Learning and economic and human development in the third world, particularly Africa

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THE AFRICAN CHALLENGE

In the international arena, the debate concerning Africa has gone from Afro-pessimism to the effects of globalization on the local economies of the continent. For Africa not to be marginalized in the 21st century, it has to devote the bulk, if not all, of its resources to the development of its human potential. It can be argued that a new emphasis on science and technology related thinking skills and attitudes is key to the success of that choice. Such a change of focus is urgent. It requires a well-planned approach that makes use of the latest communication and information technologies as well as the synergy between all 52 African countries, for seldom have so many had to face up to a common challenge.

As a practicing engineer and the Manager of the Mars Exploration Directorate's Education and Public Outreach Office[1], my observations and experience lead me to believe that building bridges between the North American experience and Africa is an ideal starting point for this effort. The numerous educational and outreach programs in existence in North America have resulted in a sizable amount of inquiry-based materials with hands-on activities as well as ways to disseminate them to educational partners in the relevant communities. The suggested bridge between continents will afford the North American educational communities unique experiences not attainable in other ways while providing African schools and their communities with most needed curriculum materials and new approaches towards learning. This paper proposes approaches that can be beneficial to North America while at the same time taking African schools to the classroom of the future: A clear win-win situation.

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[1] http://marsnt3.jpl.nasa.gov/education/index-education.html

LEARNING IN AFRICA

As UNESCO Goodwill Ambassador, I arranged for one of my collaborators, Dr. Olson, to be involved in a teacher training trip organized by UNESCO in the summer of 1998. She is a volunteer for the Foundation for Education and Development in Africa (FEDA) and the leader of the Mars Education and Outreach efforts. She visited three African countries where she worked with practicing educators. Here are some comments extracted from her reports:

"... office workers patiently waiting to use elevators in poor repair."

"...women were on their hands and knees scrubbing marble floors with soft cotton rags, the condition of the restrooms suggested they had not been sanitized in weeks... Further on, a man with twisted legs dragged himself across an intersection on his belt buckle... No one seemed to find these events out-of-the-ordinary."

She went on to mention: "*How is it that we arrive at a situation where one of the oldest intellectual cultures of the world becomes a developing technological society when compared with others?*"

And then she asked : "*What sort of background leads to toleration of mechanical deterioration and fails to devise ways to reduce communicable diseases or support physical infirmity?*"

"What are the circumstances which promote acceptance of existing conditions? Is the solution someone else's problem?"

Her opinion is that " *...the schools of a country represent its heartbeat and its values. If we revere ancient information too much we may be blinded to the possibility of new innovation... Invention may be difficult for most of us, but innovation can become a way of life where we practice taking known inventions and relating them in new and ingenious ways to improve our approach to current conditions."*

Africa has 740 million inhabitants with over 50% under 20 years. In most African countries, the health, nutrition, infrastructure... problems are so overwhelming that the part of all available

resources allocated to education does not permit learning to occur in a way that is conducive to innovation or even to enthusiasm for learning.

CONSIDER THIS…

Anyone who is used to the conditions in North America and who travels to Africa, like Dr. Olson, is struck by the deterioration of the physical environment where learning takes place and the ways in which teaching occurs. The shortage of resources for education is enormous. Here are some general characterizations.

- Dedicated teachers who, if at all trained, did not have the opportunity to participate in a teacher workshop since their graduation from education colleges.

- Teachers whose only way to function in the classroom is by reciting whatever and however little they know. The majority of them do not have access to information regarding the developments in the fields of knowledge they are responsible for. Therefore, they teach what they have been taught and do so in the same way they have been taught.

- Large numbers of students (40 to 50 or more) per classroom at the elementary and secondary school levels. The sheer number of students has stretched the capacity of existing educational infrastructure beyond its limits.

- If a school has something like a library at all, then the shelves are almost empty with the few remaining books, dating back at least a decade. African students, studying in North America and Europe, collecting books for schools in their home countries, are challenged by the prohibitive cost of shipping.

- Laboratories for hands-on activities are non-existent, and some high schools can't even afford half a liter of alcohol for a classroom demonstration.

- The cost of communications is still very high in Africa. This is why many vocations that could benefit from the use of information technologies do not do so.

BUT CONSIDER ALSO THIS…

Conditions in North America contrast sharply with the ones described above.

- Communication and information technologies provide a new way of decentralizing educational institutions and of cheaply bringing much needed proven curriculum materials to the schools.

- The same technologies enable teachers to share information based on their classroom experiences with educational modules available to all on the web.

- These modules are being continuously improved based on the feedback from the classrooms across the country and the developments in education.
- The modules are available through programs such as Globe[2], "Red Rover, Red Rover" from the Planetary Society[3], and "Telescopes In Education" (TIE)[4] from NASA's Jet Propulsion Laboratory, to name but a few.

Consider a program such as TIE, available in the United States and Japan to schools. TIE allows classrooms in Japan to do daytime astronomy by making use of telescopes in the US, which can be remotely operated through a computer. Similarly, the classrooms in US can use the Japanese telescopes linked to the program. However, as of now, TIE does not give the students involved access to the southern skies. This part of the data could become available if the program would involve African schools as well. It is not necessary for the schools to be wired; it is sufficient if a local university would give them some on-line time.

BETTER LEARNING BY SHARING RESOURCES

The marginalization of Africa's educational systems prevents the educational communities around the world from having the kinds of data about and understanding of global phenomena the new technologies could afford us. Henry Edward Armstrong said, 'I am told, I forget; I read, I remember; I do, I understand'. When students learn and understand what they learn by doing, the retention rate and their enthusiasm for learning increase. The approach suggested here enables students to see more readily the relevance of their classroom exercises and to perceive practical applications of the concepts they familiarize themselves with. Their hands-on involvement in learning science may promote innovation and make innovation and problem-solving a way of life.

The African decision-makers are overwhelmed by the problems competing for the few resources available to them. The initial costs for the infrastructure that can afford their schools access to programs like those referred to above, providing students and teachers the benefit of engaging in hands-on activities, and to obtain vast bodies of information, are huge.

The globalization of the world market has made us aware of our interdependency. A problem of any region in the world affects all other regions. Denying any community access to education is potentially the most limiting factor in the quests for knowledge of us all.

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[2] http://www.hwr.arizona.edu/globe/globe_home.html
[3] http://redrover.planetary.org/
[4] http://tie.jpl.nasa.gov/tie/index.html

A partnership between both the educational community and the information and communication technologies companies in North America on the one hand, and Africa on the other hand, could be worthwhile to all three: A win-win-win situation.