CADMUS

NEW PERSPECTIVES ON MAJOR GLOBAL ISSUES

PROMOTING LEADERSHIP IN THOUGHT
THAT LEADS TO ACTION

The CADMUS Journal

The acronym of the South-East European Division of The World Academy of Art and Science—SEED—prompted us to initiate a journal devoted to seed ideas—to leadership in thought that leads to action. Cadmus (or Kadmos in Greek and Phoenician mythology) was a son of King Agenor and Queen Telephassa of Tyre, and brother of Cilix, Phoenix and Europa. Cadmus is credited with introducing the original alphabet—the Phoenician alphabet, with "the invention" of agriculture, and with founding the city of Thebes. His marriage to Harmonia represents the symbolic coupling of Eastern learning and Western love of beauty. The youngest son of Cadmus and Harmonia is Illyrius. The city of Zagreb, which is the formal seat of SEED, was once a part of Illyria, a region including what is today referred to as the Western Balkans and even more. Cadmus will be a journal for fresh thinking and new perspectives that integrates knowledge from all fields of science, arts and humanities to address real-life issues, inform policy and decision-making, and enhance our collective response to the challenges and opportunities facing the world today.

Overcoming the Educational Time Warp:
Anticipating a Different Future

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Abstract

Education abridges the time required for individual and social progress by preserving and propagating the essence of human experience. It delivers to youth the accumulated knowledge of countless past generations in an organized and abridged form, so that future generations can start off with all the capacities acquired by their predecessors. However, today education confronts a serious dilemma. We are living in an educational time warp. There is a growing gap between contemporary human experience and what is taught in our educational system and that gap is widening rapidly with each passing year. Today humanity confronts challenges of unprecedented scope, magnitude and intensity. The incremental development of educational content and pedagogy in recent decades has not kept with the ever-accelerating pace of technological and social evolution. Education is also subject to a generational time warp resulting from the fact that many of today's teachers were educated decades ago during very different times and based on different values and perspectives. The challenge of preparing youth for the future is exasperated by the fact that the future for which we are educating youth does not yet exist and to a large extent is unknown or unknowable. The resulting gap between the content of education and societal needs inhibits our capacity to anticipate and effectively respond to social problems. All these factors argue for a major reorientation of educational content and pedagogy from transmission of acquired knowledge based on past experience to development of the knowledge, skills and capacities of personality needed in a future we cannot clearly envision. We may not be able to anticipate the precise nature of the future, but we can provide an education based on the understanding that it will be very different from the present. In terms of content, the emphasis needs to shift from facts regarding the actual state of affairs in the past, present and future to the process governing the continuous evolution of the society and the deep drivers that are catalysts of that process. In terms of pedagogy, there should be a shift from emphasis on comprehension of what is taught to development of the capacity to think independently and creatively about the future. In terms of objectives, it requires a shift from promoting socialization to fostering individualization and from educating the mind to educating the whole person.

Education is the most remarkable technology so far invented by human beings. Education organizes knowledge and abridges time. It transmits the essence of humanity's cumulative past learnings to future generations in a systematic and condensed form. It enables future generations to commence their productive lives with the essential knowledge acquired

by countless generations in the past, rather than having to rediscover and reinvent all that has been learned by their ancestors. This extraordinary device enables society to convert individual experience into a possession of the entire collective. It also makes it possible for society to synthesize the external experience of the collective and apply it to develop the inner, psychological endowments and capacities of each of its members. Oriented in this manner, education becomes the catalyst for conscious social evolution.

Education widens our sense of identity from the family and community to larger social groups. It helps prepare us for responsible citizenship at the national level and for participation in the wider life of the global community. It provides a foundation for the spread of effective democracy and establishment of universal human rights. Education equips us with the practical knowledge and skills needed to productively and creatively contribute to the advances of modern economy, science and technology. Education expands our consciousness of the impact of human activities on distant places, on future generations and on the environment.

In 1870 one new PhD was awarded in the entire USA. Today more than 67,000 are awarded annually. During the same period, the number of BA degrees awarded rose from 9400 to 1.6 million. India's higher educational system expanded from 1.1 million students in 1961 to accommodate 26.5 million last year. Over the last four decades, the world total tertiary enrollment in education has grown nearly five-fold from 37.5 million to 184.5 million.[*] Were it not for the enormous quantitative expansion and diversification of higher education, it is inconceivable that humanity could have made such enormous strides in raising food production, abolishing famine, eradicating a host of fatal diseases, reducing infant mortality, extending life expectancy, multiplying real per capita global income 12-fold, weaving isolated communities into a single global community through advances in transportation and communication, ending slavery and colonialism, extending rights to women and minorities, and drastically reducing the global incidence of war between nations and war-related fatality rates.

1. The Changing Speed of Time

Education expands our sense of time. It enhances our awareness of the movement of time and extends our conscious time horizons from the origins of the universe, the evolution of Homo sapiens, and the first stirrings of civilization into the near and distant future of individuals, societies and the universe itself. Education provides us with a sense of history and a historical perspective of current events. It generates awareness of the constant process of change occurring ceaselessly in the universe around us, in society and within ourselves.

It shifts our time horizon from the past to the future. It instills belief in humanity's continuous progress, which is one of the defining characteristics of global society today, distinguishing the modern era from earlier more static, conventional periods focused almost exclusively on preservation of tradition. It alters our underlying motivation from a reverence for what has been to an anticipation of what is yet to come. It replaces the sense of fatality defined by historical determinations beyond our control with a sense of freedom, self-confidence and self-determination. It modifies our psychological orientation from conformity

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[*] *United Nations Statistical Handbook for 1978*, NY, 1979, and *UNESCO On-line Database* http://data.uis.unesco.org/?queryid=142.

to individuality. It transforms our spiritual orientation from blind submission and adoration of ancient beliefs and practices to an intense aspiration for greater knowledge and higher accomplishment.

Education abridges and accelerates time. Historically, our sense of time conveyed continuity with the past, our relatively insignificant place in a slow, unending progression of repetitive events and historical cycles. Awareness of the brevity of our lifetimes and the inevitability of death reminds us of the severe limitations within which we move, act and aspire. Before the advent of literature, ancient and medieval humanity lived in an eternal present, unconscious of the very long, slow incremental evolution of the universe and civilization. The prevailing sense was that things were and always will be more or less as they are now. Our sense of duration in time was also severely constrained. During the Elizabethan Age, ancient Greek myth and contemporary histories, such as Shakespeare's, established both the boundaries and expanse of the social time sense. A mere three centuries ago, Sir Isaac Newton's quest to discover the unchanging universal laws of a static, immobile universe was conducted side by side with his study of Biblical sources to determine the exact beginning of the universe some 6000 years ago. Time seemed to almost stand still in Timeless India, where history, literature and education for millennia depended exclusively on oral traditions.

All things change, including time. Time is no longer what it used to be. At least our sense of it has been dramatically altered. The invention of the printing press coupled with the Reformation and the spread of education gradually altered the time sense in Europe. As consciousness of history expanded, so did awareness of change. Thomas Malthus' concern about the dire consequences of rapid population growth, Adam Smith's writings on the nascent Industrial Revolution, and Darwin's treatise on the origin of species arose from a growing awareness of evolutionary changes impacting on human beings and the world we live in. It took tens of thousands of years for the world's population to reach 100 million, but only 18 centuries to multiply another ten-fold to reach one billion. Since 1800 it has multiplied another seven-fold to cross seven billion. Over the same two centuries, global real GDP multiplied 84-fold. Parallel changes in transportation, communication, life expectancy and every other aspect of life signaled a fundamental change in the speed of time. Things began to change far more rapidly than in the past. Moreover, the spread of education ensured that an increasing proportion of humanity were informed of the fact and understood at least some of the factors and forces that were altering the speed of time and the future of humanity.

2. Time's Challenge to Education

Today the speed of time is accelerating exponentially and society is more conscious and observant than ever before. It is accumulating and analyzing enormous quantities of data every second, generating new inventions and discoveries every hour. More than two million patent applications are filed annually. According to Google, a total of 129 million original book titles have been published since the dawn of printing five centuries ago. We are now adding another 2.2 million a year in addition to the innumerable other forms of text. Born in 1991, the Internet now contains more than one billion websites. These facts provide just

a distant reflection of how rapidly global society is changing, how much new information it is acquiring, and how great is the challenge confronting the world's educational system to keep pace with the lightning rate and gargantuan quantities of facts, experiences, events, discoveries and ideas that contribute to development of knowledge and human capabilities.

"In an age when information about virtually everything is available at our fingertips, the educational system continues to emphasize transfer of information as the predominant objective of education."

Education as we know it involves the transmission of knowledge from one generation to another. In practice there is usually a two to three generation gap between what instructors learned from their own instructors when they were students, what they teach to students when they become instructors, and the world in which these students will live and seek to apply what they have learned in future. A single generation ago, the Cold War, Soviet Union, Communist Bloc and 70,000 nuclear weapons were dominant realities of the day. The World Wide Web, the Human Genome Project, nanotechnology, iPods and smartphones did not yet exist. Two generations ago, Europe was still recovering from devastation of the Second World War, the US had just landed its first contingent of combat troops to fight in Vietnam, the Berlin Wall had only just been constructed, world population was less than half what it is today, Martin Luther King was just launching the American Civil Rights Movement, and the Green Revolution had not yet emancipated more than billion people from the perennial threat of famine. Three generations ago, the Great Depression still dominated the world economy, the world war was still in its early stages, penicillin was not yet in use, the atomic bomb had not yet been invented, and the population explosion had not yet begun.

3. Closing the Educational Technology Gap

Is it reasonable to rely on the perspective of instructors raised in worlds so different than today to prepare and equip our youth for life a generation from now which we cannot even imagine? The increasing speed of discovery, invention and knowledge generation imposes an ever-greater burden on the educational system and those who pass through it. One result is that the gap between information generation and transmission through education is widening rapidly. The world's educational system lags far behind in responding to the growing need for speed.

Since the dawn of the Industrial Revolution, rapid technological development has been one of the key drivers for accelerated social evolution. It has radically altered the way almost every human activity is carried out. Mass production has radically changed the nature of work and the workplace. The train, automobile and airplane have transformed beyond recognition the frequency and speed with which we move from place to place. The telephone, radio, television and internet have inconceivably altered the speed and frequency with which we communicate. Urbanization has drastically reconfigured where and how we live. Antibiotics

and other medicines have doubled our life span and abolished many ailments. The only notable exceptions are religion and education which are conducted largely as they have been for centuries in the past. Organization stifles rapid evolution in both fields.

Although the number of people engaged in higher education has increased even faster than the growth of population, the technology of higher education remains essentially unaltered. A reluctance to adopt new technologies in higher education can be traced back to the very origins of the system. The first modern university was founded at Bologna in 1088 about 360 years before the invention of the printing press. At that time oral transmission of information and ideas from scholars to assembled groups of students at a central location was the only available method for mass education. Yet six centuries after the advent of the printing press and the wide availability of printed books, the earlier model remains dominant. Since then, systems of communication have advanced from handwritten books to instant printing and global text, audio and video broadcasting, but education continues to rely on oral delivery systems akin to those used in ancient India and ancient Greece.

Serious efforts to develop alternative models can be traced back a few centuries, but have only recently begun to attain the critical mass needed to meet the rapid growth in demand. The first distance education program was introduced at the University of London in 1836 and at the University of Chicago in 1892. The USA and Soviet Union introduced distance education by radio broadcasts in the 1920s. Iowa State University became the first to broadcast educational courses on TV in 1950. The UK Open University was founded in 1969. The first online program of higher education was introduced by the Western Behavioral Sciences Institute of California in 1981. After 2000, MIT and other mostly American universities began to experiment more seriously with online delivery. The creation of YouTube in 2005, followed by Khan Academy and iTunes University in 2006, opened up alternative delivery systems outside the traditional university environment. This eventually led to the founding of the first Massive Open Online Courses (MOOCs) offered by Udacity, Coursera and EdX in 2012.[*] Today more than 30% of American college students participate in distance learning programs. China is expected to have 100 million online learners next year.[1,2,†] These developments herald the first truly widespread change in educational technology in ten centuries. Yet, inertia and resistance from within the present system remain enormous and still retard adoption of new models.

4. Rediscovering Pedagogy

The mode of delivery is only one of the ways in which the global system of higher education is out of sync with the needs of society in the 21st century. Pedagogy is another serious constraint. The prevailing conception of what should be taught and how it should be taught remains mired in the distant past. In an age when information about virtually everything is available at our fingertips, the educational system continues to emphasize transfer of information as its predominant objective. It is time to pause and ask ourselves whether an entirely different conception of education is required.

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* See http://www.worldwidelearn.com/education-articles/history-of-distance-learning.html

† See 2014 China Online Education Report (Brief Edition), http://www.iresearchchina.com

The world over memorization of facts remains the predominant and often the exclusive approach to education. The predominant measure of education remains the capacity to regurgitate facts. With rare exceptions, understanding and application of principles and independent thinking are at best given secondary importance. In many countries students learn how to read, but still do not learn how to comprehend what they read. They are taught how to read and understand individual sentences, not how to comprehend the meaning of a series of arguments. They learn to speak in grammatically correct sentences, rather than to think in coherent chains of thought. Excessive emphasis on memorization diverts mental energy

> *"Excessive emphasis on memorization diverts mental energy from higher processes of understanding, analysis and thinking."*

from higher processes of understanding, analysis and thinking. It forges deeply engrained habits at an early age that persist throughout life. It reinforces the insatiable appetite for more news and information. It explains why the best informed, most highly educated populations in the world continue to exhibit a very poor capacity for comprehension and independent thinking, as reflected in public opinion polls and electoral behavior.

While leading American universities tend to give greater emphasis to understanding and analysis than universities in most other countries, subject proficiency remains the primary qualification for lecturers around the world. At the WAAS-WUC conference at UC Berkeley in October 2013, leading educators confirmed that the perpetual race to keep up with the increasing accumulation of information to be taught has overshadowed research on the actual process of learning itself. The role of the university instructor is still primarily to transfer information, not to awaken minds and stimulate creative thinking.[*] The near universal effort to remember more and more has led us to neglect something more important than all the facts they commit to memory. In placing exclusive emphasis on what is to be taught, we neglect the process of learning itself. Higher education has forgotten the central importance of pedagogy. Thus, text based learning and oral language learning continue to predominate long after educators and psychologists have identified important individual differences in the way different people learn best and multiple intelligences which human beings utilize in order to learn in multiple different ways.

The recent revolution in learning technologies has revived efforts to understand the process of learning itself and to measure it more effectively. It has also facilitated the study of different individual learning patterns and their results. This research confirms what every teacher has always known—that we learn most when we teach others. The present system is designed to maximize the learning of the instructor, rather than that of the student. The mind develops when curiosity is aroused and imagination is awakened, not when it is passively absorbed processing bits and pieces of canned knowledge. The essential value of live contact with the instructor is to promote interaction that raises conscious awareness and stimulates independent thinking. Experimentation with hybrid learning models in which students study

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[*] "The justification for a university is that it preserves the connection between knowledge and the zest of life, by uniting the young and the old in the imaginative consideration of learning. The university imparts information, but it imparts it imaginatively. At least, this is the function which it should perform for society. A university which fails in this respect has no reason for existence." Whitehead, *op. cit., p93.*

on their own and then come to class to interact with instructors and other students demonstrates rates of learning far exceeding those obtained by either conventional classroom or online methods by themselves. Moreover, the shift to online learning has greatly facilitated the adoption of multi-sensory forms of learning, incorporating text, images, sound and video that appeal to different aspects of human intelligence. A new pedagogy is needed that harnesses the new technologies to provide a more complete and effective learning experience.

"Examination of humanity's current problems makes evident that narrow specialization is a source of the problems rather than a solution to them."

Another longstanding pedagogical tenet is that students learn best when they study independently and compete with one another. Few question why this should in fact be the case. In the workplace almost all activity involves group collaboration, where the process of discovery and development is a collective process. A cooperative learning model was introduced at New Technology High School in Napa, California in 1996 at the suggestion of companies seeking to improve the learning skills and working capacities of their future recruits. The altered model was found so successful that it has resulted in the establishment of a national New Tech Network consisting of 160 schools in 26 states based on the cooperative learning model.[*]

5. Restoring Life to Education

There is another fundamental aspect of pedagogy which receives too little attention today—the creation of context. As Whitehead put it, "There is only one subject-matter for education, and that is Life in all its manifestations."[3] Life is a learning experience that is perceptible to all our physical senses, feelings and emotions. In addition, it is inherently contextual. Each experience occurs within a wider physical, social, cultural, intellectual and psychological context that provides essential insights into the nature of the knowledge that can be discerned from the experience. We understand very little about the unique discoveries of Copernicus and Darwin, unless we are cognizant of the constraining force of religious orthodoxy opposing the propagation of ideas that appeared to directly undermine the authority of established church doctrine. Great scientific discoveries of the 20th century met with similar resistance from the entrenched scientific community. The history of the American Civil War is hardly intelligible unless viewed in the context of the growing sentiment against slavery that began in Europe and spread around the world after 1700. Yet today the tendency toward decontextualization of information is greater than ever before. We have evolved a culture of facts devoid of knowledge. We pride ourselves on the capacity to absorb innumerable snippets of data daily on a wide range of subjects so that we can converse on all subjects without really understanding any of them. And this may be widely prevalent within academia, as well as in the outside world.

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* http://www.newtechnetwork.org

This tendency toward decontextualization is fueled and aggravated by the exponential growth of information, but it has deeper, more fundamental roots in the workings of the thinking mind. The nature of the mind is to try to know by dividing reality into parts and concentrate on studying each part as if it were a whole, then subdividing it into smaller parts and studying each of them as if it too constituted a whole in its own right. We study the trees and lose sight of the forest. We study circulatory or respiratory diseases and lose the holistic perception of human health, which characterized ancient systems of medicine such as Ayurveda and Siddha. We create specialists in finance who have been taught little about the impact of finance on production, employment and human welfare. We educate experts in marketing, engineering, and human resources without imparting the knowledge of how organizations grow, develop and evolve. We educate leaders of business and research without considering the impact of their activities on society and the environment. We produce experts in each of the parts who are increasingly blind to the whole of which these parts are inseparable, integral elements.

> *"Growing awareness of this reductionist tendency of the human mind led to the development of systems theory, complexity theory, ecology and holistic thinking as efforts to reconstruct the whole that has been infinitely subdivided."*

The quantum of information is growing so rapidly that keeping up with new knowledge in a single field has become a full-time job that leaves little time for either teaching other people or applying that knowledge in other occupations. The knee-jerk response to information overload has been a proliferation of new disciplines and more specialized fields of study, resulting in an increasing fragmentation and compartmentalization of knowledge. The ideal of higher education a century ago was to equip people with broad general knowledge coupled with specialized expertise. Today higher education turns out specialists in innumerable narrow technical disciplines of business, chemistry, economics, engineering, law, medicine, physics, psychology, etc., but almost no generalists with a broad perspective of the whole subject or the wider reality of life of which all disciplines are a part.

The world's problems today arise from a divorce between ourselves and the reality we live in. Financial markets are divorced from the real economy, economy is divorced from ecology and business and science are divorced from social responsibility and accountability. This results in a tendency to affirm the exclusive truth or greater truth of one side or aspect of reality at the expense of the other: we mistake the elusive gains of financial speculation for real economic progress; higher GDP for greater human welfare; and huge arsenals of nuclear weapons for enhanced cooperative security. After centuries of progress in all fields of natural science, we are baffled and helpless before the destructive impact of human activity on our environment, a consequence intuitively self-evident to far less advanced civilizations who lived in touch with nature.

Is more and more specialized expertise really the type of knowledge we need in the 21ˢᵗ century? The evidence suggests it is not. Examination of humanity's current problems makes evident that narrow specialization is a source of the problems rather than a solution to them. A narrow focusing on financial economics is a root cause of the divorce between finance and economy that dominates the global economy today. Real knowledge is knowledge of the whole. Exercise of fragmentary partial knowledge without a wider perspective undermines the integrity of living systems, just like unlimited production devours the earth and unidimensional treatment of specific diseases often cures one ailment while creating another one in its place.

"Only when we are able to conceive of the personality as a living, organic whole will we be able to formulate concepts that are sufficiently inclusive and integrated."

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6. Trans-disciplinarity

To compensate for this fragmentation of reality, mind seeks to aggregate and recombine what it divides to form larger wholes, like the dictionaries and encyclopedias that gather all available information on a subject and place it in a container alphabetically. Then we seek to reconstruct relationships between the parts that have become separate by creating interdisciplinary, cross-disciplinary and multi-disciplinary studies that never succeed in encompassing the vitality, complexity and organic integrality of the original holistic reality they examine.

Growing awareness of this reductionist tendency of the human mind led to the development of systems theory, complexity theory, ecology and holistic thinking as efforts to reconstruct the whole that has been infinitely subdivided. This is a welcome and important development. Systems theory is based on the mind's capacity for organization. The principle of organization is one of the characteristic ways in which mind aggregates its perceptions of separate ideas, objects and activities. Organization is an example of a trans-disciplinary principle applicable to all academic fields and all human activities. A study of the fundamental characteristics of organization is relevant to all fields of knowledge and life. Organization is the means by which human beings give form and structure to our consciousness and aspirations. We organize our ideas into theories, beliefs into philosophies and religions, values into modes of conduct and cultures, emotional commitments into relationships, activities into fields of social existence, land and material objects into property, etc. Organization is creative. It generates power for accomplishment. It can also become obstructive, rigid, inflexible and stifling to creativity, freshness and life itself.

Organization is essentially a mechanical construction of reality designed to divide and aggregate parts, the way a business subdivides work into specialized functions and activities and then aggregates them through structures, systems, rules and procedures. In contrast, the natural and social worlds in which we function are dynamic living systems, with the characteristics of all living organisms. The organizations we create often are a combination of the two—their organic character makes them dynamic and creative, their mechanical character

makes them conservative, inflexible and bureaucratic. The reality they seek to create, nurture, manage and preserve evolves continuously over time, but the organizations themselves tend to become fixed in time, rigid and inflexible. These characteristics are relevant to the development and understanding of languages, societies, religions, political establishments, businesses, economic systems, scientific research and educational institutions.

"The artificial detachment of the observer absolves scientists and universities from demands for social relevance, social responsibility and social accountability."

The principle of organization is only one example of a wide range of trans-disciplinary principles and processes that characterize life, society, growth, development and evolution. A shift of emphasis from retention of facts to understanding of the trans-disciplinary principles applicable to all fields of study and life is one of the ways to counter information overload by raising the field of study from concepts that divide and contrast to concepts that differentiate even as they unify.

7. Reuniting Life and Knowledge

The tendency of mind to divide reality occurs in multiple dimensions. Horizontally, it divides reality into innumerable specialized fields of knowledge and activity. Vertically, it places an artificial divide between Life and Mind. It divides knowing from living, education from society, the universities from the real world. The tendency of mind to separate idea from fact divides knowledge from the reality it seeks to comprehend. Mind's capacity for abstraction generalizes from the particular to formulate universal principles, laws and theories. Abstraction is one of mind's greatest powers, yet at the same time the source of some of the greatest weaknesses and deficiencies of modern education. It fosters an ever-widening gulf between idea and reality, theory and practice.

All reality is multi-dimensional and complex. It admits of differing perspectives and interpretations, depending on the vantage point of the knower. Viewing the complexity of reality from different perspectives—each valid in its own right—leads to the formulation of mutually contradictory theories in physics, evolutionary biology, genetics, economics, psychology, philosophy and other fields—each internally consistent, but irreconcilable with one another or with the facts they seek to explain. In psychology it has led to multiple theories of personality that appear more applicable to different species of life than to different individual human beings. Only when we are able to conceive of the personality as a living, organic whole will we be able to formulate concepts that are sufficiently inclusive and integrated.

Mind's ultimate act of abstraction is its own separation from the world in which it lives. While we are increasingly informed about the world around us, we are also increasingly separated, divorced and alienated from it. The Cartesian separation between mind and world

is the implicit rationale for the poise of the scientist as an impartial, detached observer of nature, even when he is observing detonation of a nuclear explosion, designing a new biological weapon, or creating a computerized trading platform that can destabilize global financial markets. Nearly a century after physicists discovered the importance of the relationship between the observer and the observation in the study of matter, the knowledge dispensed by institutions of higher education continues to regard the objective reality of the world around us as if we were in some way separate and independent. The artificial detachment of the observer absolves scientists and universities from demands for social relevance, social responsibility and social accountability. Perhaps it also explains the relative complacency of the general public to concerns about nuclear stockpiles, Fukushima type disasters in other countries, global climate change and soaring homicide rates in the USA. Is there an alternative?

> *"Big Data is not a synonym for more knowledge."*

8. Values-Based Education

The Cartesian divide between mind and life led naturally to the development of science as the impersonal study of an objective reality independent of the scientist. We easily forget that all knowledge and education are a product of interaction between the person and the world, between human consciousness and the universe in which we live. In that interaction, the subject, the object and the conscious act of knowing are inseparable and of equal importance. There is no such thing as purely objective knowledge. All knowledge involves and is determined by the subjective consciousness of the observer. Absence of personal partiality and prejudice in scientific investigation is highly desirable, though very difficult to attain; but this type of objectivity is too often confused with efforts to eliminate the valid perspective of the subject, which is neither possible nor desirable. All knowledge depends on the viewpoint and perspective of the observer. All knowledge is subjective. All knowledge is mentally constructed and socially construed.

So too, all knowledge is implicitly or explicitly values-based. We decry investment bankers who destabilize financial markets in pursuit of personal benefit, but ignore the fact that scientific research can equally be driven by personal motives of money, career or fame. Even curiosity can lead to consequences that harm society and endanger humanity, as Pandora demonstrated. Every human action must be accessed on the basis of the motives that actuate it and judged in terms of the values it aspires to realize. The quest for impersonal laws of nature in the social sciences divorced from human values and aspirations dehumanizes the study of economics, business, law and even psychology. At a deeper level, the effort to separate and divorce science from philosophy and spirituality is another reflection of the schizophrenia that characterizes society and education today.

9. Conceptions of Knowledge

Is it possible to continuously expand the horizons of our knowledge through education without being drowned by information overload, fragmentation, specialization and alienation

of knowledge from reality? The answer to this depends very much on the conception of knowledge on which our educational system is based. Today the words data, information and knowledge are often used interchangeably. We speak of the 'knowledge society' with reference to a world in which a plethora of data circles the globe at the speed of light and is accessible at our fingertips. We refer to the continuous doubling or tripling of humanity's information or knowledge base, when what we really mean is the emerging technologies enable us to collect, store and process an infinitely greater amount of data than in the past. Big Data is not a synonym for more knowledge. It simply means that we now have technologies that can measure and computers that can analyze mountains of data, such as the amount of radiation falling on every square mile of earth 365 days a year or the number of search queries, tweets or Facebook hits every hour.

The ambiguity of terms relating to knowledge leads to ambiguity regarding the aims and content of education as well. It is, therefore, necessary to define the way we use these terms. The process by which we learn from life experience commences with the observation of the world around us and the gathering of innumerable bits of sensory data. The correlation of these bits of data generates Information. We see a flash of lightning in the sky and then hear the sound of thunder a few seconds later. We correlate the light and the sound to conclude that they result from an approaching storm. We learn to estimate the distance of the storm relative to our location by the time delay between the two events. The storm is five miles away is information derived by analysis of the data. Correlating repeated experiences of this type leads to the thought that sound travels more slowly than light. Correlating two or more pieces of information generates Thought. We also note that the lightning may be obscured by cloud cover, but transmission of the sound persists in spite of the clouds. Correlating two or more thoughts born of the information derived by analysis of the data, we eventually formulate an idea or theory that explains all these experiences in a coherent, consistent manner. In the measure our conceptual conclusion is confirmed by further observations, analysis and careful correlation of thoughts, we come to regard the idea or theory as a form of knowledge. Neither data, information, thoughts nor ideas themselves constitute knowledge.

The process of education currently involves all four of these stages in the process of knowledge generation—observation of data, analysis of data to derive information, correlation of information to form thoughts, and integration of thoughts to constitute coherent principles. It is noteworthy that in this entire process we rarely reflect on the characteristics of the human mind that is engaged in the process of knowledge acquisition. Brain research may be a specialty of Psychology and Neuroscience, but the application of the instrument we call mind to our understanding of reality is of essential importance to all fields of knowledge. Social scientists emphasize the limitations and distortions imposed by our social construction of knowledge. We interpret experience in terms of our own conscious and subconscious values, beliefs and experiences.

The tendency of mind to divide and re-aggregate, to abstract theory from reality and to divorce the observer from the phenomena observed constitutes essential knowledge for understanding the past history of human social evolution and knowledge generation. It is at the root of the errors and problems that now confront humanity in the fields of economy, ecology,

politics, science, society and culture. But even more importantly, in a world that is changing so rapidly and in which retention of all available information has become both untenable and detrimental to human intelligence, essential knowledge about the way we human beings observe, perceive, understand and interpret reality is vitally important knowledge that needs to be transmitted to future generations.

It is ironic that we spend so much time using our minds in search of knowledge and so little trying to acquire knowledge as the instrument we utilize for that purpose. The study of the mind, the way we think and other ways in which we seek to know reality is essential for every human being in search for knowledge, regardless of the field. It is not a subject that can simply be left to philosophers, psychologists or neuroscientists. Education that anticipates the future and prepares for it needs to encompass knowledge of the fundamental characteristics of mind applicable to all human activities, both mental and social.

10. Person-Centered Education

Mistaking the means for the end is a common human folly beautifully depicted by George Bernard Shaw in his play *Pygmalion*. Professor Henry Higgins, an expert in the science of phonetics, takes on the seemingly impossible challenge of educating a flower girl named Eliza within three months to acquire the speech and manners of a high-born aristocrat. On achieving this remarkable feat by passing her off as a princess at a gala ball, he and his associate celebrate in triumphant self-satisfaction, never for a moment considering the effort that Eliza has made to acquire the specialized knowledge he offered, the psychological process that motivated her to make such a prodigious effort, the impact of that training on her as a person, or its utility in her future life. At the height of his celebration, Eliza bursts out in frustration and throws his slippers at him. Higgins was guilty of the unpardonable crime of priding himself on his knowledge of phonetics, forgetful of the fact that education is all about developing human beings, not creating mannequins or robots with perfect diction.

Shaw's play is a satire on an educational system that mistakes specialized subject knowledge for real education. The worship of abstract knowledge divorced from life and devoid of relevance to human beings is at best a superstition, at worst a tragic crime against the human mind, heart and soul. In depersonalizing knowledge, it dehumanizes both the instructor and the student.

The real subject and object of education are the same. The subject of education is a human being. The object of education is to develop the mind and personality of that human being. Everything else is secondary, often irrelevant and many times detrimental to mental, emotional, social and physical health and well-being. The real challenge confronting education for the 21st century is not about altering the curriculum to focus on STEM, ITC, nanotechnology, microbiology or any other discipline. It is about abandoning the superstition that transfer of information and narrow disciplinary expertise is education. Mistaking the object for the subject has led to a world of scarcity in the midst of inconceivable abundance. Robots of either the metallic or flesh and blood variety may be great at high speed calculations but are utterly incapable of grasping or dealing with the subtlety and complexity of human life.

Knowledge is and always will be central and essential to education, but the knowledge we so desperately need now is about how human beings think, feel, act, interact, respond to each other, innovate, create, seek and find fulfillment, overcome the limitations of the past and embrace the possibilities of the future, grow physically and mature emotionally, develop organizationally and evolve consciously.

"How can we shift the focus of learning from reverence for the past to anticipation of the future, from information to understanding and thinking, from passive to active, from abstracted to contextualized, from fragmented to integrated, from subject centered to person centered, and from productive to creative?"

Education is the means evolved by humanity over millennia to consciously accelerate the development of the individual and the evolution of the society. In an earlier age when information and specialized professional expertise were scarce and extremely difficult to come by, the emphasis on these goals was understandable. In the coming age when information is superabundant and growing exponentially, what we desperately need to develop is the capacity to correlate and synthesize, to place isolated pieces of information within a cohesive framework of thought, to think independently from first principles and originally outside the sanctioned boundaries of accepted knowledge, to reintegrate abstract thought with the world in which we live, and apply it for the growth and development of our own personalities.

Person-centered education needs to be founded on a comprehensive conception of what a human being is and of all the aspects and dimensions of the human mind and personality that can benefit from education. This encompasses a wide range of physical, interpersonal, and mental skills, faculties, capacities, abilities and values. It encompasses all the functions of the human mind, such as observation, perception, judgment, understanding, thinking, will, imagination, and intuition, as well as social and emotional faculties for interactions and relationships with other people. It encompasses all the layers of personality from the most external manners and behaviors to deeper levels of character and individuality. The development of these capacities can be done through many different types of learning experience, including all academic subjects, where the objective is to develop the person and not merely transfer information. Biography, contemporary events, literature and drama, anthropology, the study of accomplishment in business and politics, achievement in sports and the arts, the study of scientific discoveries, philosophy, and all fields of history provide rich material.

Employment is cited as a primary goal of higher education in an age of increasing computerization and robotization. Today, we are aggressively pursuing a course that transforms human beings into robots far more efficiently than it imparts human capacities to computers. We need to be educating people to do what computers and robots can never do, rather than preparing living, breathing people to compete with the memory capacity or calculating speed of a mainframe. The knowledge and skills society needs in the 21st century are those that nurture the mental, emotional and social development of individuals who know how to live

and interact with other people, to lead and collaborate with others, to understand themselves and empathize with others. It needs individuals with the courage to question and disagree, not the submissiveness to unquestionably accept as wisdom all that science proclaims as the present version of truth. It needs individuals who seek opportunities to be creative, not merely productive; to create employment for themselves and others, rather than seeking a job; who know the value of values, not merely laws, rules and procedures.

"A right starting point might be a systematic effort to identify the seeds of future education wherever they already exist and consider how these seeds can be multiplied and further developed."

The response of the educational system to the issues flagged in this article will have enormous impact on the future of global higher education and evolution of global society. The questions raised here are far easier to ask than to answer and far easier to comprehend than to act upon. But these are among the most critical questions that need to become central to the discussion about the future of education and the human community. How can we shift the focus of learning from reverence for the past to anticipation of the future, from information to understanding and thinking, from passive to active, from abstracted to contextualized, from fragmented to integrated, from subject centered to person centered, and from productive to creative?

Such a radical change cannot be made universally in a year or a decade, but it can begin, grow and spread rapidly. It cannot be done so long as we look up in awe to the pillars of the old system and imbue them with a sanctity or prestige that, however warranted in the past, is insufficient for the future. True education is to replace superstition with knowledge, and that includes a superstitious reverence for past glories. Our blind faith in the present system is the greatest bar to evolving a better one for the future. The strategy of striving to emulate the current best and raising the average to the level of the best is valid and useful in many fields, but only in the measure the best truly represents a viable model for the future. Otherwise we risk reinforcing an outmoded version of perfection, like striving for benevolent monarchy when what we really need is liberal democracy. A right starting point might be a systematic effort to identify the seeds of future education wherever they already exist and consider how these seeds can be multiplied and further developed.

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Notes

1.   *E-Learning Market Trends & Forecast 2014-2016* (Athens: Docebo, 2014) https://www.docebo.com/landing/contactform/elearning-market-trends-and-forecast-2014-2016-docebo-report.pdf

2.   "Trends in Global Distance Learning," *Hanover Research* December 2011 http://www.hanoverresearch.com/wp-content/uploads/2011/12/Trends-in-Global-Distance-Learning-Membership.pdf

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Contextual Education

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Abstract

When the knowledge gained over centuries has to be presented to students through a 12-15 year study, it has to be abridged and organized elaborately. This process of encapsulating all knowledge into an educational course often results in fragmentation of knowledge and a mental divorce from life. Life knowledge that is reduced to objective principles may be intelligible to the intellect, but is incomprehensible to the imagination, creativity and emotional intelligence, all of which are important to the full development of personality. A study of Economics without the human and social dimensions, industrialization detached from ecology, or science devoid of moral accountability results in problems. Education of each part must be in the context of the whole. Knowing the whole context helps one get the right perspective to address the issue effectively. In the education of the future, the gap between abstract concept and social relevance must be bridged. The following article explores the need for contextual education and the ways in which it can be implemented.

1. Our Education Today

Watching a tiny seed sprout and grow into a plant, early humans stopped foraging for food as they had been doing for tens of thousands of years before. They found when the sprouted seed flourishes, when it shrivels, what makes the plant bear flower and fruit, what makes it wilt, how much water a plant needs, how much sun helps this bush, and what type of soil that tree grows best in. Then they perfected this art over thousands of years, which resulted in agriculture that feeds seven billion people today.

When people traded their nomadic lives to a more settled one, they stayed in caves and trees. Then they fashioned crude shelters with mud, stone, animal skin, wood. Small settlements grew into villages. People began to produce what they required—food, clothes, vessels, tools—and traded them with each other. Roads were laid, connecting people. This networking of people and their ideas set off an explosive growth of civilization. Towns and cities developed. Countries, governments and the rule of law came to be. Money, banking, financial systems and trade evolved. Today as we look down from our glass and steel skyscrapers to see megacities develop, we continue our attempts to create perfect organizations, and learn.

We have seen tides rise and fall, and traced them to the impact of the moon. We have sent people to the moon, and brought them back safely to earth. We spoke to people on the other

side of the earth, first through wires. Then we began to do the same without the wires. Now we have virtually fitted the entire world in little devices that fit in our palm. We have split the atom and decoded the DNA. We have lengthened life spans, made human life more comfortable, and continue to make marvellous inventions. But among all the greatest achievements of humanity, education ranks close to the top.

Universal education, schools, colleges, distance education, MOOCs and education reforms draw so much debate that the wonder of their origin and evolution is often lost. When something soft and cold fell from above, the early man, or woman, looked up to find where it came from, and could not find anything. What fell on them seemed like the same substance that they found flowing, or stagnant, in different places around them—water. It made them wet and uncomfortable. But they needed to consume it every now and then, just as the animals and birds did. Also, plants seemed to do better with it. You never knew when it suddenly fell from above. At times, you could tell somewhat in advance. When dark clouds were above, it fell. Sometimes, it kept falling for many suns and moons. Then there was a long gap, after which it began again. There were also other times when it was accompanied by strong winds. People told each other what they knew about it, one generation taught another. Slowly, the occurrence, rain, was connected to the water that was in the lakes and rivers that the sun heated. Patterns were detected. People sowed their seeds in sync with the pattern, and planned their travel and stocked up on essentials keeping it in mind. Superstitions as to the causes of rain were weeded out. The cleansing power of water was found and used. Connections were detected between diseases and stagnant water. Methods to purify water and transport it over long distances were developed. All this that a primary school student learns from a science text book today, as the simple concepts of clouds, water cycle, rain, weather and seasons, was discovered over thousands of years of living and learning, sometimes consciously, sometimes unconsciously. This knowledge, along with a large dose of misinformation and superstition that was regularly pruned, was transferred first orally and then by the written word, over generations and across regions separated by journeys that were often weeks or months in length.

As a far cry from our age of information overload, knowledge was such a precious commodity that it came to be treasured, even hoarded. Schools were set up by the Church to train young monks and nuns. Kings established universities to train scholars who would serve the royalty. Books were chained to libraries because of their rarity. Education was at first only for the aristocracy, then it included all the wealthy. Hesitantly, it reached women. It spread horizontally, to include more and new academic disciplines. To the traditional 3 Rs of education—*Reading, Writing and Arithmetic*—were included science, literature, history, philosophy, law. From the university towns and the 'developed' world, it moved to every town and village, and to all the 'developing' countries to varying extents. It grew vertically, and delved into each subject more and more. Beginning from kindergarten up to the post doctorate level, education has been classified and organized most elaborately.

Through this marvellous system of education that we have devised, we take all the knowledge that humanity has learnt in the past few millennia, weed out mistakes and superstitions, organize all the componental elements within a comprehensive framework and

multi-layered structure, encapsulate everything into a 15 or 20 year study, and offer it to our youngsters. Anyone who enrols in school today has a fair chance of being equipped, at the end of a 12 or more year long period of study, with a gist of all that has been accumulatively learnt by all people, all over the world, from the first instance of recorded history till date. For those with the inclination and means to pursue education further, it is possible to specialize in one or more topics, and learn all that there is to be learnt on the subject, and carry out research to find out more.

> *"When it is forecast that 60% of today's youth will work in jobs that aren't invented yet, what am I preparing myself for by reading this textbook?"*

Added to this system is the few-years-old phenomenon of online education that is accelerating the spread of education, while erasing the horizontal and vertical limits in unimaginable ways. Though the UN Millennium Development Goal of Universal Primary Education by 2015 has been missed by a gap of 58 million children, aided by communication technology, education is well on its way to becoming universal, accessible, affordable and lifelong.

2. The Problem of Abstraction

A cartoon that did the rounds on the internet had a man looking at a lengthy calculus problem from a high school Mathematics textbook and declaring, 'I'm still waiting for the day when I will actually use this in life'. There are many similar statements one hears from students, such as

> *What is the use of learning about the French Revolution?*
>
> *Will I get a job because I can quote Shakespeare?*
>
> *Why should I read another man's biography?*
>
> *Why should I memorize the Latin names of plants? Who speaks Latin these days anyway?*
>
> *Why history, isn't it the future that is relevant?*
>
> *After graduating, does anyone use Pythagorean theorem or recite lines from Macbeth?*
>
> *Why are we still following the pattern that our colonial rulers set?*
>
> *Why do we still use a curriculum that was designed for the Industrial Revolution?*
>
> *When it is forecast that 60% of today's youth will work in jobs that aren't invented yet, what am I preparing myself for by reading this textbook?*

and so on. Marvellous as the system of education is, many students do not connect to it any more than they need to, which is simply to pass the grade and get on with the next, with exams appearing to be hurdles that need to be cleared along the way. The fascination of discovery and the joy of learning are no longer real to many. How and why did this happen?

All those who have seen a famous beautiful painting, or any painting for that matter, from very close know the difference between the big picture that one can admire from a distance, and the apparently rough brush strokes that appear when the same painting is viewed from a few inches away. A digital version of the same phenomenon can be experienced when a person's photo is zoomed to 1000% of its actual size, to show the pixels that make up the photo. The beauty of the face is no longer visible, in its place is a jarring mix of dots in different shades. When one sees the close-up and the close-up alone, there is nothing beautiful or admirable there. Similarly, with education.

When all the knowledge that humanity has collected over millennia is to be presented to every new generation in one or two decades, it has to be abridged and organized elaborately. Knowledge is broken into different parts, what we call subjects. The spoken and written word become Literature. Everything connected with the living world we call Biology. The study of the world and natural phenomena is Geography. The world of numbers and computations is called Mathematics. Within each subject, we again classify knowledge into smaller parts. That part of Geography that studies the earth is Geology, the weather is classified under Meteorology, outer space study becomes Astronomy. Then there are those parts of knowledge that are of two subjects, and we name them accordingly—Biochemistry, Behavioural Economics, Geopolitics, Marine Biology. In thus partitioning knowledge into smaller and smaller portions, we begin to stare at the large picture from closer and closer, losing sight of the beauty of the whole. This horizontal divorce of knowledge from the real world context is described by Marilyn Ferguson, American author and speaker, when she says that our educational institutions "*break knowledge and experience into subjects, relentlessly turning wholes into parts, flowers into petals, history into events*."

Another process by which we have accomplished the organization and abridgement of all knowledge into educational courses is by condensing knowledge of life experience into a series of generalized mental abstract principles. When we do this, the divorce is vertical—it leads to the separation of mind from life. It divides whole perceptions of truth into partial aspects of reality in which the sum of the parts is far less than the whole and each partial truth remains incomplete when divorced from the wider context of which it is a part.

Take the topic of the French Revolution or the Indian independence movement, for example. The injustice in French society and the poverty and hardship of centuries that the lower classes had faced reached a point where they could be contained no longer, resulting in the French Revolution of 1898. A lot of concurrent and subsequent events that transpired in different parts of the world were a reaction to this violent means to equalize society and usher in liberty, equality and fraternity. A hundred years later, shunning all violence, against a better armed colonial ruler, Mahatma Gandhi awoke the dormant aspiration of all Indians, channelized their energy and obtained independence for India. This event was followed by three dozen more countries obtaining political independence in Asia and Africa. Gandhi's life and struggle inspired and continues to inspire movements for civil rights and freedom across the world. But when such complex and multidisciplinary themes are reduced to facts that students are required to memorize—*King Louis XVI ruled France from 1774 to 1792, and was executed in 1793, during the French Revolution, a period of social and political*

upheaval that lasted from 1789 until 1799, and M.K. Gandhi (2 October 1869–30 January 1948) employed nonviolent civil disobedience and led India to independence from the British on August 15, 1947—profound ideas are condensed into definitions and formulae, such as the algebraic formula $(a + b)^2 = a^2 + 2ab + b^2$. In this process, the student is lost, and so is much precious knowledge.

It is this horizontal and vertical fragmentation of knowledge from life, the abstraction, the divorce of the part from the whole, this breaking of flowers into petals that creates the disconnect that students experience from education. No wonder students quip, "Dear Algebra, Please do not ask me to find your x, I don't know, and don't ask y".

3. Contextual Education

That we are all connected to each other and to this universe is not some metaphysical idea, it is a truth of life. Every particle in the universe is connected to every other particle. Each galaxy is connected to all the other galaxies. All living systems on earth are part of a web of relationships. Symbiotic relationships begin at the microorganism level onwards. Plants and animals engage with each other, and their environment. Humans influence and are influenced by their environment. The power of the internet comes from its web of connections. Alienation, for anything, anyone, is a theoretical impossibility. Therefore, to understand any part, we also need to understand the whole and the relationship of the part to the whole. In other words, we understand anything when we see it in a context.

Poetry and art can be appreciated better if one knows the period when it was created. Literature can be understood to a greater depth when the environment in which the author wrote is known. Understanding population explosion requires a knowledge of the economic realities and religious sentiments of communities. Pollution can be checked when we understand all about industrialization. Fundamentalism can be tackled only when its root causes, such as illiteracy, unemployment, poverty and marginalization, are addressed. Even a bodily ailment can be treated more effectively when instead of treating the diseases, the whole person is treated. Nothing exists in isolation. Everything needs to be seen in a context.

In the same way, our education acquires meaning and comes to life when we make it contextual.

Contextual education is a method of teaching and learning, based on a constructivist theory, where information is presented in a way that students are able to construct meaning based on their own experiences. Everything is studied within the physical, social, cultural, political, economic and personal circumstances characterizing real life situations, the subjective mental and emotional processes that prompt human action, and the creative role of individuals in the collective social process. Students are able to process new information or knowledge with reference to their memory, experience and to knowledge already acquired. The opinions and perspectives of students are valued, and so are the student's life context and prior knowledge. Along with teaching the subject, there is a constant emphasis on establishing relationships—between the subject and all other subjects, between the data and

the circumstances in which it was generated, between the lesson and the learner, between knowledge and life.

The concept of contextual education is not new or uncommon. Maths problems such as "There are two apples and three oranges, how many fruits are there in all?" and "A tree is 17 feet from the wall, and forms an angle of 45° from it. What is the height of the tree?" are common in school. But in higher education, teaching becomes more abstract and detached from the student's context, and with increasing specialization, becomes divorced from all other academic disciplines. Some institutions attempt to contextualize education through

> *"Meaning emerges from the relationship between the content and its context."*

teamwork, discussions, peer learning, project-based learning, internship and service learning. However, contextualizing education is not systematized in the curriculum, and remains highly dependent on the creativity and innovation of the individual teachers and institutions. An organized, collective effort to add context to the information imparted is needed. This way, we can put the petals back together so the flower comes to view.

4. Support for Contextual Education

Contextual Education parallels nature. All universe is contained in a web of relationships, its very meaning is derived from these relationships. Robinson Crusoes do not exist in nature. After twenty four years, even they need a Friday. Individuals are the content, our relationships with each other are the context: It is the context that gives meaning to the individual existence. Similarly in education, no subject or topic can in isolation provide any meaningful knowledge. Meaning emerges from the relationship between the content and its context. The context gives meaning to content. The broader the context within which the learner makes connections, the more meaning the content, the text book, the lesson holds. Physicists and biologists have discovered that the three principles of interdependence, differentiation and self-organization infuse everything in the universe. Contextual education that is also based on these three principles, therefore corresponds to the way the universe works, and is the most natural way for anyone to learn.

Austrian psychiatrist and Holocaust survivor Viktor E. Frankl said that 'Man's main concern is not to gain pleasure or to avoid pain but rather to see a meaning in his life'. Contextual education answers an innate longing for meaning that is characteristic to all humans. It also satisfies the brain's habit of connecting new information with existing knowledge. The brain naturally seeks meaning in context by searching for relationships that make sense and appear useful. Neuroscientists show that making connections is a natural human activity. The brain tries to give new information significance by connecting it with existing knowledge and skills. When we are asked to do something we have not done before, we immediately try to recall whether we have done anything similar before. Much as a child who is learning to read, reads the word 'dome' that he sees for the first time based on his knowledge of the familiar word 'home', or the student tries to understand the flow of electricity with the flow of water, the brain tries to connect to the new task with the task it already recognizes.

Einstein used this principle when he explained his Theory of Relativity humorously, 'Put your hand on a hot stove for a minute, and it seems like an hour. Sit with a pretty girl for an hour, and it seems like a minute. That's relativity.' Analogy bridges the gap between the familiar and the new. It personalizes learning and lets students learn intuitively. Comparing sound waves to ripples in water, aerodynamics of a plane to the shape of a bird, earth to a magnet, animal or plant cell to a city, DNA to a blueprint—analogy teaches effectively because it builds on the existing foundation, so the resulting building is stronger.

The brain's connection with the environment shapes its physical structure, its neurons connect in different patterns in response to stimuli from outside. To help the brain become more powerful requires that it make connections, so it can weave patterns that generate its own sense of meaning. The more connections the neurons make, the more the brain is stimulated. When these connections are used more often, they become stronger. On the other hand, if these pathways are not used, they eventually disappear. So making different kinds of connections and strengthening them increase the learner's chances of learning more and better.

Studies show that memory is best when we process an item deeply, rather than simply superficially. Learning and remembering are maximum when we relate the things we are trying to learn to each other, and see what common features they share, and how they differ. When we group them into categories and find links among them, our learning is more efficient. The essential principle is that education is at its best when it is progressive, building up on the basis of old knowledge.

Instead of accentuating the dualism between thought and action, contextual education unites concept and practice. When the parts are united, the resulting whole is greater than the sum of the parts. Teachers are discovering that most students' interest and achievement in math, science and language improve dramatically when they are helped to make connections between new knowledge and old experience and knowledge. Their engagement in work, motivation and comprehension increases when they are taught why they are learning what they are learning, and how the lessons can be used in real-world contexts. It eliminates the question, 'Why am I learning this stuff?'. It helps the discouraged and disillusioned student who is accustomed to fail, as well as the eager student who earns 'A's.

Currently, most of our courses teach concepts and theories, but not the way these relate to the workplace, society and our lives. That is left out of the syllabus, for the students to figure out on their own, outside the classroom or once out of school. Its consequences are seen in the workplace as skills shortage.

According to the UNESCO Background paper prepared for the Education for All Global Monitoring Report 2012, CEOs from around the world consider unemployability or the skills gap as one of their top five pressing concerns.[*] Not only are skills in short supply, but there is a skills mismatch among fresh graduates. They lack the skills to fill a position, due to a misalignment of the education system to the needs of the labour market. *The Harvard Business Review* article 'Employers Aren't Just Whining – the "Skills Gap" Is Real' shows

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[*] See UNESCO Report Education for All Global Monitoring Report 2012 http://unesdoc.unesco.org/images/0021/002178/217874e.pdf

that the skills gap cannot be dismissed as 'employer whining' anymore.[*] It quotes the Manpower Group 'Talent Shortage Survey' that found that 35% of 38,000 employers in 42 countries reported difficulty filling jobs due to lack of available talent in 2013.[†]

In fact, top companies in the technology industry like Google do not care about hiring top college graduates. Google's head of People Operations, Laszlo Bock, says that graduates of top schools lack 'intellectual humility', a quality without which one is unable to learn, and which is essential in the work place. Google receives 2 million job applications every year, and Bock who has seen some 25,000 resumes says that college grades predict performance for the first two years of a career, but after that, do not matter. Leadership skills, sense of responsibility, problem solving ability, focus and persistence are important, what is least important is expertise! Google's newly appointed CEO, Sundar Pichai, is said to be a natural diplomat. He avoids making enemies, and is responsible for maintaining smooth ties with partners. He is known to navigate internal politics in such a way as to make his team succeed while inflicting the least possible damage on others. There isn't a single person at Google who doesn't like him. Computer science courses do not teach good manners and behavior, but Pichai has obviously learnt that they are needed, to rise all the way to the top. How many of our students are taught that 'humility' is essential to get an ace job? Or to get into a much envied company, what is needed is a sense of responsibility, not high grades? Our universities are producing graduates who are not only not ready for the workplace, but have a totally different impression of what is needed to succeed. There is huge gap, the skills gap as the employers see it, between the competitive, knowledgeable graduate available and the responsible, humble, team worker needed. Contextual education helps bridge this gap.

5. Teaching a Subject Contextually, with Reference to all Other Subjects

So how can the context be added to content? One way of doing it is to teach and learn a subject, not in isolation from all other subjects, but with reference to them. Take history. Names, places and dates are an essential feature of history education. The names are mostly the names of kings, queens, and leaders of countries or mass movements. The places and dates are details related to their life and work. In that way, history often tends to be the study of 0.001% of humanity, in chronological order. We begin at the beginning, with the stone age, bronze age, iron age, and then move to the ancient civilizations—Mesopotamian, Indian, Egyptian, Chinese, Greek, Roman. The Middle Ages, Reformation, Renaissance, Age of Discovery, Colonization, World Wars—history is thus a line connecting the major events that have occurred, a uni-dimensional study of the what, when, where and how. In order to make the study of history contextual, it could be related to all other subjects and made multi-dimensional.

The student of history can be taught why the cavemen made those paintings, some of which have survived to this day. What did they paint? How is art important? Inherently, are we all artists, although science and technology rule the fort today? Cave paintings are predominantly on animal and hunting themes. What was painted in India, China, Rome?

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[*] See https://hbr.org/2014/08/employers-arent-just-whining-the-skills-gap-is-real

[†] See http://www.manpower.com/wps/wcm/connect/587d2b45-c47a-4647-a7c1-e7a74f68fb85/2013_Talent_Shortage_Survey_Results_US_high+res.pdf?MOD=AJPERES

Has art always reflected our chief preoccupations? What was the impact of Renaissance on art? What are we painting today, and what does it tell about us? How much did religion influence art, positively, negatively? How lucrative was art as a profession? What was the social position of artists? How did different art forms evolve? In this way, art can be taught, through history.

Not only art. Were the crude figures that the caveman made on the walls an attempt to express himself? How did writing evolve from art? When did writing become the predominant way of expression? How and where did the various forms—sonnets, ballads, drama, novel—evolve? Do writings reflect the sentiments of the period? What do the writings of Socrates and Plato show about the Greeks? What was written during the dark ages? What is the power in books that some people regarded them as a threat and ordered book burnings at different times? How does literature show the changing attitudes towards slavery, colonization, rights of women, segregation? Did books shape the course of history, or at least influence it? What was the effect of the printing press on books and knowledge? How has digitization impacted writing? This is a study of literature, branching from history.

When Gutenberg invented the printing press in 1495, how did it alter the course of history? How have inventions, beginning from the wheel, shaped history? In the absence of instant communication or fast travel, how did news of discoveries spread? With mobile phones and social networking today, can we expect more and powerful Arab Springs? How did science clear itself of superstition and misinformation? When, how did Science part ways with religion? Why did some rulers patronize science, while others stymied its development? Which places and peoples were advanced in their knowledge of science? Did the Age of Discovery provide an impetus to the maritime industry, or did increasing knowledge of sea travel and ship building along with inventions such as the chronometer and sextant result in exploration? How did science play a role in the industrial revolution? How have new inventions and theories been received? Is there any difference between the attitude of scientists to a radically new idea in the 18th century and today? Is science responsible to society? Should scientists be morally responsible? Why did the American physicist and the father of the atomic bomb, J. Robert Oppenheimer, oppose the hydrogen bomb? Why was he accused of being a communist and tried by the US government? Is there a parallel between that and treatment meted out to Galileo by the Catholic Church when he supported the Heliocentric theory? Heliocentric theory is easy to comprehend in principle, but the social and psychological process Copernicus went through in contemplating and pronouncing heretical ideas in the face of the entrenched knowledge of the times, is as relevant today as it was during his own lifetime. Is any of this of relevance to students of science today? Why did Sir Joseph Rotblat leave the Manhattan Project on the grounds of conscience? Science, studied from a historical perspective, is as equally informative as the scientific principles themselves.

Resistance to change and new ideas is a common phenomenon. The French Revolution was due to the French aristocrats' inability to give up their privileges and accommodate the aspirations of the rest of society. But when both France and England had monarchs and an aristocracy, why was there no English revolution? How has society changed since the time of the hunter-gatherer, in what ways is it essentially the same? How have the different

components of society organized themselves? How has human psychology evolved with evolution of society? How did so many thinkers and writers develop in Greece? Why were Roman sports so violent? How did the concept of universal human rights develop? How did industrialization and urbanization affect the family, values and living standards? What was the impact of women's liberation and civil rights movements? What were the lessons not learnt from World War I that resulted in World War II? What were the lessons learnt from World War II that have resulted in elimination of large scale warfare in Europe? How can this be emulated in the rest of the world? How has immigration homogenized populations? Instead of history being the study of a miniscule part of the population, it can be a study of the entire society. Sociology can be a part of study of history.

How did law come to be? What were the early governments like? How did different political systems develop? When was monarchy overthrown in most places, why and how does it still survive in some? What gave and in some regions, continues to give religious groups the power to govern? What circumstances create dictators? Is the European Union a predecessor to a World Government? What gave rise to Communism? Did anyone win the Cold War? That will be studying politics from a historical perspective.

Gorbachev was instrumental in winning the Cold War. Extensive studies have covered the process of Soviet liberalization that culminated in the break-up of the USSR and the end of the East-West confrontation. But how many history books answer, or even ask the question, why did Gorbachev do it? He stood to lose from dissolving his own post, which he willingly did. What went into moulding his personality? How are leaders created? Lincoln had in his cabinet his bitter critics. Was it shrewd political stratagem or profound wisdom? When Churchill said, 'We will not surrender' in the face of a better manned German air force, what was he thinking? What inspired Mahatma Gandhi to call on all Indians to make salt, in defiance of the British salt monopoly? Did he believe Indians could gain independence by making their own salt? Biography and the psychology of individual leaders can be a part of study of history.

How has the environment been affected through history? Which animals have become extinct, and why? Which are endangered, and how can they be saved? What have been our past superstitions, have we overcome them today, or replaced them with new ones? Do we see patterns in our history, and use them to anticipate the future? There is no limit to contextualizing education, by teaching a single subject in the context of many others.

6. Teaching Everything Contextually, with One Subject

All for one and one for all, the motto of the title characters in Alexandre Dumas' novel *The Three Musketeers*, perfectly suits contextual education too. Just as one subject can be taught in the context of all others, all subjects can be taught in the context of one.

We normally regard literature as fiction and rarely resort to literary examples to illustrate scientific principles. But life as depicted in literature is not merely the product of a writer's imagination. All great literature reflects realities of human character, society, values and aspirations. Literature can be used to complement the study of any academic discipline.

Many students and practitioners of psychology have said they have learnt about the human mind more from reading Shakespeare than from Freud and Jung. There isn't a single characteristic, personality trait, behaviour or manner that one does not find in literature. Studying Shakespeare is like studying a cross section of humanity. A strong woman ruled by passion in Lady Macbeth, a lady with a heart of gold in Juliet's nurse, the incorrigible old rogue Falstaff, the great old man Prospero, the quintessence of evil Iago, Hamlet with his internal struggles—Shakespeare has them all. Reading all great literature increases the vocabulary of thoughts and ideas, and gives a vicarious experience that one may never have otherwise. As we read literature and charge at the enemy on the battlefield, cross the ocean and weather a storm, follow a family's fortune over generations or the protagonist's life from beginning till end, solve a mystery or laugh over a romance, as we love some characters and hate some, empathize with some and wonder at others, our study of human psychology becomes more rounded.

Plato, the Greek philosopher, was apparently familiar with contextual education, he used parables and conversational prose to teach his principles, his characters asked questions and generated discussions. His Analogy of the Sun, Allegory of the Divided Line and the Parable of the Cave teach principles of philosophy such as goodness, psyche and perception. He tells the story of prisoners chained facing the wall of a cave, who have only seen the shadows of objects behind them fall on the dark cave wall. They mistake these shadows for reality. When one of them is forcibly dragged out of the cave, the sunlight hurts him, but he gradually begins to see reality. But if he were taken back to the cave, he would be unable to see in the darkness, and his fellow prisoners would be convinced that being freed from the cave would only harm them. Profound, abstract principles of philosophy can be simply illustrated and explained with a short story. 'Sour grapes' and 'the emperor's new clothes' are terms inspired by stories that convey a message succinctly.

Values cannot be taught effectively without literature. This is why we have a huge repository of folklores, fairy tales and fables in every society. Difficult thoughts can be communicated easily, boring topics can be made interesting and values can be made live through stories. Panchatantra is an ancient Indian collection of stories, somewhat similar to Aesop's Fables. The collection is attributed to the 3rd century BCE writer Vishnu Sharma. Legend has it that a strong and scholarly Indian king had three 'dullards' for sons. The king despaired of the princes' inability to learn, when his minister advised him that rather than teach science, politics, diplomacy—all limitless disciplines that take a lifetime to master—formally through texts, the princes be taught the wisdom inherent in them. Vishnu Sharma promised to make the princes wise to the ways of politics and leadership within six months. Conventional ways of teaching them would be ineffective, so Vishnu Sharma used fables to accomplish his purpose. Stories are not just for educating children while entertaining them. Any good piece of literature can give insights into life, as the writer is a seer of life. Rather than study the huge canvas of life, the same can be studied in miniature in a story. Anthony Trollope, one of the most prolific and successful novelists of Victorian England, has created 47 novels with hundreds of characters, each of which is a treatise in human values. The title character in the novel *Dr. Thorne* is a good hearted, selfless country doctor who values people above money. He is blessed with people who love him, and eventually, with unimaginable wealth. Lizzie

Eustace, in *The Eustace Diamonds*, is at the other end of the human spectrum, cunning, calculating and unscrupulous. All her schemes backfire, and she finds herself married to a man who is more than her match in wiliness. In *Ayala's Angel*, Ayala is a poor orphan dependent on her relatives, but with a strong sense of her destiny. She rejects suitor after suitor because of her aspiration for the perfect angel she has envisioned. Common sense, her relatives tell her, requires her to accept any marriage proposal that comes her way, but she clings to her dreams, and sees them come true. In *Can You Forgive Her*, Lady Glencora is forced to marry Plantagenet Palliser, though she loves Burgo Fitzgerald. Palliser sees Glencora is unable to give up Fitzgerald, and gives his wife the freedom to choose her own future, something her relatives had not given her when they forced her to give up her lover. When all circumstances are suited for Glencora to elope with her lover, she chooses to stay back. Palliser, in return, gives up his cherished hope of becoming the Minister of the Exchequer, and takes his wife on a tour of Europe. When he returns with a happy wife and successful marriage, he also finds the post of the Prime Minister of the country waiting for him. Patience, selflessness, integrity, falsehood, individuality, conventionality, and the response of life to these values come out through these and all other great works of literature.

Literature reflects people and society. Sociology studies can be aided and enhanced through a study of literary works. The gradual movement of status and prestige, from land and estate, to trade and money, is seen throughout the literature of the 18th and 19th centuries. The question raised earlier, as to why there was a French Revolution but no English Revolution is answered through a love story by Jane Austen in her *Pride and Prejudice*. The simple romance depicts with profound insight how England avoided revolutionary war between the classes by permitting upward social mobility and marriages between members of the different classes. The story is a simple romance, a wealthy gentleman is attracted to a country girl of humbler means. He sees the intelligence, strength and goodness in her, but is unable to accept the difference in social class. Eventually, his good nature overcomes the sense of social superiority, and he marries her. The same movement is seen among other couples in this story that was set at the time the French Revolution was unfolding in all its brutality across the channel. There the French aristocrat refused to part with his crown, so his head was forcibly cut off. Darcy gave up his pride, accommodated the aspirations of those below and voluntarily erased class barriers, thus saving his head. Darcy's act symbolized the movement prevalent in English society, where class boundaries were gradually erased through the acceptance of trade, dilution of class consciousness, and inter-class friendships and marriages. This resulted in a peaceful social evolution, and spared it a violent revolution. Such ideas and movements in society and peoples can be traced in all books. Society's conception of virtue and vice, and its hold on people are brought out in Nathaniel Hawthorne's *The Scarlet Letter*. The growing opposition to slavery is depicted in Harriet Beecher Stowe's *Uncle Tom's Cabin*. The book is even credited to having influenced the course of the country. When Abraham Lincoln met the writer during the American Civil War, he is reported to have said, "'So you're the little woman who wrote the book that started this great war." The human side of the Industrial Revolution is seen in *David Copperfield* and *Hard Times*.

Though literature does not directly focus on Science, it traces the development of the subject over time. The comic adventure of Phileas Fogg and Jean Passepartout in Jules

Verne's *Around the World in Eighty Days* shows us what an immense accomplishment it was, in 1873, to complete a trip around the world in 80 days, and how far we have come since. Technology happens to be an essential part of plots in writings today. Literature exposes us to new cultures, something much needed in today's shrinking world. It awakens in us a sense of the aesthetic. Knowledge of any subject can be enhanced by a study of literature.

What is true of literature is more generally true of other forms of contextual knowledge including case studies, cinema, history, biography and art which can offer similar benefits to students of economics, politics, law, business, sociology and even the hard sciences. Everything can be taught with reference to one subject, completing the contextualization of knowledge.

7. Educating the Person, not the Subject

A student of English literature was writing his term end paper on Shakespeare. He hurriedly scanned the first question, read only the first three lines of an unidentified passage, 'recognized' them as coming from Hamlet, and wrote for 90 minutes on what the passage expressed, of Hamlet's dominant themes. After completing the exam, he had time to go over the question paper a little more carefully, and found to his consternation that the passage was from King Lear, and not Hamlet. At the bottom of the answer booklet, he scrawled in a hurry, ''The lines come from King Lear. I am sorry for being so careless and writing on the wrong play. I really do know, and could have written about Lear.' The English professor, Dr. Elizabeth Pope of Mills College, Oakland, California returned the booklet with an 'A'. She had added a comment, 'Your closely reasoned, detailed argument very nearly persuaded me that the passage from King Lear would have served very well in Hamlet'!

In her 2002 book *Contextual Teaching and Learning: What It Is and Why It's Here to Stay*, author and education consultant Elaine B. Johnson recounts this incident about her English professor Dr. Pope, who was interested in her students' depth of understanding, more than anything else. She saw that mistaking King Lear for Hamlet was a slip, but she appreciated the student's understanding! While teaching Shakespeare and other great authors and poets, Dr. Pope showed her students how the poets urged all to think about how they perceived others, how others perceived them, made decisions, resisted or succumbed to peer pressure, faced humiliation, handled power, exercised compassion and maintained integrity. She connected the centuries-old works to the modern day and the students' lives. She helped them see meaning in what they learnt. She taught them, not Shakespeare!

Education has to be person-centered. Wholesome medicine treats the patient and not the disease or just one symptom. Similarly, education must be for the person, not one part of him. Enterprise Rent-A-Car, an American car rental company, is one of the top recruiters of entry-level college graduates in the US. It hires college athletes because sportspeople know how to work in teams and multitask. Marie Artim, Vice President of Talent Acquisition at Enterprise, says that there are a lot of transferable skills in athletes that make them effective employees even in a field unrelated to sports. Just as the technology company Google considers technical expertise as the least valuable skill, the car rental company knows that a wholesome personality is needed to excel at work, not just grades or specialized information.

It is not the MBA that prequalifies a CEO. Business Management students are taught project management, strategic management, risk management, human resources management, and so on. The human resource is assigned to one exam in one semester, whereas every part of business management, be it project, strategy, risk or marketing is about people!

A progressive school that is centered around the person rather than subject, course or expertise is New Technology High School in Napa, California. It has re-imagined education and created a model that educates the person as a whole, imparting not only textbook knowledge but life skills. A culture of respect, trust and responsibility is inculcated in the students. There are no bells that ring signalling the end of class periods. Students are trusted to keep track of their own time, just as they would need to do later as adults. They can organize their own projects, or work in groups of their choice. They are included in the decision making process in school. The curriculum is project-based and the teachers lead the activities, and not give lectures to students. One criterion on which students' answer papers are graded is work ethic. Communication is considered important, even while solving Maths problems. Traditionally, students have been encouraged to compete with others and come first. But at the workplace, they need to totally reverse, and work in teams, in mutual cooperation. Somewhere between college and career, the students are required to pick it up. But New Technology High School makes students help each other and see the benefit there is to be derived when competition is replaced by cooperation. The exceptional skill sets and life knowledge that a dynamic CEO possesses can be taught to everyone in this way. Imagine an organization where everyone possesses the skills and capacities of the CEO!

Organization is a concept integral to all disciplines. It is a fundamental principle behind social evolution in every field of life—commercial, economic, social, political, religious, educational, scientific, etc. A family is organized, with different roles and responsibilities to each member. The market, city, government, health care, education—all these are organizations of people, structures and the relationships between them. But the true power of organization is rarely brought forth with sufficient clarity and emphasis in courses. To understand the idea in its entirety, the teacher has to be one who thinks contextually and teaches creatively. There are many teachers, at all levels of education, who use props and technology tools to make the classes more interesting and effective, analogies to explain, biographies to inspire and movies to make ideas clear. Movies can be a very powerful educational tool. A five minute clip from the opening scene of the movie Gladiator brings to life the power of organization. It depicts a fierce assembly of fearless German tribesmen fighting for their very survival against the quiet disciplined orderliness of the Roman military machine and being quickly annihilated by organizational precision more than strength, courage or determination. The Romans have many specialized divisions—infantry, archers, cavalry, the signal bearers. In the background, they are supported by physicians, blacksmiths, cooks, drivers, those who take care of the animals. They even have a man whose assigned duty is to fire the oil, so each archer can light his arrow at once. The Germans have a lot of courage, energy and determination, but cannot match the organization of the Roman army. The Roman side has a clear hierarchy, starting from the king down to the foot soldier. The fighters are grouped into specialized divisions, each performing a different task. The organization, co-ordination and specialization of tasks give the Roman army its power.

Films and documentaries are part of the curriculum followed by some progressive school and teachers. There are resources such as www.teachwithmovies.org that recommend movies and corresponding lesson guides for teachers. The Department of Education in Alberta, Canada includes feature film in the minimum requirements for text study. Many teachers, mostly in Europe and America, use movies in their lesson plans. The concept of class differences is brought out in *Titanic*. *Cast Away* is a tale of isolation and perseverance. *Matrix* is about conformity, self-discovery and the influence of technology. *Chocolat* talks about the longstanding debate of Change vs. Tradition. A 21st century student in Asia or Africa, or even Italy itself, may find it hard to recreate in his mind the Roman streets and palaces while reading Shakespeare's *Julius Caesar*. Watching the movie adaptation of the play makes the story more real. Otherwise, even the thought of a man in a toga would make them wonder how the Romans managed to move around, let alone have a flourishing civilization!

Like movies, biography is another field that serves contextual education by looking at the whole instead of the part. The study of an individual's life can be a great lesson. How their actions altered history and how historical events shaped them, how personalities are formed and how a formed personality acts, are lessons that students of history or psychology need to fully understand the subject, educators need to understand students, politicians need to handle issues, leaders of organizations need to lead, business people need to negotiate—all those who receive an education can benefit from the study of biography. The great men and women can inspire the young and act as role models. Watching the movie *Gandhi*, or reading his biography, one can learn what is it in an individual that made an ordinary man a Mahatma, or great soul.

The biography of Lincoln shows how honest he was, to be called Honest Abe, and how that honesty served him. Lincoln, when a young legislator, ran for the senate. He and two others, Joel Matteson and Lyman Trumbull, were in the fray. Matteson had 44% of the support, Trumbull just 9%. Lincoln, who had 38% of the support knew that Matteson was not a straightforward man. He and Trumbull shared a common vision for the country. So he withdrew from the race. Rather than splitting the votes and allowing Matteson to win, he withdrew, and supported Trumbull. He asked all his supporters to do the same too. Trumbull at first could not believe it was happening. This man was actually giving up his huge advantage, because he wanted the right person, not himself, but a right person in the senate instead of a man of questionable character. So he sacrificed his chances for the greater good. Trumbull won the seat. When Lincoln later contested the elections at the national level, Trumbull was one of his loyal supporters, and Lincoln rose to the post of the US President. It is not so much a moral lesson as an insight into the workings of life. Honesty and political aspiration do not often appear to be the closest of allies, but when they do form an alliance, they take one all the way to the top. Values have been recognized as an essential driver of professional excellence. Biographies bring the principle to life.

Centering on the whole person, the ills in today's education can be eliminated. ADHD, Attention Deficit Hyperactivity Disorder, is a term that is heard increasingly with reference to children today. In the US, some 9% of all children are diagnosed with ADHD, and treated with different kinds of medications. The percentage of children with ADHD in France is less than 0.5%. In the US, child psychiatrists treat ADHD as a biological disorder, and treat the

brain's neural functioning. French child psychiatrists see ADHD as being linked to the child's psycho-social circumstances, and focus on the issues that cause the child stress and underlie the ADHD. They treat the children with different forms of counselling. Hence the difference in numbers in the two countries. Similarly, a comprehensive, person-centered approach in education makes youth complete, and prepares them to face the challenges of the 21st century.

8. Educating the Part in the Context of the Whole

When the President of a country is faced with the largest crisis ever in the nation's economic and banking history, what does he depend on? The opinion of the economists? The advice from the bank presidents? His cabinet colleagues? Does he bank on the economic theories propounded by the elite universities in the country? This is the dilemma Franklin D Roosevelt faced, in 1933. The US banking crisis led to the closure of more than 6000 banks. There was a sense of panic among the people. They began to withdraw their deposits from the remaining banks, which led to an escalation of the crisis. The President put his finger on the issue when he declared on public radio that there is nothing to fear except fear itself. He rejected the monetary principles he had learned in Economics at Harvard and appealed directly to the emotions of the American people. He addressed them on radio and asked them to reject the sense of panic that was destroying the financial system, to exhibit courage and trust in themselves, and pride in their nation, and leave their money in the banks. His appeal halted the panic and paved the way for legislation that ensured the stability of the system for the following seven decades.

Economics touches people's lives directly, but the study of the subject rarely brings out the human and social dimensions. Similarly, industrialization detached from ecology, financial systems divorced from the real economy, and science devoid of moral accountability result in problems. Education of each part must be in the context of the whole. Roosevelt intuitively knew the link between economics and the aspirations and feelings of people. He knew the power of communication, of appealing to the emotions. Banks or the economy do not operate in isolation, they need to be seen in the context of the people. This linking, this kind of seeing the part in the context of the whole, must be integral to education of the future.

Winston Churchill intuitively knew the context when, at the height of World War II, he told his country and the world, 'We shall never surrender'. During the Battle of Britain, the Germans expected Britain to surrender in 6 weeks. But after 3 months, the Germans gave up, though they heavily outnumbered Britain in both aircraft and experienced pilots. They were training four times as many pilots every month as Britain. The advantage seemed to be with Hitler, but he had not taken into account the enormous psychological determination of Britain and the intuitive knowledge of her leader. In one of his most famous addresses to the nation, Churchill rallied the English to make unheard of sacrifices and unrelenting effort to defend their freedom. He spoke out of the deepest conviction and courage of his heart. He was not going to surrender, and he appealed to the depths of the English people. During air raids, he would stand outside on the roof top, shaking his fists at the bombers. His courage, patriotism, sense of honor and self-sacrifice resonated with all the English people. They backed him totally. In one of his other war speeches, he said 'I have nothing to offer but blood, toil, tears

and sweat'. What more can a leader offer, and every one of his countrymen was willing to follow him and offer the same. These statements of Churchill had all his emotions, sentiments and beliefs behind them, and struck a chord with all his people. Against all odds the underequipped and undermanned British air force was victorious in the skies over Britain. In the face of such resistance, Hitler had no choice but to give up. Churchill knew that more than the planes, pilots, armaments and war infrastructure, it was the soldiers' determination backed by the countrymen's support that would win the war.

Whether in war or in peace, knowing the whole context helps one get the right perspective to address the issue. Contextual education helps students get this perspective. There are a number of initiatives many schools and colleges take in this regard. The concept of service learning that some universities offer is one attempt, the trans-disciplinarity that Finland has introduced in its curriculum is another.

Service-learning is an educational approach that combines book learning with real world work. Students are given an opportunity to apply their classroom learning to support or enhance the community as part of their course. Many organizations and universities have incorporated service-learning into the curriculum, to address the contextual, motivational, and multi-disciplinary team needs. Purdue University's Engineering Projects in Community Service program requires its students to form multi-disciplinary groups to meet community needs. Penn State University has a program entitled 'Humanitarian Engineering', in which the emphasis is on relationship building. Long-term collaborative partnerships are formed with local communities so that the outreach programs at the university reach the community.

California-based UnCollege, founded by a young man put off by the disconnect between theory and real world applications, Dale Stephens, offers the 'gap year program'. It is an experiential learning program where students are provided with the resources and relevant contacts to equip themselves for an entrepreneurial career. The London-based IF Project aims to provide free, university level humanities education to youth. University professors and subject experts volunteer to teach, universities and other institutions make available their premises and other resources. The project coordinators also leverage the public lectures, concerts, exhibitions scheduled in London, and use museums, galleries and public spaces as venues for classes. The entire city of London is converted into a large, open air classroom.

Contextualization has been introduced in a more formal, structured way by the government of Finland. Finland has an efficient and equitable education system. The youth are regarded as one of the country's most precious resources. The schools and colleges foster the individual potential of every child. Apart from academics, students are taught handcrafts, cooking, sports, creative pursuits, community skills, developing a good image, and sensitivity to others.

The country has consistently ranked among the top in the Programme for International Student Assessment (PISA), a standardized test given to 15-year olds in 65 nations. In 2013, OECD tested adults from 24 countries in a survey called the PIAAC (Programme for International Assessment of Adult Competencies). Literacy, numeracy and problem solving skills were measured for 16-65 year olds. Finland was either at or near the top on all measures.

Instead of following the principle of "If it ain't broke, don't fix it", Finland has introduced a revolutionary change in its education system.

"Education becomes contextualized when studied within the physical, social and cultural circumstances characterizing real life situations. So, creating the relevant context, education comes to life."

Subject-specific subjects have been replaced by broad topics. Instead of an hour of History, an hour of Maths and so on, upper schools in the country teach 'European Union', in which students will study the subject from the perspective of history, politics, geography, languages, sociology, business, etc. 'Climate Change' will study weather, environment, living sciences, industry, and economy. Teachers lecturing to rows of students is giving place to small groups of students studying together. This 'phenomenon' teaching is benefitting students, according to early data. Student performance has improved in this already excellent educational system.

9. Conclusion

The power of abstraction reduces life knowledge to objective principles. Abstraction may be intelligible to the intellect, but is incomprehensible to the imagination, creativity, emotional intelligence all of which is so important to the full development of personality. In the education of the future, the gap between abstract concept and social relevance must be bridged. Education becomes contextualized when studied within the physical, social and cultural circumstances characterizing real life situations. So, creating the relevant context, education comes to life. It transforms education from a two dimensional image into a three dimensional holograph.

Not every academic discipline lends itself to contextualization, but we can explore how much can be done. The arts and humanities are easier to contextualize, but it may be more difficult with the sciences. When we need experts in every field, would knowledge of other fields help or distract? Does contextualization stand in the way of specialization? These are questions that need to be explored in the education of the future.

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The Double Helix of Learning and Work[*]

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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 an abridged version of the last chapter being published in *Cadmus*.

Chapter 5
"A Call to Action"

5.1. All the Ingredients are Available

The solution to the problem of Learning and Work is likely to emerge from the existing elements. It might be the following: the modularization of the curriculum with the aim of creating a personal choice system to be constructed by the individual along his or her active life, between the ages of 16 and 76, to consist of alternative sequences of work and learning. At the dawn of the Twenty-First Century, a vast number of experiments, debates, and initiatives are underway and are aimed at devising solutions to the problems of education and work. The problems in question are also being given priority on governmental agendas. International organizations are focusing on them. Both the pressure of public opinion and the rapid pace of technological and economic change are calling out for solutions. The relationship between education and work is being followed, with great concern, by private companies, and it is catalyzing the involvement of civil society. The main issues for reflection are listed in the table below:

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[*] All content being used from the book *The Double Helix of Learning and Work*—a Report to the Club of Rome—by Orio Giarini and Mircea Malitza, published in 2003, is copyrighted to UNESCO. The full book is available online for download at http://unesdoc.unesco.org/images/0013/001307/130713eb.pdf Please refer to the original book for complete bibliography.

Education and Work: The Principal Issues

Education	Education and work	Work
Curriculum reform	Assessments	Employment
Modularity	Indicators	Active knowledge
Shift to learning	Financing	Non-monetarized work
Optional and choice	Education for work	Non-monetized work
learning	Job-oriented education	Participatory work
Lifelong education and	Public and private	Inclusion in management
learning	Knowledge	Part-time work
Interdisciplinarity	On the job learning	
Formal, informal, non-	IC Technology	
formal	Adult innovation	
Imparting knowledge	Recurrent education	
Anticipatory learning		
Participatory learning		
Distance learning		
Open institutions		
Education for all		

This list of themes regarding education and work is about as comprehensive as possible. The evolution of the concepts in question and the degree of their recognition are also important. Who would have guessed that the aspiration of humankind to permanent education would give rise to a concept that would become an official programme (*i.e.,* lifelong education)? In the world of politics, bulky chapters are devoted to such items in the electoral platforms of various parties. National and international meetings are tackling these issues more extensively than ever before.

The relatively complete agenda of lifelong education and the energies dedicated to the analysis of its implications are aided by an additional fortuitous circumstance. The debate is not only theoretical, but also action-oriented. It has gradually embraced each and every component of the solution. All the ingredients are now present. Among the myriad experiments, there are some that asymptotically come close to the solution. The overall picture is still in a state of flux, waiting to be crystallized.

Either of the two parts of the helix have multiple exits and points of entry. Transit takes place within a common assessment system, based on cumulative credits and on a funding framework resulting from co-operation between the public and the private sectors. And yet,

the solution is not there, and the coagulation point remains beyond reach; moreover, further progress is currently slowing down. The saturation of the mixture is leading to dysfunction.

Thus, the stated and acknowledged objectives tend to turn into empty rhetoric. The proponents of the idea sooth their consciences by delivering noble speeches. Experiments do not advance because of a lack of communication. They appear as isolated spots in an indifferent mass, held to ransom by traditional routines. The acquired expertise moves in closed circles, the case, for instance, with modularization in vocational and postgraduate education.

In almost all cases, experiments amount to *ad hoc* additions to the mainstream curriculum (a little bit of genetics in secondary education, more civic culture, visits to or practice in industrial enterprises). Teachers seem to treat these activities with condescension and tolerate them providing they do not interfere with the system of class-teacher one-stream curriculum.

Even when solutions meritoriously address previously neglected problems, they are mostly inefficient, if not downright wrong.

Let us take, for instance, the question of children with special needs. The old terms bearing a connotation of exclusion (*e.g.,* handicapped or disabled) have been abandoned. A step forward was taken at a conference held in Salamanca in 1994. It stated a valid principle; those children have to be integrated into the regular system, considering that normality should be construed as recognition of human diversity, and that children with special needs should not be confined to institutions and marked as unable to live a normal life. Steps toward integration into the regular school system have already been taken, and the teachers have been instructed to extend adequate treatment to all children. Nevertheless, integration within a system with a single curriculum may give rise to greater problems than those encountered in special schools. Discrimination will, in fact, be eradicated only when each pupil is able to have an adequate curriculum adapted to his or her specific situation and needs. In the light of the personal curriculum solution, all children are special, and each one has special needs.

The integration of minorities has been and still is being seriously considered by sociologists and government agencies. To quote a representative of a minority group, "integration is another name for assimilation". Even so, a personalized itinerary provides solutions such as choices of modules relevant to the community language, history, customs, and beliefs within the general framework of the educational offer.

In that perspective, the issue of non-discrimination finds a natural solution. The idea was tenaciously pursued at the end of the Twentieth Century through official programmes aimed at *Education for All* which simply implemented the provisions of existing international agreements starting with the Universal Declaration of Human Rights. Since the notion of an individual itinerary applies to everybody, it eliminates any source of discrimination. The *Education for All* programme is not limited to the elimination of discrimination from the educational cycle; it also points to the inclusion of all age groups, at least through age 76. In this vision, curricula should be based on modules for all the periods of a person's life. A possible, but yet unexplored, result could be an extension by twenty years of the productive life span of the adult generations.

The multiplication of optional subjects at all the levels of the educational system can be regarded as an encouraging early result in this process. It reveals the capacity of the educational system to renew itself through cooperation with the community, with parents, and with interested companies. The decision-makers now have to catch up by drafting new laws and introducing systemic modifications into such areas as evaluation, diplomas, and financing schemes. We are witnessing the first signs of flexibility in an effort to come closer to the individual by enabling him or her to exercise his or her essential faculty, that of free choice. Enhanced flexibility is required when it becomes necessary to tackle the more sensitive areas of education.

Many reformist trends around the world have approached the issue of education for work. Special classes were allocated to visits, mostly passive ones, to workplaces in factories and service enterprises, to institutions of public administration, to hospitals, and even to the traffic police. As a result, students became more aware of, and more familiar with, the reality of work. At best, those visits awakened in them a certain interest or vocation. Entertainment and sports have, so far, been more successful in offering attractive heroic models for the young. So have other models of shortcuts to wealth, fame, and prestige, leaving behind the doubtful fascination of work.

A possible experiment could focus on the introduction of occupational modules for children aged 10 to 16, with more advanced levels for students over 16, focusing on such occupations as: electronic engineer, programmer, graphic designer, nurse, salesperson, tourist guide, gardener, farmer, etc. The list is endless, and it coincides with the standard record of professions. Why should recommended hobbies concentrate only on such activities as the breeding of birds or of rabbits? Should a greater degree of free choice not make a young person happy to have earned a professional diploma by the age of 15? Basically, the idea is to gradually assimilate amateurism and hobbies within the curriculum, thus providing a pleasant and attractive introduction to the sphere of work.

Non-formal education and informal education no longer need theoretical recognition, but they remain largely unexplored even though they are attainable with modest means. Where are the "Do-it-yourself" shops which would enable young people to get tremendous satisfaction and pride from having built, from detached parts, their own radio sets, portable sound recorders, home appliances, mosaic-covered tables, computers, etc.? Where are the modules for the organization and equipping of a personal science laboratory (physics, chemistry, natural sciences)? While the schema of modular education is bound to give rise to new industries, such as the module industry, the new concept calls for the establishment of an auxiliary industry producing the wherewithal for informal activities.

It should be noted that all the topics that are being explored by educational research today—formal, informal, and non-formal learning, open and distance learning, recurrent education, optional choice, and modular learning—are increasingly relevant for that area of lifelong education which addresses the adult person.

The promise that learning through experience holds for scientific knowledge is still being mostly ignored. Whereas experiments in the school laboratory under a teacher's

supervision are mandatory, according to the curriculum, the value of exercises in problem solving related to theoretical subjects is played down. In fact, the exercise book is not the auxiliary addendum to the theoretical textbook but rather the other way around. The winners of contests in mathematics, physics, or chemistry will confirm this reality.

However, the most intense and perceptible change of attitude is occurring with the coming generation. Something perceptible and significant has happened, directly linked to education and work, for the structural reform of which the young could be the main asset.

Scholars doing research on the impact of technology on the younger generation (the United States provided a most appropriate field of study) suggested that, following the baby boomers, the people born in the aftermath of the Second World War, the generation of the 1960s and 1970s, have their own particular characteristics. The former, the baby boomers, bear the imprint of television and of its confusing, non-interactive influence. That generation produced radical and revolutionary youth movements. It was followed by the Y (for "Yuppie") generation (also called the "Millennials"), children of the Internet. Children turn their backs on traditional games because of the superior interaction and sheer fun that the new environment of the Web offers them. People of the new generation are displaying unusually strong new propensities: independence, skepticism about adults, a rich imagination, and an incredible innovative power. They love change and, above all, they are entrepreneurial.

Don Tapscott, the author of *Growing Up Digital: The Rise of the Net Generation* (1998), wrote: "For the first time in history, children are more comfortable and literate than their parents about an innovation central to society".

What should be noted is the impatience of these young people with the pace and the protocol of the conventional curriculum. They want to learn faster and better by making use of available technology in a more focused and selective manner than is prescribed in the rigid curriculum. They already are the authors, *avant la lettre*, of personal curricula. They are also impatient to jump-start their involvement in the sphere of work as soon as possible. At a time when senior citizens learn how to use e-mail and to search the World Wide Web from their juniors, young people are no longer attracted to the defiant spirit of the 1970s. They simply wish to find out more about life during that period. The much-discussed "generation gap" is not widening. The contrary seems to be the case.

It is striking to see how much respect these young people have gained in the eyes of their seniors. Adults have started to imitate youth, to dress like them, and to listen to their music. Companies want them for their technical skills and their taste for change. Governments take them along with their delegations to the United Nations. City halls set up youth councils. Political parties increasingly depend on inputs from their youth branches. Students have an active presence in the management committees of secondary schools and universities.

Some might object that this picture is that of corporate America. Yet another young generation is turning to the symbols and myths of the past. From a ludic point of view, it is fair to say that the young play the games that are available to them, even the most sinister ones. By extension, in the new century, the name of the game is the computer, not the

swastika. Despite obvious material obstacles, it is surprising how this trend is also gaining ground in the developing countries.

Let us examine the reasons why this dynamic young generation and the spirit of change that it is stimulating can be placed at the top of the list of present-day favourable factors. The experiments it is engaged in will likely decide the future of lifelong learning intertwined with work and accomplished through a variety of individual itineraries.

5.2. Slowly Getting Ready

An educational system, no matter how decentralized, needs some general guidelines in order to operate properly. These are elaborated at a national level and are expressed in laws and policies. The regulated segment includes the structure of the system, the procedure for awarding diplomas and other attestations, the standards or grades, the funding schemes, and the operational requirements of this vast public sector comprising from one-fourth to one-fifth of the population. The government is therefore the prime agent entitled to take decisions regarding the institutional framework of education and the needed reforms.

"Despite some interesting and promising developments, the inertia of the old structures and policies remains considerable."

The private sector comes next with its practical knowledge of the actual current and future manpower requirements at company level. In fact, training for work is even older than religious education.

In third position comes civil society, represented, in particular, by parents, who have always been involved but have recently become more vocal.

The fourth essential factor is the teaching staff owing to its position in the educational system and the weight of its opinion in the formulation and application of reforms. The importance of teachers, even in numerical terms, should not be overlooked. In any country, there are about 50,000 teachers and auxiliary staff for each 1 million young people enrolled in the educational system. Most of these teachers are represented by powerful trade unions.

Finally, since it is necessary to analyze the relationship between work and education, it is necessary to note the role of the trade unions in the national economy as a whole, especially in the light of their trilateral partnership with employers and government.

The press, television, and the other media are factors that influence the debate on the future of education; however, they can be regarded as part of civil society or as part of the non-governmental sector.

One observes that a strong will for change is obvious in regard to experimental action, and important steps in favour of structural reform have been taken at that level. Such has not been the case with other major agents that are having a crucial impact in key sectors: legislation and financing. Despite some interesting and promising developments, the inertia of the old structures and policies remains considerable.

The question here is that of the institutionalized governance of states and of their parliamentary and executive systems. Central to politics is the power to decide and manage the affairs of state in an orderly manner. Consequently, all structures have to be judiciously organized: public administration, law enforcement, the military, the health system, and public education. The political mind dreams of stability and continuity. The obsession with order becomes a systemic disease that begets bureaucracy, corruption, inertia, and resistance to change. Most national educational systems have retained a certain rigidity. They still emphasize the ideas of order and regulation, and they resist the kind of modernization that is required by contemporary society and economy and made possible by contemporary technology.

"The key to effectiveness can be found only in the capacity of the system itself to absorb change in a continuous flow."

Spasmodic attempts to promote renewal are noticeable in the shaping of the reforms promised by political parties in the run-up to cyclical elections. In fact, the commonly accepted idea of how to go about reform may be fatally flawed. The stages of educational reform should not coincide with the succession of governments. The educational system needs to be regulated by a built-in mechanism of permanent and continuous reform. Considering the pace of change, no formula can be regarded as the ultimate formula. The key to effectiveness can be found only in the capacity of the system itself to absorb change in a continuous flow.

Current educational legislation and practice lack such adaptive mechanisms for their basic components: the cast-in-concrete curriculum, the teacher-class system, and the conditionality of diplomas. Those immobile elements, plus the goal of integration into a homogeneous mass designed to serve and perpetuate an economy and a society that no longer exist, allow only insignificant, ornamental, and symbolic alterations.

Two major processes, globalization and regional integration, are now confronting states with a new agenda. The position of an individual country within the international environment depends on how wisely it manages to play its cards, to find new niches, and to identify and to exploit its competitive advantages. These requirements call for a flexible and alert educational system.

The following story may prove more enlightening. At a conference in Algiers devoted to the new international economic order, a subject that was much debated in the 1970s, a young diplomat approached Lord Ritchie Calder, a well-known Laborite author and specialist in science and technology. Said the young man: "I must ask you about something that bothers me. When the United Kingdom gave up India and the colonial empire, among the arguments you mentioned was the country's ability to find other ways to assert its global interests. After all, Britain had been the cradle of the... industrial revolution through technology, science, and knowledge. And yet the dream shattered once the young brains of the realm started their migration to the US." Lord Calder replied: "The answer is simple. Education did not keep pace with the times. Universities did not understand what was at stake. School prevented us from moving forward".

Today, states are beginning to realize that they cannot ride the waves of globalization with fixed, non-adjustable sails. Another good sign is that no nation seems inclined to suggest that its own system is the best and should be adopted as a model. All existing systems are still quite far from the ideal of flexibility and radical renewal that learned international conferences have been putting forward. Some education systems, which have been famous for their rigidity, such as the Japanese system, are starting to throw off ballast.

The private sector has also been slow to rise to the challenge, but for different reasons. The financial resources of a private bank or company are far greater than those of a ministry.

The business community has two main reasons for its reluctance to get involved in matters traditionally reserved for government action. First, education has been assigned a place on the other side of the barricade, while the government was supposed to abstain from interfering with the economy. The second reason is even more serious. Profit is the motive force of the private sector. It may even acknowledge that education is a profitable exercise. But the problem is that education becomes a profitable investment only over the long term. The natural preference of capital is for short-term gain. At this point, a quotation from Lester Thurow (1996, pp. 283-284) appears to be relevant:

> Consider college education as a hard-nosed capitalist might consider it. Sixteen years of expensive investments must be made before the returns begin. Approximately $65,000 must be invested to acquire a K12 education; depending upon the quality one wishes to buy, $80,000 to $120,000 will be necessary to buy a college education and the sixteen years spent in school will mean forgone earnings of about $68,000. Sixteen years of high-quality education will require a total investment of about $250,000 per child. The risks that this investment will not pay off are enormous.... Capitalists simply don't invest in sectors where they have to commit to a sequence of investments with low returns, high risks, and falling asset values.

There is another serious consideration. Investors always take care to avoid a situation whereby their investments could give competitors a *free* ride, as is the case with public goods. The emergence of corporate universities indicates that the feeling of insecurity about the economic returns on investment in education might have been overcome. But keeping educational investments under corporate control in order to frustrate free riders may still inhibit private investment in education as a public good.

Are these good signs? Yes, if one considers the grants that some companies punctually, though not very frequently, award to universities, or their patronage of certain schools. Also yes, if one considers the significant experience of the technological parks attached to universities, which provide a prolific interface between education and companies, with enhanced chances for the education-work linkage.

Neither the third nor the fourth categories of agents (teachers and unions) that have a bearing on structural measures are in a position to offer sufficient supporting elements for positive action.

Let us start with the *teachers*. They regard themselves, rightly, as the key element of the educational system. But they fear that a new system, while enhancing their guiding function as tutors, might reduce their crucial, well-defined role as masters of their discipline, their exclusive control over the way the curriculum is covered, and their decisive power over evaluation.

"The notion of confining education to instruction and the tacit adherence of teachers to behaviourist principles, with their emphasis on exogenous control and the minimization of the endogenous resources of learning, make teachers feel comfortable in their dominant positions as wardens of the whole process."

Teachers are the ones who award the credits and give the green light to the issuance of diplomas. The mechanism of reward and punishment is also in their hands. A possible dislocation from that entrenched position would naturally meet with opposition. The notion of confining education to instruction and the tacit adherence of teachers to behaviourist principles, with their emphasis on exogenous control and the minimization of the endogenous resources of learning, make teachers feel comfortable in their dominant positions as wardens of the whole process.

But these are not the reasons teachers would normally give for their resistance to innovation. Their objections are packaged as a campaign in defense of quality against the changes that might threaten it. This argument carries weight with parents. They attach importance to quality and good results, authenticated by diplomas and certificates as the safest way to a stable career.

It should, nonetheless, be noted that many teachers have embarked upon experiments meant to broaden the educational horizon. Also, one should not overlook the important trend—embraced by public opinion and reflected in the activities of NGOs—which proclaims its faith in the individual, in his or her autonomy and resourcefulness. The prevailing philosophy and mentality of civil society can be transposed in the area of education through the individual curriculum, the personal itinerary, and the freedom to alternate learning and work during one's lifetime.

Although they are frequently viewed as being a part of civil society, the *trade unions* play a special role in the relationship between learning and work. Traditionally, their priorities were related to jobs and wages and, later, also, to working conditions. Consequently, they looked with some suspicion upon the educational sector because it produced people with diplomas that entitled them to automatically hold better-remunerated positions without having "real" qualifications. But unions tended to support promotion following on-the-job training, adult courses, open education, and other measures developed within the enterprise itself.

Transition to a system based on individual training is a major test for the trade unions. Such a system brings with it not simply enhanced mobility of the type advocated by liberals

in the labour market, but total mobility. The difference is fundamental. The mobility of the market is involuntary in terms of individual choice and interest, while individual mobility is voluntary and dictated by interest.

Let us assume that the unions might give favourable consideration to the new schema, if and when it is accepted by their members. However, a fluctuating mass between the two helixes may eventually deprive the unions of clear and stable support from their membership. The need to protect the rights of those who are simultaneously and recurrently engaged in work and learning will generate new forms of organization, which will require the unions to develop more complex and comprehensive activities.

At present, the agents involved in structural change are not prepared to direct their energies and resources toward a far-reaching transition in the work-education relationship. But those agents are themselves subject to experimentation. Whether they like it or not, they are constantly confronted with the dysfunctions of the traditional systems and the high costs of their maintenance and repair. They begin to realize that a new approach is necessary in order to face the demands of modernity in the Twenty-First Century.

5.3. The Counter-Aging Society: A Life of Sixty Active Years

The best indication of the success of the Industrial Revolution was the increased human life expectancy that came in its wake. It is still rising in most parts of the world.

This phenomenon is frequently described in traditional terms as a sign that society is aging. If the statement merely means that most people today live longer than they would have lived some fifty years ago, then the statement is acceptable. But, in itself, the expression, "aging society", is somewhat inappropriate. It is first necessary to recognize that there has been an increase in the length of the life cycle, which should probably count as one of the greatest achievements of the Twentieth Century. Second, it must be observed that what is really becoming older is the notion of age itself. One only needs to refer to the European literature of the past century in order to learn how people felt at 40. It is also clear that the onset of physical and mental decline has been pushed back. In other words, at 50, 60, or 70, one is much younger today than one would have been at those ages in the not so distant past. Therefore, our societies are, in a sense, getting younger because people are living longer and better. This phenomenon can be observed in most countries around the world.

The failure to understand the situation in these terms can lead to serious errors. On the one hand, we tend to marginalize a growing portion of the population (those over 60) far too early. On the other hand, we quickly run aground in the political debate about how much and how long the younger generation should pay to support the older generations. On both counts, we find ourselves at a dead end!

In order to come up with a rational answer, it is necessary to turn the proposition completely around: Older people are younger today than they used to be in the past because the "value" of human beings is being linked to their productive activities and creative endeavours. The key social and political challenge of the coming decades will be the extent to which modern society

manages to involve people from, say, 16 to 80 years of age in the worldwide process of creating and sustaining the wealth of nations. There are already clear signs that things are beginning to move in that direction, even though the global picture is as yet far from homogeneous (Delsen and Reday-Mulvey, 1996).* It is important to recognize the good news that we live in a counter-aging society, since the change that is occurring in the structure of our planet's population is a momentous one in human history. Our culture, our mindset, and the structures of our societies must now adapt to this new and promising trend. The inescapable significance of the new situation is that every

> *"We still hold to our philosophical prejudices: we are much more what we produce than what we consume."*

one of us has a potential for staying on as an active participant longer and more effectively than it has ever been the case. Achieving that sort of continued participation must now become the goal of the learning-work tandem and a key instrument of progress and justice for all.

In this perspective, it will be essential to propose educational programmes for those who are 60 and over with an aim to develop new skills enabling them to embark on new careers based essentially on part- time jobs and/or unremunerated activities. Indeed, a great deal is already happening along these lines.

One must also consider the fact that in many countries, particularly in the developing world, young people account for a very large segment of the population. Those people will eventually grow old within twenty, thirty, or more years. The consequences of an extended life cycle will then become a truly global issue everywhere. China, for instance, has already taken this inevitable problem into consideration at governmental level.

It is first necessary to reconsider and to redefine the notion of work as productive activity in the world of today, but not in the sense of what has been inherited from two centuries of the industrial revolution. Full-time remunerated work of around thirty-five hours per week, at the least, is still considered in most cases as the only measure of the contribution of an individual to productive activity. It is through this process that one establishes most of one's social contacts. It is also at work that individuals find and define their place in society. Official forms one has to fill out on various occasions always ask questions about one's professional career, qualifications, skills, and even sex. The perception of one's personality is very much linked to that sort of factual information. One's entire network of social interaction is heavily dependent upon one's position in the world of (remunerated) work.

The fact that other human activities are hardly ever noticed has led to a perverse situation: somebody who is engaged in valuable non-monetized work—household work or child care at home are the obvious examples—receives much less that his or her due share of social recognition. Evidently, this attitude has adverse effects on personal motivation and self-esteem.

Quite a few other activities are gaining importance in a society in which leisure may sometimes occupy people at least as much as work, even though that representation is not entirely true since much of the so-called leisure time is spent on voluntary work.

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* The Geneva Association, a pioneer in this important issue, had already started a research programme on gradual retirement in 1987. It has since organized at least one seminar each year on this issue and has published a series of special studies as well as *The Fourth Pillar Newsletter*.

The increased differentiation of the types of productive work and of the opportunities to perform additional activities as complementary elements of human personality is a rather new development, particularly if seen from the point of view of classical economics. An evaluation of such activities becomes a helpful tool for making judgments about individual contributions to the progress of society in a modern economic system.

We still hold to our philosophical prejudices: we are much more what we produce than what we consume. Even consumption patterns are simply ways to generate an image of ourselves. Most people, we believe, are aware of the fact that their worth is much related to their level of self-esteem and usefulness to society. We definitely stand behind the idea that we consume, and need to consume, in order to produce for ourselves and for society rather than the other way around. In this perspective, the question of work as an element of one's personality gains a whole new dimension.

To identify the current intensity of work in the life cycle we have to examine the participation rates of people in the monetized labour market. This determination is made by the ratio of the active population—i.e., all persons of either sex who ensure the supply of remunerated labour for the production of goods and services regardless of their employment status—to the total number of people in a determined age group. The higher the proportion of the active population in a specific age group, the greater their work intensity. Work intensity is subject to legal regulation, social influences, and individual decisions.

A sharp increase in economic activity occurs at age 15 to 24 as a result of graduation from secondary or tertiary education. Before the age of 15 there is usually, at least in the industrialized countries, only negligible activity in the labour market. This situation changes when mandatory school attendance comes to an end, and individuals can join the work force according to their personal inclinations and needs.

Afterwards, work intensity is more or less stable over a period of several decades. For men, the proportion of economically active people typically exceeds 90 percent, while for women, the rate tends to be considerably lower. Depending on the degree of integration of women in the labour force, the activity level, in various countries, only rarely exceeds 75 percent. During the period of activity, the participation rates of women exhibit a particular but very characteristic drop between the ages of 30 and 39. An obvious explanation for this phenomenon is the preference of women of that age to spend more time on domestic work and/or child-care activities.

At the end of this phase, the proportion of people who are gainfully employed gradually diminishes. At this time, retirement becomes a major factor in the making of personal decisions regarding working time and lucrative activities. More and more people choose to drop out of the labour market and to devote increased time to other activities than remunerated work.

We shall now propose an alternative system for the distribution of work and work intensity that seems better suited to individual needs throughout those different stages of activity.

During the education phase, more part-time work should be integrated into the official tertiary education system. Such an approach would enable young people to gain working

experience while still studying, without necessarily submitting themselves to the stress of taking an unpleasant or uninteresting job in addition to being enrolled in full-time education. At the same time, the solution would relieve them of at least part of their financial worries. The integration of part-time work into the educational system would also foster connections between theory and practice, and it would provide closer links between higher education establishments and the productive sector.

During the second phase, there would be fewer changes in work intensity. That stage, however, should be gradually phased out rather than come to a sudden end. There would be increased possibilities for older people to prepare for retirement by gradually reducing their workloads according to their individual preferences and needs. At the age of 60, they still have twenty years of life ahead of them. Gradual retirement could thus become a beneficial complement to the established three pillars of the social security system. It would also help reduce the pressures on national budgets in aging societies. Voluntary work, which is already, to some extent, being undertaken, might increase in volume. It could become a non-monetized substitute for part of the previously remunerated work since many older people would like to stay active without necessarily asking for monetary compensation.

During all three phases, education, training, and retraining should be part of daily life, albeit differentiated according to age. Constant access to education is necessary in order to enable people to remain in the labour market and to meet the demands of an ever more complex and rapidly changing society.

At this point, it appears appropriate to dispel a common misperception. Conventional corporate wisdom still claims that older workers are a burden to dynamic enterprises trying to keep abreast of a rapidly changing business environment. In fact, a number of serious recent studies demonstrate the generally positive contribution of older workers (see Warr, 1994: 472-480; and The Commonwealth Fund, 1991). They have been found to be experienced, reliable, hardworking, and effective in their jobs. They think before they act, and they seem to be more flexible when faced with new assignments and changing work conditions as compared to their younger colleagues. These very positive characteristics of older workers can, and definitely should, be exploited not only until the age of retirement, 60 to 65 years in most industrialized countries, but for a longer period. Longer life expectancies and improved health conditions make such an extended period of employment possible.

One of the major problems of the employment of older workers stems from the system of remuneration according to seniority. Traditionally, older workers have been more expensive than their younger counterparts who, in fact, have been subsidizing the higher wages of the former. This practice has led to a situation whereby older workers might be earning more than their actual productivity would merit, thus providing employers with an incentive to dismiss them, or with an excuse to shed them first in case of downsizing resulting in redundancies. The situation is even more serious in certain countries in which contributions to pension schemes increase with age, thus making older workers even more expensive.

A movement in favour of performance-based remuneration is underway in certain countries, especially in the Anglo-Saxon world, which is likely to enhance the competitiveness of

older workers. Part-time work could considerably assist the transformation of the system of remuneration, since the switch of older workers, who have reached retirement age, from full-time to part-time employment with additional, if partial, pension benefits would ease some of the financial constraints for both the employer and the employee.

However, the current distribution of income among the older population, those aged 65 and over, still does not reflect any shift towards higher earnings from part-time work.

Gradual retirement, as a complement to the established three pillars of the social security system and an expression of personal choice and individual preference, is closely linked to part-time work. Even in countries like Germany, France, or Japan, where traditional attitudes to part-time work have been predominant for a long time, the situation is beginning to change. The explicit wish of those over 60 to have a broader choice of ways to organize their lives has contributed to increased recognition of the rationality of more flexible work patterns.

So far, experiences with part-time work as the component of a gradual retirement approach are mainly positive (Delson and Reday-Mulvey, 1996). Initial organizational problems can be overcome rather quickly, and the costs of the required administrative measures, planning and sometimes equipment, are compensated through reductions in absenteeism, increased flexibility, improved morale, and productivity growth. Ignorance appears to be one of the more serious obstacles to part-time work or employment of older people, especially when they have passed the official retirement age. People tend to be skeptical whenever there is no experience of part-time work, but when that practice has been developed, it is generally welcomed by supervisors. Younger colleagues can also benefit from the valuable skills of part-time experienced workers who would otherwise not share them when fully retired.

Since the benefits of the part-time work performed by older people generally outweigh the costs, there should be no structural obstacles to the employment of older people. Current practice shows that part-time workers could undertake many more tasks than is now the case. The development of part-time work thus appears to be an ideal way of lengthening working lives and/or of giving them increased flexibility.

There is an element of absolute novelty in the relative length of working periods. The sixty-year active life tends to become generalized. An average active life increases by twenty years. Thus, the facts of demography and the leap from 55 to 75 years in life expectancy eventually come to terms with societal organization. Extended useful lives are no longer the bane of national budgets, and the specter of the "aging society" no longer seems so frightening.

5.4. Funding Schemes

How will the costs of the new system be covered? Will they be higher, as sometimes appears to be the case, or will the possible schema reduce budgetary pressures on public spending? Let us first review the relevant experiences and tendencies.

So far as education is concerned, the most debated initiative is that of the voucher system. The definition is simple: the government makes a payment to a family in the form of a voucher. The family gives the voucher to a school of its choice. Thus, the tuition fees for the

children of this family are covered. The school cashes in the voucher with the Government from the tax-funded budget. The beneficiaries are the family, especially the children, the school, and even the state.

The most important change is that both public and private schools can be chosen because the government subsidizes the schools in proportion to enrollment. Consequently, schools are encouraged to compete with one another. Only the best succeed in bringing in more students and more funding, according to *the funds-follow-the child* principle.

In fact, the voucher scheme is a continuation of the system of loans for compulsory education. It enhances responsibility towards the principle of *Education for All*. Several arguments plead in favour of this new system: *(i) child protection* following from the Education for All principle, but also providing for those suffering from parental neglect; *(ii) internalization of beneficial externalities*, since support for education reduces poverty and encourages economic growth, increases lifetime income, and has constructive social effects. One can argue that the State actually makes a long-term investment in a manner that is quite similar to the theory of human capital and the knowledge economy; *(iii)* The principle of *equal opportunities* is universally acknowledged and constitutionally enshrined. Children should not be deprived of upward mobility through education only because their parents are not wealthy.

In reality, most of the methods used in the voucher system are selective and somewhat biased in favour of the underprivileged categories (single parents or the disabled) and of families with reduced revenues. Other fiscal measures exist by which to attain the same goal as that of the voucher system, such as tax reduction (an education tax rebate); however, vouchers are also designed to help persons who pay lower taxes; *(iv)* The voucher system enhances the pool of available resources by *reducing the waste of intellectual potential*. This factor, however, does not lend itself to precise measurement. We can only guess how much is lost by not allowing individuals to develop to their full potential; *(v)* An application of the voucher system *challenges schools to compete*.

The new system soon encountered many objections and gave rise to heated disputes at theoretical and practical levels. It was said of voucher schemes that *(i)* they were generated by a free market philosophy and thus encouraged the pursuit of selfish material gains and minimized public benefits; *(ii)* they undermined the public educational system by reducing emphasis on quality and orienting young people towards private education; *(iii)* they would cause private schools to be subjected to the same kinds of controls as public schools, thus sapping their independence and specific merits and making them more and more bureaucratic; *(iv)* they would prevent poor families from deriving true benefits, which, rather, would go to the middle class. Segregation would thus deepen (as in the inner cities in the United States), and the educational gap would widen. Other objections pointed to the dangers of higher costs and the misappropriation of budgeted allocations, which are primarily needed by the public schools that are faced with specific problems.

The disputes over the voucher system grew even more acrimonious when the arguments turned political and doctrinal. In the United States, a country in which the debate has produced the largest number of initiatives for the adoption or the rejection of the voucher system,

it turned into a dispute between the Democrats (contra) and the Republicans (pro). Legislative action was initiated in twenty-six states.

The issue has also given rise to constitutional disputes. The United States Supreme Court ruled against the granting of subsidies from public funds to schools run by religious denominations; however, it refused to make a ruling in a parents-versus-state case on the use of vouchers. The NGOs were divided. One of them, People for the American Way, claimed that the voucher programmes weakened public education, that taxpayers' money was spent on explicitly religious instruction, and that the new system obstructed further meaningful efforts to improve the quality of public schools. In exchange, the Children's Scholarship Fund announced an interesting initiative: 45,000 privately funded scholarships for which there were 1.25 million applicants.

It would be a mistake to consider the issue only in light of the highly publicized debate in the United States and therefore to underestimate the scope of similar or related initiatives in other countries.

The application of the new system is not confined to industrialized countries.

It is now time to ask ourselves to what extent the approach was able to provide worthwhile support to the kinds of structural reform that are required for lifelong learning, curriculum itinerary, and the double helix of work and education.

First, the system is based on consumer choice supported by public funding, even though the funds are mainly allocated to maintain the functioning of suppliers. Second and most importantly, its guiding principle is personal advancement, qualification, and fulfillment. The individual decides how to use the available means in those areas that stimulate his or her interest, participation, and satisfaction, while giving him or her access to new opportunities and chances. Third, the system can apply to all age levels. Moreover, the contribution from the state budget becomes an add-on rather than a substitute to one's own earnings when necessary.

Having seen the terms of reference for lifelong education and active participation, let us now briefly examine what happens with the financing of the post-work period. States have a vital interest in providing old-age security. Pension systems are currently subject to serious debate, especially in those countries in which the aging population is on the rise.

The classical system is based on the premise that workers are taxed today in order to pay for the old people of today, *i.e., the pay-as-you-go* plan. The system does not allow for a correlation of the immediately available resources and the obligations already assumed. The working generation takes responsibility for supporting the retired generation. Early retirement has only worsened the situation. The list of shortfalls is so long that the mandatory, publicly managed, tax-financed pillar for redistribution has to be supplemented with two other pillars: a mandatory, privately managed, fully funded pillar for savings and a voluntary pillar for people who want additional resources in their old age.

Such diversification is being implemented in many countries. It reduces the risks for the retired since it introduces several types of management (public and private), of financial

sources (of labour and of capital), and of new investment strategies at domestic and international levels. Since the 1970s, advanced studies have been undertaken by the Geneva-based Association for the Study of Applied Economics and by the Risk Institute concerning gradually phased-in pension schemes and chance enhancement for the after-work period of productive life.

The topic of flexible retirement plans reveals a link to the double helix of work and learning. Such schemes stretch across longer periods of active life (4-10 extra years at one end and 11-16 years at the other). The question of pensions proper will thus shrink in size and be applicable to a smaller category of people (those over 76). The additional decade will be taken care of by means of a different type of security arrangement pertaining to the right to work and lifelong education. Consequently, the contribution of the state budget needs to take into consideration a uniform approach to people aged 16 to 76, one that is related to vouchers rather than to pensions.

Two circumstances make life considerably easier for public budgets: the decreasing number of those who are relying exclusively for their living on the three-pillar pension system and a drastic reduction of the complicated and cumbersome unemployment benefits schemes. The latter will eventually become part of the social security safety net, usually applying to people who have become marginalized or incapacitated. The blurred distinction between the public and the private sectors, already instituted in the field of education, turns into a partnership for the management of the education-work system for the period between ages 16 and 76. The main contribution of the private sector will no longer come from taxes collected into a general budgetary system but from targeted investments in knowledge creation.

Education, unemployment benefits, and pension schemes are all based on taxation accounting for a staggering proportion of GDP. If one adds to that sum the expenses incurred by companies to cover social demands other than wages, the resulting figures become really huge. Hence, the conclusion that the introduction of the double helix concept gives rise to a financing system of "lifelong basic rights" which emphasizes the duty of society to provide individuals with entitlements, that will be much less costly than traditional ones, owing to its unifying vision, common mechanism, and synergetic approach.

Its advantages are much more diverse. More flexible and cost-effective formulae are emerging everywhere. The R/D perspective is a clear case in point.

5.5. Assessment

Each system has its merits. Daily assessments, a system of incentives, and a final grading scale (from 1 to 10, or from 1 to 20, ratings from unsatisfactory to very good, letters from F to A) are used all over the world in primary and secondary education. A cumulative system of credits, without differences in terms of quality, should become predominant in universities.

In order to achieve integration, lifelong education should have its own single financing system, with no differences at the ends or in between. The credit system offers relevant services. A person can gain points without interruption, thus obtaining impressive continuity in

his or her learning activity. In fact, credit accumulation should not stop at the end of one's active life (at age 76), it should continue in third-age universities.

If one considers a credit average of forty points per year of study for those involved in learning or learning for work and assume an additional eight years of college and university through age twenty-four, one will obtain a total of 320 credits. Let us further assume that, after fifty-two years of active life, mostly spent in industry or in small business, or even in front of one's own computer at home, an average of five points can be assigned to those who leave their work environment to return to the Alma mater system of continuous education. Doing so would account for another 200 credits. The equivalent of another five years will be dedicated to on-the-job training, adult learning, or to courses organized by the company (a plausible hypothesis if one takes into account the fact that the updating of knowledge requires at least one year out of five, therefore 10 out of 52).

Here is a possible credit accumulation for a 75-year-old individual: 320 plus the 400 credits obtained through lifelong learning yielding 720 credits.

Another nearly 300 credits are available for those who are more ambitious. According to one's voluntary choice and spontaneous interests (political science for engineers, aesthetics for doctors, hobbies for workers, mysticism for psychologists are examples that can function in any combination), a learned subject might yield as many as 1,000 credits. That total would correspond to 1,000 modular subjects, 1,000 weeks devoted to lifelong learning, or twenty compact learning years. Is this a great deal? Should not the pride of having collected 1,000 credits be as justified as the awe or envy one might feel toward a successful millionaire? Why should the wealth of knowledge mean less?

Those who will be called upon to develop in minute detail the open system that is painted herein with a wide brush will have two major issues to debate and resolve. One pertains to the passage from one helix to another. The traditional system currently responds to a simple demand: the graduates of medical schools become physicians; the graduates of the Polytechnic University become engineers; those graduating from schools of public administration become civil servants; the graduates of vocational schools become workers, etc. As the system becomes less specialized—inversely proportional to the specialization freely chosen by the individual, which provides a wider range of diplomas and qualifications—the sheer number of credits is not sufficient to warrant leaving an educational system in order to enter a work system.

Adequate symbols may indicate the nature of the covered modules: E or L for the basic or generally valid ones (what is sometimes called general culture or *stadium generale*) or EW for those oriented towards an activity in the sphere of work. The latter may contain an indication about the predominant speciality according to a catalogue to be elaborated together with the decision-makers in the field of work. For instance, AERO Eng. designates a profession but also the necessary knowledge to practice it, *i.e.,* aviation engineer. Such a solution will throw more light on the complicated issue of the relevance of diplomas, a subject that today is being attacked from all sides. The supple mechanism of *joints* (entry-exit from one sphere

to another) or well-greased door hinges is one of the main contributions to the harmonious combination and smooth operation of the two major social systems of education and work.

The mixed team of experts who will have to work out the organization charts for these delicate mechanisms will also have to take into account the in-built periodicity of the system. The cycles are so old that they could be maintained as a point of reference. Today they comprise thirteen years (called K through 12): five for basic education and eight for middle and secondary school, sometimes called *gymnasium or lyceum* (four years).

Adaptive mode

In contrast to a selective mode, an adaptive mode of education assumes that the educational environment can support many and varied instructional methods and opportunities for success. Alternate means of learning are adaptive to, and are in some way matched to, knowledge about each individual—his background, talents, and interests, and the nature of his past performance. An individual's styles and abilities are assessed either upon entrance or during the course of learning, and certain educational paths are elected or assigned. Further information is obtained about the learner as learning proceeds, and this, in turn, is related to subsequent alternate learning opportunities. The continual interaction between performance and the subsequent nature of the educational setting is the defining characteristics of an adaptive mode. The success of this adaptive interaction is determined by the extent to which the student experiences a match between his specific abilities and interests and the activities in which he engages. The effect of any election of, or assignment to, an instructional path is evaluated by the changes it brings about in the student's potential for future learning and goal attainment. Measures of individual differences in an adaptive educational mode are valid only to the extent that they help to define alternate paths that result in optimizing immediate learning, as well as long-term success (Robert Glaser, "Future Adaptive Environments for Learning", 1996).

Two possible corrections can be made to the prevailing system. One suggests the introduction of credits at the age of 14, two years before the first possible exit into the active world of work. Between ages 6 and 14, the system should develop what, today, we call general and compulsory education. Some countries even devote ten years to that stage, but eight years seem to be sufficient. The two years between the basic level and high school are the time for opting for immediate employment or for choosing a profession that presupposes longer training. This transfer also takes place in the two final years of high school. In certain countries (*e.g.,* France), those years prepare the passage to tertiary education. In fact, they are more or less like college rather than high school.

All variants are indicative of the primacy of the individual pace, a factor that has been neglected in the traditionally rigid system. Should someone wish to collect his or her 320 credits due between the ages of 16 and 24 one or two years sooner or later on, the choice would be possible. It would be equally irrelevant whether one is awarded one's college

graduation diploma at 24 or at 54. The final title is, however, too deeply rooted for it to be eliminated.

In Latin America, graduation from a university gives one the right to call oneself *licenciado*, a title that is inscribed on one's calling card, on one's door, and on one's letterhead. Such titles or diplomas are not compatible with the suggested new system. Instead, Education and Work training certificates obtained at an early age might prove to be more useful in relation to later switches on the helix of work.

Here we have to take a radical, but not impossible, step. Why should the credit system not apply to the field of work as well, thus introducing W credits? Nowadays, it is still the length of service that matters most for a promotion. Since one's active period also includes one's Learning and Work achievements within a lifelong education system, it would be more logical to express experience by means of Work (W) credits plus Learning and Work (LW) credits. One year of work experience would count as nearly 40 W credits. For the duration of an active life, one would acquire at least 1,600 W credits. The system of promotions and corresponding wages could be very much simplified. Special merits and high performance that today entitle one to a bonus or other rewards could account for extra credits.

What will the life of our friend John, who starts as a fisherman, and eventually becomes the president of a foundation, look like? A simple calculation shows that since the age of 14 he has accumulated: 80 LW credits, 80 W credits, 120 LW credits and 120 W credits, then again, 80 LW credits, followed by 160 W credits and 80 LW credits, plus 200 W credits, and again, 80 LW credits. Beginning at the age of 40, his itinerary earns him 40 LW credits and 200 W credits, followed by another 200 W credits after the switch. After 40 LW credits, another 200 W credits follow. Another switch yields 80 W credits and 40 LW credits. After age 65, there are 80 W, 40 W, and 200 W credits. Now he has entered the period of academic tourism with a total of 560 LW credits and 1,320 W credits, let alone the numerous incursions into the general modules of philosophy, political science, and aesthetics. More interesting than the credits collected are the twelve switches that have offered John a diverse panorama of life and knowledge.

The system of credits brings essential changes to the definition of the indicators used to evaluate and study the evolution of different systems according to country or level. When examining the indicators suggested by relevant international organizations, such as UNESCO (global), the European Union (regional), and OECD (group of industrialized countries), one realizes the enormous amount of work that went into this endeavour, without which statistics and quantitative studies would be inoperable. Of course, the simple count of those who study at different levels as well as those who assist them (the teachers) is mandatory for any operational schema. The classification according to sex and age or to entry and exit from a single system is also necessary. We thus obtain the most widely used indicators for performance, management, examinations, budgets, planning, funding, access, research, employment, and equal opportunity.

Unfortunately, lifelong education is mentioned only once in the survey on Society and Work, with a small and irrelevant number of issues. For the "innovative schemes of

collaboration between higher education and the world of work on a humanitarian basis",
states "are likely to undertake a survey". But the recommendations are reduced to a mere
enumeration of the formulae involving academics and business people, with a comment on
the income that might result.

The most widely used measures lose their relevance in light of the modular schema,
lifelong education, and personal itineraries. It is not important how many young people pass
from one level to another or how many interrupt the cycle, since this becomes an asset rather
than a liability arising from the mobility of the system. Age is also irrelevant, for both young
and old people are equally entitled to stay within the mainstream. So are the costs that are
calculated only in relation to the budget.

In exchange, a new measure is proposed for the knowledge contained within the system,
quantifiable by means of E, LW, and W credits. The LW indicator is conclusive for the effort
to gain active knowledge, education for its general formative merits and access to culture,
and work for the amount of work-related skills in the mobile and flexible framework of the
new schema. The switches from one helix to another measure the mobility within a given
society, and they also point to the pursuit of satisfaction and self-fulfillment undertaken by
individuals.

5.6. The Network of Experimental Points

Most statements on structural change stop, after a formulation of the best and most noble
ideas, at the point of implementation. The nostalgia for action and innovation is mirrored in
the frequent use of such terms as new, innovation, adaptation, anticipation, the requirements
of reality, and the ideal desiderata. Although novelty appears like a pie growing in a green-
house, it does not move rapidly enough, nor is it widely known.

The following are some topical issues for the coming years: the emergence of a new kind
enterprise, the magnitude of which is given by the new map of knowledge and by the nume-
rous combinable modules according to individual choices, learning spanning over the entire
duration of life, the introduction of new technologies, continuous updating of information,
and the joining together of learning and work. From the very start, we tend to favour horizon-
tal experiments as opposed to the hierarchical fiat of the hierarchical systems. A pedagogical
experiment takes a generation in order to be productive or assessable. Thirty-three years of
waiting, *i.e.,* three generations per century, means too much waiting. The pace of knowledge
and of economic and social change may reduce the interval to twenty-five years.

The process can begin with the development of current experiments (ten years), followed
by changing the funding of macro-systems (legislation, organization, funding) over another
decade, and assembling the results in a coherent and operational schema of global scope
(another five years). The intervals suggested for the implementation of the Learning and
Work schema are not much longer than, say, those required for building a factory or desig-
ning the master plan for a city (5 years), nor are they fanciful.

There are no real conceptual difficulties in accomplishing the tasks of the first phase,
considering the fact that further action will rely on current experiments. Emphasis is to be

laid on their extension, maturation, acknowledgment, and confrontation. The key word is *network*, rather than a central authority, a global Areopagus, or a flow of vertical top-down instructions. The network is a question of experimental spots.

An outline of its topics emerges from the inventory of current experiments. Here is a tentative list:

– gradual introduction of modularization, especially in the years preceding a predictable exit (vocational and at the ages of 14-16, 16-18; a college exit almost everywhere in higher, postgraduate, adult, and recurrent education);

– opening of all elementary, secondary, and higher schools to persons returning to resume interrupted studies at various ages; adaptation of all methods of evaluation and teaching so as to fit the requirements of lifelong learning;

– multiplication of forms and assimilation of training for work within the general system by means of modules that are equally valuable for the rest of the system (LW);

– more free-choice or optional courses, which will be treated as equal to those required by either the compulsory system or by the demands of the chosen itinerary;

– cultivation of the ability to choose through adequate courses describing various activities and professions; encouraging interest in the development of vocations and aptitudes;

– steps towards the recognition of the forms of learning to be taken from the work sphere into the educational system and followed by their assimilation within lifelong learning;

– retraining the trainers in order for them to move on from master courses to individual or small group tutoring; as teachers are recruited from the general university system, special modular programmes should be introduced for those choosing that profession (for instance, foreign language modules designed to meet distinct needs for translators, researchers, specialists in comparative literature, etc.);

– a new approach to non-formal and informal education, with important resources for specific interests and attractiveness; also, because such courses have many elements that could be included in modules;

– strengthening the basis for source references (well-equipped libraries, data bases) and practical activity (laboratories, workshops, computerized classrooms, etc.);

– intensive use of computers to make modules more attractive and orientational through the use of multimedia techniques;

– development of distance education;

– encouragement of new forms of part-time work and learning;

– establishment of joint councils (involving parents, communities, and the private sector) to provide assistance in the management of educational institutions;

- creation of a favourable atmosphere for innovation through the mass media, special awareness sessions, and meetings (for example, alumni associations);

- enactment of new educational laws and regulations designed to cut red tape and bureaucracy;

- assurance of system maintenance by means of regular bulletins and constantly updated Websites on the Internet;

- support for various professional associations, NGOs, CSOs (civil society organizations), foundations, and private funds that display a particular interest in education and work;

- introduction of specific methods to stimulate participation and anticipation at all levels and to enhance the ability of learners to concentrate, which is currently at risk owing to the informational boom.

We have focused on a particular interval in a person's life that is closest to the concerns of the Learning and Work relationship.

But the formative period of an individual begins much earlier, starting in kindergarten, nursery school, or even earlier. It would be unfair to overlook the interesting experiences in this domain. So would it also be to underestimate the endeavours to capitalize on the acquisitions resulting from advanced knowledge of cerebral functions or other psychological studies. Children display early on a fantastic ability to learn foreign languages (something that has fascinated Noam Chomsky), or to follow the logical steps in assimilating concepts such as space, time, measurement (something that inspired Jean Piaget). Important artificial intelligence centers, such as that at the Massachusetts Institute of Technology, led by Patrick Winston, have created kindergartens in order to study the mechanisms underlying the recognition of formulae. Optional courses have crossed the threshold of elementary education. This huge learning potential that we read in children's eyes, in their clever hands and creative talents, goes down in a descending curve once they enter the rigid and cold environment of formal education. The very fact that such an involution actually happens should be a cause for concern and a perpetual source of inspiration.

The progress of other large systems (the field of work, managerial innovations, entrepreneurial culture, R&D organization) may give rise to new developments of utmost significance for the double helix. It would make a great deal of sense to establish an early partnership with those who are interested in the classification of the sciences and in the global mapping of knowledge. These projects need time to mature and, no matter what happens in the experimental phase, the crop will be reaped later. It will also take at least ten years, and it will depend on the measures that the major decision-makers might choose to enforce at the level of macro-systems. While the classical institutions may have been favoured in this experimental phase, it is also clear that such innovations as the open and corporate universities, spurred on precisely by the inadequacies and narrow-mindedness of those institutions, are likely to lead to further interesting experiments inviting broader generalization.

If we have considered experience and its horizontal movement over the same ten years, it does not mean that measures toward more opening and reform cannot also be initiated from top down by central authorities. That is what the Japanese system is currently undertaking.

Here are some of the more plausible and feasible measures:

– Development of a unitary system, based on the modularization of knowledge, individual itinerary, and lifelong learning by means of adequate legislation allowing for frequent switches between learning and work, with adequate funding provisions from public and private sources.

– Encouraging existing governmental organizations and creating new ones to work together in support of the double helix of education and work with the business community and civil society (trade unions included).

– Complete harmonization of education in the sphere of work with work in the sphere of education to be reflected in correlated evaluations and recurrent, interchangeable, activities.

– Large scale introduction of the tutorial system based on individual guidance, which does not imply abandoning classical specializations (those of mathematician, biologist, social scientist, and humanist). On the contrary, the best sources for the modules on sciences are the specialists themselves, and they will also write the modules. The novelty lies in the time gained for scientific research, with universities and also the secondary schools as reliable pillars.

– The implementation of the Learning and Work concept will trigger great changes in the institutional structures of states.

– The most important innovation will be reform of the funding system for the two social systems of learning and work by means of a common methodology and a single chapter in the state budget taking care of both of them.

– The major educational questions (interdisciplinarity, lifelong education, the combining of social demand with individual fulfillment) are likely to find answers that will turn around the obsessive present agenda to accommodate the changes occurring in the field of labour (employment mobility).

– International organizations will become more active in supervising regional and global generalizations of mature solutions.

– Statistics will be simpler once credits become the measure of one's knowledge through social mobility and the number of switches on the double helix.

The historical trajectory also matters. If the Twenty-First Century continues to be haunted by identity crises and social or ethnic conflicts, if certain inner cities become battle grounds for urban warfare, if peace does not prevail, a rational effort toward radical change through Learning and Work will not be able to flourish and come to fruition.

If, however, conflicts are successfully prevented or peacefully resolved, this schema will be established within a favourable environment. More than that, the co-operation it invites, involving political decision-makers, executive authorities, and the material power of knowledge and money will eventually affect the substance and methods of local and global governance. No soil is more propitious for nurturing new methods of societal management in the era of knowledge.

The individual will benefit most from the effects of the macro-measures to be experienced in the next three decades. His or her dignity will rise as a result of the recognition of his or her statute and role. He or she will make choices that have traditionally been reserved to others. Briefly, he or she will become, more than ever before, the master of his or her own destiny, broadly mirrored in his or her Learning and Work trajectory, bearing the specificity of a per-sonalized fingerprint. It is to be expected that cohesion and partnership, rather than contest and competition, will govern these parallel games. The United Nations will be entitled to say that an important correction has been made to alleviate the drawbacks of globalization. It may sound a bit like *tempo di marchia*, but the Twenty-First Century deserves it.

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Person-Centered Education

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Abstract

Education, together with family and culture, is one of the fundamental building blocks of the social construction of reality. It is more and more evident that we need a paradigm change in the field of education in order to enable people to deal effectively with the mounting challenges facing humanity.

This retooling needs to start with our frames of reference.

We need to create a new paradigm of education in order to enable education to serve people's needs and to have relevance in public service, social responsibility and sustainable governance and development.

Education is one of the main narratives to prepare new generations to be an active and constructive part of the society and is one of the main carriers of values. Values can be implicit or explicit. In Person-Centered Education (PCE), also called student-centered education, values are made explicit to facilitate students to have a critical and proactive role and an effective training to become fully functioning members of the *Polis*. The Person-Centered Approach (PCA) was originated by Dr. Carl Rogers. PCA is a scientifically validated systemic, holistic approach with applications in almost all professions: Psychology, Education, Medicine, Social Work, Management, Intercultural Communication, Conflict Prevention, etc.

"The purpose of Person-Centered Education is to protect and promote a person's innate creative capacities of learning from their experiences, to promote wholeness and integration in the individual by focusing on their personal growth, and develop them into creative and competent members of the society who can contribute effectively to their community."

The central hypothesis of the Person-Centered Approach is that individuals have within themselves vast resources for self-understanding and for changing their self-concepts, basic attitudes and self-directed behavior, and these resources can be tapped if a climate of facilitative psychological conditions is provided. PCA focuses on health, not illness; on

solutions, not on problems. PCA empowers rather than cures and promotes the development of potentialities of individuals, groups and organizations through interpersonal relationships characterized by respect, trust, empathetic understanding and authenticity. It makes people responsible for what they do rather than encouraging dependency.

The purpose of Person-Centered Education is to protect and promote a person's innate creative capacities of learning from their experiences, to promote wholeness and integration in the individual by focusing on their personal growth, and develop them into creative and competent members of the society who can contribute effectively to their community.

A large body of research carried out by David N. Aspy and Flora N. Roebuck and many other colleagues shows that schools, colleges and universities with student-centered education attain higher rates of student retention and better learning.

The student-centered approach requires a willingness from teachers to share their power and have better trust in their students.

At the Person-Centered Approach Institute (IACP), the post graduate courses are organized as a learning community where professors and students intentionally create a facilitative climate of learning and collaboratively strive to achieve common goals. Every day there is an encounter group and students can call a community meeting if they want to address specific problems.

Exams at IACP are very different from traditional practice: the students share their self-evaluation with the group and receive their peers' and the professors' feedback. In addition, each professor and tutor receive feedback from the students. The secretaries and the facilities are also evaluated by the students. Suggestions for improvements are given to each professor, tutor and secretary as well as to each faculty member. The feedback of the students is discussed in a staff meeting after which the course director and the local IACP branch director communicate to the students the changes and improvements that they are willing to make and they implement this with the students' active involvement.

During written exams, questions are distributed and a time duration is set, but at the end of the allotted time the students don't return their answer sheets, but take them home and evaluate their answers by consulting the literature, edit what they have written in the class-room and send the answer sheets to their professors.

Thus, the role of the student-centered teacher is a professional commitment to learning and towards effective, democratic and value-based education, the capacity to share her/his passion about learning, relating to the students with respect, empathy and congruence.

The teacher needs to be capable of being in touch with herself, her students, the members of her community and the world and having the needed skills and attitudes to be a facilitator of learning, an effective mentor promoting student creativity and autonomy and capable of helping students develop their personal and social skills.

The role of the student in Person-Centered Education is learning to take responsibility for their own personal development, with interest in the development of social, personal and problem-solving skills, and for learning to learn, learning from mistakes, willing to contribute to a cooperative and tolerant school ethos and able to learn how to relate to herself/himself and others with respect, empathy and congruence.

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Musings on Economic Theory

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With time "economics" has become more and more specialized and fragmented, and in particular limited to the production of tools as though sociology, psychology, search for values, technology etc. were separate and divorced from it.

Moving from the Industrial Economy to the Service Economy is akin to moving from Newtonian Physics to Quantum Physics.

It was not really the church trying to destroy Galileo and his thoughts, but the basic philosophy of ideas of society at that time. Today, this is represented in various occasions by many economists-priests.

The major problems we face today are due to the lack of an adequate global vision, belief (often implicit) that the future is simply an extrapolation of the present, inadequate "cultural" class when there is a need to deeply integrate economics, morality, sociology, psychology, natural sciences.

Inadequacy of macroeconomics is the root cause of the economic crisis.

Report on Future Education Symposium

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Abstract

Higher education has continuously evolved in its purpose and methods. As the demands on education have become increasingly complex today, it becomes essential to determine the needs of the future, and evolve a system of education that equips youth to face the challenges that the 21st century will bring, and scale its yet unseen peaks. The following paper draws its inspiration from the recent WAAS-WUC course on 'Future Education' in Dubrovnik, Croatia that sought to explore key issues in teaching and learning, and the means for ushering in a new paradigm in education.

1. The Value of Education

What education has done to improve human life would appear to be, in an age prior to the proliferation of education, a miracle. It has increased human life span, improved health and eradicated diseases. It has delivered us, to a great extent, from superstition and ignorance. It has raised agricultural output to feed over 7 billion people today. It has resulted in the invention of tools and devices that have made life easier. The common man or woman anywhere today has access to what was considered a luxury even to kings a few centuries ago. What was impossible, such as travelling around the world in less than 80 days or speaking to someone beyond shouting distance, has become commonplace. Education has abridged time and conquered space.

According to UNESCO, every extra year of school increases individual earnings by upto 10%, and the national GDP growth by 0.37%.[*] Girls' education is the most powerful factor affecting the fertility rate and maternal mortality. Each extra year of the mother's schooling reduces the probability of infant mortality by 5%-10%. It even boosts agricultural output by 25%! Education is positively co-related to peace, democracy, human rights and sustainable development.

Our educational system offers the entire knowledge that humanity has collected over centuries, and presents it in a capsule to every generation. The more and better the education, the greater is the benefit for all.

2. The Change we Need

Heitor Gurgulino de Souza, President of WAAS and WUC and Ivo Šlaus, Honorary President of WAAS, pointed out the quantitative and qualitative demands of the future.

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[*] See http://unesdoc.unesco.org/images/0019/001902/190214e.pdf

Global tertiary enrolment has multiplied five-fold since 1975, to about 180 million today. But if the forecast global demand for education is to be met, 4 new universities with 40,000 students each have to be founded every week, over the next 15 years. Nothing short of a revolution, not in constructing the university buildings and administering the

"The most fundamental change needed is at the conceptual level."

enrollment process, but in the very conception of integrating these aspiring students into the education system, is needed. Quantitative expansion is one part, perhaps the easier to define, of the challenge in the future of education.

Quality of education is a much researched, much spoken about need. What makes this need most compelling and urgent today is the complexity of the issues that we face. Unemployment, climate change, religious fundamentalism, shortage of essential needs, threat of war—each challenge is multidimensional and interconnected. Garry Jacobs, Chief Executive Officer of WAAS & WUC, pointed out that every one of them is global in scope, defies solution by action at the regional level, and cannot be addressed by sectoral, piecemeal attempts to address it. What is needed is a radical change in economic and social theory, which in turn requires a change in the way we teach them to our youth.

The most fundamental change needed is at the conceptual level. Unless we change our understanding of the knowledge with which we approach our problems, we will not effectively address them. So it is not enough that our policies change. Our conceptions to the whole framework, the theories on which we base our policies need to change. This paradigm change is our best bet for a better future.

Education is central to this process of paradigm change. If the world needs to think freshly about how it can address its problems, that implies that we need to take another look at how we organize our education. It is to initiate the process of change and identification of a new paradigm that WAAS-WUC conducted three trans-disciplinary courses earlier, on the topics of individuality and accomplishment, a trans-disciplinary science of society and effective leadership. The Future Education course was intended to initiate a discussion on the qualitative dimension of the change needed in education in terms of the principles of higher education, how it is practiced, how the paradigm of education can improve and change in future, and thereby impact social thought and political decision making in a way that has not been done before.

The post-graduate certificate course was held from Sept 21-23, 2015 at Inter-University Centre, Dubrovnik, Croatia. The course involved 16 faculty members drawn from the fields of education and educational policy making from organizations in Europe, America and Asia. Apart from WAAS and WUC, The Mother's Service Society, India; Person-Centered Approach Institute, Italy; Dag Hammarskjöld University College of International Relations and Diplomacy, Croatia and Inter-University Centre, Croatia were the partner organizations for the course.

The course was made available live on the internet. Online participants could watch the lectures and participate in the course by raising questions and responding to the discussion

during the course, or afterwards in the online forum.[†] The course has a permanent dedicated website similar to MOOCs, containing course announcements, recommended reading, video recordings of the lectures, lecture notes, assessment questions and other details related to the course.[‡] Apart from this, course details are also permanently available on the WAAS and WUC websites.[§]

3. Redefining the Purpose

"[I do not] carry such information in my mind since it is readily available in books. ...The value of a college education is not the learning of many facts but the training of the mind to think," said Einstein, one of the greatest scientific minds. Today, any information, useful, trivial or utterly frivolous, is available to anyone with a smartphone and internet connection. So what should we teach, and with what purpose? What is it that is not available in a book or a webpage?

It is expected that 50% of occupations today will no longer exist by 2025.[¶] But disappearing occupations do not result in diminishing jobs, they simply mean newer occupations will emerge. So, what future do we prepare students for? We cannot predict anything else about the future except that we can expect much that is new. Courses do need to teach facts, though in the case of some disciplines, information is multiplying exponentially and constantly going out of date. More essential than information are thoughts derived by the correlation of information, ideas that relate & integrate thoughts, and values as principles to guide accomplishment and growth.

The Age of Discovery saw great developments in the shipping industry and invention of instruments that aided navigation. The voyages and overseas conquests are a piece of information. Development in the science of navigation is another. When a student starts to think of the simultaneity of voyages and discoveries, and wonders if one led to another, or both mutually influenced each other, or were themselves part of a larger movement that was influenced by people's aspirations, then thinking is born in him/her. Education that encourages original thought is better than the system that simply imparts different pieces of information. That is like stopping with admiring the different pieces in a jigsaw puzzle.

An education that misses values misses a crucial element. Values—personal, ethical, corporate—contain the essence of all human knowledge of accomplishment. Knowledge without values is like building a large and lovely mansion without a foundation. It is of no use, and may only harm.

During the Great Depression in the 1930s, the US was faced with its biggest economic crisis till date. Banks had collapsed, and people were in a panic. They rushed to withdraw their money from whatever banks remained, ensuring their eventual collapse too. The US President, Franklin D. Roosevelt, found that the economic theories he had learnt at Harvard

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† See https://waascourse.appspot.com/future_education/forum
‡ See https://waascourse.appspot.com/future_education/course
§ See http://worldacademy.org and http://wunicon.org
¶ See http://www.cbre.com/

did not serve him. He went on public radio, a new technology then, and spoke to the people open-heartedly. Workers used to rush home from factories saying if the President took the time to speak to them, the least they could do was listen! FDR was able to connect with and reach the people. He reminded them of the greatness of their country and extolled them to believe in themselves and

> *"Isolation is impossible in the universe."*

their institutions. He asked them to leave their money in the banks. He imposed banking regulations and introduced economic reforms, but the public emotional appeal he made to his countrymen was a powerful idea. Banking and finance have an existence only inasmuch as they are connected to people. Without people, there is neither money nor economy. Integrating people with the economy, FDR saw that people's aspirations were the lever that moved larger objects. Such relating and integrating of facts and thoughts to form ideas is a skill that our education could equip students with.

Isolation is impossible in the universe, from the level of the particle upwards, to the level of galaxies, and for all living beings from the microorganism to the human being. The current refugee crisis in Europe shows that an issue can have its origins in one part of the world in one century, and its effects seen in another century in any other distant part of the world. Thinking in silos, being concerned with a narrow cause, ignoring the larger picture and imagining that anything can be 'contained' are ideas education has to work on to eliminate in youth. Instilling a planetary identity, as Sesh Velamoor, Executive Director of the Foundation for the Future, described, rather than an identity with the national, state or county border expands the mind and personality. To such an expansive identity, when ethical responsibility is added, we create potential global leaders whom we need so much.

If the challenges of the earlier centuries were puzzling enough, with little pieces that had to be fit together as per a picture, today's challenges are like jigsaw puzzles where the pieces are constantly changing shape while the big picture is also changing! So education today is more educational when the outcomes are uncertain, not when it is about securing a preconceived set of outcomes. Keri Facer, Professor of Educational and Social Futures from the University of Bristol, pointed out that we need a new contract between education and society, one that no longer prepares youth for or against a future we have already imagined. Instead, education needs to create the conditions that will enable students to assume societal leadership and responsibility, confront uncertainty and to participate in the dynamic creation of possibilities.

4. Change of Subject

Looking back at the time spent in college, ask anyone to think of a few things that come to mind. Most likely, it will be the friendships made, the teachers they liked (or disliked), the fun during recess and even in class, the group projects, discussions and debates, the study trips and sports! But what about mathematics, economic theories, literary analysis, chemical equations and anatomical drawings? Those were the ostensible reasons for going to college, and the knowledge and degree obtained are valued and recognized as the reason for one's position professionally and socially. Still, what is cherished most is what appealed to the emotions, what most touched one personally.

True education teaches the person, not the subject. Data, knowledge, theories and subject expertise can be obtained even from a book. There are software and electronic readers with read-aloud text. What elevates the classroom is the personal touch, the relationships that can be forged between the teacher and the student, and among the students. A mechanistic method that is not person-centered throws away this advantage and settles for what can be done with a book or a piece of software.

Teaching is effective not when the teacher is an expert in the subject, not even when he/she knows how to teach. Alberto Zucconi, Secretary General of WUC, stressed that the most effective educator is the person-centered one who has respect, empathic understanding and sincerity. They are mentors who promote student creativity, autonomy and individuality, rather than conformity.

Students often like or dislike a subject because of the teacher who handles it. They choose to pursue a field because the teacher was inspired and passionate about the subject. There are some teachers whose lectures last the entire duration of the class. There are others who make the subject come live. When they read Shakespeare, the students see the drama unfold in the classroom. When they teach Mathematics, they pass on the thrill of solving a problem to the students. Economics becomes a study of real people and situations in their hands. They make History and Geography thrilling journeys through time and space. Electronics and IT move beyond 0s and 1s to show how they can serve people and simplify life. The person-centered approach to education, through such teachers, instills the joy of learning. It creates an environment which cultivates curiosity, trust and self-responsibility. It produces creative, empathic, well-formed individuals with a strong personality and an integrated outlook. Such people are life-long learners, adaptive to new situations and successful in problem solving. Professional success is integrated with personal wholeness, and the person-centered approach to teaching and learning ensures all-round personal development.

American psychologist and educational reformer John Dewey said that schools have too many teachers and too few facilitators. The person-centered approach reverses this, and makes learning more effective by making it participatory. The subject is an occasion. The real subject is the student.

5. From Bologna Onwards

The ancient Chinese proverb "Tell me and I will forget. Show me and I will remember. Involve me and I will understand" gives a wisdom that our classrooms around the world would do well to accept. The Socratic method of teaching by asking questions and initiating dialogue wakened the faculty of thinking. Involvement, rather than passive listening, makes better learning.

However, from the time of the first formal University of Bologna, the lecture has been the primary method for imparting knowledge. Over time, it has been supplemented by discussion, research, project work, internship, service learning, computer and online education, but change in education has not kept pace with change in other fields, or evolved in response to research findings that show the advantage of other methods over the traditional practices

followed for centuries. The lecture in the university began at a time when literacy was considered education, knowledge was limited to a few scholars, there were only a precious few handwritten books, and people had to gather around a scholar and hear him speak, if they needed to learn. Today, education has grown in terms of a number of disciplines and subjects, and the amount of information available in each of them. The printing press liberated the book from the manual labour of writing each copy by hand. Digitization has liberated the book even from paper! The internet makes knowledge more accessible than it has ever been, MOOCs have virtually opened up universities around the world to anyone who would like to take a look inside, without leaving their homes or computers. In such a changed scenario, following the same lecture model would be like the early news readers on television who used to read the news from sheets of paper, much as the news readers on radio had done before. All the visual and multimedia potential of the television went unexploited when it followed an earlier model. Similarly, with all the resources and developments, the university classroom needs to look beyond the lecture model, one that is shown to result in an average student retention rate of just 10%. Using audio, video and demonstration improves retention further. But if at least half of what is taught has to be retained by students, discussion in the classroom is needed. Memory and comprehension are enhanced with increasing interest and participation. Multi-sensory learning, using tactile, visual, auditory, kinesthetic and olfactory channels, improves performance.

Practical work raises student retention even further. But as teachers have known all along, the best method to learn, one that results in an average retention of 90%, is to teach others. Stefan Brunnhuber, Medical Director and Chief Medical Officer, Diakonie Hospital, Germany and Vice-Chairman of the European Institute of Health, showed that inter-personal variables involving peer-tutoring, cooperative peer-learning and the interaction between teacher and student oversteer institutional variables by factor 2. An education system that incorporates teaching, which appears to be diametrically opposite to learning, as a learning method enhances the learning curve best. Inter-personal relationships also boost creativity, an essential attribute required to face a future we cannot yet predict. It equips students with the capacity to ask questions never asked or answered before, and address challenges in ways never done before.

The strong neurobiological link between health and academic performance too merits more attention. Physical exercise has a positive impact on cognitive enhancement. It improves memory, attention span, mathematical skills and overall performance. Adequate rest, yoga, meditation and mind-body medicine improve the brain's executive function. In our fast-paced world, as we try to get more and more work done, we think we are being efficient if we do more than one task at a time. Multitasking is a relatively new word in our vocabulary, but it has firmly taken root. But in truth, multitasking is neurobiologically an illusion. We think we are doing two things more effectively, but we are not doing two things. We are lowering performance. If we are involved in a mental task, and are interrupted every 3 minutes by an SMS, we end up with a functional reduction of IQ by 10 points. The use of Internet and Communication Technology 6-8 hours or more a day, in order to learn, is negatively co-related with the development of executive function of the brain and

lifestyle, and is positively co-related with dissatisfaction. But the reality is, the average global smartphone user looks at it, on an average, 150 times a day. How that affects our collective IQ and productivity does not need Mensa level IQ to estimate.

Just as letting go of the past is necessary in some cases, going back to basics and rediscovering the wisdom that has been known for centuries are essential in some. Wisdom is to know and educate others about when we need to look ahead, and when to turn back.

We do not need more, new disciplines, what we need is a creativity response—a creative change in our education that boosts the creativity of the learner. We have seen a steady rise in the number of disciplines and subjects, and greater and greater fragmentation of knowledge. As we break it up into smaller, more manageable parts, we begin to look at a large beautiful painting from closer and closer, and lose sight of the beauty of the whole, staring at the individual brush strokes that have neither meaning nor beauty when seen in isolation from the rest of the picture. This results in a horizontal divorce between the different categories in education. Divorce of another type is seen in the complete disconnect that many students feel from studies, because they cannot relate to it from their life and experience. As we try to teach the knowledge collected over centuries in a three, four or five year course, we condense it by abstracting knowledge of many life experiences into a series of generalized abstract principles. This divides truth into fragments, all of which together do not recreate the whole. Each aspect is partial and incomplete when isolated from the wider context of which it is a part, and leaves the student asking, 'Why am I learning this stuff?'. They do not see what it signifies, and where it fits in real life.

We take a flower, separate each petal and show it to the students, and expect them to visualize the whole and appreciate it. In other words, we teach them individual subjects, evaluate them, rank them and create competition. But in the real world of work and life, what is needed is cooperation and collaboration. Somewhere between graduation and employment, we expect them to figure that out by themselves. This disillusions students and leaves them unprepared to face the world of work, with its interconnected issues that transcend narrow disciplines.

All issues and challenges that were effectively handled in the past were done so only because those who were in charge saw the issue within its context, not isolated from it. To understand any part, we also need to understand the whole and the relationship of the part to the whole. In the same way, our education acquires meaning and comes to life when we make it contextual. The context abridges the skills gap in graduates, and equips them to seamlessly move into the world of work and real issues.

Olga Melykh, Lecturer, National University of Kyiv-Mohyla Academy and President of the ''Young Generation will Change Ukraine'' Association, pointed out the comprehensive curricula that equip youth to think contextually. One way of adding context to content is to teach and learn a subject, not in isolation from all other subjects, but with reference to them. Instead of teaching history as a uni-dimensional study of the major epochs and events in chronological order, it could be related to all other subjects and made multi-dimensional.

A study of art and literature can be taken up beginning from history. Examining the evolution of art, the influence of the times and the lives of artists sees art from a historical perspective. Similarly literature can be studied from within history—How and when did writing and its various forms evolve? Do writings reflect the sentiments of the period? Conversely, did writing influence the course of history?

"At the root of the multiple crises confronting humanity today is a crisis of values that must be resolved before there can be any hope of lasting solutions to the problems facing humanity."

How have inventions, beginning from the wheel, shaped history? When, how did science part ways with religion? How have new inventions and theories been received? Is science responsible to society? Do scientists have moral obligations? Science, studied from a historical perspective, is as equally informative as the scientific principles themselves.

When was democracy born? Why does monarchy still exist in some places? How did governments, political system and law evolve? How has society changed since the time of the hunter-gatherer, in what ways is it essentially the same? How has human psychology evolved with evolution in society? What circumstances create dictators, what creates visionaries? How is the personality of great leaders shaped? Sociology, politics, law, psychology—all these can be related to from history. We can study history and detect patterns to understand the present and anticipate the future.

What is illustrated here with history study can be done with other subjects as well. By establishing interconnections between all disciplines and making education contextual, we enable students to see the part in the context of the whole. This ability is essential if we are to find effective, permanent alternatives and solutions.

6. The Value of Values

One of the top technology companies, Google, believes that when it comes to recruiting new employees, technical expertise is the least important criterion! Intellectual humility, sense of responsibility, empathy, and willingness to work in and for the team are more important. Grades determine one's career for the first two years, according to Google's head of People Operations. So the rest of one's career depends on the value one adds to work, and that is determined by one's own values.

Knowledge without values is catastrophic. After the bombings of Hiroshima and Nagasaki, Oppenheimer became the emblem of a new type of technocratic power. He became a household name and appeared on the covers of the magazines *Life* and *Time*. But five years later, during the arms race between the US and USSR, Oppenheimer lobbied for international arms control. He opposed the development of the hydrogen bomb for ethical concerns. With growing concern about the social and ethical responsibility of scientists, Oppenheimer joined

Albert Einstein, Bertrand Russell, Joseph Rotblat and other eminent scientists and academics to establish WAAS in 1960.

When conflicting interests prevail, it is values that one is committed to that set the direction. Values are the quintessence of the knowledge of human accomplishment. They represent a universal ideal of conduct, an idealized goal of perfection. The common element in all instances of progress or accomplishment, in any field, at any level, individual, regional, national or global, is positive values. Just as physical skills are the channels through which physical energy is directed so that it produces results, values play a similar role at the psychological level. The quality of the values and the intensity of our commitment to them determine the level of our accomplishment.

As Winston Nagan, Chairman of the Board of WAAS and Director of WUC emphasized, at the root of the multiple crises confronting humanity today is a crisis of values that must be resolved before there can be any hope of lasting solutions to the problems facing humanity. An education without values is destructive. Civilization offers us knowledge, culture provides values. When knowledge and values are unmatched, we move towards dystopia. As Einstein suggested, new knowledge should be a blessing and not a curse to humankind. Learning and work are effective and productive only when they are based on positive values, and these need to be incorporated in every subject and course.

7. Towards a Bolder Future

We have not yet fully explored the infinite potential there is in human capital. We have disproved predictions that earth will not be able to produce food for all and devised ways to turn desert into farmland, grow plants without soil, and continuously boost agricultural productivity. Food shortage in any part of the world today is not because of shortage of food but due to political and organizational folly. Concern over depleting oil reserves has been removed by the discovery that the sun beams enough solar energy in an hour to satisfy global energy needs for a year.[**] We have deciphered the structure of the DNA, split the atom, and mastered rocket science. Now we are looking to move out of the earth, to other worlds. We made computers, connected them together, and have created a virtual world with unlimited possibilities. No resource is as resourceful or unlimited as the potential in the human being. The human mind has amazing resources at its command. It has faculties we have not discovered yet, and the potential to evolve and accomplish much more than we have ever done.

With all the focus that education gives to science, on closer examination, we see that much of that focus is on the process of validation of discovery, and not really on the process of discovery itself. An understanding of this process, and of what constitutes intellectual genius will move us closer to discovering the method that develops genius through education.

Today, our mental processes have a strong bias for physical reality. Though we know that if we went only by our senses, we would still be saying that the sun goes around the earth; even in our thinking process, we give primacy to the physical. Reality has many dimensions. Reality is in the material, emotional and conceptual planes. But our scientifically validated,

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** See http://environment.nationalgeographic.com/environment/global-warming/solar-power-profile/

rational education places great emphasis only on the material dimensions of reality. Our thinking process in general is conditioned to emphasize on what is physically verifiable and dependent on our senses. Our education often downgrades the reality of the subjective dimension and places great emphasis on being completely objective, even though the subjective reality is what we live in to a powerful extent. Ignoring the subjective dimension robs us of a rich knowledge we could discover otherwise.

"Comprehending the challenges in present and future education, identifying the changes needed, and determining a course of action are easy when compared to the task of translating the action plan into action."

Thinking is a critical faculty that education needs to develop. Thinking itself can be of many types. One is the analytical, where we take one part of the whole, concentrate on it, gain extensive knowledge and specialize in the part alone. Another is synthetic thinking, where we try to see the big picture. We put all the parts together, and find the commonality in all. We combine a number of disciplines and subjects, and make up an education course in this way. The third type of thinking, integrated thinking, sees the oneness among the parts at a fundamental level, it recognizes the essentiality in all. It reconciles apparent contradictions as complementary dimensions of a wider reality—truths completing truths—to reveal the underlying transdisciplinary principles. If our education can shift from analytical, to synthetic, to integrated thinking, we evolve collectively to function at a yet undiscovered plane of thinking, working and creating.

The unrealized is not necessarily unrealizable. Many a thing that is possible today was unimagined, or science fiction in the past. But we have an inherent bias to believe in the reality of what exists today, and downplay the reality of what has not yet materialized, even if it is inevitable, simply because it is not intelligible to our senses. The determinative power of anticipation and aspiration are not taken into account in our understanding of any development in science or the humanities. A holistic education not only imparts facts, it reveals the great powers of the mind, develops the personality and individuality, and makes students discoverers of unthought realities.

All knowledge is based on a conceptual framework. Problems are not solved when we insist on working within the existing paradigm or the intellectual framework. We are constantly learning new paradigms, but we do so unconsciously. We move to new paradigms without knowing we are doing it. In our classes, if we can teach the knowledge we are teaching, and make conscious the progress that we have made, and the process by which we shift from one paradigm to another, we will create not just knowledge but the capacity to create new paradigms, and to come out of the box.

The natural progression in the educational paradigm is a gradual shift from 'Learning to Know' to 'Learning to Do' to 'Learning to Be' to 'Learning to Live Together', as described

by Stephen Yong-Seung Park, Dean at the Office of International Affairs and Professor of Human Resource Management, Kyung Hee University, South Korea. At a fundamental level, education must prepare us to strive for Truth, self-development and self-knowledge. The focus on the external that teaches one how to make a living must be balanced by a focus on how to make a life, an idea that Pierre Antoine Barraillé, President of Praneo, put forward.

In order to meet the increasing demands on quality and quantity of education, and to effectively handle the challenges we face today, our educational model along with all the involved people (teachers and students), pedagogy (of research and teaching) and organizations, should transform into a more conscious, person-centered, value-based, holistic system.

Comprehending the challenges in present and future education, identifying the changes needed, and determining a course of action are easy when compared to the task of translating the action plan into action. Change almost always meets with inertia and resistance from long time practitioners who believe in the superiority of their practice. To shake the beliefs of an old, established organization is more difficult than to move its physical structure from its foundation. Even when there is clear knowledge of what needs to be done, existing forces in society prevent or impede the execution of the knowledge from a hundred ulterior motives. Vested interests with limited vision are hostile to change that threatens the status quo. Even when change is implemented, the policy has to be tailored specially for each country, region or university. What suits one may not work elsewhere.

The challenges to be overcome in order to revolutionize education are enormous, as Zlatko Lagumdžija, Former Prime Minister and Minister of Foreign Affairs of Bosnia and Herzegovina, and Tibor Tóth, Ambassador, Executive Secretary Emeritus, Comprehensive Nuclear-Test-Ban Treaty Organization PC, said. But the stakes are high enough, and they are rising perpetually. Education is our best hope for the future. We need to translate the thoughts and ideas generated from the WAAS-WUC course on Future Education into a working reality. We could make a start with one or a few progressive universities and countries, as suggested by Erich Hoedl, Vice-President of the European Academy for Sciences and Arts. As the saying goes, nothing succeeds like success, and others around the world will follow. Many a revolution had a modest beginning.

We do not know exactly what the future will look like. A phrase from Indian philosophy talks about knowing that which all is known. Translating that into the educational context, we can teach students that knowing which, they can handle all. Alongside teaching them the facts, we can train them to handle complexity and make them capable of being adaptive and constantly reassessing the future. So no matter what the future turns out to be, our youth will be well formed individuals equipped to face it. Better still, they will invent the future.

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