in all cases regards the commitments as "firm," and legally and morally binding. In a wire to NSF, Addison said that because of the size of the expenditure cut "we could not come within $160,000 of meeting firm commitments of department to faculty and students, even if we fired all six secretaries, took zero travel, and zero everything else."

On 17 October, by a 47-to-1 vote, the mathematics faculty passed a resolution declaring it to be "the policy of the department to offer all possible assistance to the injured people in the legal suits that will arise from any attempt by the university to renege on any of these commitments." The precise merits of the Berkeley case could only be decided in the courts. But government attorneys say, in general, that any individual who has received an explicit verbal or written job contract would have grounds for suit if the university reneged. The legal argument would probably hinge on whether there was or was not a firm contract, and the lackadaisical approach of some academic departments to personnel matters might make the issue difficult to determine.

Thus far there is no indication that anyone actually intends to file suit, and Berkeley is already taking steps to ease the budget problem in mathematics. Loy L. Sammet, vice chancellor for research, told *Science* the mathematicians were "trigger-happy" in their response to budget cuts and that the "situation will work out." But the mere threat of a suit has raised the specter that harassed university administrators may soon find their budgetary problems are compounded by a flurry of legal actions.—PHILIP M. BOFFEY

On the second day the university broke into smaller discussion groups of students and faculty to discuss proposals for innovation. The subjects for these discussions included academic requirements, curricular innovations, admissions, and teaching effectiveness and the faculty reward system. Discussions on specific curricular subjects, such as biological sciences or engineering, were held later in the day, as well as meetings of individual departments. Many participants regarded these smaller sessions as much more useful and interesting than the larger ones. One of the most appealing features of the meetings was the great number of serious discussions about educational matters that arose among students, between students and faculty members, and among faculty members.

On the third day, another all-university meeting was held to discuss the question, "How can more effective mechanisms for governance be devised?" In the afternoon, the university split into smaller work groups to discuss the implementation of proposals to change such areas as the curriculum and faculty personnel policies.

Recommendations

On the evening of the third day, representatives, both faculty members and students, reported the recommendations of their work groups to an all-university meeting. Among the recommendations made were the following.

- Abolition of university requirements.
- Creation of a liberal arts major to supplement the more restricted departmental ones.
- The creation of two separate faculties, one for teaching and one for research.
- Promotion of professors primarily on the basis of teaching ability. (A member of the audience complained that this proposal and the one preceding it were contradictory.)
- Greater university attention to community service, and credit for such service in faculty promotion.
- A policy whereby tenure decisions should reflect student evaluation. Economics professor Michael F. Zweig said it was the feeling of his work group that students should have "a non-trivial role" in tenure decisions.

Zweig said it was the unanimous sense of his group that the responsibility for all education policies lies with students and faculty and not with the administration. "It is our responsibility to decide what we want and for the administration to implement it," Zweig argued. He conceded that President Toll might have the legal authority for running the university but argued, "we have the substantive authority."

The next step in implementing change for Stony Brook is consideration of the above recommendations, and others, by a faculty-student commission to be elected shortly. This commission will consist of five members from the teaching faculty, one member from the nonacademic professional staff, five undergraduates, and one graduate student. The commission will be charged with preparing its preliminary report and recommendations by 3 February 1969 and its final recommendations by 14 March. A referendum on these recommendations is to be held, by students and faculty, by 14 April at the latest. All recommendations passed by both students and faculty will stand as faculty policy, if they fall within the area of faculty authority. Other recommendations will be transmitted to the president at Stony Brook or to the chancellor of the state university system, and, in the words of the resolution passed by the faculty senate and assembly, "it shall be the responsibility of all members of the academic community to take all steps necessary to assure their implementation."

A concern of many students is that decisions, academic and otherwise, made at Stony Brook should, formally, take student views into account. Some of the students expressed a desire to have university institutions created wherein change to meet student needs could be made easily, without violent student-administration confrontations.

Beneficial Results

Obviously, Stony Brook will be at least an intellectual battleground for the next few months. According to some who had advocated the conference, the 3-day meeting had several beneficial results. First, it got the administration and faculty formally committed to the idea of change. Second, it got the faculty to assume more responsibility for university failures for which students have tended to blame the administration. Third, it helped convince students that changes will be forthcoming in their university, and it may have damped down the fires of violent rebellion. The spirit of some of the backers of the conference was conveyed by Theodore Goldfarb, an associate professor of chemistry, who said, "We are a new university; there is no reason why we have to model ourselves on irrelevant institutions like Berkeley or Michigan."

Although many discussions were conducted in an even-tempered manner, sweetness and light certainly did not characterize all faculty-student interchange. After the final meeting, a small group of students and faculty gathered outside the gymnasium's inner doors in a discussion which grew extremely heated. A student complained that President Toll had "copped out" of the meeting by leaving early; it was explained to him that he had to travel to Albany to see about funds for the university (no doubt a necessary bureaucratic chore). Violent argument broke out between a student and a senior physicist (who, earlier in the conference, had received tumultuous student applause for his forcefully delivered academic views). At one point the physicist, who looked as if he might eventually be tempted to throw a punch at the student, shouted, "I don't have to talk to you. If you think I have nothing to say to you, then get the hell out!"

Standing for Something

Nothing is ever resolved in anger, of course, but at least the professor took the student seriously enough to find him worthy of anger. At several points in the conference it occurred to this observer that, although students did want their elders to accept change, they also wanted them to stand for something worthwhile and to hold to their positions with firmness. Students know when they are being put off by affable bureaucratic platitudes, and they resent this more than they do forceful disagreement.

In an era when the attitudes of many university students are bordering on the revolutionary, no one can say with certainty that Stony Brook or any other university will avoid Columbia-style disruptions. But it seems necessary that those who wish to avoid such disruptions should help channel student demands for change into workable processes and toward attainable revision of university policies. At least, Stony Brook has taken an important first step toward peaceful revision. Perhaps the main thing that Stony Brook has to fear is that the outside world (perhaps in the form of the Suffolk County police) will once again descend to disrupt the campus, thus violently upsetting the progress that is being achieved.

—BRYCE NELSON