Chandler obviously likes trees, yet he also supports the jungle-burning project because, in his words, "it was part of a military operation" and no villages "friendly or unfriendly" were involved. "This was definitely not a burn-up-people project," he says. And a high ARPA official defends the agency's role thus: "Here was a situation which came up which clearly no one knew what the facts were. . . . We were, as research people, asked to look into the technical possibilities and to tell people who make political decisions what the facts were." These statements rivet the issue back to the historic claim by scientists that their technical advice is morally neutral and, by implication, divorced from the uses to which the technology they develop is ultimately applied. Perhaps there were no villages involved in what ARPA blandly called the "field tests" of the incendiary projects. Yet clearly there was no insurance that villages would not someday be included in the target area.

The fire storm project is now a mere historical event which its perpetrators would prefer to forget. But another issue may loom very much in the present and future and relates to the matter of ecocide. According to Forest Service experts who have surveyed and inventoried the forest resources of South Vietnam and their alteration due to the war, at least 1 million hectares were defoliated, as of 1967, and that total may have reached 3.5 million by 1969.‡ Defoliation has taken place, not just a few times in a few strategic patches of jungle; some areas have been sprayed for almost 10 years. The tropical hardwood forests of the Mekong Terrace are drier now that they were in 1965–1967 when humidity dampened Pink Rose projects. It is still possible that fires might recur as a mode of warfare in the collective memory of CINCPAC and the military commanders. As one ARPA official said, "If the system has any institutional memory whatever, if this suggestion is ever made again, they'll look into the files and find out it doesn't work."—DEBORAH SHAPLEY

‡ Barry R. Flamm and Jay H. Cravens, "Effects of war damage on the forest resources of South Vietnam," *J. Forest.* **69**, 784 (1971).

Spain (III): Education Reform Drawn on Outside Ideas, Support

The university city on the fringe of Madrid formed the front lines for some of the most sustained and savage fighting of the Spanish civil war. Now, 35 years after the war ended in a victory for the Nationalist forces under Generalissimo Francisco Franco, the embattled university remains a convenient symbol, for it is at Madrid and other Spanish universities that the lines are most clearly drawn between the Franco government and its opposition.

Student unrest is not, of course, peculiar to Spain. As a matter of fact, at no point during the 1960's did the Spanish government seem in danger of losing control of student protests, as seemed possible in France, Italy, Germany, and the United States. What has been remarkable in Spain is that the universities, particularly in Madrid and Barcelona, despite tough countermeasures devised by an authoritarian regime, have for two decades been centers of opposition influencing a generation of university students.

Other Europeans and Americans tend to regard the contest as being between the liberal university and a repressive regime. True, by Western democratic standards; but, as is often the case in Spain, the whole truth is more complicated. The university has been the source of liberal and radical ideas in Spain for more than a century and for much of that time a reservoir of antigovernment sentiment as well. In the 1920's, for example, the universities figured centrally in the events that brought about the downfall of the dictator Diego Primo de Rivera, the abdication of Alfonso XIII, and the rise of the unready Second Republic.

If the universities are incubators of change, they are also themselves institutions in need of reform. The pathology of Spanish universities is much the same as that of French and Italian universities, but in Spain the contradictions seem richer and more perplexing.

The Spanish government has launched what is probably the most ambitious program of education reform attempted in Western Europe. Not surprisingly, the reforms, which affect education at every level, have caused controversy and confusion in Spain, but what puzzles the outsider is that, on so many issues, those who would appear to be natural allies work at cross-purposes. In Madrid, for example, the phenomenon of radical students and reactionary professors joining forces to oppose reforms now causes little surprise. Indeed, many professors identified as liberals are cool to the reforms, not on political grounds, but because they view them as ill-designed and ill-managed.

The education reform has attracted remarkably little notice outside Spain, considering its scale and the fact that it is a textbook example of modern, international educational theory. A pivotal figure in the reform has been the undersecretary of the Ministry of Education and Science, Ricardo Díez Hochleitner. An educational planner with considerable experience with UNESCO and other international organizations, Díez Hochleitner got more than a little help from his friends in the form of money, technical assistance, and moral support. Such organizations as the World Bank, the Ford Foundation, and UNESCO have rallied to the aid of the reform.

The abrupt replacement of Díez Hochleitner last month perhaps indicated some of the limits of reform in Spain. His policies and personality had become a subject of controversy in Spain, but the diagnosis by people in Washington who are in touch with the situation in Madrid is that the pace of reform had grown too swift, its administration too off-handed. But the reform, it appeared, is to continue.

About the necessity for education reform there is actually little disagreement in Spain. The educational system was formed to serve an agricultural economy and a preindustrial social structure. The church dominated elementary and secondary education, and the national universities persisted rigidly in their historic task of transmitting the culture and providing training in the traditional professions.

Social and economic disparities are clearly reflected in statistics on education in Spain. Of 100 students who began primary education in 1951, 27

progressed to secondary education, 10 won the *bachillerato* (baccalaureate) required for university entrance, and 3 were graduated from the university.

Two factors seem mainly to have prepared the way for the education reform. The government, influenced by a new cadre of technocrats and planners (*Science*, 7 July), recognized that the educational system needed to be expanded and revamped from top to bottom if the scientists, engineers, technicians, and skilled workers needed by a developing economy were to be trained. In addition, the mid-1960's saw the beginning of the international student movement, and as greater numbers of students from the lower-middle class and even the working class entered the universities, political protest and criticism of "elite" education grew steadily stronger.

By 1968 this double pressure had its effect—the incumbent minister of education and science was replaced, and the new minister, José Luis Villar Palasi, came into office with, in effect, a mandate to carry out major changes. He brought in Díez Hochleitner as the ministry's technical secretary general to orchestrate a sweeping examination of the educational system. Data gathering and analysis were given new emphasis, and a multiplicity of critical studies were carried out by Spanish and foreign experts. The result was a government white paper, *La Educacion en España: Bases para una Politica Educativa*, published in 1969. A year of planning and of public discussion, as well as an unparalleled public relations effort, ensued; then in April 1970, a draft education law was submitted to the Cortes, Spain's unicameral legislative body, which in August enacted a comprehensive education law.

What sets the effort apart is that the reformers insisted on dealing with the educational system as a whole and on making fundamental changes at every level simultaneously. The effort to impose new theoretical principles and, at the same time, to implement reform at every level has, not surprisingly, shaken the system considerably.

The main principle underlying the reform is that the educational system shall be the "decisive instrument of social mobility," that access to the highest levels of education be governed by a student's ability, not by the economic status of his family. This principle, strongly reiterated in the copious literature of the reform, is surprising in a country where public references to class differences or social inequity are effectively discouraged.

A major aim of the reform is to achieve the "unity and interrelation" of the various levels of education. Until now, the transition between elementary and secondary school has come at the age of 10. A majority of Spanish children have gone to work at age 10 or shortly thereafter. Of the minority who continued in school, perhaps 60 percent were educated at church-operated secondary schools. These schools have stressed a traditional curriculum heavy on formal learning and religious and moral instruction and have prepared students specifically for the examination for the *bachillerato*, which is required for admission to the university. The criticism is that secondary schools provided indifferent preparation, in terms of both knowledge and work habits, for university courses.

By reorganizing the educational structure, the reformers intend to remedy the discontinuity between levels of education and to advance the aim of social integration. Heavy stress is being placed on a new program of "General Basic Education" intended to provide modernized content and to adapt the system to the "cycles of psychobiological development" of children. This phase will cover 8 years, ending when most children are age 13, and is intended to provide a common education for all children, irrespective of socioeconomic status. This is meant to be "compulsory and free," a label that has special significance in Spain, where the numbers of the "unschooled" are still great and where middle-class parents with ambitions for their children have almost automatically enrolled them in private secondary schools—most church operated—that involve costs which put them out of the reach of the poor.

A big building program for state secondary schools is in progress, and the 3-year baccalaureate course is being revised to provide better preparation not only for the university, but for postsecondary vocational training or direct entry into the job market. University applicants are now required to take a 1-year "orientation course" to ease the transition into higher education.

The reforms call for the university to be organized into three clearly defined cycles. Spain has not had the equivalent of an undergraduate degree, and the new 3-year, first-cycle degree is meant to carry weight on the job market. A 2-year, second-cycle degree would be at the level of the professional degree in law, engineering, or architecture. The third-cycle degree would be a research degree similar to other European and American doctoral degrees.

Higher education in Spain has undergone a series of partial reforms in the past decade. The greatest social impact seems to have been created by the changes in engineering education. The engineering profession had particularly high prestige in Spain; engineers, by and large, enjoyed even higher status than lawyers and physicians. Engineers, trained in highly selective special schools (*escuelas superiores*) that operated outside the university structure, formed an exclusive elite which operated in Spanish society in much the same way that the alumni of the *Grandes ecoles* have in France. But a series of changes, particularly placing the schools within the university framework and broadening access, has opened up engineering and even created a surplus of some kinds of engineers.

In the mid-1960's, a reorganization of the university's traditional faculties (*facultades*) along departmental lines was ordered, but the carrying out of that edict, both in letter and spirit, has proceeded slowly in most places.

Resistance to Reform

The new reform program has the same democratizing aims for higher education as for the schools. But the intransigence of students and the resistance from professors has made the going slow. The malaise of the Spanish universities has the familiar European symptoms. Students outnumber teachers outrageously. Professors have been poorly paid and frequently earn more money and spend more time on other jobs. As for teaching techniques, the magisterial lecture is still the prevailing form, and students are expected to sit through 4 or 5 hours a day of seldom-inspiring lectures. There is little money for research, and professors have little time for it; graduate education in most disciplines is poorly financed and poorly organized.

The reforms call for a recasting of teaching roles and rewards. The feudal powers of professors are to be broken, and there are to be three regular grades, corresponding roughly to professor (*catedrático*), associate professor (*agregado*), and assistant professor (*adjunto*) in the United States. The problem of part-time and absentee teachers is to be met with the creation of three categories of commitment, or *dedicación*. These are *exclusivo, plena,*

and *normale*. The first implies full-time status in the American sense and requires 9 hours of teaching per week. *Dedicación plena* implies 6 hours per week of teaching, and *normale* is for part-timers. Professors with exclusive dedication appointments receive about $8000 a year under the higher salary scales decreed by the reforms. It is significant that many professors, including those with American experience and interests in research, choose *dedicación plena* because of the latitude it affords them to earn outside income and have more time for research.

The new deal for professors has attracted back to Spain some able scholars who had left to take up academic careers in other countries. But a brain drain, particularly among younger scholars, continues. The political atmosphere sends some abroad, but career prospects, the state of graduate education, and the limited horizons for research seem equally strong disincentives. The creation of a regular position at the assistant professor level seemed to meet one criticism of younger academics, but, in practice, the requirements for eligibility ruled out young scholars who had recently received their doctorates and opened the way for those who had been assistants a decade or more ago and who had, in most cases, left the university and lost touch with their disciplines.

Reform of the method of appointing professors is in progress. Critics charge that professorial appointments are settled behind the scenes rather than through the public, competitive process that is prescribed. Many academics are convinced that Opus Dei, the organization of Catholic laymen said to wield strong influence at the top policy and administrative levels in government, exercises power in the universities by influencing the appointment of professors. National examinations have been prescribed for appointment to lower levels in the academic hierarchy, but these are not yet in force.

If something like an impasse seems to prevail in the universities, the reformers appear to have been aware of the difficulties from the start. Their strategy has been to take immediate action to establish several new "autonomous" universities where the advantages of innovation could be successfully demonstrated. At the same time, existing universities were also guaranteed "autonomy," which meant they were to develop governing statutes of their own in line with the principles of the reform. And incentives of better pay and working conditions were held out to encourage new attitudes toward teaching and research.

The reforms, therefore, have had their greatest impact at the elementary and secondary levels. And it is in this sector that support from outside Spain has been most significant. The World Bank in 1970 approved a loan of $12 million to finance the initial phase of the reform. The money, with an equal amount of matching funds from the Spanish government, went primarily for construction of regional primary schools and "diversified" secondary schools, and for teacher training.

The World Bank approved a second big—$50 million—loan in May to extend the reform into technical education. In addition to more secondary schools, some 39 vocational education schools will be built and $14 million provided to fund the relocation of the university-level Barcelona polytechnic.

The Ford Foundation has awarded a $400,000 grant, most of which is to be used to finance fellowships in Europe and the United States for Spanish educators.

Officials of both organizations are obviously impressed by the possibilities of the reform, and the World Bank appears to be optimistic that the Spanish experience could be directly relevant to Latin American nations, where the education system and problems are similar.

Crisis in the Schools

Despite the international aid, the reform strategy of a simultaneous attack on all fronts has created something of a crisis in the schools. An effort to build a large number of new schools, recast the curriculum, and reform the training of teachers all at the same time has overstressed the system. Perhaps the last straw was a grand reorganization of the ministry along functional lines, replacing the old structure based on levels of education. The resulting confusion has been considerable.

Trying to draw up a balance sheet of the accomplishments and failures of the reform at this point is virtually impossible for the outsider. Certainly, in terms of budget expansion, new schools constructed, and personnel recruited, the statistics are striking. The government education budget rose from $106.7 million in 1960 to $513.2 million in 1968 and $833.6 million in 1970. But unquestionably much of the change is still on paper, in the voluminous and impressive planning documents generated by the reform. More important, however, is that proponents and critics almost invariably give very different interpretations of the same policy or event, and the outsider is likely to be left with the impression that each side believes what it says and that there is some truth in both views.

Skeptics are thickest in the universities, and the "autonomy" granted in the new laws is widely discounted because of an expectation that government intervention in the universities will continue. Police on campus are no novelty in Spain, and career informers who keep both students and teachers under surveillance are fixtures on the university scene. Motives of political control are also said to influence the design and location of university buildings. In Madrid, first-year students are taught in buildings isolated from other students, allegedly to discourage contact and possible radicalization. The construction of new university facilities on the fringe of cities is believed to be, in part, calculated to keep turbulent students out of the center of cities.

The habit of mistrust of government motives is reflected in the ambivalent attitude of many professors toward the new autonomous universities. The planners deem the autonomous universities a testing ground for innovation. With younger faculty and smaller enrollments, the reformers argue, it is possible to develop more flexible teaching methods and a curriculum that breaks the bonds of the old faculties.

Critics, however, see a different rationale. As one Madrid professor put it, "They are establishing separate universities for separate people. Spanish universities used to be a marriage market for the middle class. In the 1960's, a new type of student began to go to the university—still middle-class, but from a lower status. Wealthy people now go to the autonomous universities. Admission is arranged in their favor." He and others expressed the view that the traditional universities will become "mass universities," and, as if to clinch the argument, he noted that Franco's grandson had chosen one of the autonomous universities.

Criticism of the reforms from university people tends to focus on Díez Hochleitner. The comments of one professor illustrate the tenor of the remarks. "He [Díez Hochleitner] is an international bureaucrat. He doesn't know any country and goes by the book. He does have a good facade and impresses Americans. Everybody agrees that education needs reform. One piece

of advice for the planners is to get around the country. The trouble is they are planning for I don't know who. Anglo-Saxons perhaps.

Díez Hochleitner has certainly been the man in the middle. There have been rumors in Madrid for some time that a change in management at the ministry was imminent, and in an interview in Madrid early this spring Díez Hochleitner showed both the wear of the job and an awareness of the criticism.

Díez Hochleitner, who is from the Basque country, is big and fair in a way that seems consonant with his north European matronymic. His office in the ministry is in the grand Spanish style, with 20-foot ceilings, heavy furniture, and paintings from the Prado attic. During the interview there were some interruptions, including a transatlantic telephone call, but he picked up the thread of the conversation easily and he gave direct answers to most of the questions. The ideas and explanations poured out. He is obviously an enthusiast, and it is hard to doubt his sincerity.

Asked why a decision was made to press the reforms at all levels at once, he replied that such a course was "indispensable. There was no chance otherwise. It is the most important aspect of the reform." When he and Villar Palasi took office, he says, "the terms were [no] unless the whole thing [were done in concert]," and he elaborates on the "interconnection," observing, for example, that to reform elementary and secondary education the universities must provide capable teachers.

His response to a question of whether he was aware of the criticism of the pace of the reforms was, "Yes, the reform is very ambitious. Success goes against management in the sense that expectations are raised. There is a demand for the immediate execution of goals. We refer to 10 years, however."

Díez Hochleitner's background is in educational planning, and he is especially proud of the econometric modeling techniques and the major studies designed to produce plans adapting the reform to each region. There are even projects in programed learning, computer-assisted instruction, and "post-Gutenberg teaching techniques." Research funds, which amounted to 0.5 percent of the budget last year, go up to 1.5 percent this year.

As for the universities, he acknowledges that there is resistance there and that the reforms "have just scraped the surface." Of student militants he says, "The issue for these people is to prove that the regime doesn't work. The [reform] law is a great menace to them if it does work. Their problem is to attack something they asked for."

To his critics among the professors, he responds with a note of impatience. "The professors say [the reform is] 'wonderful, but it doesn't work.' The new [autonomous] universities are proof that the universities can operate in a different way. They have already succeeded in some ways—Barcelona in recruitment, Madrid in management, the Basque university in equipment." And he goes on to say that seven more autonomous universities are included in the new Third Development Plan.

With the impatience still in his voice, he continues, "The *cuerpos* [corps] of *catedráticos* have more rights than duties. You can do things which benefit them, but you cannot take away any of their rights." He says that professors' salaries have been raised from $250 to $900 a month in recent years, and the pay of school teachers has been increased by 40 percent in recent years.

Díez Hochleitner was firm in espousing the democratizing rationale of the reform. "Primary education was different for rich and poor," he said. "The main issue [of the reform] is to have people living together and understanding each other in the microsociety of the school. Higher education in Spain was a search for a title, not for knowledge. It used to . . . differentiate the children of the rich. Universities were not adapted to the reality of the society."

Now Díez Hochleitner is gone from the big office in the ministry. The word from Madrid is that he was rusticated as a result of the effects of trying to do too much too fast. Certainly the Catholic church was concerned about the increasing role of state-operated schools in secondary education. And troubles in the university this year had not diminished. As one foreign observer put it, "The lower levels were shaken, and there was the old problem of the universities' deterioration."

One of Díez Hochleitner's American friends observes, "Ricardo is an idea man, he is not a very good administrator." It appears that reforms will go on at a slower pace and under somewhat firmer control. There seems to be evidence that the change was made for the sake of tighter management in the fact that Villar Palasi was continued in office. Díez Hochleitner's successor is Rafael Mendizabal, another high-level bureaucrat with a legal background and a reputation as an efficient administrator. Four top deputies were also replaced, but their successors are regarded as capable men sympathetic to the reform.

Díez Hochleitner's immediate destination is apparently not yet decided, but one American official said he would not be surprised if Díez Hochleitner spent a term with UNESCO or some other international organization and then returned to the reform in the not-too-distant future.

The government's emphasis in carrying through the reforms is now expected to shift somewhat to the universities. It is thought that an attempt will be made to set limits on the enrollment of individual universities, since sheer size is regarded as one cause of unmanageability. But resistance from the *cuerpos* and from students will continue to be the most serious challenge to the reformers.

Probably the most serious issue for the universities in Spain, as in France and Italy, is that of "selection." Militant students argue that the university is designed by the regime to educate an elite and that the universities are paid for by the poor for the benefit of the middle class. The matter of selection was a central issue in the troubles in the Madrid medical school this year which produced repeated, serious confrontations with police. And, given the resources in prospect, it is difficult to see how a formula for satisfying demands for both equality and quality in higher education can be met.

The prognosis for the education reforms in Spain must be guarded. This article and the two that preceded it were based mainly on talks with about a score of university scholars, government officials, and businessmen during a 10-day visit to Barcelona and Madrid early last spring. There were also talks with a number of people in Britain and the United States who are in touch with developments in Spain. But, as has long been true of Spain, it is possible to find men of good will on both sides of the issues, but difficult to come by judgments that are both informed and unbiased. Therefore, in concluding, perhaps it is best simply to cite the comments of a medical school professor who has been working for change, but who speaks with what might be called qualified pessimism. "The paradox is that, out of this tremendous mess, out of immobilism, finally comes some movement. I only hope it can be channeled. . . ."

—JOHN WALSH