◆Technologic Advances to Alleviate Global Poverty and Disease

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Major problems in the developing world include lack of good drinking water, poor access to education and information, and a coming global energy crisis. Colin Humphreys and V S Arunachalam explained how the physical sciences can help.

In a time when the cell phone has become ubiquitous and one can hardly think of life without it, Arunachalam stressed that this type of connectivity cannot be restricted to the developed world. One of the largest barriers to alleviating poverty among the poorest people is lack of education and information. By expanding the global network and taking advantage of multimedia formats, we can spread information across the developing world.

As Arunachalam pointed out, information technology cannot feed the poor or cure the sick, but it can enable wealth creation through education and provide a link to medical resources. One anecdote of such a connection concerned an Indian midwife who was able to call a doctor on her cell phone during a difficult birth and save the lives of the mother and the baby.

Most important, we must shed our ideas that the peoples of the developing world need only minimal technology. They want and deserve the same access as the rest of the world. In India, a company called e-Choupal has provided farmers with kiosks to check the market prices of their crops without leaving their villages for the long trip to market. Some 31,000 villages and 3.1 million farmers participate in the program, and seven kiosks are erected every day.

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Although some problems are tackled in an indirect way by facilitating knowledge exchange, others can be tackled directly by the physical sciences. Colin Humphreys explained that more than half the hospital beds in the world are occupied by people with water-related diseases, and at least 10% of child mortality is directly related to poor-quality water.

Materials science is developing a nonchemical way to purify water. By harnessing the properties of a new material called gallium nitride, scientists can create light-emitting diodes (LEDs) that emit a single wavelength of light. In the case of water purification, they are developing LEDs that shine at precisely 270 nm, the perfect wavelength to destroy bacteria, viruses, and a number of other water contaminants. Ideally, the LEDs, linked to solar panels, will be attached to water pipes going into villages. Unfortunately, the technology is not yet perfected, but it has great potential for the future.

In addition to providing a nonchemical purifying technique for water, the same LEDs offer a way to ease the energy demands that we are imposing on our planet. LEDs are dramatically more efficient and use far less energy than traditional light bulbs. Scientists are already able to produce white LEDs that are 72% more efficient than light bulbs. However, current white LEDs are harsh to the eye and not yet ready for lighting our homes and offices.

The potential energy savings can be seen in an example that Humphreys gave of traffic lights in Denver, Colorado. By replacing the red and green lights with LEDs, Denver was able to reduce its annual power bill from $330,000 to $26,000. Humphreys predicts that by moving to this kind of lighting, the UK could save £1.7 billion a year.

In the developing world, LED lights with solar panels and a battery (at a cost of $20) can provide cheap and efficient lighting. That would translate into the ability to work and learn at night and reduce the strain on biomass fuels, such as firewood.

By combining Humphrey's efficient lighting and energy-saving technology with Arunachalam's efforts to spread technology, the physical sciences can contribute substantially to bringing clean water, light, and essential information to the developing world.