

INTERNATIONAL PARTNERSHIPS IN
BUILDING CAPACITY AMONG EHEALTH
WORKERS IN DEVELOPING COUNTRIES:
CHARACTERISTICS OF SUCCESSFUL COLLABORATIONS

By

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CERTIFICATE OF APPROVAL

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Table of Contents

Title.....	i
Certificate of Approval.....	ii
Table of Contents	iii
Acknowledgements	iv
Abstract	v
Introduction	1
Background.....	2
Promoting health through the use of technology	2
The need for building eHealth workforce capacity	4
Building eHealth workforce capacity through international partnerships	5
Methods.....	7
Results.....	8
Discussion	17
Conclusion	23
References	24

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Abstract

Electronic–health tools are being used throughout the world to monitor and manage health indices and outcomes. In the developing world their use has increased substantially in the last decade. In order to use these tools effectively, there must be some training and education available to those working with the tools.

A number of examples of international collaborations have been created to develop curricula and the means of delivery to meet the needs of the eHealth workforce in developing countries. Many ongoing projects have common traits that help in ensuring the success of any training initiative.

Eleven international collaborations were analyzed for this paper and seven prevalent characteristics of the partnerships and training programs were identified as instrumental to the success of the eventual education program.

Introduction

In May, 2005, the 58th World Health Assembly adopted Resolution WHA58.28 establishing an eHealth strategy for the World Health Organization.¹ The recognition of the importance of eHealth in improving and strengthening health services around the world has been determined as an integral step in meeting the UN Millennium Project's Millennium Development Goals (MDGs) by the international community. The MDGs were created in 2000 to provide concrete, numerical benchmarks to tackle the various causes of extreme poverty with an achievement date of 2015.² Among the requirements for eradicating poverty, the MDGs emphasized that improving health among people in developing nations is necessary for any efforts in eradicating poverty and are supplemented by the eighth goal to create global partnerships to promote effective and a means by which to accomplish these goals. Though these objectives are easy to agree on, they are dependent on a number of factors to help them succeed, among them is the ability to build local capacity within resource-poor settings to ensure the long-term success of any interventions.

After a brief background about the role of eHealth tools and the need to provide effective training for such tools, this paper presents examples of current and recent global partnerships working towards providing citizens of developing countries the knowledge and skills needed to effectively implement, administrate, and monitor applications of eHealth. Common success factors of the programs are then summarized and areas of future research suggested.

Background

Promoting health through the use of technology

Gonzala Vecina Neto, head of the Brazilian National Health Regulatory Agency, once observed, “There is no health without management, and there is no management without information.”³ This sentiment encapsulates the growing importance of eHealth tools in developed and developing nations alike. The term eHealth is defined as the application of information and communication technology (ICT) in the healthcare industry e.g., telemedicine and electronic health records.¹ The role of ICT is intrinsically associated with the promotion of improved health outcomes in a variety of ways including but not limited to:

- Routine management of health services
- Program specific support – particularly with HIV/AIDS and TB
- Supply management of pharmaceuticals and medical supplies
- Planning for new facilities
- Emergency response facilitation
- Epidemiological analysis and disease surveillance
- Supporting policy making; and,
- Reporting to governmental and international agencies.^{1,4}

The need for managing, recording and tracking patient data in developing countries has recently become even more important as chronic conditions, including

diabetes and hypertension, have increased in prevalence and as historically acute conditions, including HIV/AIDS, have begun to transition into chronic conditions through the successes of ARV treatment programs.⁵ The data management needs for these health interventions are substantial and, as noted in Mamlin's and Biondich's 2005 paper, often the health care providers in developing countries are overworked, "seeing upwards of 80 to 90 patients per day", in an environment where "mistakes are not just probable, they are already occurring."⁶

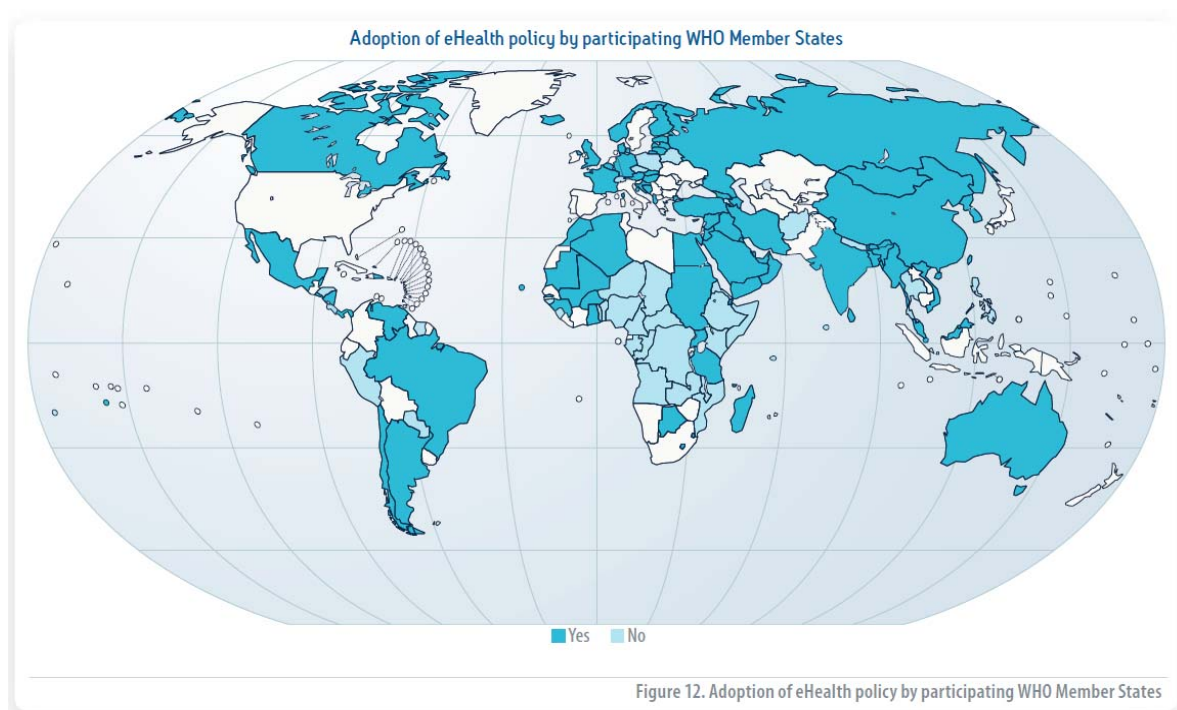


Figure 1. Adoption of eHealth policy by participating WHO member states Building Foundations for eHealth. ¹ Countries appearing as white in Figure 1 did not respond to the WHO survey or are not WHO member states.

Though the importance of these tools has been established in the literature, the adoption of them, particularly in resource-poor settings such as sub-Saharan Africa is incomplete as illustrated in Figure 1. 1

There are several factors associated with successfully implementing eHealth tools in developing countries. Organizational complexity, lack of coordination, and a shortage of human resources have all been identified as obstacles impeding the increased use of these tools.⁷ This finding demonstrates that one cannot make assumptions about the capabilities of a local workforce. For example, a recent report reviewed the skill sets of the personnel of the Southern Sudan government and found only ten individuals who knew how to use a basic spreadsheet.⁸ These challenges cannot be addressed individually, but are indicators of systemic lack of workforce capacity.

The need for building eHealth workforce capacity

In their 2001 paper, Braa and Muquinge determined, after reviewing the survey responses of personnel working with health information systems in Mozambique, that the main impediment to using eHealth tools was a low level of skill and education among workers.⁷ This sentiment has been corroborated among many leaders involved in projects implementing eHealth tools in developing countries.³ Most eHealth tools require regular and expensive maintenance to ensure sustainable use, yet many of the local people involved in the project have not had formal training in the subjects

required to make that happen. As the availability and necessity of these tools become more commonplace, building capacity among the users is of paramount importance. Unfortunately, building eHealth workforce capacity is a daunting pursuit for a single agency to undertake independently.

Building eHealth Workforce Capacity Through International Collaborations

In economic terms, any collaboration between two or more parties decreases their shared risk and increases their probability of success at achieving the common goal. In an article examining global partnerships in the scientific community, respondents reported that collaboration had enabled their developing country counterparts to increase their ability to do independent research and investigation.⁹ This finding also applies to the effectiveness of creating training programs for eHealth workers in developing countries. For example, the visiting institution may be responsible for defining the resource requirements for an eHealth training program, while the local institution can use their inherent knowledge of a region and its people to help determine a curriculum. International partnerships developed to promote eHealth tool skills provide the local users of a health information system with the necessary building blocks to maintain and administer the eHealth system indefinitely, as well as provides an education by which knowledge transfer occurs between the trainee and their associates. Evidence further suggests that international alliances associated with the strengthening of health systems and improving health outcomes are only growing

as healthcare and health systems become more global in nature.¹⁰ Among universities in both developed and developing countries, joint efforts to deliver the skills sets required for the 21st century workforce are well underway.¹¹

Methods

Sources for this paper were derived from conducting searches of the MEDLINE database, the Google search engine, and bibliographies from relevant articles. A series of queries were carried out using combinations of the following MeSH terms:

“eHealth”, “medical informatics”, “clinical informatics”, “training”, “education”, “capacity building”, “global”, “international” “partnerships” “collaborations” and “alliances.” Search results were then limited to English full-text articles and web pages pertinent to international collaborations between institutions in developed and developing countries to train health informatics personnel. Alliances between public organizations, including academic institutions and government bodies, were considered relevant and references to private-organization partnerships were discarded.

The partnerships meeting the inclusion criteria were then reviewed to identify common elements among their approaches and frameworks. The common characteristics of the collaborations pertinent to this paper were chosen by frequency referenced throughout the search results. Table 1 provides a list of international partnerships described in this paper demonstrating the identified characteristic in their eHealth training efforts. The analysis yielded seven common elements associated with international collaborations for training eHealth workers in developing countries

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Table 1. Presence of success characteristics in the programs reviewed.

	Locally Owned and Relevant	Educational Research Networks	Varied formats and delivery methods	Support South-South Collaborations	Peer Mentorship	Centers of Excellence	Establish Government Support
AITI	X	X	X		X		
AMAUTA	X	X	X	X	X	X	
AMIA 10X10 Latin America	X	X	X				
GHIP	X	X	X	X	X	X	X
HISP / BEANISH	X	X	X	X	X		
ITGH	X		X		X		X
ITI - Egypt	X		X			X	
OIN	X		X	X	X	X	X
REACH	X		X		X	X	
USAID - DHS	X				X		
UNICEF - MICS	X				X		

Results

There are several examples of current and recent international collaborations for training eHealth workers in developing countries. Despite their similar missions, these initiatives range in scope, origin, and location. Some were created by international and national governmental organizations and other are the product of academic collaborations. They are located in countries around the world, though the majority of the ones highlighted below are specific to sub-Saharan Africa. Some are providing brief training opportunities for a high-level overview of health informatics, and others are focused on creating specialists and experts in the field.

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AITI

The Africa Information Technology Initiative (AITI) is a student-run partnership between the Massachusetts Institute of Technology (MIT) and various universities in throughout Kenya, Ethiopia, Ghana, and Zambia. The initiative was piloted in the summer of 2000, collaborating with Strathmore College in Nairobi, Kenya, and focuses on training Java Programming, HTML, and the basics of UNIX system administration. More recently, AITI and Google partnered to deliver an intensive six-week course at Strathmore University providing instruction and skills training for building software applications for use on commonly available mobile devices.¹²

AMAUTA

Developed in 1999, Amauta (a Quechua word meaning a person of great wisdom, one who knows and teaches) brought together the Universidad Peruana Cayeto Heredia (UPCH), the Universidad Nacional Mayor de San Marcos, and the University of Washington (UW) in Seattle, Washington. Major funding of the collaboration was provided by the Fogarty International Center through the National Institutes of Health. The goal of the partnership is to train Peruvians in biomedical and

health informatics and improve accessibility to information resources for academic research.¹⁰

Both short-term coursework and long-term academic programs are available through the initiative, the former consisting of intensive 1-2 week training in the fundamentals of eHealth using a train-the-trainers strategy. This approach provides participants with the necessary skill sets to return to UPCH and teach introductory classes themselves. The longer-term curriculum is offered at the UW campus and provides faculty members from UPCH the necessary competencies to receive certificates, doctoral, post-doctoral, and post-masters degrees. Upon returning to Peru, the faculty members are automatically granted a position at either UPCH or another academic institution in the country.

In the most recent iteration of training methods, UPCH is preparing to create Peru's first graduate degree in biomedical informatics, which will be led by alumni of the AMAUTA program.¹⁰

AMIA 10X10 Latin America

The American Medical Informatics Association (AMIA) and the Oregon Health & Sciences University (OHSU) - Department of Medical Informatics and Clinical Epidemiology began offering the AMIA 10X10 program in 2005. One year later, a physician from Hospital Italiano of Buenos Aires (HIBA), Argentina, collaborated with

OHSU to translate and tailor the original coursework to meet the specific needs of eHealth in Latin America. Both the English and Spanish versions of the AMIA 10x10 program are offered in a web-based format, increasing accessibility for the student.^{12, 13}

GHIP

The Global Health Informatics Partnership (GHIP) was founded in 2010 under the auspices of AMIA as a collaborative effort hosted by the WHO and between, International Medical Informatics Association (IMIA), University of North Carolina's Intrahealth International, Millennium Villages Project, Earth Institute, Columbia University, the Regenstrief Institute, Open Educational Resources (OER) Africa, and OpenMRS. GHIP's core mission is to strengthen medical informatics capabilities to developing countries through knowledge transfer conducted by; acting as a health informatics resource center, the creation of educational materials, conducted both on-line and in-person, enabling access to health informatics experts, and, supporting collaboration to address issues occurring in real world settings.^{14, 15} Many of the learning tools used by GHIP are electronic and accessible via their portal, www.GHIP.net.¹⁵

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HISP/ BEANISH

One of the first alliances among developed and developing nations to build capacity among eHealth workers was the Health Information Systems Programme (HISP). Created in 1994 at the University of Oslo, HISP's original focus was on developing healthcare information systems and training personnel in post-apartheid South Africa. Later the mission of the organization was expanded, using lessons learned and best practices from the South African partnership, to India, Malawi, Tanzania, Botswana, and Ethiopia creating the HISP/ BEANISH (Building Europe Africa Network for Applying ICT in Health) network. Training programs involve aspects of service-based learning through mentorship, software tools and documentation development, continuing education, and coursework to achieve higher graduate degrees.⁷

One approach HISP/BEANISH has taken is in tailoring their offerings to meet local requirements and creating a means by which cross-border support for courses can flourish by enabling South- South collaborations, such as Mozambican HISP/BEANISH alumni teaching their counterparts in Malawi and helping to develop the curriculum for similar work in Botswana. South-South collaborations are recognized as one of the key tenets of the HISP/BEANISH methodology, as it has been noted that training endeavors have had improvements in long-term successes when created and taught by citizens of one African country to another.^{4, 7}

ITGH

The Informatics Training for Global Health (ITGH) program is funded through the Fogarty International Center of the National Institutes of Health, the National Library of Medicine, the National Human Genome Research Institute, and the National Institute for Biomedical Imaging and Bioengineering. It provides grants to aid in the support of informatics research training between low- and middle-income countries and US institutions. To ensure sustainability of the interventions modeled by the program, all training is integrated with research efforts at the partnering foreign institution to develop capacity building programs internally. A fundamental requirement of receiving a grant is that the training must support and address the specific needs of the area it is being taught.¹⁶ Eight projects are currently being funded through this program, several of which include names of organizations and professionals already familiar to this paper and the medical informatics community, in providing training in developing countries to address eHealth workforce capacity.^{16, 17}

ITI - Egypt

The Information Technology Institute (ITI), under the auspices of Egypt's Ministry of Communications and Information Technology has been developing skills of eHealth workers in a joint venture with OHSU's Department of Medical Informatics & Clinical Epidemiology (DMICE).¹⁸ Since 2007, ITI training programs have focused on

developing, implementing, maintaining, and managing health information resources to address the needs of Egyptian healthcare professionals. Since its initiation of the medical informatics training, ITI has introduced coursework for both Bioinformatics and a Joint Health Informatics Fellowship Program with Egypt's Ministry of Health.¹⁹

OIN

The Open Medical Record System Implementers Network (OIN) was developed by the Regenstreif Institute at Indiana University and Partners in Health in February 2006. The audience of OIN is the technical support staff (ie. non-programmer) responsible for the implementation and maintenance of OpenMRS, the most widely adopted free open-source electronic health record in the developing world. OIN provides training on OpenMRS, as well as informs members of the network about future developments and enhancements to the application.²⁰

There are a number of different activities taking place under OIN to increase capacity of eHealth workers; two of which are pertinent to this paper and described below: OASIS and EHDSI.

The Open Architectures, Standards, and Information Systems (OASIS) Project has three core areas of operation in South Africa, Mozambique, and Zimbabwe. Week long training sessions include aspects of theoretical aspects of patient management systems and practical use and application of OpenMRS.²⁰

Located in Rwanda, E-Health: Software Development and Implementation, (EHDSI) was developed to fund and train interns for one year in basic and advanced Java and OpenMRS development. The interns receive a stipend from the Rwanda Information Technology Administration during their coursework and upon completion are required to work with the local Ministry of Health for 1-2 years. The curriculum involves web design, Java programming, OpenMRS implementation, and a background in the field of medical informatics.^{20, 21}

REACH

The Regional East African Centre of Health Informatics (REACH- Informatics) was developed through a collaboration between Indiana University School of Medicine, Moi University School of Medicine, and Regenstreif Institute's Global Informatics Faculty in 2009 in Kenya. It focuses on increasing local eHealth worker capacity by providing training in the implementation and administration of EHRs with short courses and practicum training.²² The center also offers a two-year post doctoral fellowship; the first year at Indiana University to complete class work and the second year in Kenya, at the Academic Model Providing Access to Healthcare (AMPATH), one of the developing world's most successful programs combating HIV/AIDS.²³

USAID - DHS

USAID – Demographic and Health Surveys collaborates with a number of countries in sub-Saharan Africa to collect, analyze, disseminate and use the demographic and health data collected.²⁴ The DHS uses statistical analysis to plan, monitor and improve population, health, and nutrition programs. Their model for capacity building is learning by doing and they have had broad success in training local people in data retrieval and use in various roles including health technicians, data entry specialists, and lab staff.²⁵

UNICEF – MICS

The United Nations Children’s Fund’s (UNICEF) ongoing project, Multiple Indicator Cluster Survey (MICS) is another example of building capacity of local people to improve disease monitoring systems, an effort specifically focused on improving maternal and child health strategies. MICS was initiated after the 1990 World Summit for Children and currently there are almost 200 active implementations in over 100 countries.^{25, 26} UNICEF uses regional workshops to provide local researchers and organizations training to improve their ability to understand, interpret, analyze, and disseminate statistical information gathered on women and children in the area. This allows for tracking estimates on low birth weight, vitamin A deficiency, pneumonia, iodine deficiency disorder, with a special emphasis on tracking malaria rates.²⁶

Discussion

Seven common elements among the global partnerships reviewed were identified as being effective in training eHealth workers in low-resource settings. A discussion of these characteristics follows in more detail.

Locally owned and relevant

Medical informatics programs created in the developed world often overlook the technical and resource constraints being faced in the developing world. The capacity requirements for eHealth workers reflect the nature of their surroundings and educational access. Application of a curriculum created for a developed country may not necessarily fit the needs of users in low-resource settings. Therefore, understanding the current skills of the people of a region and the expected application of an eHealth tool will create a more efficacious approach to creation of curriculum.

Those partnerships that were guided by the context of where their program was to be implemented reported having more success at developing a curriculum and teaching principles that were relevant to the local population using it. Many of the programs reviewed here have taken this process of tailoring coursework to meet local needs one step further. Aligning the training technique and content with the technical

infrastructure of the region in which the program is taking place provides students with the practical tools and skill sets to improve the health outcomes of their community rather than creating frustration with the limitations of a learning environment that lacks context. Additionally, creating solutions specific to regional health problems engages the student in a meaningful way, thereby creating a vested interest in learning and applying their coursework. Developing curriculum in a method tailored to the local people fosters a framework of learning-by-doing, whereby “doing” can eventually contribute to the improvement of the lives of their neighbor, child, or even themselves.

Educational research networks

Establishing networks, or communities of practice (CoPs), among eHealth professionals has the dual benefit of promoting collaboration among members and providing a means by which information can be transferred. Annual or quarterly meetings, arranged by the partnering institutions, can allow experts and alumni from public and private organizations, the opportunity to meet and discuss current topics in the field of eHealth and build the region’s overall capacity.³ Maintaining ties with professionals in the field of medical informatics will foster cooperation and the creation of new ideas and, in turn, further develop both the support and expansion of the partnership, as well as the local informatics community.

Alternatively, improved Internet access helps partnering institutions maintain an informatics community despite geographic disparity. Development of a social networking tool portal community website can facilitate further communication and relationships between a program and its former students are maintained well after completion of a program. This collaborative tool can also serve as a means by which experts and professionals could propose questions about eHealth topics and receive thoughtful and accurate responses from peers.

Varied formats and delivery methods for training

Conducting training sessions using varied curriculums and delivery methods allows the eHealth worker and their institution the opportunity to customize their learning programs based on specific requirements. Providing short- form and long form courses, available either electronically or in-person, allows eHealth personnel at various levels of ability and expertise to adjust the depth and breadth of their engagement. Electronic offerings, delivered through portals or CD-ROM address the need for readily accessible education, despite the time and location constraints that may exist. Intensive short-courses, generally one to two weeks in length and delivered in a classroom environment, allow for greater depth of learning while also accounting for limitations the eHealth worker may face by taking an extended leave from work or travel away from home. Creating a flexible curriculum that can be tailored for

individual needs will allow any eHealth training program the opportunity to reach a greater number of people while mitigating disruption to their day-to-day lives.

Longer-term training opportunities can allow the student to learn about eHealth in a more in-depth manner and provide them the opportunity to earn certificates, masters, doctoral, or post-doctoral degrees. This, in turn, can play a role in sustaining the spread of knowledge, as the student can then become the trainer upon their return to their home region.

Support of South-South collaborations

The analysis revealed that global partnerships are primarily composed of universities and NGO's based in developed (i.e., "north") countries, reaching out to similar institutions in developing (i.e., "south") countries, in order to promote and deliver eHealth training. Many of these groups, though, argue that to ensure continued use of eHealth tools and the sustained growth of those who can use the tools, simply maintaining the north- south model of partnership will not be enough. Efforts to develop and support collaborations between one developing country and another can not only empower the teacher in that scenario but also create increased excitement and openness to the challenge that lay ahead on the part of the student.

South-south collaborations also benefit from the shared experiences of the parties involved. The training team can account for similar regional and socio-economic plight

of a people and tailor the program accordingly, saving valuable trial and error time otherwise. The partnerships could extend beyond eHealth training and foster cooperation and information sharing among different groups throughout various fields of scientific research.

Peer-supported mentorship

Peer-supported mentorship is based on the foundation of creating coursework that not only enhances skill sets required for eHealth tools but provides the necessary capacity to later be able to teach the material as well. A benefit of this approach is sustainability: it ensures that as future eHealth workforce needs expand, there are members of the community that can provide the training, which further reinforces the sustainability of the partnership's efforts. A key piece to ensuring that mentorships succeed is establishing incentives for the individual, so as they attain higher degrees, they remain or return to their region of origin, and initiate a new network of eHealth professionals.

Creating Centers of Excellence

The establishment of Centers of Excellence (CoEs) in developing countries is an important step toward maintaining the momentum of an eHealth training partnership. Located strategically in a region, CoEs are created as institutions focused on developing

collaborative plans for eHealth best practice, policy coordination, service improvement, surveillance, and further capacity building. In many cases, the Center is associated with a strong academic institution that already has eHealth technical and professional staff but can, through its leadership in a community, further foster local and regional support for eHealth implementations.^{10, 20} By establishing a CoE, international partnerships benefit from being able to regularly meet and collaborate with eHealth experts working on projects and research in the region in a centralized location.

Establishing governmental support

Educating governmental bodies about the importance of eHealth tools is important to building support and establishing trust in any program launched by any international partnership. Moreover, clear national policies for eHealth and legal standards for health care information are critical to creating and delivering both eHealth tools and the corresponding training needs. Transmission and storage of health data, in particular, requires guidelines and standards developed through legislative bodies that carry penalties if not adhered to. Governments can also provide funding to training projects if an organization can clearly explain its overall importance of eHealth tools, including the gathering and management of health data, and the need to have a well-trained workforce to implement and administrate the necessary information systems.

Conclusion

Of the international collaborations reviewed, several share one or more of the identified key characteristics. Preparing tomorrow's eHealth workforce is not an easy task, especially in developing countries where the situation is further complicated by resource constraints that limit ICT infrastructure and education investment. Therefore, struggling or emerging international collaborations will be best served by adopting one or more of these key characteristics as a core strategy.

Understanding the needs of a local people by building on the foundations of the global partnership is key to the success of any project of this magnitude. Institutions in the developed world need to be open and responsive to the voices of their peers to the south in curriculum development and method of delivery. The analysis of international partnerships suggests that mutual respect and engaged participation of all institutions involved can have a positive synergistic effect on the project outcomes.

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