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A Bridge to Knowledge

An Internet-age training program improves access to scientific literature in sub-Saharan Africa

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Like a box with its treasure locked inside, the Internet holds tomes of valuable information, especially for scientists. But the keys to unlocking its secrets can be frustratingly out of reach for researchers in Africa. Typically, a person would "order an article from some Francophone institute and wait for a couple of weeks," says Mohammed Jalloh, a urological surgeon at Hôpital Général de Grand Yoff in Dakar, Senegal. He has seen many colleagues' research stymied by such isolation. "Scientists and clinicians could not publish just because they couldn't access the scientific literature." Other experts' research remained inaccessible, and the potential authors could neither create citation lists for their articles nor learn about the latest results and protocols, Jalloh says.

In 2006, Jalloh's supervisor returned from a trip to the United States, eager to tell his colleagues about a database of medical literature called the Health InterNetwork Access to Research Initiative (HINARI), one of several Web-based portals that provides free or inexpensive journal access to institutions in countries below a certain income level. Finally he and his colleagues would learn the latest research about diseases and treatments at the same time as their counterparts in North America and Europe did.

But with little experience navigating complicated Web-page layouts or databases that require elaborate search strings, Jalloh and his coworkers had a difficult time exploiting its capabilities. So HINARI's availability was more of a tease than a tool. Then Jalloh attended a training hosted by a group called ITOCA—the Information and Training Outreach Centre for Africa—that instructs researchers, librarians, and students how to use online resources such as PubMed. Soon Jalloh had the materials he needed, and "it took me just an hour to download all of the references" he needed to publish his dissertation, Jalloh says.

By removing this professional bottleneck, ITOCA took one step toward its goal of building information-mining capacity among scholars born and working in sub-Saharan Africa—the ones who are most intimately in touch with the region's problems and who have the most at stake in helping their communities. Devising solutions to the bevy of complex challenges that besets the continent—disease, famine, and environmental degradation, to name a few—requires a nuanced understanding of the land, its peoples, and their cultures, as well as scientific expertise. Jalloh, for example, studies the high prevalence of prostate cancer in African men and of a metabolic enzyme deficiency in the population of Sierra Leone—topics on which he has published recently. To accelerate progress, ITOCA aims to bridge the digital divide in the fields of health, agriculture, and other sciences.

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Its trainings bring together a broad spectrum of researchers who are dedicated to finding solutions to the continent's troubles. They have the chance "not only to share their experiences, but also to realize that the challenges we have here in Africa—disease, health problems, poverty—are linked together," says Gracian Chimwaza, executive director of ITOCA, based in Centurion, South Africa. "You're amazed by the discussions you get between medical specialists and the agriculture and environment specialists."

Founded in 1999 by the Albert R. Mann Library at Cornell University in Ithaca, N.Y., the nonprofit organization receives grants from Cornell University, the Rockefeller Foundation, the Food and Agricultural Organization (FAO), the World Health Organization (WHO), the Technical Centre for Agricultural and Rural Cooperation of the Netherlands, and the UK's Department for International Development. It holds trainings that introduce attendees to HINARI as well as two similar databases: the Access to Global Online Research in Agriculture (AGORA) for food and crop sciences and the Online Access to Research in the Environment (OARE) for environmental sciences. Until the late 1990s, many journals lay out of reach for cash-strapped universities because subscriptions were so expensive, says Pamela Marinda, an agricultural economist and lecturer at Masinde Muliro University of Science and Technology in Kakamega, Kenya, and the East Africa Representative for ITOCA. In the past decade, prominent international agencies such as FAO, WHO, and the United Nation's Environment Programme (UNEP), with support from publishers and other groups, created aggregations of journal literature with the goal of providing, inexpensively or for free, up-to-date access to at least a thousand

journals—and in HINARI's case, many more. "[The databases] are very current," Jalloh says. "They even have articles that are in press."

ITOCA's sessions begin with an introduction to the computer, says Nerisa Kamar, a librarian at Egerton University in Egerton, Kenya, and an ITOCA trainer. Technophobia is a problem, Kamar says, especially with older trainees, so instructors cover basic computer operation, such as powering machines on and off and mouse usage.

Connecting Continents

ITOCA students (pictured here in Senegal) learn to navigate their machines as well as the scientific literature.

Photo: Vimbai Hungwe/ITOCA

"Some of our audience saw the computer for the first time in university, so they are not as versatile as many users in the West," says Chimwaza. Others, like Jalloh, are familiar with technology, but lack the first-hand experience of manipulating the databases to find specific articles online.

After pupils are familiar with their computers, ITOCA instructors introduce navigation of OARE, AGORA, and HINARI, Kamar says. Then people get the chance to search, access, and download articles from the Web portals.

While one teacher conducts the training, others are available to help the students individually, says Kamar, "so it's not only one trainer doing the training." Jalloh agrees that the high teacher-to-student ratio is a key strength, especially in light of the language barriers that exist between and within many African countries. Although Jalloh speaks fluent English, the official language of his native Sierra Leone, many of his Senegalese classmates at his ITOCA training spoke only French. ITOCA "had somebody who was able to translate everything," he says.

ITOCA calls its approach "training of trainers." Attendees are carefully selected in collaboration with their home institutions. The goal is to educate learners who are most apt to share their new skills with their colleagues when they return home. "We won't be able to teach as many people as we would like," Chimwaza says, "so our approach has been to teach researchers and information managers so they can go back to their stations and train their colleagues."

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The increased awareness of the scientific literature that the databases and the trainings provide extends beyond the research enterprise. Fawole says, and it translates directly to improvements in the graduate and undergraduate biology courses he teaches. "The fact that I can get current information means that my lecture notes are up to date," he adds.

Still, poor infrastructure and high maintenance costs have prohibited many institutions and universities from taking full advantage of the information systems. HINARI, for example, grants free access to countries with a Gross National Product of $1000 or less. But many universities and institutions in such countries do not have access to the internet, Marinda says. "And if they do, there is the problem of bandwidth."

As a stopgap measure—until internet connectivity improves—ITOCA is marketing a 300-gigabyte hard drive containing a database of some 130 journals with articles published as recently as 2006 and stretching back more than a decade. For $3500, institutions can purchase this hard drive, which is placed on a local area network and requires much less bandwidth than does a traditional connection to the Internet. Then, for approximately $1000, institutions can buy annual updates. Subscription money goes to the Mann Library, which created this system, called LanTEEAL 2.0; Lan refers to local area network and TEEAL stands for The Essential Electronic Agricultural Library, one of the first systems that aggregated research publications online for poor countries—before HINARI, AGORA, and OARE. In turn, Mann Library funnels these funds into ITOCA's programs, "so the model is self-sustaining," Chimwaza says.

Although LanTEEAL 2.0 is not as current as are resources that harness Internet access, it provides information that is more recent than what would otherwise be available.

Training Trainers

Angela Manjichi (in Mozambique) and other ITOCA trainers encourage attendees to take what they've learned back to their home institutions.

Photo: Vimbai Hungwe/ITOCA

With knowledge of the latest methodologies and discoveries, African scientists no longer have to be hamstrung by the information they find in outdated texts and decade-old journals. Closer engagement with the literature will likely propel more local researchers onto the forefront of science-catalyzed advances, says Chimwaza: "Ultimately, we will see the African scientists themselves really leading in fighting poverty and disease in Africa."

John Cannon is a science writer in northern California. He has covered a variety of topics, from superconductivity to whale biology, for outlets such as Innovation magazine and ScienceNOW.