

Formative University Education to Face the Knowledge Outburst¹

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Ours is a time of profound social change, but it lacks one or more Utopian horizons on which to set the sights of this transforming zeal. Society is advancing so fast that its own structures cannot keep pace. Universities lag behind events. The university today must recognize, and act in accordance with, the diversification and increasingly multicultural composition of societies throughout the world, factors such as overcrowding, communication and information technology, the incorporation of technology in daily life, the narrowing of the demarcation between what is public and what is private, access of citizens to channels to knowledge different from those used by the university, the new dimensions of work based on the scope of personal and collective initiative and on co-responsibility in decision-making, the interdisciplinary nature of jobs and ever-changing characteristics of professional profiles, geographical and cultural mobility, the constant transformation of society defined by uncertainty and complexity, and the curtailment of the nation-state by regional, economic and social superstructures. All of this, have been generating an epistemological globalization, so called "the knowledge outburst."

It is the first outburst or have there already been other outburst of knowledge? Undoubtedly history of civilizations gives account of many revolutions of knowledge. For instance, Greek civilization's contribution to the knowledge of man, in terms of scope, depth and pace of assimilation, was not only revolutionary for its time by changing many paradigms about the Universe, but it was also a genuine outburst of a new generation of knowledge. The complexity of such knowledge is still studied today by philosophers and scientists, and awakens even more admiration if we take into consideration the poor technological resources that existed 2,500 years ago. A significant difference does exist between present-day society and any other in history, and it relates to the shock wave and not to the explosion itself. We are approaching an information and communication era in which the main element is constituted by an

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enormous web of dynamic relations in a transitional period. This situation increases the times of uncertainty, of instability and of extreme complexity. Therefore, if in past times access to information and knowledge was limited to minorities and closed systems, today we witness the creation of open systems of information that reduce time and space. This is why the crisis of university education is not so much in the outburst of knowledge itself but in the degree of coherence between its shock wave, the means to embrace it and the holistic capacity it needs to assimilate the multi/interdisciplinary knowledge that is produced.

The realities underpinning such crisis in the university could be summed up by 4 basic thoughts:

1. Scientific and technological advances cannot be included in the formal university curriculum as fast as they occur. Even social knowledge is far ahead of the anticipatory analysis to which higher education ought to aspire. Some response must therefore be found for new employment requirements, professional retraining at every age and research into new fields of science.
2. Knowledge about man and his world has been carved up into ever smaller and more specialized segments, but a deeper knowledge of matter and its characteristics leads to an inter- and transdisciplinary view and a unifying concept of the world, both in the field of science and in the humanities. The new trends have once again broken down the artificial barriers which had been erected between the different individual sciences. The application of the scientific method in its widest sense identifies the sciences with the arts, leading us closer to a scientific-technical humanism, where pure reason must be in harmony with the aesthetic and ethical sense and the sense of the transcendence of humanity.
3. The trend which exists today is toward fragmented education and the sole pursuit of diplomas which stress the characteristics of the once-and-for-all university education. On the other hand, the concept of lifelong university education is essentially holistic, implying an attitude of constant research and the permanent search for new knowledge. Permanent or lifelong university education is consistent with the dynamics of change and uncertainty of a society which requires not only that people should possess the necessary knowledge and techniques to function in the modern world but, fundamentally, that they should be trained to permanently learn, re-learn and unlearn as the only solution to adapt to the future.
4. The expansion of university objectives to include permanent formative education and training is closely linked with the modernizing concept of

education. There is no one period for studying and another for acting. Learning and acting are a part of the existential process of the human being.

Universities have been slow to respond. Many university institutions in developed countries have not even introduced changes to adapt to the current situation, and many of the remaining universities throughout the world lag behind these changes. There is, however, a greater awareness in the academic world regarding the pressing need for universities to confront the new challenges and social realities. There is a clear trend towards agreement on concerted action between the university and the productive industrial and business sectors, which is reflected in the concrete programs in operation in many areas of the globe. Besides improving the quality of education and research, relations between the university and industry imply the adjustment of training to the needs of the work-place. But the creation of diverse «knowledge markets» requires strict quality control mechanisms to be put in place, even more stringent than those which exist in the health and food sectors, since knowledge impinges upon the ethical and moral conscience as well as the development of the individual.

The interrelationship between the three conventional principles of teaching, research and university coverage constitute new dimensions which compel the university to undertake two-way development along with society. It is not enough for the university to reach out to society. It must open up its gates and allow society to enter in. The tendency for universities to open up towards society has been resisted with arrogance and a degree of disdain towards the cooperation of society in fields which *academe* regard as its own private domain. This point of view overlooks the fact that scientific research implies impartiality and freedom from the prejudices handed down to us by the customs or the culture to which we belong. The new role of the university in society requires the university to adopt not only new attitudes and values, new commitments and relationships, new practices of cooperation and service, but also new structures, new teaching and learning techniques, new modes of cooperative education, new curricular concepts, as well as new administrative, planning and control systems. In short, what is required are universities which transform themselves whilst preserving their *raison d'être*, rather than universities which passively adapt to the demands of the new age.

The most relevant and controversial issue facing the university, however, is one of its *raison d'être*: formation², the teaching-learning process. The challenge posed by the diversity of knowledge, the plurality of science, the multiplication of branches of knowledge and the speed of change has underscored a problem of academic and curricular effectiveness. On the one hand, in so far as knowledge has become more complex, varied and impossible to embrace in its entirety, it has become correspondingly more difficult to impart. On the other hand, the segmentation of fields of knowledge has led to the fragmentation of language, producing a generation of professional people incapable of communicating between one branch of knowledge and another and, increasingly, between the cultures of science and the humanities. The controversy between general formative education and specialized formative education, between professionalization and the liberal study of the arts and sciences, between once-and-for-all learning and an lifelong learning process are subjects for debate within the university community and society (Escotet, 1992).

However, the interdisciplinary approach, general basic formation and training, flexibility of the curriculum permitting adaptation to change, the extension of the university mission to cover permanent formative education are all trends which have been gaining prevalence in recent years and which run counter to the other view which favors professionalization as direct training in a single discipline. The risk of specialized professionalization is very great. After all, this model has been very much in vogue since the incorporation of industrial production systems and the development oriented political and economic systems of the fifties and sixties. The result is not particularly edifying. Never before in contemporary history have there been more unemployed university graduates and professional people than there are today. Unemployment among university graduates is not only the responsibility of the socioeconomic system, it is the result of the interaction of that system in evolution with a university which produces rigid, passive professionals educated on a once-and-for-all basis.

² The English word 'formation' - among other meanings - indicates 'the act or process of forming' or 'the shaping or developing of something'. The word 'formative' means 'having influence in forming or developing'. Similarly, I use the term 'formation or formative education' to describe a kind of education which forms or develops a person's character, values and morals as well as merely making him/her knowledgeable or giving him/her skills. A distinction between teaching, training or instructing and formation or formative education should be made. To instruct is a process whereby teaching in the sense of training remains on an intellectual or cognitive low level and formation is a process of academic socialization which inserts itself into the personality and the emotional domain, manifesting itself in the subject's behavior. Therefore, formation and instruction are indivisible and interactive elements in the process of education. A psychological and educational analysis of such terms are presented in Miguel A. Escotet (1992), *Information and Formation: The change of paradigm in university distance learning*.

A more adequate balance between generalization and specialization would reduce the under-exploitation of professionals in the short-term labor market on the one hand, whilst, at the same time, promoting the updating of professional qualifications in keeping with the new demands of society in the medium term. The false dichotomy between formative education in the sciences and the arts requires a radical change in teaching and learning strategies. The university will have to strike the right balance of aesthetics, science and ethics in the education of men and women, so that they will emerge knowing a lot about their own field but also enough about other disciplines: in other words, the university as a center of aesthetics, science and basic human values. But even if the extremes of educational models were drawn towards the center, this would not resolve the whole problem. To do this, the university would have to become an institution oriented towards permanent education and lifelong learning, which, in turn, would require course contents, teaching methods, practices, means and the duration of courses to be kept under constant review.

Lifelong education requires universities to de-formalize their structures and services to accommodate new teaching-learning methods, to set up two-way systems of cooperation with business, industry and community enterprises, to create educational networks with the non-formal systems in society, to recognize experience and knowledge acquired in ways other than the conventional lecture room and academic laboratory, to incorporate communication and information technology in the teaching-learning process, and even to de-formalize classroom attendance. This also means setting up multiple inter-university and inter-educational networks to break down the false barriers within scholarship and the transmission and generation of knowledge.

Cooperation between universities within the same country and between different regions of the world is a growing trend. Teacher and student exchanges, joint research programs and the sharing of information and available resources are compulsory practices for any university which - more than any other social institution - is obliged to work in an interdependent and universal reality in which different societies function. Many of these forms of cooperation do not even require people or objects to move. New information technology and advanced communication technology can provide any university with international and national databases, libraries, video libraries, multimedia data systems, lectures and seminars using teleconferencing techniques, interactive videotext and many other kinds of cooperative modes for distance learning and research. In the medium term institutions with limited resources have the potential to improve and develop their academic

quality through these technologies. Programs of this nature can put the university in a position of anticipatory thinking for strategic planning to serve mankind. Let me mention some of the university policies which I consider in my book on the Mission of the University, and which are highly related to formative university education and the knowledge outburst. The following policies constitute some philosophical basis for university development to face the explosion and the shock wave of knowledge.

Anticipatory Thinking

The processes of creation, research and innovation are absolutely fundamental to the mission of the university. Learning, as a link between creativity and information, determines the transition from a higher education system which transmits information to a new system which teaches where to look for information and how to create it. Creativity and innovation in the university - for what?: for basic and applied research, to create new knowledge which can be incorporated in parallel into the teaching-learning process, to bring the future within reach of the present, to make university formation an ongoing exercise of the cognitive faculties; in short, to contribute to the improvement of the human condition. This latter reason is a priority, but does not exclude other considerations which constitute revolutions of knowledge.

Harlan Cleveland holds that eight revolutions of knowledge exist today. *Explosive power*, derived from nuclear fission, which broadened war-related research and which today must be channeled towards peace; *global change*, which promotes cooperative study of the environment as a holistic process; *biotechnology*, to transform the link between well-being and misery; the *world of communications*, as an opposite, advanced stage of hyper-industrialized societies or the society of information. Within the fields of scientific and technological research these four revolutions respond to the questions «Know-what» and «Know-how». Research into the value system gives rise to another four revolutions of knowledge in response to «Know-why» and «Know-who». These are: the *ecological ethic*, as a means of preserving the diversity of the environment and a new awareness of human self-control; *justice*, which covers a wide range of factors which impinge upon human rights, the development of social justice, freedom as respect for one's fellows and cooperation as a symbol of solidarity and the obligation of humanity; *cultural identity*, in terms of respect and love for the cultural diversity of the world i.e. multiculturalism without loss of identity; and *participation*, as a solid philosophy underpinning the democratic spirit of the global society. I would stress at least two other revolutions, which should always be present in people's minds and apparent in their actions: the

aesthetic revolution, that human dimension concerned with beauty, harmony and the cultivation of the spirit; and the *ethical revolution*, as a response to behavior patterns which threaten to destroy humanity and their habitat in any way, i.e. the combination of values and attitudes which stand in opposition to intolerance, authoritarianism, corruption, hatred and destruction. These aspects are not circumscribed only to research into technological phenomena but also include factors related to value systems, social, administrative and political decisions and their corresponding processes of transformation: creative actions which entail anticipation, planning and prevention.

The university must incorporate research as a transverse activity within the curriculum. Every discipline involves the exercise of creativity within it, and this activity should form a part of all the learning units which make up the curriculum. Research and teaching are two component parts of university education aimed at moderating value judgments, learning to think and learning to act in the midst of the uncertainty of the future. Applied research in technologies, processes and transfers is one of the basic tasks of the university. Obviously, this task forms a part of the basic research function. It is worth stressing once more the importance of basic research within the university, and the obvious reason for the dependence of one on the other. «There is no applied science if there is no science to apply,» said the Argentine Nobel prize-winner, Bernardo Houssay. The strengthening of research and development (R & D) in the university is best channeled through the mission of «university extension». This «extension», which is not only educational and cultural, also covers research and technical assistance for social institutions and services. The creation of mechanisms and alliances with the public and private sector is a university obligation from which all parties stand to benefit. Both the university and the social institutions or companies need each other for all-round development. The university cannot carry out its creative mission in a vacuum, solely in the context of the relationship between research and abstract nature. It needs to apply basic science and to experiment on the social reality surrounding it.

At the same time, special organizations in the fields of health, industry, agriculture, livestock and fisheries, trade, leisure and other systems of production, management and human well-being require interdisciplinary and specialized efforts which, by their very nature, are concentrated in institutions such as universities. This is a trend of our time which is an expanding area of university activity today. However, it is up to the university to open its doors to such collective participation, which cannot be limited solely to «sponsored research or contracts according to results», on the basis of services rendered, but which must allow professionals and

technicians from outside, from the social institutions which require help, to be part of the university. At the same time, a spell spent in the companies with which research or technical assistance projects have been arranged must become part of the routine for university researchers. This scheme of university work is consistent with the policy for reflection in action, bringing the realities of society closer to the teacher-researcher, who is often alienated on account of his/her isolation which may either be self-imposed or imposed by the practices of speculation on pure reason and the study of society from an «ivory tower».

Development of Aesthetic Thinking

Science and art, as dimensions of creative thought, are universal in nature and develop to the full in freedom. Science stimulates the cognitive processes of the individual involved and art the emotions, but the cognitive and emotional elements coexist in both. Through science it is possible to experience aesthetic enjoyment, and with art it is possible to develop knowledge unfettered. Let us not forget, as Octavio Paz points out, that poets nearly always reach the truth before others do. Neither should we forget the integrated knowledge of the cultured Renaissance man, where no clear line could be drawn between where the artist ended and the scientist began. Leonardo da Vinci illustrates this admirably. The great men of science have been dominated by the world of aesthetics and many of them contributed enormously to that sphere of human activity. Cognitive, ethical and aesthetic considerations are an essential part of symbolic thought and they must be reflected in all their intensity in the formative mission of the university.

However, the aesthetic mission has been displaced, if not eliminated, from the position which it ought to occupy in the university curriculum. It is wrongly regarded as an ornamental extra, both in teaching and in the creative process. To educate for the aesthetic sense is to educate for sensitivity, imagination, global perception, a sense of harmony and beauty and an understanding of the diversity of modes, forms and cultures which distinguish humanity throughout the universe. Aesthetics, as an element incorporated into and transmitted through every branch of university learning, also contributes to the struggle against indifference, lack of solidarity and intolerance and is an excellent learning strategy to contribute to the right balance between reason and feeling, between the social and the intimate, between order and chaos, and the real and the imaginary world. Philosophy provides notable examples of the link between aesthetics, creativity and human well-being. In the literary field, the most important principle of aesthetics was formulated by Aristotle, who said that

fiction is of greater philosophical importance than history. «History reflects things as they are, whilst fiction reflects them as they ought to be».

Aesthetic education stimulates the development of fantasy, which is the basis of all creativity, whether artistic or scientific, the development of an overall view and the anticipation of an outcome, the use of logic and the various forms of human communication. The university must promote a policy of creativity in the arts and the sciences, in the humanities and technical studies which will stimulate the development of both areas of thought, as an integral form of the intellectual and affective growth of the individual. The university institution cannot be satisfied with a few units for artistic learning or a tiny shop window of «cultural activities». The aesthetic and the scientific dimension must go hand in hand, if the aim is to mold members of a society capable of continuing to learn in harmony with one another and developing their creative potential to the full.

Administrative and Management Thinking

The corpus of legislation and regulations governing universities at the present time is a considerable obstacle to the process of ongoing adaptation in which the university is involved. The more university legislation there is, the more difficult it is for its structures to become more flexible, diversified and innovative. At one extreme some universities are governed by basic state laws which are so detailed that the margin for maneuver left to the university is limited to the mechanics of the teaching-learning process. Many of these laws contain the contradiction of establishing autonomy for the university whilst, at the same time, regulating its structures, curricula, programs and degrees, forms of academic organization, criteria governing the admission of students and teachers, financing and, in some cases, they even define the specific objectives of the institutions and how to attain them. Alongside these extreme models there are also autonomous models where the university sets its own legislation, the laws governing them being carbon copies of the basic legislative models of the State or those of other universities. The only advantage is that should they decide to change them, the authority is the university itself.

These models, whether regulated or autonomous, are extremes which converge. Basically, they are a part of a sociological and psychological problem based on the lack of responsibility in the application of rights and obligations and necessary individual self-control. It has been said that the best basic university law is one which, in a single clause, compels the university to undertake unceasing change, i.e. a general law which speaks of rights and obligations towards the society to which the university

belongs, and which allows the university to establish the regulations it sees fit to fulfill those aims: a university legislation which should be as brief as possible, totally orientative, flexible, indicative, and truly stimulating if it aims to reflect the very essence and the philosophical foundations of all education and, consequently, of all creative activity; a legislation which reflects the missions and policies of the university as horizons for development, but which will deflect anything which might stand in the way of the pursuit of those missions; a body of regulations to solve needs and satisfy or channel expectations; a legislation which evolves at the same pace as social change and developments in fields of learning.

A flexible legislation requires a parallel flexible administration, one which exists to facilitate the teaching-learning process and the process of creation by the university community, not to stand in its way or make its task more difficult: an administration with the most modern management techniques using models which have been proved effective in other fields of business or public administration; an administration which ought to be governed by at least four criteria in all its functions - relevance, efficiency, effectiveness and advisability; an administration system shared by the academic community which must cooperate in those aspects of management which have a direct bearing on the teaching-learning or research process, such as preparation and evaluation of projects, applied studies and research, programs of technical assistance to businesses, public or community services, academic calendars, student counseling and other areas in which the teaching and administrative bodies need each other, i.e. a university community of students, teachers and administrators cooperating constructively.

University administrations must introduce significant changes in their own organizational procedures in order to come into line with the demands of an institution committed to permanent change. Complex organizations like universities have certain peculiarities which may limit innovation within them. The seven factors for organizational change analyzed by J. Hage and M. Aiken are classics. They hold that the more formal structures and regulations are, the more centralized the organization is; the greater the stratification available between incentives and salaries and the volume of quantity production to the detriment of quality; and the greater the stress on efficiency to the detriment of effectiveness and relevance; the slower the pace and adjustment of organizational change. Contrariwise, the more complex (interdisciplinary, for example), diverse and the greater the degree of interaction within the organization and of work satisfaction, the more rapid the speed of organizational change (Hage and Aiken, 1970). It is worth repeating here the need to de-formalize structures, to make the administration an effective, integrated channel

towards the rest of the university subsystems. The administration of a university institution is not an isolated body within the university. The management of the university also falls to the academic community, so that running the university is a responsibility shared by both sectors: the administrative and the academic communities. There is also a great need to split «macro-faculties» and «macro-schools» up into smaller units which will make discipline more compatible with interdisciplinary and multidisciplinary approaches and the links between basic and specialized areas of knowledge. A system of multiple functional structures, totally inter-communicated, which will facilitate the flow and feedback of knowledge and learners.

Diversification of the Curriculum

The explosion of knowledge, the changes taking place in the world of work and the ongoing change occurring in society must be reflected in the diversity of fields and disciplines available for study at universities. No type, form or expression of knowledge can be exempt from study and free investigation by the university community. However, the university cannot continue to offer obsolete programs, out-of-date degrees or specializations which are no longer relevant: diversification requires areas of study and disciplines to be opened and closed in response to the requirements of the times.

Also, diversification does not necessarily imply the fragmentation of knowledge. When the university missions of universality, diversity and interdependence were defined above, it was pointed out that the latter is a consequence of the interaction between the other two. The same argument can be used to define the interdisciplinary approach as the dialectic result of the unitary and diverse nature of knowledge. Therefore, the interdisciplinary approach cannot be regarded as taking a little from each discipline like little bits taken from different piles to make a new one. Arriving at the truth is not an eclectic compromise between partial truths, but the discovery of a holistic concept which can explain the links between these truths. An interdisciplinary approach is a complex one, because it is dialectic in nature in the sense that, in order to study the whole, the parts are analyzed individually as well as the relationship between the individual parts and between each part and the whole. The objective must be to produce conceptual synergies where, as in the phenomenon of chemical synergy, the effect obtained by the combined action of the different branches of knowledge is more enriching by far than the effect obtained by each one taken in isolation.

The interdisciplinary approach must focus on the understanding of the «other» in order to probe more deeply in one's own field. This idea brings to mind a thought of Lewis Mumford, the gist of whose remarks referring to the education of people was that our lives are governed by specialists who know so little about what is going on outside their special field that they can barely understand what is happening within their specialty. The interdisciplinary university is synonymous with learning for diversity and is part of its nature. The academic community of the university must exchange ideas, think about matters outside its own special field - on a transdisciplinary dimension - and be capable of constructing a great variety of syntheses: a community of professor-researchers and students as «learning persons» with the ability to grasp the whole and act upon the individual parts.

The university teaching-learning process must undergo an immediate revolution to diversify its methods, forms and the duration of courses. This diversification of the processes must be directed towards the use of teaching technologies which will give priority to creativity, learning by discovery, innovation, the constant exercise of the critical faculties of the individual, the ethical commitment in decision-making, the aesthetic and affective sense and the capacity to formulate and solve problems. It must foster the ability to search for information, as well as to select and interpret that information. Given the demand for quality university education, excellence is not measured in terms of the amount of knowledge accumulated, but rather the capacity to evaluate the possibilities and limitations of that knowledge.

University teaching-learning processes must combine numerous strategies for the acquisition of knowledge. These should include mixed theoretical and practical systems and explore the acquisition of knowledge through direct experience. They should apply objective-based evaluation techniques to replace the system of terminal or final examinations which is inappropriate in the light of what is now known about learning psychology and technology. The curriculum must be consistent with the principles of the inter-disciplinary approach and those referred to in the previous point. Acceptance of this challenge of the interdisciplinary curriculum is, by its very nature, a revolutionary change which affects the university institution in its entirety.

It is mistakenly believed that grouping together subjects drawn from specific disciplines constitutes an interdisciplinary curriculum. The same mistake applies to the professors who teach these subjects. An interdisciplinary curriculum requires subjects - preferably as learning units - to contain the languages of the sciences and the humanities. The learning units should contain the peculiarities and global features of individual disciplines and of transdisciplinary synthesis. These units, which together represent a study program, course syllabus or plan, must aim to provide

learning experiences which address not only the unitary nature of knowledge but also the characteristics of specific disciplines, the global or totaling character of phenomena, multi-causality problems, the indivisible and the divisible and the links between theory and practice, as a part of the utilitarian component of the curriculum. This horizontal dimension of the curriculum alters conventional course durations making students responsible for progressing with their studies in the periods which their particular personal and social circumstances permit. A pre-condition is that the teaching staff should be structured around the team-teaching technique, and that they should reinstate the concept of the academic community and apply it to its ultimate consequences. Instead of having only one professor per subject, the university of the future needs several professors specialized in different fields to teach each subject area, each learning unit.

An urgent and profound transformation of the teaching-learning strategy is required to combine the various forms of participation, acquisition of information, application of knowledge, holistic understanding of fields of knowledge supported by the contribution of communication technology and by a dialogue and commitment between the learner and the person who, besides learning along with the student, helps the student to learn. Students ought to play a more active role and stimulate their potential capacity for initiative. Professors ought to be aware of and competent in the use of all the teaching methods available in order to include independent and guided research in the teaching-learning relationship; live-in learning-work courses; guided didactic conversation; seminars *in situ* and field seminars; simulation of experiences and negotiations games; individual or small group projects; supervised study papers; methods for acquisition of information by individuals on their own initiative; and many other tutorial, participatory and distance learning methods which aid the learning process. University professors must understand that, in order to exercise their profession, they must, besides possessing a series of affective and cognitive qualities, fulfill three conditions: they must be competent in at least one field of knowledge and the link between it and other areas; they must display competence in the use of teaching-learning technology and comply with the code of ethics imposed by a profession which is directly involved in the all-round development of people.

Existing curriculum design in nearly every university in the world is centered around subjects or courses grouped in pyramidal or tubular structures. The latter are the most rigid. From the moment when students enter the university they are assigned to a specialization or degree course, which they follow without entering into communication with other fields of knowledge in the sciences and the humanities for a number of years until they emerge on to the labor market. These are totally vertical

structures which, in the best of cases, permit a small and limited amount of interaction with other specializations with a close affinity to that assigned: they are inflexible designs, incompatible with the interdisciplinary approach, and although the acquisition of specific knowledge is systematized, they «train» students with a high degree of segmentation which gives rise to separate languages in different branches of the sciences or the humanities, and, it goes without saying, a total lack of communication between these two fields. This is one of the most important causes of the training of «professional individualism», as opposed to the interdependent reality of the world and the need for an interdisciplinary approach required by research or the new labor market. To this would have to be added the reinforcement of this lack of communication between members of the university community; isolation of the teaching body in small groups or departments; the increased costs of teaching and research which the tubular process produces in terms of the duplication of effort and resources; and the irreparable damage suffered by any student, who, for whatever reason, wishes to explore other fields, disciplines or specializations without having to suffer the penalty of having to start all over again.

As the curriculum moves away from this tubular system towards a pyramidal structure, it becomes more flexible. The more horizontal and less vertical it is - without abandoning either orientation - the more flexible it becomes. Horizontal movement at the more basic levels must be total. Verticality is gradually introduced without ever attaining a single vertex. This strategy, adapted to the aims of each of the fields of basic and applied knowledge, would allow many curricular combinations. It would accommodate a disciplinary, transdisciplinary and interdisciplinary approach at one and the same time. It would allow students to transfer from one degree course and one specialization to another, from one institution to another and between universities and other institutions of society. Plans organized around «learning contracts» between the university and the learner, «self-learning contracts» and «supervised learning» must be accommodated within the curriculum: a study program which will agree to certify or attest to experience gained outside the formal university structures and allow knowledge, abilities and skills to be evaluated without requiring learners to attend lectures to acquire what they already know and are familiar with.

Curriculum flexibility also requires large «learning resource centers», units which must be the heart of the acquisition of information by the learner. These structures could be shared by one or a number of institutions, so that they can all have access to libraries, laboratories, workshops, electronic systems for the storage and recovery of data and all the technological resources available in order to carry out the university mission. There is no reason why these resource centers should be situated

within the university campus. They do not even have to be for the exclusive use of a single institution. As was pointed out above, the aim of inter-university cooperation is to share in lean times and in times of plenty. In this case, it is better to have one large learning resource center shared by several universities, rather than a travesty of a library and laboratories or information technology systems in small institutions or universities subjected to severe economic restrictions on account of the conditions of development prevalent in the country.

In conclusion, curricular flexibility is a primary condition if the university is to be a part of the mainstream of social, scientific and technological change which are intrinsic to the essence and future of education. Such changes compel the university to participate in a process of constant movement and, consequently, to constantly adjust and modify programs, contents, applications, the duration of courses and the configuration of spaces. In the absence of adequate curricular flexibility, the university will continue to be unable to provide information at the same time as this information is being produced. It runs the risk of becoming an institution solely for teaching history instead of a protagonist in the building of the future.

Finally, universities are required to change their internal culture and their extension programs to society. They urgently need to move from a "community of teachers and students" to a "community of learners." A university development based in a learner-centered formative education.

Learner-centered Education

A society for learning is based on the idea that all its members are constantly learning, each being helped by the other. The traditional, contemporary university has centered formative education on the «*teaching person*». Two cultures have been created: that of the «learning person» (the student) and that of the «teaching person» (the professor). It is recognized that without students the university would not exist, but the learning environment is organized in such a way that, perhaps even unwittingly, greater value is put upon the person who *teaches* than on the person who *is learning*. The concept of academic freedom has been applied exclusively to the job of the professor without including the student, when it ought preferably to be used for the free flow of knowledge. These two cultures ought to give way to a single culture, a learner-centered education, that of the «learning person»: a university all of whose members are a part of a community dedicated to lifelong learning, where both professors and students are learning; where the focus of the administration and management is specifically to facilitate the learning and creative process; where the

curriculum is designed, modified and transmitted on a day-to-day basis taking into account the innovations, new concepts and new technologies for teaching / learning.

Just as important as the above is the development of programs with contents which cover, both in breadth and in depth, what the *learning person* «should know» and which are not based on what the *teaching person* «knows». This would force «professors», educators or facilitators of learning, to constantly renew theories, techniques or methodologies and applications and, at the same time, to keep in touch with the generation of knowledge occurring both inside and outside the university. It involves, of necessity, a dose of humility on the part of people who, on account of their experience and capacity, recognize their limitations, share their knowledge and continue until the end of their days to learn the many things which they do not know. At the same time, this change in the current role of the teacher introduces a totally different relationship with the student, since a new educational philosophy is created, according to which learning is a shared, fascinating, intriguing and necessary adventure, instead of being authoritarian, tiring and boring.

In this way the university would respond to what its origins were: a community of scholars, of «learners», a large family of knowledge working with and for the world community. The realities of university life show that, save very few exceptions, the faculty constitutes a «university tribe» cocooned around itself, corporate in outlook and displaying an attitude of infallibility. The university today revolves, first and foremost, around the academic body. The design of the physical space, the systems of remuneration and promotion, the evaluation of merits, study programs, the academic-administrative structures, timetabling and other aspects of university life respond principally to the needs of the teachers, but not necessarily to those of teaching.

This system of priorities is applicable to universities in developing and developed countries alike. In some of the latter it is a well known fact that, for instance, many professors use their post-graduate students in the preparation of research papers, books and articles, where the names of these helpers do not appear, or are not given the predominance in the publication which their work merits, or they are simply thanked in small print in the relative obscurity of the introduction. Where are learning and research going? This kind of behavior is immoral and punishable as an infringement of intellectual property, and reveals the kind of covert authoritarian system reinforced by education centered on the «teaching person». On the other hand, this kind of behavior runs counter to the very essence of a teaching-learning situation, where the first rule is ethics, honesty and respect for others. If the university does not

change towards a community of learners, towards a learner-centered education, it can not face the new diversity and progression of knowledge.

In short, nothing new is relevant enough to be pointed out in view of the geometric growth of knowledge. It is about a shaking evolution but measured by the just as shaking development of the mass media and information systems. This relation controls the shock wave and produces a certain balance between the generation of knowledge and its distribution and assimilation. However, today's university is not receptive to this system of relation. It actually informs less and educates even less. It is absolutely necessary for the university to reform its own essence. This forces it to modify its process of education and therefore its policies and practices. We will conclude by summarizing the three core axes (Escotet, 1993) needed to guide the university towards the leading role it deserves: that is, the main institution for the generation and diffusion of knowledge.

Axes for University Change

The first of these axes, **Reflection in Action**, involves the principle of education and research - in an ever-changing world -, the principle that learning and acting, and creating and acting are parallel stages like parts of a process in constant flux. It is the same idea as education «in» life, as opposed to the tendency to educate «for» life, which implies that learners go through two distinct stages: one during which they «prepare» for life and another during which they «live life». This division runs counter to the philosophy of lifelong education and has been one of the main causes of the gap which exists between theory and practice, between generation and transmission of knowledge and between formal education and society itself.

The second axis is a **University for Diversification**. Creativity is closely linked to diversity which is, in turn, an authentic expression of universal culture and science. Man's cosmic understanding of the world is based on the study of multicultural inter-relations and the similarities and differences between cultures. Cross-cultural psychology analyzes a given culture on the basis of its local characteristics and as a systematic-dialectic component of the other cultures which make up the world. The study of a single culture, isolating it from the interdependence to which it is subject, is an erroneous methodology, as what defines any culture is the degree of diversity between it and other cultures. As variety is reduced to uniformity, the creative potential of peoples is correspondingly reduced. Diversity does not mean inequality or imbalances. The concept of diversity is based on the equality of people's rights and obligations which is achieved starting from

unequal and diverse policies and realities by perfecting what is existentially implicit in solidarity and fraternity.

Diversity, as a mission and a policy, is the essence of all education and an indispensable condition for the development of the sciences and the arts. Scientific laws themselves, if they are to be universal, must be tested under diverse circumstances. New knowledge brings in its wake large doses of creativity, and the application of these laws has ethical and aesthetic implications for a broad variety of judgments. The university, as a part of this diverse reality and as an inspiration for the learning of creativity, must be receptive to the diversification of learning, learners, branches of science and the humanities and interdisciplines. It must diversify its teaching methods and forms, the length of its courses, its institutions and programs, the system of certification and forms of financing. It must respond to the diversity of society and nature themselves.

The third and last axis is a **University for Flexibility**. There is no place for dogmatism in university culture. Rigidity of thought comes into direct conflict with the principles of the search for truth and the unencompassable breadth of knowledge. Just as diversity is the spur to creativity, so flexibility is the promoter of change. In the absence of flexibility things remain static. Dogmatism and rigidity are the source of intolerance, authoritarianism and conflict. At the same time, flexibility is not synonymous with weakness. On the contrary, it is a symbol of strength of spirit which grows when mistakes are rectified and ignorance is discovered. Certainty and the expansion of knowledge stand in inverse proportion to one another. As people become educated, the more people know and discover, the more aware they become of their own ignorance about the universe, which, in turn, spurs them on to learn more. Therefore, intellectual vanity is not an attribute of any person whose knowledge has reached the limit of his/her capacity. It is a characteristic of those who feign knowledge to conceal their ignorance. Knowledge excludes vanity, just as it excludes selfishness. Knowing for sharing and giving is one of the manifestations which ennoble humanity.

Following this line of thought, creativity and teaching need that flexible dimension where dialogue, tolerance, innovation, justice and freedom can flourish. This framework of values cannot be created with theoretical dissertations. One learns to be free by being free; one learns to choose by choosing; one learns to be responsible by exercising responsibility and one learns to be flexible by harvesting the fruit of flexibility which is knowledge itself. The university is one of the social conductors of flexibility, but on the condition that the university is itself flexible, both inwardly and outwardly: flexible in its structures, programs, research and transfer

processes, in its truths, and its community of men and women. The university needs the flexibility of the bamboo stalk which bends before the hurricane but holds out and survives the storm with vigor. Many of the policies outlined under the previous two axes require large doses of flexibility. In fact, reflection in action and building and accepting diversity cannot be achieved except in a climate of flexibility. Without reflection, diversification and flexibility it is impossible to build a philosophical framework about the epistemological genesis and transmission of the learner dimension and of the scientific, social and cultural dimensions of the university.

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