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Science in a Rapidly Changing World

Let me express my most sincere thanks to the PEACE Programme for inviting me to this important meeting and giving me the opportunity to share with you some concerns and reflections on education and science in developing countries, at a time that is crucial for the construction of the Independent Palestinian State.

Palestine is a distant entity for us Latin Americans, as distant as is our part of the world for Palestinians. And yet, the more one reads and learns about the history of the Palestinian people, old and recent, their dramas and their achievements, their culture, their ancestral fight for freedom and independence, and their present problems of development, the closer one feels we are to one another. Not only because of the assets we have in common a rich and long history, a noble people, a strong cultural heritage and traditions but also because of the vast amount of difficulties, historical drawbacks and have-nots which we also seem to have in common leaving aside the specificity. Although both our territories reach a latitude as high as 30 degrees North, we belong to the South; we are part, with many, many others, of what is euphemistically termed the developing world for the simple reason that we do not form part of the developed world. We pertain to the large periphery of the present world system, in the economical sense, in the political sense, and of course in science as well. It is in this context that I have tried to answer myself: What role can science have for us, for you? What can we do with it, for it? What sense does it have for us to invest in science, to develop scientific curricula, to create scientific institutions? What are the prospects for our countries, for our people, at a time when science, as well as technology, seem to play a definitive role in shaping the development of humankind?

In his book *The Origins of Modern Science*, the historian Herbert Butterfield ascertains that the Scientific Revolution of the XVI and XVII centuries “outshone anything since the rise of Christianity and reduced the Renaissance and the Reformation to the rank of mere episodes, mere internal displacements within the system of medieval Christendom”². This is to imply that science, as it evolved mainly in western Europe in the last three or four centuries, has brought about a fundamental transformation of civilisation in the western world. Many factors are considered to have triggered this scientific prosperity, among them the political independence and stability in the region, the technological superiority, the territorial expansion through the conquest of the New Continent, the creation of urban societies with a strong middle class in the newly formed nation-states, even the separation of Church and State and the rise of political thinking. All in all, what is clear is that western Europe sprung after the Renaissance period as an independent and powerful entity with a clear

² H. Butterfield, *The Origins of Modern Science*. G. Bell and Sons, London, 1949.

conscience of what it wanted; it started to develop an identity which has evolved so far as for present-day Europeans to consider themselves a “community of destiny”, in the words of Edgar Morin.

This thrift led in western Europe to a boom of intellectual creativeness and innovative activity that has hardly been surpassed. A passion arose to extend the scientific method or approach to all spheres of thought, equalled only by the passion to put science to work for the causes of agriculture and industry (including noticeably the military industry). Suddenly, for the first time in history the changes in human and social life started to occur within one generation and were visible for everybody; suddenly, people, scientists, in particular started to believe that they could bring about these changes at their will and even control the behaviour of natural systems.

One should of course bear in mind that this is not the first time in history that scientific activity is part and testimony of a strong and thriving civilisation. Science, understood as an intellectual endeavour geared towards the systematised production of knowledge, has developed in different fields of relevance for other civilisations, in other regions of the world, in other periods of history. The Arab world contributed its very valuable share especially in mathematics, optics, and medicine during a glorious time of various centuries that is hardly registered in the European annals. Certainly, however, modern science is of an unprecedented breadth and scope, it is immensely industrious and productive, it is highly organised and professionalised, and its influence seems to have no frontiers. One hears of an international scientific community, to which every scientist belongs in principle; multilateral projects are set up to address so-called global problems; the colleagues travel and the scientific journals circulate all around the world; and we are on the brink of becoming a global academia thanks to the electronic telecommunications.

Here one asks oneself, however: Is science really so international?

A consensus has built up in recent times, that scientific creation should be indeed viewed as a social process, as is also artistic creation, or technological innovation.³ It has become clear that science is at least as much an expression of the values and institutional structures characteristic of the society in which it appears, as it is an expression of the properties and ‘laws’ of natural phenomena. No science is produced in an empty or neutral space; no scientist is independent of predecessors, previous discoveries, theories, paradigms and models. And yet, it is the new effect, the new question asked to nature, the new idea or observation reported, which, even if small, makes each scientific work worth; though, rather than being merely worth in itself, it is, again, worth within a context, in a given social and historical framework in which science continuously evolves along with many other human activities.

The present heterogeneity and fragmentation of our societies, the extreme social and economic disparities world-wide and our highly complex and plural cultural

³ See, e.g., *New Worlds, New Technologies, New Issues*. S.H. Cutcliffe, S.L. Goldman, M. Medina and J. Sanmartin, editors. Associated University Presses, London, 1992.

mosaic, make it therefore difficult to believe in the universality of science. Although it is true that much of the scientific information - that which is not classified and which flows into the mainstream communication channels - is accessible to a relatively wide community, it is just that: information. It is but a step in the process of doing science, which serves to give evidence of scientific progress and to communicate some of its results. Science does not become international by the mere transfer or transmission of scientific information, valuable as this may be; rather, it runs the risk of becoming *trans*-national. A risk that turns into reality each time this information reaches a passive receiver who has nothing to add to it or build upon it.

The periphery of our world is increasingly populated with passive receivers of modern science and modern technologies. We have become eager consumers of so many products of modern times that make our lives apparently easier and more agreeable, without however taking part in their conception, design or production. We gradually find it more difficult to renounce these commodities which, from the point of view of their genesis and production, are alien to us. Yet, ironically, our part of the world is at the same time populated with producers of goods that swiftly escape from their own reach, and with originators and transmitters of a wealth of popular traditions and knowledge which is sometimes deeply rooted but in general scarcely systematised and recorded. Examples of such wealth that rapidly come to mind pertain to traditional environmental knowledge, as in sustainable agricultural practices or water management, to health care and natural medicinal products, to child rearing, to nutrition and food processing. A large amount of such knowledge is excluded or dismissed by western science.

Alternatively, one could say that the producers and owners of this body of knowledge have not incorporated it into the modern science schemes, and generally have not developed a science of their own. Yet it is the sort of knowledge that is essential for survival and is therefore - in normal conditions - left to evolve according to the evolution of external conditions and in response to the emerging needs; in this sense, it forms part of an adaptive knowledge system which constitutes the basis of long-term human survival. It is the sort of knowledge that is more based on accumulated experience, understanding, feeling and intuition, rather than on analytical thinking and erudition. It is, of course, a social product as well, though not as highly structured as modern science and not as efficiently organised; it is most often of local relevance; it does not get published, nor does it circulate internationally; but it has stood up to the test of the centuries.

Its lack of systematisation and the absence of records, however, render this knowledge highly vulnerable. It gets scattered or lost when a society is disrupted by colonisation or massive migration; it is liable to fall into oblivion or into a precarious state with the massive introduction of foreign products or procedures which displace the traditional ones. Not that the traditional or popular knowledge becomes thus necessarily replaced, complemented or improved by a modern knowledge system, more appropriate to the local conditions; it often happens that it is not replaced by *any* knowledge at all. In the words of Edward Said, "over the missing 'something' are superimposed new realities...; the symbols of a universal pop culture enshroud the

vulnerable”.⁴ This painful denaturation of cultures is in many cases irreversible, and with it, most valuable elements of our civilisation get astray forever.

This process is advancing at a rapid pace, being pushed by the world-wide expanding technostructure and by the dynamism of modern economic institutions. One can think that this puts the future of humanity at an enormous risk, since in an atmosphere of a very great uncertainty about what is to come, we seem to be throwing ‘all our eggs in the same basket’.⁵ Will the present dominant system annihilate the social and natural diversity that has until today been an essential element in the development of life and reproduction of the human race, or will its evolution allow it to maintain this necessary diversity and make it flourish further?

Who can tell?

In most fronts, in practically all human activities, the changes are proceeding so swiftly, that all we know for certain is that the next century will be very different from the one that is about to conclude. At a time when the density of human beings on the planet and the frequency of our interactions have become so high, it is increasingly difficult to keep one’s own pace or to evolve in isolation. Whatever path of development one chooses - were we free to do so - will necessarily imply an interdependence and a strong interaction between social groups, peoples, nations, institutions. This means, then, that there should be also a collective and plural participation in the design and the construction of the roads that will be stepped by future generations.

A big challenge for us is precisely this: to prepare for the transition from dependence to interdependence, and to choose our own modalities of evolution within this context. But we have in mind an evolution that does not merely imply improvement (which in some cases sounds even like a dream); it implies development understood as the systematic strengthening of our economic and social life in accordance with our rules, cultures and interests. It implies, still further, the building (or reconstruction) of our capacities both with a view to contribute our share to the evolution of all humankind, and to benefit from and become enriched by being part of this humankind. This sounds as an even more ethereal dream; it is our dream for the twenty-first century.

Our tasks start at home with the construction of an identity, which is achieved by recognising common backgrounds, features, resources, needs and aspirations of our societies, and shaping them into a coherent expression. “The search for a future ends inevitably with a reconquest of the past”, are the wise words of our Nobel poet Octavio Paz. This national identity - which Palestinians have time and again seen so battered and shattered -, is needed to promote basic policies for the collective betterment and evolution of our societies, and at the same time it is a necessary

⁴ E.W. Said, *After the Last Sky*. Vintage, London, 1993.

⁵ M. Olivier, in *Proceedings of the INES Congress on Challenges of Sustainable Development*. A. Tenner and Ph. Smith, editors. Amsterdam, 1996.

element for defining and implementing any reasonable external policy. The strength of any nation in the international arena relies heavily on its identity; on the articulate expression of its specificity; on its internal decision to act sovereignly.

Universities play a central role in these tasks. They constitute the centres for critical thinking par excellence. They foster a cultural and intellectual activity that helps to give cohesion to our societies, recover their history, restore their dignity and develop their identity. The universities and higher schools bear the tasks of compiling the existing knowledge, building upon it to generate new knowledge, cultivating technological creativity and innovation, and, finally, the high task of transmitting all of this to the younger generations and thus helping them shape their future. They serve as links and bridges to other centres of intellectual activity, in different countries and parts of the world. They constitute niches for the creative work of artists, writers, scientists, thinkers and students. The universities are the places to ponder over ways of constructing peace, when there is war in the streets; to search for non-violent forms of social interaction; to develop new or alternative economical theories, models for development, judiciary systems.

Much of this is scientific work. To fulfil such tasks the universities must organise and carry out a good deal of science, in all disciplines of the human and social, natural, exact and engineering sciences, and in the various cross-disciplines. The construction of this scientific capacity until a tradition becomes established is, however, a long and complex process, that requires a continued effort, a stable investment and clear policies. Especially so if, as discussed before, this scientific capacity is to develop from within, primarily on the basis of the local background and resources, and with a view to respond to genuine needs and motivations; it is delusive to proceed otherwise. Scientists coming from other latitudes and the science produced in other places can constitute a very important support and catalyser, by providing historical records of accumulated knowledge, successful examples of methodologies and procedures, relevant information, interesting experiences, and so on; all this cannot, however, replace the local efforts to develop science as an endogenous activity. It is on these terms that international scientific co-operation works at its best. It is thus that science can become truly international, when we all contribute to it from our very local perspectives and with our modest capacities. Then it will also be more plural and representative of the intellectual capacities of humankind, and it will be more fit to respond to the big challenges that mark the turn of this century.