

Whither Italian Universities?

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I was a Professor of Mathematics at the Scuola Normale Superiore, Pisa from 1986-1996 and I still maintain close contacts with that great institution. I also have been a Professor at the Massachusetts Institute of Technology, Cambridge, MA since 1969. I believe therefore, that I have a dispassionate and comparative view of the Italian educational and research enterprise. It is my hope that my observations may be useful in the formulation of new policies for substantive change in education and research in Italy, something that I think is badly needed. I speak about substantive change deliberately, even though some reforms have been instituted. Universities have financial autonomy even though the criteria for allocation of funds have never been spelled out in detail. A two-tier system of degrees has been instituted but the premises for this reform have never received serious discussion. There have been changes in the system of professorial appointments but whether this has resulted in less inbreeding and has led to appointments being made strictly on merit is quite unclear. Changes in the system of professional appointments have again been proposed, but its consequences are not known

at this time.

The current debate about educational reform (both at the school level and the university level) has often been carried out in newspapers such as the *Corriere della Sera* and *La Repubblica*. Public debate about these changes are necessary and this is a welcome development. It has little to do with the ideology of the right or the left. It primarily has to do with what education needs to be in the twenty-first century where we are witnessing a technological and economic revolution of unparalleled proportions brought about by the confluence of communication and computation technology which permits linking the industrial and economic world on a global scale. The role of both scientific and technological education as well as education in the humanities and liberal arts which prepare students to be productive in this new world require a serious discussion.

In my discussion of what I consider to be the major issues in education facing Italy I will separate university education from school education. This in fact is not a good idea, since school education determines the initial preparation of students entering the university. For this discussion, however, I will assume that a common minimal platform of knowledge for entrance into universities has been determined which takes into account the wide variation in the quality of education of students which, in its turn, depends on the diversity of educational structures (such as *liceo classico*, *scientifico*, *scuola tecnico*, etc.) existing in Italy.

The problems of the Italian University System are well known. Too many students registered with a large percentage never graduating, inadequate infrastructure, a rigid bureaucracy and an ungovernable administrative structure, essential inequities in appointments due to a structure based on chairs and a doctoral program which does not function are some of the problems that face universities today. The question is why these problems have not been addressed by the faculty in universities and why university reform has not emerged from within the university system. The answer to this ques-

tion has to be that the university faculty are not really engaged in the total educational process of the university and they have shown little interest in educational reform for the university. Furthermore, a well known professor in a well known university once told me that he did not see any role for the university in shaping the economic and social life of the country — a statement I found to be quite astounding and which may partially account for the lack of enthusiasm of the professorial class for educational reform. On the other side, one should recognize that, in spite of all the problems of the Italian university system, the Laurea in the better universities gives students an excellent education and is quite comparable to a Master's degree in the top American universities. This is in no small measure due to the valiant efforts of many excellent and dedicated professors.

University Reform has now been initiated from “the top” by the Ministry for University and Research. Italy essentially had one university degree, the Laurea (the doctorate being of recent origin which functions badly), equivalent to a Master's degree of American Universities and of nominal duration of four/five years. In practice, very few students (amongst the small percentage of students that graduate) complete the degree in four or even five years.

Probably the major reason for university education reform is to give students a wider choice in subject matter and in the level of education they wish to pursue. Hence, the current suggestion of a terminal first degree of three years duration is not at all unreasonable. This is especially so if one believes that the average high school education in Italy is more advanced than that of the corresponding education in the United States, for example. The difficulty arises when one hears that the apparent objective of the three year degree is to make it more “operational” so that students are better prepared to enter the world of employment, and to increase the number of degree holding students. The problem with these objectives is at least three-fold: (1) no distinction is made between the educational needs of the professions,

such as engineering, medicine, law and management and education in the sciences and the liberal arts; (2) there is the apparent belief that education in the fundamentals can be partially replaced by a more operational education (the distinction is between imparting knowledge versus know-how), some fundamental parts left out to be taken up in the subsequent two year period; (3) the quality and function of the various universities in Italy are viewed in a uniform manner and furthermore the university system is being asked to serve the function of institutions like the technikum (not technische hochschule) in Germany.

Moreover, the world of employment (industry, both manufacturing and service; commerce and business, government) is not homogeneous but heterogeneous, dynamic and requires personnel at various levels of education. If Italy wants to solve its unemployment (and partial employment) problem it must realize that new jobs will not be created by the mature manufacturing industries (unless they undergo significant transformations), but by new industries in sectors such as information technology as well as through the incorporation of computers and communications in every industrial sector, microelectronics, biotechnology, banking, finance and in the cultivation and development of its formidable artistic and cultural heritage. The fundamental capital here is “intellectual knowledge” and if Italy is not going to be “colonized” it must ensure that its universities deliver a high level of education which is not derivative, but fundamental, so that its students can adapt to the needs of a rapidly changing world which is increasingly technological. The role of research and the interaction between education and research becomes fundamental if we accept the above thesis and little attention has been paid to this in universities as well as in ministries of the government.

There are three parts to this equation comprising the universities and national laboratories, federal and state government and the industries. Of course, all these entities reside in society at large and their goal should be to serve the public good. Therefore it is very important to understand and

even define what the role and function of each of these entities need to be. As far as universities are concerned, the role of the government should be to give the universities as much independence as possible within some broad policy directives. It must have the courage to admit that all universities are not the same, there are stronger and weaker universities, and resource allocation needs to be based on excellence in teaching and research and not just on number of students registered in the universities. This entails recognizing that introducing competition within the university system is not a betrayal of the principles of democracy. On the contrary, it has the effect of introducing the proper balance between the freedom of each university to choose its educational and research goals and the instruments for meeting those objectives and the collective responsibility of providing a high-level of education to students coming from different educational and economic backgrounds. To give autonomy to universities to manage its finances but not to give incentives for intellectual excellence tends to produce mediocrity.

The second point that the government must recognize is that the current structure and organization into departments, faculties and corsi di laurea has led to a system of governance in universities which is dysfunctional and ends in responsibility residing nowhere. It also separates education and research which is simply a bad idea. The government also must recognize that the system of cattedra with its appointment and promotion structure results in narrow specialization which is intellectually untenable today.

Even within the confines of individual disciplines such as mathematics (given a broad definition), it channels faculty members, especially younger faculty members, towards teaching and research in subareas, such as analysis, which is given a narrow definition by the senior researchers in the subject area. Younger researchers follow this path since they recognize that this is the only possible way for them to have a successful university career. The fact that there is an essential unity to mathematics and that intellectual excitement resides on the interfaces of subdisciplines in mathematics receives

little recognition within the formal university organizational and intellectual structure of Italy today. The situation is of course much worse when it comes to research across disciplines, for example, biology, information science and mathematics or interdisciplinary research bridging the humanities and the sciences. Successive ministries of university and research have failed to recognize this fundamental flaw in the university system. The Italian professorial class has paid scant attention to this. Once this flaw is recognized, it becomes obvious that the current system of allocation of university positions and the current national competition leading to appointments have to be completely rethought. It is essential that the local interests of professors representing narrow sectors be eliminated in the interests of broader national goals.

The government also needs to define the role of special institutions such as the Scuola Normale di Pisa, SISSA, Scuola Superiore di Santa Anna and the two Polytechnics in Milano and Torino. What should be the mission of these institutions? Should they collectively play a role similar to the Grandes Ecoles in France or Cambridge University, Oxford University and Imperial College in England? If so, they must be given adequate resources to achieve a critical mass in faculty and students, encourage international collaboration and provide resources to establish the necessary infrastructure to support their research and educational mission.

I now come to the question of research and development viewed in a national context and the coupling of education and research in universities. There is nothing comparable in the world to the structure, organization and quality of graduate education and research in the best American universities. The doctoral program in American universities where education supports research and research supports education is a model that Italy should carefully study — not copy it, but carefully adapt it in an Italian context. In particular, the Polytechnics of Milano and Torino should have the mission of establishing close ties to industries especially in communications, electronics,

information technology and biotechnology and also in cultivating a culture of technological innovation and entrepreneurship resulting in the formation of new industries.

Italy needs to define the role and mission of the national laboratories and how the national laboratories should interact with universities. I want to suggest that the model of Physics where there is close collaboration between the National Laboratories such as INFN and the universities be seriously studied for implementation in other fields. The quality of many of the national laboratories in Italy are not as high as that of Physics. In particular, serious improvement is needed in research in communication, control and computer science and technology, fields defining Information technology, both at the university and national laboratory level. A national laboratory like the Institut Nationale de Recherche en Informatique e Automatique in France is badly needed in Italy.

My purpose in writing this article is not just to describe the current state of affairs in research and education in Italy but to make concrete suggestions for improving the situation. In order to do this it is necessary to put the matter in the context of economic and social development in Italy. Much has been written lately about the lack of research and technological innovation in Italy. This is clearly demonstrable in the case for example, of the current state of a company like Fiat. Insufficient investment in research and development in the automobile sector surely has led to the decline of the automaker. If one asks the question as to where research and development beneficial to economic development of the country will take place, then the first place where this can happen are the universities. But this cannot happen by dictating things from ministries at the national level unless the university, namely its faculty and students, seriously engage themselves in the endeavor. In turn, the progressive members of the faculty must take the lead in moving beyond maintaining individual privileges towards accepting their collective responsibility of instituting the necessary reform in education and research in

universities. A social contract between government, industry and universities is needed which clearly articulates a vision of the importance of universities in achieving economic and social progress in the country. One part of this equation is for the government and the private sector to guarantee that the better universities and schools of excellence receive adequate funds to carry out their mission. Italy is a rich country and yet its capitalist class contributes little towards the financing of universities. Undoubtedly laws which do not permit deduction of taxes for contribution to universities are partly to blame for this. But this is surely not the whole explanation. In my view, progressive leaders of the private sector must make the case that the changing nature of capitalism which now functions at a global scale makes support of universities to be of essential economic interest of the capitalist class.

I want to end this article with a number of concrete recommendations for the Minister for Research and Public Instruction, University Faculty, University Administrators and Directors of National Laboratories:

- (i) Admit that the current system of Concorsi for professorial appointments is a failure and leads to results which are predictable prior to administering the Concorso. The best candidate is often not a winner and the winning candidate usually is a member of the university where the appointment is being made. There are two options. One would be to truly have a national competition where appointments will be made strictly on merit. Alternatively, universities should have the autonomy of making professorial appointments. Quality control of research and education and the introduction of intellectual competition among universities can be used to ensure that appointments are made on merit. This however cannot succeed unless the full professors of universities work towards achieving intellectual excellence in their respective institutions.
- (ii) Introduce criteria such as quality of educational programs, quality of

students, quality of professors as judged by their research and teaching contributions in determining the level of financing for universities. How this should be done and who should be the judges require serious discussions.

- (iii) Institute an external review of all national centers of research both within and outside the university. The external review is to be carried out by committees constituted of academicians and leading researchers from industry and national laboratories from outside Italy. Enlist the support of prominent Italian scientists and intellectuals living abroad in organizing this effort. The Minister for Science and Technology in one of the previous Governments of Portugal did precisely this, which has brought about significant changes in the organization and support of research in Portugal. I speak from first-hand knowledge having participated in two such committees.
- (iv) The administrative structure of universities needs to undergo radical changes. Firstly, the administration of education and research which by and large will be carried out by the faculty of universities should be differentiated from the administration needed to support the activities of research and education (for example, administration of research contracts, administrative structure for students, administration of facilities). Faculty oversight may be needed for the latter, but this should clearly be the responsibility of senior administrative staff. A fundamental problem of administration in Italian Universities is that little thought is given to the organization and division of administrative work and allocation of responsibilities. Staff who perform at a superior level should be given recognition through promotion within the administrative structure and salary raises. Although the structure of Italian universities is clearly different from those of its American counterpart it would be worthwhile for administrators of Italian universities

to study the administrative structure of the better private American universities. At the risk of repetition, I would like to emphasize that the problem lies not in the quality of administrative personnel but in the organizational structure of administration.

- (v) As I have remarked before, the current structure of universities subdivided into faculties, departments and institutes makes no sense whatsoever. For one thing this often leads to a separation of education and research which is detrimental both for teachers and students. The system of chairs in individual subject areas leading to professors teaching the same subject over a lifetime makes little sense in the modern world. The system of privileges and local politics are often inevitable consequences of this system of chaired appointments. The responsibility rests with the Ministry of Education and research to radically restructure this system by appointing a high level commission with membership of academicians both from Italy and abroad, whose charge will be to make recommendations for defining this new structure. This commission must have some guarantees that its recommendations will be followed through by the ministry.
- (vi) Most importantly, now that a two-tier system of university education with a basic degree of three year duration and an advanced degree of two year duration is in place, the serious business of curriculum definition and development must take place. This is obviously the responsibility of university faculties. What I have in mind is not the system of credits and quantitative measures which have often been the focus of attention, but defining the contents of degree programs in individual disciplines. I respectfully submit that university faculties have been negligent in this respect. If we admit that Italian students enter universities at a level of knowledge comparable to the end of the first year of university education in America, then why cannot students receive

a good education in Physics, for example, in three years? The answer is that they can, but the difficult task of curriculum definition and development which ensure this must become a collective responsibility of professors in their respective disciplines. Moreover, serious thought must be given to intellectual coordination between the basic degree and the advanced degrees. The proliferation of Lauree Specialistiche is in my opinion a disastrous course to follow. The two year advanced degree should be intellectually integrated with the doctoral program for those students wanting to proceed towards a doctoral degree.

Italy is rich in human resources. Italian students who have worked with me at the Scuola Normale, Pisa and MIT are intellectually comparable to the best in the world. Yet they often fail to realize their full intellectual potential. The reasons for this are complex but universities often fail to impart the sense of intellectual adventure and ambition which lead to the formation of truly great scientists and humanists.

On the other side, students need to realize that doing something difficult and challenging requires a certain amount of risk taking — looking for life-long job security, perhaps within the university system itself, should not become their supreme goal in life.

To conclude, in a world as global and complex as ours, Italy can ill afford not to take steps which ensure the maximal development of its intellectual capital.