Available online at http://cadmusjournal.org/
Cadmus
Promoting Leadership in Thought that Leads to Action
Volume 2, Issue 4 - May 2015

The Double Helix of Learning and Work*

Orio Giarini
Director, The Risk Institute;
Member, Board of Trustees, World Academy of Art & Science

Mircea Malitza
Founding Member, Black Sea University Foundation, Romania;
Fellow, World Academy of Art & Science

Editors' Note

The Double Helix of Learning and Work by Orio Giarini and Mircea Malitza is a report to the Club of Rome first published by UNESCO in 2003. It advances fundamental paradigm-changing ideas in the field of education. Drawing inspiration from the double helix structure of DNA, the authors seek to strengthen the relationship between education and employment in order to bring 'The Knowledge Society' within reach. This article is a slightly abridged version of the fourth chapter of the report. The last and the next chapter will be published in the next issue of *Cadmus*.

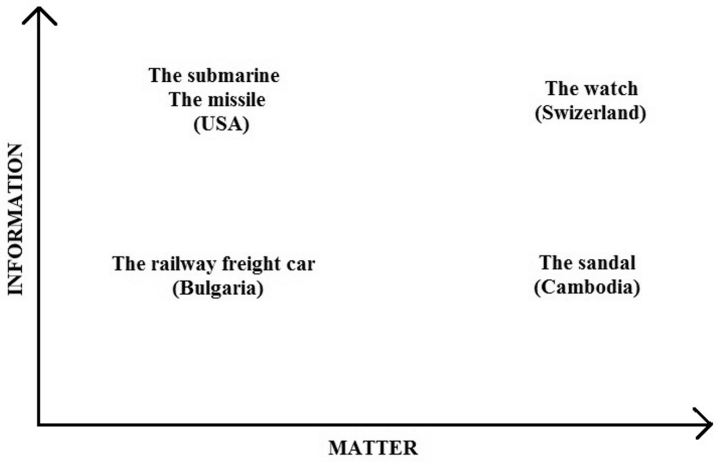
Chapter 4
"The Knowledge Economy and Work"

4.1. Knowledge as a Commodity

A Swiss professor at the Polytechnic University of Zürich used to draw a large rectangle divided into four smaller boxes on the blackboard. There were also two axes, one for the matter which entered the composition of the products specific to a particular country and the other for the information incorporated into those products.

According to the diagram, a submarine contains a large amount of steel, but it also has an impressive control panel. The great world powers build their military capability on products that combine large quantities of energy for propelling large payloads over very long trajectories with small quantities of energy to show the way. A watch uses little substance and energy but its fine, precise mechanism provides vital information on the flow of time. A railway freight car has massive wheels, a chassis, and wooden or metal sides, but it has neither a "brain" nor command mechanisms. A sandal made of straps holding a sole is the manual product of a worker who puts very little matter and only a grain of intelligence into his work.

Figure 1. Relative amounts of matter and information/intelligence in the composition of products made in given countries



One could write "intelligence" rather than "information" on the left axis of this figure so as to account for the desire of humankind to create products which are new and different and which reduce human effort, *e.g.,* through automation.

There is a new trend today according to which knowledge replaces information or intelligence. The "knowledge economy", in which we are living, assigns a new and supreme importance to knowledge.

Does this modification mark a turning point in economic thinking? One might as well cast doubt on the novelty of the concept. It is simply necessary to remember that, three hundred years ago, the Industrial Revolution occurred when people learned how to make machines. For the past two centuries, especially in the last century, industry has been science-based. Nevertheless, the novelty is great if one considers the relative weight of matter and knowledge incorporated into products.

The importance of classical factors (among which knowledge was not even mentioned) in the production of goods has obviously declined. The resource-based industry that characterized the first significant part of the history of manufacturing and shaped national strategies has lost its cogency. Japan is a major player in the steel market without having significant deposits of iron ore or of coal. Prices for natural resources fell 60 percent between the mid-1970s and the mid-1990s because modern products simply use smaller quantities of raw materials. To be capital intensive is not a condition for commercial success, since capital is widely available. Moving toward labour-intensive production is no longer a trump card in an era when skilled, and, consequently, well-remunerated labour is more important when one

has to run quasi-automated industries. In exchange, a new term has emerged in the equation of comparative advantages, something that counts more than the older factors and makes their location less relevant. As one author put it, "Today knowledge and skills now stand alone as the only source of comparative advantage" (Thurow, 1999).

"The effectiveness of knowledge is given by its movement. It does not produce anything when it lies still; it yields everything when it is intensively used."

This new commodity called knowledge, which is incorporated into the structures of all goods, can be compared to money. This comparison is suggestive of a puzzle: knowledge is like money, but it is not money: it can produce money and can be obtained for money. The universality of knowledge means that no goods can be produced and exist without knowledge. Knowledge has a relationship of mutual penetrability with goods, much like the complete interchangeability between money and goods.

The same as in the case of money, the effectiveness of knowledge is given by its movement. It does not produce anything when it lies still; it yields everything when it is intensively used. Its behaviour should be considered according to the derivative of the function or the speed of circulation. There is erudition that is valued for itself; however, it is less valuable than a certain hidden treasure. The value of money, resulting from the use of this treasure, has been recognized since biblical times. If Molière mocked the sterile exercise of avaricious hoarding, society did not repudiate the knowledge owner in the same way. A man of knowledge was considered the educational ideal.

In spite of these qualities, knowledge cannot either be appropriated or expropriated, as happens in the case of money. The brain is the safest repository of knowledge, as long as it is not expressed and circulated. The same thing happens to both knowledge and information: if circulated, it does not get depleted when it is shared, and any of its applications may provide opportunities for growth or development.

Globalization has created networks that defy time and space, allowing for the quasi-instantaneous transfer of money or pieces of knowledge (information) anywhere on the planet, no matter how far away. Information is, evidently, an indispensable support for knowledge, while knowledge is not reduced to bare information, but it contains a surplus of explanations of the facts, of understanding, of control of the natural, physical, or social processes, and of applicability and foresight. Broadly speaking, knowledge is science enriched with tacit, artistic, or logically informal norms. Knowledge is the first human activity that has reached the status of universality, most likely followed by trade and types of exchanges. Eluding restrictions or barriers, it keeps seeping into the places where attraction and demand are the greatest.

Another comparison might be made between knowledge and goods. Although it is initially stored in individual human brains, knowledge is produced in a highly interactive and

co-operative social melting pot. After it has been partially or systematically enounced, it becomes a public good that lends itself to general distribution. Everybody can drink from the "fountains of knowledge". We assimilate knowledge in public or private schools, we explore it on the Internet using a personal computer, we discover it by reading, studying, experimenting, and judging.

What kind of public good is knowledge? Its first feature is that it is not subject to rivalry. One can have knowledge without depriving somebody else of it. Information has the same feature. But only disembodied knowledge or other objects of thought are purely exempt from rivalry. The moment knowledge is embodied or encoded in material forms, access to it may be subjected to commercial logic. It will have a cost and a price. It takes resources and time to embody knowledge in people or to apply it in products.

The second feature of knowledge as a public good should be its *non-exclusiveness.* One cannot exclude a person from the benefits of public facilities or from enjoyment of universal basic rights. But a qualification also intervenes in the case of knowledge. Owing to its power and the benefits it produces, knowledge is protected as a special form of ownership: intellectual property. Patents, licenses, and any other form of protecting property rights make knowledge partially excludible, and only those who can afford to pay its price are entitled to enjoy it.

Knowledge is therefore a public good, to some extent, but not totally and purely one. Were it to be completely excludible, companies would no longer invest as heavily in research; publishing houses would no longer print books; and costly scientific events would not take place at all. These remarks on knowledge as a public good lead to unsolved ambiguities and dilemmas, which are likely to become even more complicated in the era of the "knowledge economy".

Nobody has ever changed mathematical theorems. This assumption of stability has applied to all statements resulting from serious research in the natural sciences or in societal phenomena. The moment there is an application leading to the production of tradable goods (*e.g.,* pharmaceutical products), knowledge is protected by law and is capitalized like any private good. Moreover, one witnesses a phenomenon of *rapprochement* between the pure and the applied sciences. Their borderlines become blurred or fuzzy. Applied research laboratories have also begun to tackle theoretical issues, even though the results of such investigations pertain to intellectual property rather than to the public good. Those countries that understand the need to maintain a high level of research in the pure sciences have found it necessary to use clever stratagems in order to justify the funding of such research programmes. In the United States, the military have contracts with mathematicians specializing in pure geometry on the basis of a putative interest in potential applications.

Public schools operate in response to the constitutional requirement to provide education for all as a universally recognized right. The State invests public funds to produce people endowed with knowledge. Companies, however, regard that supply of trained people as a free input for their productive activities. Moreover, some states have built successful industrial

policies on the conversion of the scientific results obtained by other states into highly profitable applications. There are countries that rely, as a matter of policy, on the recruitment of foreign specialists who have been trained at a high cost in their countries of origin.

In the realm of education, there is continuing tension between the duty of the state to distribute and to transmit knowledge as a public good and the real chances that acquired knowledge will enter the circuit of private goods and protected property. Companies may occasionally be unhappy with the inadequate training that the personnel they require may have received in the public education system; therefore, they organize corporate training schemes for their own use, which are characterized by high costs and excludible knowledge.

The ever-increasing costs of public education, which, together with the health system, have become large consumers of the State budget, call for a comprehensive reconsideration of the educational process. From a different perspective, the major consumers of knowledge, especially in the public sector, are very interested in finding a workable solution. The people at large also expect a new approach. They aspire for emancipation and well-being in accordance with the new promises of human knowledge.

In the course of this century, a triad of decision-making and sponsorship is likely to emerge in the educational sector involving the government, the business community sector, and civil society. The new formula should also include parents, teachers, and young people. For the time being, this trend can only be detected in the convergence of the processes that influence current developments in schools: lifelong learning, work-related education, recurrent and alternative education, the modularization of curricula, the information and communication technologies, distance learning, and, ultimately, individual curricula and itineraries in the work/learning space.

We have to admit that most of the literature on the subject of the knowledge economy uses the term with different connotations. From a limited perspective, the knowledge industries are primarily those industries the major product of which is knowledge itself: software, biotechnology, and information technology hardware. The corresponding professions are engineers, scientists, programmers, and designers. Second, knowledge industries comprise units that are involved in managing, processing, and distributing information, such as telecommunications, banking, insurance, advertising, law, medicine, and education. They employ a broad range of professionals including managers, lawyers, bankers, and teachers.

From a broader perspective, the knowledge economy has been so described because it recognizes the primacy of the knowledge factor in the production of goods. This description applies in particular to the large industries, called by some authors "man-made brain power industries" in order to distinguish them from the classical industries, based on resources, capital, or labour. Usually, knowledge and skills are mentioned together. The synthetic (and not the analytical) skills seem to be the most important, since they are capable of putting together and capturing the synergy of all intellectual factors such as invention, design, manufacturing, services, and marketing, which are the premises of successful production.

There is considerable agreement on the role of tacit knowledge in craftsmanship. The intense familiarity of workers with the objects pertaining to their work, proper apprenticeship,

and experience are more relevant to the final result than are given rules or formal training. The winner in this case is intuitive learning by doing rather than the application of systematic recipes.

The knowledge required by any of the industries, services, or productive activities (not only by those designated as knowledge industries) can also be classified into two strands. We might wish to call one of them "Schumpeterian", since it addresses the entrepreneurs and in view of the fact that it was Schumpeter who first talked about them. This strand is a more élitist one that operates at the level of major decisions that determine the ideal combination of the numerous ingredients going into process technologies. The other strand goes to the basic level of the shop floor, where the workers can use their knowledge-based competencies to control processes, identify errors, increase efficiency, and develop initiatives.

Seldom has education held such a central place in the minds of reformers and of society as has been the case with the emergent knowledge economy. Learning has entered the mainstream of wealth-creating factors in society and of self-fulfillment in individual lives. The knowledge economy, however, reopens the problems of equal chances, of the right to education, and of the responsibilities of society, of the State, and of companies to organize adequate educational structures. At the beginning of a new century, we see the picture of an abundance of experiments and experiences, most of them redundant and costly, lacking orientation, and hardly lending themselves to effective classification.

4.2. Innovation

The key word for the life of work in educational discourse, the supremely persistent demand and cardinal virtue, is "innovation". The classical qualities (*i.e.,* skills, training, the work ethic, discipline, and teamwork) are not overlooked, but the ability to invent, to create, and to innovate is fundamental. The entrepreneur and the manager know that competition cannot only be confronted with lower prices and higher quality, but also with novelty. The product has to be labeled as "new". The managerial school is not discouraged by the innovative trend.

Creation was traditionally assigned to a spark of genius or to an outburst of talent, inexplicable, non-transmittable, and inimitable, attributable only to hazard or to divine grace. Such theoreticians of management as Peter Drucker claim that innovation can be learned in the same way that one acquires knowledge and skills. They argue that, in addition to educational algorithms and the networks, there is another informal, invisible, and inexplicit way to acquire an ability to innovate, which is valid for the entire sphere of knowledge.

In order to better understand the demands of production and services, it would be edifying to examine more closely the contents and the nature of innovation. Any process, no matter how advanced, can be further improved. Incremental ameliorations of performance and efficiency occur slowly and tenaciously. The same happens in sports in which established records are constantly beaten by subsequent competitors. It is a universally valid, incremental, and cumulative method, which is used daily in professional or personal life. There are

handy means to apply it, such as a pertinent remark, the repositioning of two pieces, the identification of the cause of a frequent error, or simply driving home a nail.*

Small remedies can have major effects. It has been demonstrated that it makes sense to delegate responsibility down to the shop floor and to involve workers in the innovation circuit of production processes. Many of the innovations that have been made in this way remain anonymous. Still, they are vital and should not be neglected. Even a small reduction in costs may result in huge profits. An eloquent example is provided by the electronics industry, in which microprocessors are made under the microscope. Battles are fought for microns and nanoseconds. For years, chip technology has been reducing overall dimensions and has been increasing the hosting capacity of circuits. The constant pace of incremental improvement confirms the now famous law of Gordon Moore, according to which the available computing power quadruples every 30 months. (Moore's Law of Productive Technology was enounced two decades ago). Those who design circuits know about the tremendous effects that the conquest of a minuscule space or the reduction by an infinitesimal fraction of operating speed can produce.

Each and every industry, company, or service is involved in a process of perpetual innovation that is reflected in price, quality, aspect, advertising, functioning, and user-friendliness. Innovation also accounts for a continuous effort to build additional layers of competitive advantages. At certain points, this race may show signs of exhaustion and saturation. No matter how massive the investments, profits no longer live up to expectations. In other words, the efficiency of the incremental approach is limited.

The discovery of this phenomenon has led to the examination of another type of innovation, called "value innovation" by certain authors (Kim and Mauborgne, 1990). This approach ultimately means to get out of the competition, to forget product improvement and incremental thinking, in order to choose a different track, one on which there is nobody just yet. Value innovation is innovation that actually introduces a different product, configures another market space, attracts new clients, and opens brand new horizons. In a comparative study of several new companies, it was noticed that companies using value improvement in an attempt to match or to beat their competitors generated considerably lower profits than those based on innovation. "Rather than building advantages over their competitors, companies with huge profitable growth aimed to make competition irrelevant by providing their buyers with a quantum leap in value".

This perspective on innovation, along with the underlying economic strategy, has some qualities that are worth mentioning. First and foremost, the attitude toward competition became a real trap for the theorists of incrementalism. Competitors are no longer the obsession of a company based on value innovation; their adversaries no longer matter. The logic of the zero sum game is no longer valid. Secondly, the impulse no longer comes from outside, from a competing and imitative environment and its random events. It stems from

*"A little neglect may breed mischief: for want of a nail the shoe was lost; for want of a shoe the horse was lost; and for want of a horse the rider was lost" (from Benjamin Franklin, *Maxims Prefixed, to Poor Richard's Almanac* (1757), in Bartlett (1941), p. 227).

internal resources and acknowledges a shift of focus from "exogenous" to "endogenous" growth and innovation. Thirdly, the reduced degree of competition allows some strategic relations with other firms in harmony with the requirements of the early "modular society", in which network is the prevailing element. Finally, this concept fits nicely with the knowledge economy, since it relies on specific pieces of knowledge and ideas.

This example, taken out of the economic sphere, provides an interesting analogy with the progress of the theory of negotiations and conflict resolution.

The myriad experiences in this field comprise difficult situations, protracted or recurrent, resulting from conflicts between states or economic entities, in which the basic issue is that of distributing a material asset. Distribution may apply to a territory, a strategic geographical position, mineral resources in a certain area, a sum of money, even sharing loot or profit. Such situations were studied by the two-player game theory, especially zero sum games. They resulted in an important number of conclusions, practical observations, and recommendations. Most of these concern the negotiation process, the succession and proportions of the concessions offered, the threats, the bluffs, and the promises. The result points to a formula of mutual accommodation of interests to be incorporated into an agreement or final solution that is meant to bring about the termination of the conflict. Game theory is adequate because it defines a game as a rule-based competition.

Nevertheless, the possible analogy with the game of economic competition – in which the rivals are in dispute over one and the same good, namely the market and the buyers – is most striking. The moves of everyone are incremental and experimental. They are aimed at seizing maximum advantage from a sequence of ingenious steps. It should be noted that competing companies cannot possibly become partners in any of these two cases.

The theory of negotiations and conflict resolution has registered the limits of these methods and even their failure in different types of situations, which do not involve the (re) distribution of a tangible good but rather a confrontation between two cultures in an identity conflict. There is nothing to distribute or to reconcile when it comes to two religions, two languages, two histories, two categories of customs, two mentalities, or a territory jointly inhabited by two populations that illustrate the above-mentioned differences.

Such situations are what gave birth to the "innovative" school. It aimed at achieving a new formula of conciliation, based on common interests. The trick was to make the two parties work together. It was only in the few cases in which the innovative approach was utilized that a successful outcome was obtained, leaving behind the numerous disputes that had poisoned previous relationships. An even more explicit form of that school suggests a philosophy of the common project.

In the area of negotiations, the innovative school displays even greater similarities with value innovation than in the case of the chapters on classical incrementation competition in negotiation games, or of the hardly reducible rivalry between businesses. Indeed, it was this school in its most recent and explicit form that – following a comparative study of the

conflicts in the Balkans and in the Caucasus – made a new start by leaving the old track and even overlooking the conflict itself.

The innovative solution is a project built on the clearly identified common interest of the conflicting parties. The proposed solutions pertain to the idea of civilization. They involve fewer and fewer values and beliefs, and they rely solely on the preservation instinct of the parties concerned and on their aspiration to normality. Of course, dialogue is not ruled out, but it gives way to the concept of interaction. In the final act, the initial problem is no longer even mentioned. It only contains the description of a common project in a non-controversial area and calls for constructive interaction.

All the features of economic innovation are to be noted here as well: the zero sum game is left aside; the source of the solution is endogenous, starting, as it does, from an idea related to the sphere of knowledge and intellect, and the goal is to transform former adversaries into partners. In economic matters and in political negotiations alike, the same word is used for the old competition or conflict; the common project makes it irrelevant.

This analogy points to an even greater degree of generalization so far as problem solving is concerned. Those problems that are by their nature protracted, difficult, or even unsolvable by means of current methods, require a new audacious approach: the substitution of a problem with another problem that makes the former obsolescent and irrelevant. The newly suggested problem has the virtue of opening new horizons and simultaneously meeting the expectations of those who have been caught up in contradictions and dilemmas.

Education accepts the reality of its impasse and the fact that it can only get out of it by adopting a common strategy with an adjacent field, that of work, in its attempt to find an authentic, innovative solution, to leave the never ending track of small-step reforms and piecemeal approach.

We shall see whether or not the innovation in question can be learned in schools, in institutions, or in society. Not only children learn but also adults. Today we use phrases such as: “learning companies”, “learning societies”, and “learning governments”. It is most likely that the attribute will secure the success of these undertakings.

Despite the abundance of courses, schools, and textbooks, it is difficult to believe that the mystery of innovation will vanish and that the cultivation of the capacity to exercise it can be confined to algorithms or universal practical recipes. Epistemological theories or the knowledge of how the brain functions only enable us to see innovation as a special attitude, a product of various, yet unidentified, factors. We might at least agree on the circumstances that could facilitate or encourage it to flourish. It is not clear who will come up with the surprise.

Here is an edifying example. We process knowledge, we use it, systematize it, or enrich it through reasoning. For centuries, we have debated the merits of the Aristotelian deduction or of Baconian logic. Both are vertical, but the former operates from the general to the particular, downwards, from principles to facts, while the latter functions the other way round, from particular cases toward generalization.

4.3. State, Democracy, and Market

An acutely perceived need is felt to clarify the relationships between the state and the market economy in the new century. The need is so much greater as education, work, and knowledge put additional pressures on both the state and the market. No issue is as topical for political discourse as the relationship between politics and the economy and between the State and the market. The former has decision-making and managerial power relative to public good. The power of the latter lies in the welfare offered by the private owner and producer. Political parties are basically classified according to focus and supremacy. Emphasis is laid on importance and priority.

One interpretation suggested that the triumph of the market would lead to the decline and eventual disappearance of states. Instead, at the end of the first decade of transition, analysts concluded that growing poverty in some countries was due to the weakening of the state, while prosperity in others was based on the assumption that wealthy states do not take the news of their imminent demise seriously.

States use the laws to provide a proper infrastructure for the operation of the privately owned economy. The State has institutions designed to apply those laws in order to provide roads and public transportation, trained personnel, improved health, clean cities, and the rational use of resources. It also has to ensure the protection of property and the security of lawful transactions.

The diseases from which states suffer are generally different from those of private businesses. First, there is bureaucracy resulting in rigidity, inadequacy, waste, duplication, high costs, and inefficiency. Second, there is corruption, when public responsibility is misused for personal gain. Third, there is a temptation to paint everything in political colours, bringing along a great deal of ideology and demagogy and pushing aside the criteria of competence, which should be decisive in public service.

Nevertheless, the State is the main employer, sponsor, and leader of education and knowledge. It also has to be the creator and mentor of the legislation regulating work and other civil rights. But the pace of change in the internal structures of states is slow, and their adaptation to global challenges (technology, trade, financial markets, knowledge) is held back by considerable inertial forces and vested interests. The diseases of the state are a perpetual memento of the dangers that education and work have to face.

Tangible indications of emergent counteraction are already visible. The educational system has reacted by promoting decentralization, i.e., the transfer of ministerial duties to regional and local authorities, down to the level of schools. Increased academic autonomy, the enhanced responsibility of schools in terms of financial administration, the growing number of optional courses, and parent and community involvement provide clear evidence of the flexibility that the educational system has been asked to develop.

The inherent shortcomings of the market, especially its absolute acceptance of extremist liberal trends, directly concern education and knowledge. They also have a bearing on employment policy. Such is the case with the short-term goals and limited interests involved

in the calculation of profit. Who would be willing to invest in the expectation that possible competitors would benefit from the results? It is only the State that can make such generous gestures because it has to treat the whole of society as a beneficiary.

The avoidance of a long-term view has unfortunate effects on education and research. Comparative studies of several countries indicate that the tangible results of a robust modernizing reform and of considerable investment are to be reaped within a minimum of twenty years. Advancements in the fundamental sciences, in mathematics, in the structure of matter, and in the system of life are also a matter of long cycles. Statistics indicate an increased interest on the part of the private sector in such activities, as expressed in the increased availability of funding. Still, with almost no exception, such funds are funneled into short-term efficiency projects. The genome project was deemed to advance fundamental science, but it also had extensive applications in the industries that had benefited from the progress of cellular biology. The promise of considerable profits precipitated the interest and funding from the private sector.

In the countries in transition from planned to market economies, the mistaken perception of the role of the State in relation to market resources led simply to the closing of research institutes employing highly trained personnel. In those countries, private universities have mushroomed: they now enroll up to half the total university population in some places. The key word of transition is privatization, so why not apply it to education as well?

The results were mixed. On the one hand, quality went down. Selection for admission was almost non-existent. State education lost teachers but also candidates who no longer wished to face the rigours of entrance examinations. On the other hand, the flexibility of private universities was much higher; so was their openness to innovation. State universities also rose to the challenge by admitting students without requiring an entrance examination and by charging them tuition fees. These fees enabled the universities to increase the wages of professors and to improve study conditions.

The tendency to privatize the educational system in the circumstances of the new economy is a new phenomenon. The premises of this position are undoubtedly viable. The producers of national wealth, the state budget, and the state institutions included, must have a say with respect to the fate of the learning industry that has become the main resource in a knowledge economy. They are also entitled to demand that the necessary knowledge, skills, and attitudes be produced with a view to obtaining more wealth. Now, when human capital has become more important than physical capital, it may at least claim a place in the decision-making *Areopagus*, next to public authority and civil society. Will the logic of the market prevail over the traditional approach, based on the public good? Will education stand to gain in that perspective?

One of the arguments that is frequently heard is that private enterprise is better equipped to train young people for the global economy of the Twenty-First Century, characterized as it is by increased competitiveness.

We must face the reality that the "products" of public schooling do not inculcate the kind of active dedication to competition that companies seem to be seeking. In Japan, the

graduates of regular universities are welcomed into the business community with the following slogan: "Now you [will] start from the beginning; you will enter the real school of the company which will enable you to perform an activity for which you are completely unprepared at this point". And still, according to Japanese tradition, those young people are likely to remain in the respective company for the rest of their lives.

"The shrinking sphere of action, the limitation of goals, and the increasing specialization are features that do not conform to current aspirations to maintain an open and mobile pool of competent and innovative human resources."

The disadvantage of corporate universities is characterized by the frequent situation of young people who are trained to fit the profile and behavioural pattern of a given company and who lose their jobs. In conformity with the law of increasing mobility, young people in such a situation must adapt to the requirements of another company, with a different pattern, logic, and fidelity commitment.

It should be noted that the impatience of companies about the perceived insufficiencies of the combative skills provided by regular schools is not entirely justified. The admission tests, the evaluation system, the selection through examination, the involvement of students in competitions with other schools, the struggle for recognition and prestige, the very effort required to graduate, and the fear of dropping out demonstrate that there is competition in the public education system. Aggressive competitiveness is also reinforced through sports.

For an evaluation of the advantages and disadvantages of a possible preference for education provided by private companies, corporate universities and the training they offer are a case in point. The emergence of such centers of learning has made the established educational system more alert and open to innovation. Corporate educational units are privileged places for experimentation and innovation, enjoying significantly superior facilities compared to the public sector. They have already brought in a stimulating and even provocative touch of freshness. Conversely, the emergence of segregated educational enclaves may appear ominous in any learning system in the circumstances of globalization. The shrinking sphere of action, the limitation of goals, and the increasing specialization are features that do not conform to current aspirations to maintain an open and mobile pool of competent and innovative human resources.

It is now the time to examine another dimension, which in the general confusion has been represented as a merit of the triumphant march of the market: democracy. Indeed, market and democracy do have something in common, *i.e.*, the idea of liberty, the recognition of individual responsibility, the encouragement of an entrepreneurial spirit, and risk-taking. These features were even celebrated as inseparable expressions of the victory of liberal democracy by Francis Fukuyama in *The End of History and the Last Man* (1992).

A closer look reveals that market and democracy are quite neatly delimited when it comes to equality. Democracy exalts the equality of citizens before the law as equal owners of a set of universal rights, including the rights to education and to work, and it requires the State to watch over the observance of those rights. Moreover, democracy demands that the State ceaselessly strive to remedy the undesired effects of economic mechanisms (illiteracy, unemployment, discrimination).

The principles that guide the functioning of the market are free of such concerns. It has been recognized (and measured) that the economic processes leading to successful accumulation of wealth are accompanied by deepening inequalities both domestically and at an international level. The route might be the same and the processes may run parallel, but still, democracy and the market are currently heading in opposite directions. Cogent data offered by economists confirm this fact.

In the transition countries, the latter statement is attributed to those suspected of being nostalgic regarding the planned economy. In the developed countries, it may pass for a socializing outburst on the part of the enemies of entrepreneurship. And yet, intergovernmental meetings taking place in resplendent historic cities have to face the anger of fringe groups that describe themselves as “anti-capitalist”. At United Nations summits, the acceptance of globalization as an ineluctable process is accompanied by lamentations regarding the inequalities that it tends to aggravate. It should be noted that most of the protesters are teenagers; so are the persons who are throwing stones in Gaza and Jericho. Even though there is some talk about manipulation, we must not overlook the anxieties caused by delays and hesitations in applying the agreed measures designed to correct some of the more severe inequities or to bring certain critical conflictual situations to an end.

Theoretically speaking, school is a propitious place to understand democracy, to develop it practically, and to assimilate it durably. Facing the teacher, all pupils are equal. Young minds perceive any negative or positive discrimination as intolerable. Any references to ethnic, religious, or linguistic specificities or to those of habit or belief are regarded as deviations from the general norms of education. Of course, such a position presupposes that the system itself is not contaminated or poisoned. Non-discrimination and education for all are key notions in modern conceptions of education, as attested by acts of law, international conventions, and educational theories. Education is probably the climax of equality, which the tougher realities of social and economic life will eventually dilute.

What is the solution? Who are the future patrons of education, science, and knowledge? Classical Antiquity invented the *triumvirate* as a form of government. In some states, the employers, the trade unions, and the government co-operate on matters concerning production and work. It is also plausible that educational processes should develop under the auspices of a triangle consisting of public authorities, private enterprise, and civil society. Each of the three has the material and conceptual resources that can provide education with an organizational formula that would meet the requirements of participation, anticipation, and work quality.

4.4. Democracy and Roles

An honest survey of the Twentieth Century would surely reveal that work was a clear winner. It marked the end of the era of Sisyphean toil, of a brutalizing pace, and of raw physical effort. Suffice it to say that the workweek used to be nearly eighty hours long in the Nineteenth Century

Around 1800, in Germany, people worked for ten to twelve hours a day; in 1820, for eleven to fourteen; and between 1830 and 1860, for fourteen to sixteen hours. The maximum nearly reached 112 hours per week. Reading the ILO statistics on the average numbers of working hours per week (34.7 in the United States, 38.3 in Germany, and 38.9 in France, recently cut to 35), we realize how much modern technology and advanced management have done to improve the human condition.

The remuneration for this more relaxed work shows a continuously rising trend, reminding one of Fourastié's calculations (Fourastié, 1966) for the equivalent of an hour of work in kilograms of bread over two centuries.

A major failure in the field of work, unemployment, has, however, become an obsession for politicians and a constant concern to society.

Let us look at the industrialized countries first. According to OECD standards, unemployment should normally affect about 8.5 percent of the labour force, a total of 35 million people. The situation was not always the same during the postwar period. Until 1970, unemployment did not affect more than 10 million persons in the OECD countries, but soon after it started to grow and eventually tripled in 1982. Despite some amelioration owing to the economic expansion of the 1980s and to massive countervailing measures, the level of unemployment did not fall. Rather, it tended to remain unchanged, defying a plethora of legislative, economic, and social remedies. The persistence of that phenomenon pointed to a weakness in the system and to the under-performance of the economy. Those who seek solace in the fact that an aging population reduces the pressures on the job market in some countries are confronted by the reality of a longer active life and the claim on the part of senior citizens of the right to work.

Several conclusions can be drawn from an analysis of developments in those countries in which unemployment and its social consequences have been extensively covered in specialized research literature.

First of all, what is the meaning of structural unemployment? It has to do with a failure of adjustment between demand and offer on the labour market. Some authors estimate that this type of unemployment is quite important: 8 percent of the labour force against an overall rate of 10 percent. As its name illustrates, structural unemployment is the effect not only of market regulation but also of structural change. One of its underlying causes is that of qualification, which should have been provided through education.

There are quite a few vacant positions calling for high skill levels. Every day one hears of frantic efforts to fill the gap in demand for software programmers. At the same time,

the growing mass of job seekers with low-grade or obsolescent skills is confronted with an obvious saturation of demand. Once again, we have here a telling demonstration of the fact that the mission of education has to be closely linked to the future of work. The knowledge factor pushes the standards required of education ever higher, at a greater speed than the ability of the schools to adapt.

Current programmes for coping with unemployment are primarily directed at a better mobilization of the existing labour supply. They involve additional training for unemployed adults and special measures for young people and for the disabled. A different but complementary strategy involves government assistance to persons who are willing to start a new business on their own or special incentives for companies to employ additional workers. In most of the industrialized countries, expenditures for this type of measure aimed at increasing the chances of productive employment of their citizens have reached some 0.5 percent of GDP.

Another possible solution is *active search, i.e.,* employers trying to contact job seekers by all kinds of methods including employment services and an effort to encourage more mobility for a wider variety of jobs.

A special category of measures has been developed purely in the educational sphere. The aim is to develop employment-related knowledge and skills within the educational system through the initiative of employers. This new type of activity is definitely on the rise. Never has the variety of non-classical methods or innovative approaches been so wide. Lifelong education, education for work, modular curricula, adult education, and on-the-job training offer a broad spectrum of solutions. Their diversity is in inverse proportion to their ability to fit a single coherent scheme. Hence the need to develop an articulate system whereby the issues of education and work can find practical answers at a lower cost compared to the previous loss-making, old-fashioned, and outdated systems.

Even though the debate on the natural and legitimate responsibilities of the state in economic matters has been as heated and as controversial as ever, the state still retains powerful levers for reformulating its own functions in order to control, or at least to influence, the developments that may be of concern to society as a whole. Instead of a command panel with as many buttons as a nuclear power plant or a transatlantic jet, the state still relies on a small set of simple pedals, most of them not necessarily governmental, to influence the course of economic development.

Inflation and unemployment are among those phenomena that can be realistically controlled. The pedal that the government of a market-oriented country can push is the one that sets the level of the prime interest rate, which accounts for the essence of its economic policy. Controlling inflation takes priority. It has been the main headache of decision-makers and economists because it affects the living standards of the entire population. Broadly speaking, to check rampant inflation, one has to raise interest rates. Money becomes more expensive; prices go down; and so inflation is tamed. When the pedal is released and the interest rates rise, the cost of money goes up, investments go down, economic growth slows down, fewer new jobs are created, and unemployment soars.

Europe is illustrative of a policy that keeps the interest rates high resulting in heavy unemployment. This trap has lived on, despite a post-recession recovery. For quite a while, Europe has been casting envious glances at the paradoxical situation of the United States, where a combination of a high rate of economic growth, a low inflation rate, and high employment defied the classical equation for almost a decade.

Globalization makes the prospects of stimulating growth through classical methods even gloomier in certain countries. The huge amounts of money that move rapidly around in the networks of globalization make it necessary to adjust monetary policies accordingly, rather than to pump money into the economy. As a defensive reaction, the interest rates will increase, thus inhibiting a rational use of available productive resources. In terms of philosophical approach, the economic policies of many developed nations are still dominated by monetarist neo-liberals, who do not rank increased employment high on their lists of priorities.

The pedals available to government authorities do not function perfectly. Sometimes their expected effects are delayed. Here we are faced with another paradox. At a microeconomic level, considerable profit increases following the introduction of new technologies and subsequent expansion occurs simultaneously entailing significant cutbacks in personnel. This phenomenon is what companies describe as *downsizing*. New trends in management have turned the proportion of efficiency and the volume of human resources upside down. Again, paradoxically, this phenomenon occurs during non-recessionary periods.

While past recessions primarily affected blue-collar workers, in the late 1980s, four out of five people who lost their jobs were white-collar workers, i.e., managers, clerical workers, and salespeople. The figures for the United States are relevant. In the late 1980s and early 1990s, two waves of corporate downsizing swept across the economy eliminating about 2.5 million jobs. In 1995, when corporations cashed in the highest profits in twenty-five years, 600,000 people were laid off. The same phenomenon was replicated in Europe. Also in 1995, a major bank posted a $1.75 billion profit while eliminating 10,000 jobs.

In defense of these measures, some specialists claimed that most of the personnel who had been made redundant eventually found employment with other companies. True enough; however, as one case shows, only 70 percent of the workers found new jobs, and half of them for lower wages. In many cases, downsizing meant that people had to be content with poorly paid work that earned them far less than what they had earned in their previous employment.

Some American economists praise the flexibility of the American labour market as opposed to the more rigid system prevailing in Europe. The price of that rigidity, caused by generous social programmes supported by the trade unions, could be high unemployment.

Lester Thurow (1999) draws the conclusion that “downsizing has destroyed the old implicit post-Second World War social contract”, whereby people could count on stable or lifetime employment, provided their own performance was satisfactory and that their company made profits. He actually provides a definition of work mobility when describing the effects of downsizing. Firms, he writes, “are developing a contingent workforce composed of involuntary part-time, temporary workers, limited-contract workers, and ...consultants who work for wages far below what they have previously been receiving”.

Another worrying phenomenon in the labour market is the condition of those persons who have been completely and definitively left out.

Marx's *Lumpenproletariat*, whose reduced productivity made them undesirable to any employer, are now known as "the homeless". The sidewalks along the streets of many great cities serve as bedrooms for the terminally unemployed. In order to understand the possible consequences of the emergence of that underclass, let us recall Herbert Marcuse's forecast (in *MacIntyre*, 1970) according to which future revolutions would not be carried out by the proletariat but rather by people who were marginalized and rejected by society: the *lumpenproletarians*. They are said to comprise between 600,000 and 800,000 people in France and nearly 7 million, over a five-year period, in the United States.

The prevailing fatalistic attitude toward the mysterious ways of the economy and financial mechanisms does not exonerate the state from its own responsibilities. Unemployment is a sensitive electoral issue for politicians. Taxpayers, who also happen to be voters, do not easily accept job insecurity or loss. States tend to acknowledge their responsibilities as well as the fact that individuals are powerless when left, on their own, to confront the scourge of unemployment. The response is basically embodied in the quasi-philanthropic and humiliating unemployment benefits, "the dole", which amounted to almost 2 percent of the GDP in the countries with an unemployment rate of 10 percent. One should add to this nearly 0.5 percent of GDP for mobilizing the existing labour supply through training and recycling.

The problem of jobs is acute. Attempts to alleviate it have always led to an aggravation of the budgetary situation, threatening financial disruption and bankruptcy: however, there is a viable economic solution in sight.

At this point, the contrast between the lucid acknowledgement by the State that urgent measures with regard to the education/work relationship are needed and the inability of the State to follow-through on such measures is confusing. A lingering suspicion exists that active measures to combat unemployment simply do not work.

Let us take a look at the official texts of a meeting of labour ministers of the industrialized countries that took place at the end of the 1990s.

Everything that was stated there is true and pertinent. The ministers admitted that globalization stimulated technological advances and worldwide liberalization but that the relationship of globalization to the structure of production and employment was problematic. The link between rising unemployment and the widening income gap was quite correctly emphasized. The ministers also noted that structural changes were difficult for some countries to absorb and that a public backlash against globalization was possible. They were convinced that broad-based strategies and structural reforms were necessary in order to reduce unemployment, parallel to fostering the emergence of a knowledge society "capable of generating high-productivity and high-wage jobs". They mentioned the importance of new incentives to improve training, to enhance the effectiveness of an active labour market, and to bolster employability through coherent strategies for lifelong learning. A strong link between

work and learning groups was recommended, along with a better co-ordination of the labour market, between workers and employers, so as to promote education and training. All the right premises were recognized, from the knowledge and learning society to employability for all, even the need to find the appropriate answers together. But practical solutions were still missing. The bottleneck was identified at the point of transition from school to work. Sheer intuition must have prompted the ministers to state that the young entrants into the labour market "are likely to be required to have a variety of educational and employment experiences, either concurrently or in quick succession".

Educational experts congratulate themselves on having a five-year mandate (still uncompleted by 2001) to develop lifelong education for all. They regard the latter as an effective tool to reduce the risks of economic and social marginalization. They are concerned with providing learning throughout adulthood and with creating new opportunities to mix work with learning. They acknowledge the need to introduce more flexibility into the educational timetable and to consider new combinations and new pedagogical approaches to meet, more effectively, the learning requirements of adults. Here again we find another bottleneck: the insufficiency of the means to measure and to recognize how better education translates into higher productivity. The peremptory statement according to which "teaching in the classroom is the central instrument of educational policy" is even more disarming. That very premise might have to be abandoned so as to get closer to the right answer.

All the pertinent terms are present in that scheme, even the curriculum, with timid attempts to season it with a few topical subjects. Only modularity is missing, gathering dust in some forgotten drawer. Without it, no matter how good the co-operation among various ingredients may be, the mixture will neither coagulate nor come to life. The solution of life-long learning through individual curricula that are freely chosen, knowledge intensive, and aim-oriented in a system with multiple entry and exit points, in the double helix of work and learning, is still not visible.

4.5. Knowledge as Self-Fulfillment

We have noted with satisfaction the encounter between the economic sphere and knowledge as an essential factor of production. It is a decisive step for the development of a mutual interest in the future of education and its funding and for the establishment of a creative relationship between work and education. Knowledge will have to moderate its appetite for theorizing and formalizing in favour of applications and utilization. The new method for upgrading the status of work with better qualifications and higher wages is paralleled by enhanced motivation, which energizes the learning processes. Last but not least, it creates a favourable environment in order, simultaneously, to deal with the rigid processes that have been so resistant to change in the spheres of both work and learning. The two can be finally joined together on the same social spiral.

Turning this exclusively utilitarian vision of knowledge into a dominant paradigm or theory may obscure the danger of neglecting the major changes that have altered the world-view of a significant part of the population, especially the young.

First, there is a different type of knowledge than active knowledge, which used to lead the individual along either known or new paths. That knowledge is sometimes called "inert" because it has been stored without counting on an obvious opportunity to use it in new and predictable situations. Active knowledge has a visible and recognized utility, while the inert type has different utility criteria (e.g., aesthetic satisfaction, aspirations to erudition, private answers to philosophical questions, and support for individual mediation). It is hard to believe that such knowledge can be compatible with an employment-oriented vision.

> For the time being we shall restrict ourselves to formulating the principle and to examining what its corollaries are from the point of view of society's obligations towards the child. This principle is that education (the "full development of the human personality") is not simply a contribution that would be superimposed on top of the results of an individual development regulated in some inborn way, or that is accomplished by the family alone. From birth to the end of adolescence, education is one whole, and is one of two fundamental, necessary factors for intellectual and moral formation, so much so that the school carries a great responsibility regarding the final success or failure of the individual in pursuit of his own potential and adaptation to social living. In a word, the internal evolution of a person (according to the aptitudes of each one) ...provides merely a certain amount of rough outlines that are capable of being developed, or left in an untouched state. But these are only rough outlines, and only social and educational interactions will transform them into efficient behavioral patterns or destroy them totally. The right to education, therefore, is neither more nor less than the right of an individual to develop normally, in accord with all the potential he possesses, and the obligation that society has to transform this potential into useful and effective fulfillment. (Jean Piaget, *To Understand Is To Invent The Future of Education,* 1973).

Second, useful and active knowledge maintains the educational system as a knowledge-manufacturing machine. The individual enters it untrained and comes out at the other end, well prepared to be engulfed in the social machine of work, in which he or she produces goods and wealth assisted by advanced tools. This vision fails to put people first with all their measurable and immeasurable needs. It is, therefore, contrary to a prevailing and almost universal aspiration.

Third, the active knowledge that is needed for employability and sustained productivity is susceptible to being regulated by market demand, thus enhancing the contrast with the less general activity of public education, which trains people for social roles, even though certain roles may be considered unproductive. This difference also becomes visible in the gap between proprietary knowledge (a status to which active, expropriable knowledge aspires) and general, inert knowledge, which is of no interest to entrepreneurs since it fits the notion of knowledge as a public good.

Fourth, active knowledge aims at exclusivity. It is available to a limited and select number of people. The inherent consequence is alienation from the universal and indiscriminate calls for education for all, thus widening the gap between the "haves" and the "have nots".

Fifth, active knowledge ignores that "inert" stock from which individuals spontaneously and unexpectedly pick up associations and ideas to develop a creative initiative or an innovation. What we call "intuition" has deep roots that cannot be programmed. It plods its way slowly, drawing from the complex experience of life. When it comes to problem-solving competencies – for which it develops solutions, algorithms, and recipes – knowledge leaves out the capacity to invent new problems, the true quality of innovative spirit.

A more radical sociological school starts from the adage that "knowledge is power" in order to reach the conclusion that education has invariably produced trained individuals according to the pattern imposed by superior authority. It claims that the economic paradigm of knowledge is nothing but a rehashed form of the old stratagem: economic power shapes individuals for its own purposes. An influential contemporary trend, while denouncing technology and science as allies of the dehumanizing and homogenizing structures of power, goes so far as to recommend that people smash the windows of productivity and paid work-oriented knowledge.

A less militant perspective is offered by the examination of the differences between objective knowledge and subjective values. A theorem or a technological procedure, a work of art or a personal opinion, belong to two different families. One is that of civilization, which includes all activities and goods having a universal vocation. There are no different ways of building aircraft, laying out roads, organizing hospitals, or making banks operational. Everything is there in the universal research network. Any statement produced by that network is provable and reproducible anywhere in the world. However, the same does not apply to values, which belong to various and numerous cultures. Cultures (always in the plural) comprise traditions, history, languages, and untranslatable beliefs. They lie at the other side of the spectrum considered by Arnold Toynbee. When we talk about globalization, we make references to civilization, i.e., to technology, science, economy, and infrastructures. At this level, the unprecedented flourishing of cultural variety parallels globalization. Cultures thrive through specificity and originality, unlike civilization that creates similar roles and professions all over the world.

Still, the quest for identity holds its ground in our modern world. It is linked to the aspiration for dignity, and it ranks high in the book of universal human rights and values, which go beyond all cultures. In economic literature, with the employment-wages-qualification triad at its core, there is no reference to dignity. Yet dignity plays a fundamental role in both work and learning processes. Work creates humankind and builds up his or her personality. A human being is what he or she produces.

In addition to self-identity pertaining to dignity and self-respect, there are two other elements that have been neglected by the economy-oriented approach. One is the quest for meaning, which does appear in the process of knowledge in the absence of value, and therefore culture. It adds to our linguistic symbols and conceptual elaborations through the use and assiduous frequentation of contexts, beyond the factual or formal enunciation. There is relevance in the story about the man working for a railway company who, after thirty years of successful activity, had only one wish: to be told why on earth he had to hit the train

wheels with a hammer at the station. Know-how never exhausts the meaning of work, always searching for whys. That question is also essential to learning.

> *"Schools of thought contesting the value of reason flourished, without noticing that the disputed areas and the banners of victory were nothing but extensions of the same reason too narrowly and arrogantly defined."*

The second element is ludic, also common to learning and work. *Homo ludens* enjoys playing games – competitions with rules. When one says that a young person finds satisfaction in learning and an older person is happy with his or her work, the sensation evoked is primarily a ludic one.

There are very many reasons to think of civilization and of cultures together, in "opposite inseparable terms". Recent writings admit that mankind is passing from an or/or logic to an and/and logic. Learning and work are the most evident areas in which civilization and cultures intermingle.

The impact of this shift on the curriculum is considerable. Also, it increases the difficulty in reflecting the essential from a vast variety of cultures. With a mandatory and fixed curriculum, many pitched controversies are expected to emerge. The competition between the universal and the local, illustrated by Alan Bloom's book, *The Closing of the American Mind* (1987) has been enlivening American society for many years. As to the individual curriculum, the problem becomes much simpler. We only have to ask ourselves what modules are recommended for individual choice in the process of lifelong learning.

There is also an overriding civic culture, which allows individuals to assimilate and to apply, meaningfully, all the concepts and practices of social life. It is regulated by the laws and mechanisms of the social contract it has itself generated. Democracy falls under this chapter. So do human rights, in close conjunction with duties and responsibilities. The mechanisms of governance, the policies of political parties and the games they play, the limits and the value of power, the conduct of elections and the exercise of suffrage, the relationships between state and nation, between the governmental and the non-governmental, between public and private goods – are all topics for modules designed to examine the same thing from different angles. Political theory should not be mistakenly taken for a theme of learning. Modules titled, "A Day in Parliament", or "A Cabinet Meeting", or "Debating the Budget", or "Attending a Trial" could be ways of conducting actual or virtual experiments, with a greater impact than any theory-based lectures. An efficient method is that of young people simulating a political debate. A module could consist in debating a conflict at the United Nations. Many schools already use such work sessions with roles assigned to pupils.

Community culture aims at targets that are different from social cohesion. It deals with traditions, history, and beliefs specific to a single community, with the cultural binder of

various groups expressing their specificity and their own identity. It points to multicultural society and to respect cultural diversity. This is an extremely topical issue at a time when the cult of specific identity has been heated to incandescence resulting in conflicts that dot the world map. The acceptance of alterity is a salutary virtue that can be sown at the very heart of community culture.

Integrating philosophical culture appears to be a difficult task, and its language sometimes makes it inassimilable. However, if presented in friendly modules focusing on predominant trends – to which we unconsciously stick, much like Monsieur Jourdain's prose in the play by Molière – philosophical culture might offer the young person or the adult the satisfaction of organizing his or her own ideas in a coherent format. The post-Second World War generation experienced, one after the other, existentialism, structuralism, Neo-Kantianism, Heideggerianism, and postmodernism, with its illusion of the *dernier cri*. It also visited cybernetic theory, systems theory, and the theory of chaos. Schools of thought contesting the value of reason flourished, without noticing that the disputed areas and the banners of victory were nothing but extensions of the same reason too narrowly and arrogantly defined. These schools have affected everybody in varying degrees, the same as old disputes can be identified in collective mentalities (see, for instance, the debate between the triumphant hedonism in today's consumer society and the vanishing stoicism).

An author classified the three phases of modernity as follows: (i) industry; (ii) globalization, and (iii) revival (expected in the new century). According to him, knowledge is uniform in the industrial age, segmented in the phase of globalization, and customized in the new era. The modular itinerary strives for this sequence. However, in order to create his or her own vision of the world, the individual needs the critical exercise of examining ideas.

Moral culture has many sources. Nobody can decide whether the guide for one's conduct and the dramatic distinction between good and evil is based on religion or on secular beliefs. Kant assimilated conscience to a divine imperative. There are still people who consider conscience as categorical and ultimate. Modern society reflects a deficit regarding this point. The amorality of science is questioned. Prevalent immorality is denounced. Old ethical codes are completed and enriched *(e.g.,* the work ethic); new ethics are suggested (the ecological ethic).

With respect to this last point, a new culture has asserted itself by introducing the values of respect and love for nature, care for resource conservation, preservation of the diversity of the species, and environmental concern. The strategies inspired by this culture, which has the support of young people, establish the responsibility of those living today for the future of the following generations.

Last but not least, we have to mention the culture of literary fiction and the creative or performing arts, described as aesthetic culture responding to eternal and profound human needs. It is a fundamental dimension, always present in the picture of the complete personality produced by individual learning and work in all their aspects. Many of the propensities of modern humanity find their driving force here. Science fiction cherishes the anticipatory spirit, and literary fiction guides us through the realm of the imaginary so that we may return to our own reality in a more relaxed state of mind.

The topics of culture lend themselves more than any other subjects to the free choice of the individual. He or she can cover a multitude of optional modules, which do not lead to definitive statements, but to possible and plausible ones, thus encouraging a permanently critical attitude.

Why is knowledge, in the positive and universal form of science and technology, so much contested by the advocates of cultural values and beliefs? Why are those cultural elements viewed with suspicion and often ignored by the proponents of positive knowledge? Because of what distortion or sophism engendered by a schizophrenic and separatist dualism can they not be accepted together as inseparable components of learning and work? Their common spiral invites a further effort to restore the wholeness of the mind and to reconcile the two hemispheres of the brain, which are naturally destined to work together.

Author Contact Information
Orio Giarini *- Email: giarini.orio@gmail.com*
Mircea Malitza *- Email: m_malita@upcmail.ro*