Chapter I

Online Science: Its Role in Fostering Global Scientific Capital

Concern for man and his fate must always form the chief interest of all technical endeavors...Never forget this in the midst of your diagrams and equations.

— Albert Einstein (1879-1955)

Health and illness, flood and drought, want and plenty: each of these dichotomies rests squarely within the province of science education, for science education enables one to think critically and creatively, to collaborate, to investigate, to solve real-world problems, and to apply a body of knowledge that is dynamic and that rewards the lifelong learner with its challenges.

Moreover, science is arguably the single most important force behind world economies, for good or ill, the potential for which has been recognized since World War II (Bush, 1945). Of the market categories identified by UNESCO World Development Indicators, five—defense, transportation, power and communication, information technologies, and science and technology—rely on advances in science knowledge. Science education is valued for its immediacy and its investment, as can be seen by remarkable advances across the globe in science capacity.
However, advances in myriad science and technology fields are not uniform, just as science education is not uniform (Schulman, 2002; UNESCO, 2004). Where Southeast Asia advances, for example, much of the Middle East lags. Science capacity is, truly, global capital, yet capacity must be meaningfully applied in order to be sustainable and carry worth. It has been said, “A Nobel Prize for science will do little by itself to alleviate poverty or generate new business in developing countries,” (Watkins, Osifo-Dawodu, Ehst, & Cisse, 2007, para. 4), emphasizing that science without actionable purpose accomplishes little. In fact, developing countries often lose their most highly skilled scientists to institutions that offer better salaries and the potential for revolutionary work.

In this chapter, we provide an overview of the state of global science capacity and online science education initiatives designed to increase that capital, with emphasis on developing countries. We see the online environment as a connective tool to bridge very large gaps in wealth and capacity, an educational bootstrapping mechanism that has not yet been fully tapped. We briefly describe the valuation of science education, and establish a base from which advances in science education will be explored in the remaining chapters.

### Building Global Science and Technology Capital

Whether eliminating hunger or developing global partnerships, the concerted effort to meet the needs of the world’s population requires that those who serve and are served have the ability to take advantage of opportunities developed. That ability is capacity and capacity evolves from education.

With increasing frequency, officials in low and middle income countries are coming to the conclusion that they must build up their science, technology and innovation (STI) capacity in order to make demonstrable progress in achieving the Millennium Development Goals (MDGs); raise productivity, wealth, and standards of living by developing new, competitive economic activities to serve local, regional, and global markets; and address social, economic, and ecological problems specific to each country (Watkins, Osifo-Dawodu, Ehst & Cisse, 2007, para. 4).

Agricultural and environmental husbandry, access to energy and access to health care are the most visible needs of those in developing countries, yet foundational to these are infrastructure—both regulatory and physical, and collaboration—both as internal, public support and external partnerships (Watson, Crawford, & Farley, 2003). The World Bank identifies four essential factors for successful development of human capital, environments, and support systems that facilitate innovation:

- **Education for the knowledge economy** refers to foundational secondary and tertiary education and lifelong learning, as well as specialized education in technology, science, and communications;
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