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# Integrating eLearning in Pre-Service Education in Ghana

July 2019

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## Background

Ghana's nursing and midwifery health training institutes (HTIs) are confronted with limited and overburdened resources for students and overcrowded classrooms with high student-to-instructor ratios. To enhance classroom learning and skills development, the US Agency for International Development (USAID)'s flagship Maternal and Child Survival Program (MCSP) established a fully equipped skills laboratory and introduced eLearning as a blended learning approach to help students achieve competency in clinical areas.

MCSP built on the pre-service education (PSE) work that began under its predecessor program, USAID's Maternal and Child Health Integrated Program. MCSP aimed to develop a better-prepared midwifery and nursing workforce, equipped with the knowledge and skills to effectively provide HIV, malaria, nutrition, family planning, and maternal, newborn, and child health services. To advance these PSE goals, MCSP collaborated with Ministry of Health (MOH) to implement the following eLearning activities from August 2014 to March 2019:

- Established and built the capacity of the first eLearning Secretariat within the MOH to govern and manage eLearning activities.
- Developed a methodology and built the capacity of HTI faculty and information technology (IT) tutors to implement eLearning and create standardized eLearning modules.
- In collaboration with faculty and local partners, created and deployed eLearning to 31 nursing and midwifery HTIs (out of an estimated 70 total schools<sup>1</sup>) in the 10 regions of Ghana.

As a result, eLearning has empowered 35,000 nursing and midwifery students to access relevant materials that can further strengthen and reinforce their clinical knowledge while better preparing them to serve more than 28 million Ghanaians.

## Objective and Methods

This brief documents the process of implementing eLearning activities and describes the results of a mixed methods assessment of the feasibility and acceptability of MCSP's eLearning approach in nine out of 31 MCSP-supported HTIs in six regions of Ghana. The nine schools were selected by convenience sampling and because MCSP had installed the learning management software Moodle<sup>2</sup> for use by students and tutors. At each selected school, MCSP conducted focus group discussions (FGDs) (two FGDs per school and eight students per FGD) with students; in-depth interviews (IDIs) with IT tutors, subject

<sup>1</sup> The number of nursing and midwifery HTIs in Ghana changes frequently as new schools are added or others are closed.

<sup>2</sup> Moodle is a free and open-source software learning management system, a software application for the administration, documentation, tracking, reporting, and delivery of eLearning modules.

### eLearning in Ghana

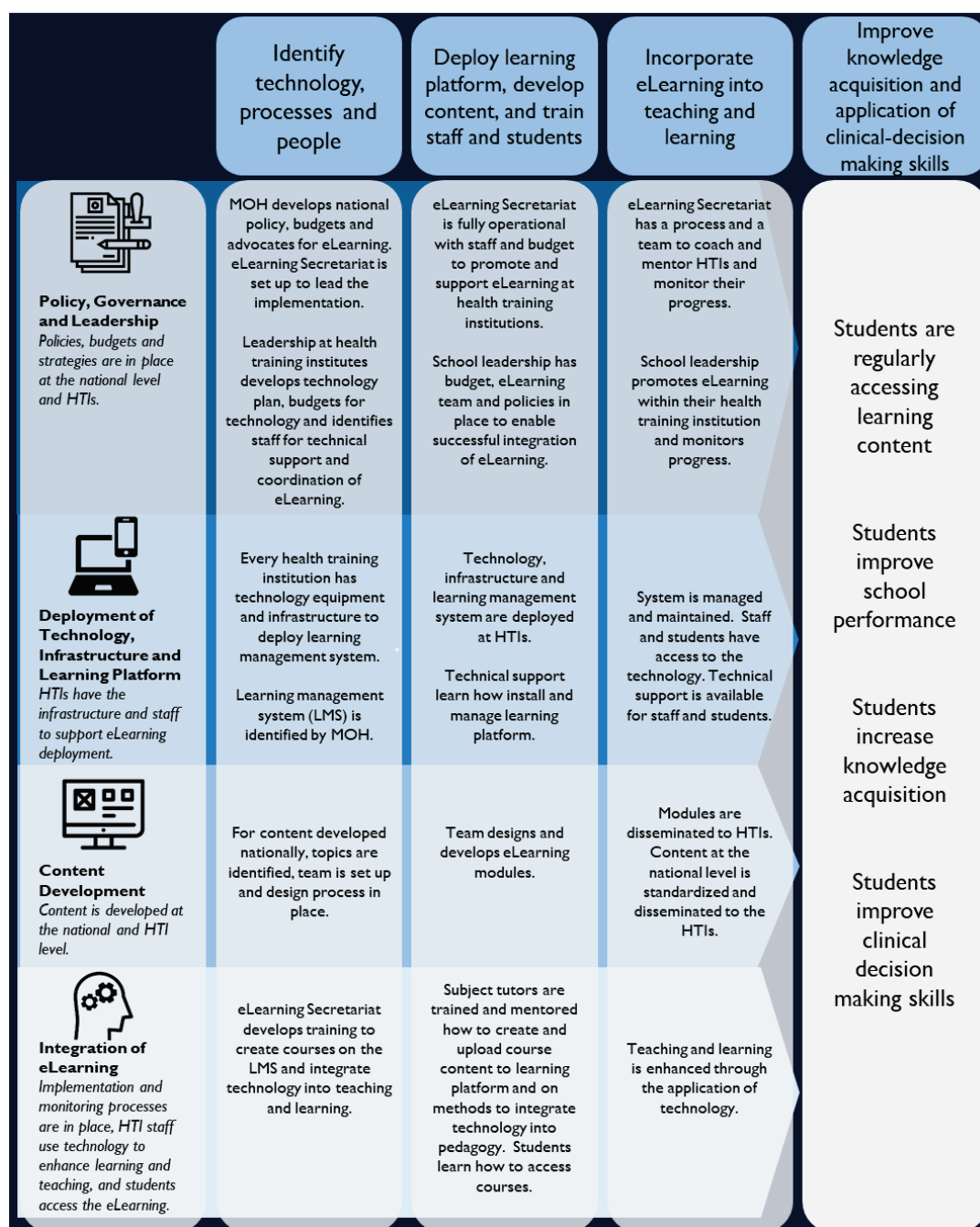
eLearning is an approach to learning facilitated by technology or an instructional practice that makes effective use of technology. MCSP conducted a literature review that identified integrating technology into pre-service education as a promising best practice. eLearning in Ghana is a supplemental resource in HTIs to support students and tutors to reinforce classroom learning, acquire knowledge, and practice clinical decision-making skills.

tutors, and principals; and quantitative surveys with IT tutors, subject tutors, principals, and vice principals. The assessment helped the study team better understand eLearning implementation under MCSP and document the challenges and opportunities that presented throughout application of the approach. A total of 18 FGDs, 29 IDIs, and 19 surveys were completed. Quantitative data analysis was conducted in Excel to describe the results of the survey. Qualitative data were analyzed in Atlas.ti for themes related to project implementation and stakeholder perspectives. In addition, document reviews and interviews with MCSP staff provided context and information on collaboration with the MOH and implementation of eLearning at supported HTIs in Ghana.

## Intervention

In collaboration with the MOH, MCSP developed a comprehensive framework and casual pathway for integrating leveraging eLearning technology to enhance learning at HTIs, particularly for skills development through theoretical and practical instruction. The causal pathway in Figure 1 describes the national- and HTI-level implementation process in more detail.

**Figure 1. eLearning framework and causal pathway**



## Policy, Governance, and Leadership



*An effective eLearning program has policies, budgets, and strategies in place at the national level and HTIs.*

MCSP aligned its activities with the national MOH and, in 2016, supported the MOH to launch the eLearning Secretariat within the Health Training Institutions Unit. With technical support and leadership from MCSP, the MOH team in the secretariat coordinated the eLearning activities, managed the national learning platform, managed content development, and provided technical support to HTIs. See Box 1 for details on how MCSP supported the MOH to introduce eLearning as a PSE strategy.

Introducing and integrating the new eLearning technology at HTIs required buy-in from institutional leadership. HTI principals initially hesitated to commit budget and staff to eLearning because they did not understand the potential and value of using technology at their institutions. After 4 years of implementation, HTI principals saw that eLearning improved teaching, motivated students, transformed how learning happened, increased productivity, and consequently committed resources for eLearning. For example, quizzes taken by students on Moodle could be graded quicker than paper-based tests. Box 2 lists the critical factors for successfully integrating eLearning at HTIs.

IT tutors at all nine sampled schools reported that their principals provided the support needed to implement eLearning. For example, principals purchased the requisite networking equipment to install the learning platform, planned to purchase additional computers for the information and communication technologies (ICT) lab, and encouraged training for staff on use of equipment and the process of eLearning implementation. Principals are also monitoring the use of eLearning.

*“My principal ... makes sure that every information, everything you teach in the school is uploaded to the eLearning platform so students can have access to it. ... that’s how it is being monitored.” –IT tutor*

All nine schools also had a dedicated budget, a technology plan in place, and an eLearning coordinator by close of project. Three of the nine schools had eLearning implementation teams to manage and coordinate eLearning activities as well as student IT prefects, who assisted with technical support.

## Deployment of Technology, Infrastructure, and Learning Platform



*The HTIs have the infrastructure and staff to support eLearning deployment.*

At the national level, MCSP and the MOH worked together to 1) identify an appropriate learning platform, 2) determine infrastructure needs at each HTI to support eLearning deployment, and 3) strengthen the capacity of HTIs to implement eLearning. Throughout the life of the project, MCSP and the MOH conducted joint visits to implementing this, during which they deployed Moodle, trained staff and students on eLearning, monitored progress, and provided technical support. See Box 3 for details on how MCSP and the MOH deployed eLearning at HTIs.

### Box 1. Establishing an eLearning strategy with MCSP support

- Created eLearning Secretariat.
- Developed processes for eLearning implementation and scale-up.
- Deployed eLearning at the health training institutes through site visits in collaboration with the secretariat team.
- Supported secretariat to liaise with government agencies and the private sector to assist with school connectivity and infrastructure.
- Supported advocacy of eLearning activities to increase visibility and promote work.

### Box 2. Critical factors for integrating eLearning at health training institutes

- Technology plan in place
- Budget allocated for technology
- eLearning implementation team to lead and manage implementation of eLearning activities
- eLearning coordinator as the champion of eLearning to coach subject tutors on integrating eLearning into their teaching
- Dedicated eLearning technical support as administrator of learning management system to maintain the server; manage accounts, users, and courses; and serve as the “help desk” for questions and challenges
- Students, known as IT prefects in several schools, to assist in managing the computer lab and provide peer support

The MOH and MCSP were committed to ensuring that every student, irrespective of device and platform, could access digital learning content. Moodle was selected as the learning management system (LMS) because it met the eLearning activity's requirements and was already being used by some contractors in Ghana, making it a sustainable solution.

To deploy the platform, different approaches were required for the national and HTI levels (Figure 2). While the MOH posted the eLearning modules on a dedicated website, HTIs could not access them via the national online platform because many lacked reliable and fast-enough Internet connectivity required to download the learning modules. To overcome this challenge, Moodle was configured on a server at each HTI so that students could access the site and content through the HTI's local network, use any device, and download modules to study offline and at their own pace. This configuration required that tutors and students be within range of the local HTI network on campus to download modules and upload their results of module assessments, not be outside the school using the Internet.

Five schools reported that upwards of 90% of their students accessed modules through the Moodle Mobile app. Three schools reported 80% of students accessing the mobile app, and another school reported 70%. The aim is that all students can use the mobile app to download the modules onto their personal mobile devices, read their tutors' notes, review the modules, and view demonstrations to prepare for class or reinforce classroom learning. Use of the mobile app is very important because it helps reduce the burden for tutors in grading quizzes for large class sizes and makes access to course materials easy for students, given that the mobile app can be accessed anywhere. In addition, the MOH focused on enhancing the Moodle Mobile app to increase overall utilization of Moodle, since most students access the course through that mechanism. For offline usage, six schools installed Moodle Desktop in their computer labs.

During visits to HTIs over course of the project, MCSP and the MOH found that the available infrastructure and equipment to install the system varied across HTIs. Common technical challenges to deployment included:

- Low digital literacy skills among students and tutors to use computers, as well as limited ability to use ICT to find, evaluate, create, and communicate digital information
- Computer labs with inadequate number of working desktops
- Not all students owning a smartphone

### Box 3. Deploying eLearning at health training institutes

#### Initial deployment visit

1. Assess the technology.
2. Install necessary infrastructure and equipment.
3. Configure the server for the learning management system (in this case, Moodle).
4. Provide training to the IT tutor and/or eLearning technical coordinator on how to install Moodle.
5. Train tutors how to create content.

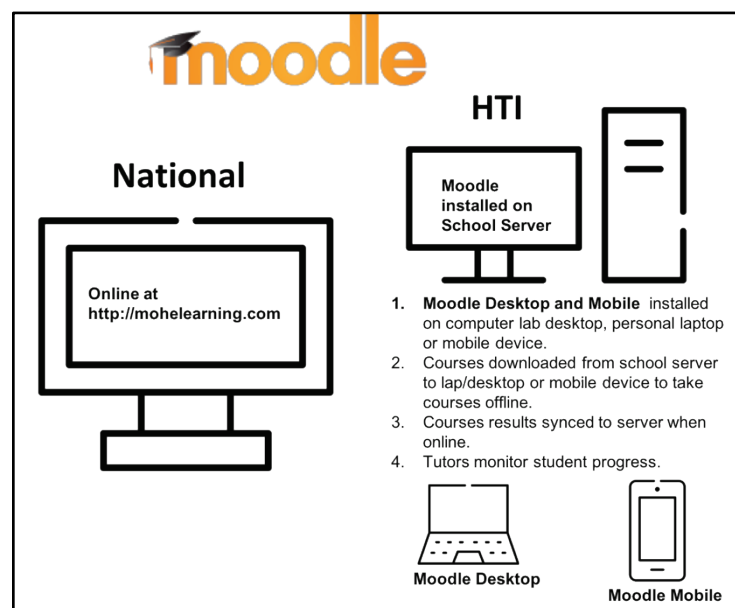
#### Follow-up monitoring visits

6. Assess progress of eLearning implementation.
7. Identify challenges and opportunities.
8. Mentor tutors and provide additional training.

#### Distance support

9. Help desk can be reached by mobile or email to assist the health training institutes to diagnose issues, address questions, and provide advice and support to resolve problems.

**Figure 2. Dual approach to platform deployment and national and HTI levels**

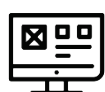


- Limited reach of local network in campuses and inadequate network bandwidth to handle all users
- Limited Internet connectivity

Despite these challenges, tutors and students are eager and motivated to use the new eLearning tool.

*“Bandwidth is so small. ... if it can be booked onto the Internet whereby students at the hostel can access it ... that is what we really want. ... it will really help us. And ... while a tutor is in the house, you can just prepare notes ... set your quizzes and mount it on the platform.” –IT tutor*

## Content Development



*Content is developed at the national and HTI levels.*

The approach for content development is two-pronged: content for national dissemination and content created by tutors at their schools. At the national level, MCSP created eLearning clinical modules on nutrition, gender, HIV, and maternal and newborn health. An interactive story game application, Hello Nurse, was developed for malaria and HIV 90-90-90<sup>3</sup> (Box 4) to help build the capacity of students to provide quality malaria case management and HIV/AIDS care.

MCSP used an instructional design methodology to develop the content for the modules and interactive story app. The process uses a problem- and case-based approach to developing the content on assessment, diagnosis, and provision of care. A series of workshops were conducted by MCSP in collaboration with the MOH and Ghana Health Service with tutors, subject matter experts, instructional designers, national associations, government institutions, and eLearning module media and game developers at the beginning of the content development process for each eLearning topic. To continue developing eLearning modules, the MOH will need a team within the ministry that is dedicated to content development. See Box 5 for steps in the content development process.

HTIs have continued to use the modules that MCSP developed with the MOH. The aim was that all modules developed to date would be used by the schools on an ongoing basis. During data collection, the team asked nine schools which of 11 eLearning modules they were using. Three schools reported using all 11 modules that had been developed to date, two schools used eight modules, two schools used five, and two of the schools were not sure how many of the modules were being used. While it is exciting to see the use of the modules across schools, the project hopes that with continued support from the eLearning Secretariat, all schools will use all developed modules to reach a higher number of students with knowledge and skills building.

### Box 4. Hello Nurse interactive story app

Hello Nurse is a two-chapter interactive story covering malaria prevention, diagnosis, and case management for pre-service nurses. MCSP developed the interactive app as part of a series of eLearning tools to strengthen malaria health services, focused on building capacity of pre-service nursing students.

The eLearning Secretariat taught the tutors how to use this learning app. Many students who downloaded it found that Hello Nurse provided them with knowledge to supplement what they learned in class, and tutors appreciated the interactive and educational app.

*“I think aside that it also corrected us on certain things that were not shown. For instance, when you choose or select your answer after the whole game, they will bring in the score and tell you the marks you had, and then ... give you the right answers to questions you had wrong. ... it ... helps us to correct our wrongs.” –Student*

### Box 5. Content development process

Content development involves creating a scenario or case study so that the content is engaging and interactive for the student or provider. The process to develop content includes the following steps:

1. Review and adapt content.
  - Differentiate content into need to know versus nice to know.
  - Determine learning objectives.
  - Align activities and assessments with objectives.
2. Develop storyboard to outline flow of content from screen to screen.
  - What to read on screen: text visible on the screen
  - What to view on screen: graphic and illustration representing the scene and narration
  - What to hear: narration to explain screen; “voice” of the scenario depicted, such as nurse, mother, student, client
  - What do in module: activities and knowledge checks
3. Package text, graphics, and narration, and publish into eLearning module.
4. Disseminate modules to schools.

<sup>3</sup> 90-90-90 is a UNAIDS treatment target to help end the AIDS epidemic.



## Integration of eLearning



*Implementation and monitoring processes are in place, HTI staff use technology to enhance learning and teaching, and students are accessing the eLearning.*

During the deployment and monitoring visits, MCSP and the MOH trained subject tutors to create content and modules on Moodle. They trained students on how to access the modules in the computer lab and how to download the modules on the Moodle Mobile app and Hello Nurse onto their mobile phones. Hello Nurse was downloaded over 8,000 times throughout the life of the project. Since many HTIs have projectors in the classroom, tutors used slide presentations in their classes. MCSP taught tutors how to convert the slides into modules on Moodle. As a result, HTIs have created modules on anatomy and physiology, emergency and disaster management, and psychology. Through MCSP's work at the national level with the Nursing and Midwifery Council on technical manuals for HTIs and revisions of teaching materials, content for these modules can be standardized across schools in Ghana.

## Results

Adapting technology into teaching requires changes to the traditional methods of pedagogy. eLearning improved the efficiency of teaching and increased learning at the HTIs in the following ways.

### Flipped Classroom Facilitates More Engagement

Tutors were uploading their notes before class, which enabled students to access and review the notes ahead of time. According to both students and tutors, sharing notes was the most frequently cited way that eLearning was employed at HTIs. By uploading module content onto the LMS for students to see in advance of the classroom lecture, classes were less “chalk and talk” and more interactive. The tutor's role evolved to a facilitator, rather than exclusively a lecturer, which supports student inquiry and engagement. Tutors were also able to draw out knowledge and insight during class while encouraging discussion and questions about the eLearning content. Students were encouraged to think critically about what they had learned and to better understand how their knowledge and clinical skills could be applied.

*“Before a tutor will enter a class to teach, he has already uploaded the content onto the platform. And students have gone through it, and they've already identified areas that they need more highlights, so when you get into the class, it's more like discussion than just to stand and talk and go out.”—Subject tutor*

Tutors learned how eLearning is beneficial to their teaching and are incorporating eLearning into their classrooms. To build on this enthusiasm, regular follow-up and/or monitoring visits are an effective strategy to motivate and encourage tutors to continue to use eLearning. The eLearning Secretariat within the MOH will provide continued technical support; additional training and coaching on the functionalities of the platform for administrators, tutors, and students; content development; and approaches to integrate technology.

### Assessments Are Streamlined

Tutors are uploading quizzes, assignments, and exams onto the platform. The assessment results are a part of the students' final grades. The learning platform automated the grading process, which improved the efficiency, speed, and accuracy of the grading process. By saving time, tutors can redirect their attention to student support.

*“What we do ... you upload content onto the platform and attach marks to students who go through ... the lecture notes. ... it motivates them to actually go through the content. ... Also, some of the tutors conduct their midterm ... organize quizzes and give assignments on the platform. ... As a result, the students are committed to accessing the platform because if they are not, it will affect them academically.”—Subject tutor*

### Collaboration Is Fostered among Professors, Students, and Tutors

The discussion forum component in Moodle continues the teaching and learning processes after class is finished.

*“There's a forum page ... in case I don't understand something, then I could just send my question to the forum. Then the lecturer will have access to it, answer it. ... He also wants to communicate with us. ... It's very effective.”—Subject tutor*

## Students Are Supported

The eLearning platform enabled tutors to monitor students more efficiently and to provide targeted assistance to those students who need it on a timely basis.

*“It helps us to also monitor their progress. Once you are able to assess them some number of times, we are able to assess progress of students ... identify the weak ones and help them to improve.”—IT tutor*

Students were more engaged using eLearning and no longer miss out on crucial information because it is available on the learning platform. The eLearning platform reinforced knowledge acquisition and served as a reference. Students and tutors cited several benefits of eLearning, including convenience and studying at their own pace, accessing module materials on their mobile phones, learning new information not taught in class or covered during the academic term, and increasing confidence using digital technology in academic and clinical settings.

*“The teaching itself, the eLearning system is self-paced. Everything that you are learning, you can go forward and come back if you don’t understand something. And at your own leisure time you can use it ... it’s been very effective ... way of teaching oneself.”—IT tutor*

*“They have it on their mobile phone wherever they go ... wherever they sit, they will open it and then go through it, unlike carrying handouts in their hands.”—Subject Tutor*

*“Sometimes when the lecturers put their notes on the platform, we don’t get to finish the course for the semester and then we use it to learn ahead.”—Student*

*“I visited Moodle and saw a video on family planning—it was about how to insert the IUD. ... I’ve never seen how it’s been inserted, but I saw it on Moodle ... and how to counsel. ... It has really helped.”—Student*

In summary, MCSP’s work supporting eLearning improved approaches to both learning and teaching at the national level and in HTIs.

## Lessons Learned and Recommendations

### Policy, Governance, and Leadership

- Although an eLearning Secretariat was established as part of the Health Training Institutes Unit at MOH, there is no MOH eLearning strategy or specific budget. Therefore, it is recommended to develop a national eLearning strategy, allocate budget, form an eLearning steering committee to advise the MOH, and work with partners on how to link eLearning activities.
- To foster buy-in from HTI leadership, evidence on the value of using new technology to improve teaching and learning, student motivation, and productivity should be generated and presented to HTI administrators. Future studies on student skills pre- and post-use of eLearning should be conducted to generate evidence for the effectiveness of eLearning materials.
- For HTIs to successfully implement eLearning, each school must develop a technology plan, delegate responsibilities to staff, and allocate a budget to support eLearning. Recommended new roles and responsibilities for staffing at HTIs include eLearning technical support, eLearning coordinator, and eLearning implementation team.

### Deployment of Technology, Infrastructure, and Learning Platform

Adequate infrastructure is crucial to a successful eLearning strategy. The MOH must work closely with HTI administrators to ensure the necessary equipment and infrastructure are in place before implementing eLearning.

- Successfully implementing eLearning as a PSE strategy requires reliable Internet connectivity and strong bandwidth within each HTI’s local network. As eLearning becomes a more prominent learning tool, the MOH must continue to work with the HTIs to address the issue of Internet connectivity and adequate bandwidth. The MOH must also work with HTIs to identify solutions to Internet access challenges, including hosting and setting up the online version of Moodle on HTI-specific networks.

- Having an offline solution to access the content is essential. To address challenges related to limited Internet connectivity, HTIs should install Moodle Desktop in their computer labs and have students download the mobile app to allow for offline student and tutor access.

## Content Development

Going forward, the MOH should establish a team to continue developing eLearning modules as needed.

- Content development is a time-consuming and expensive process. Financial and human resources must be committed to it to produce high-quality material, so new content should only be created when necessary. The MOH should make every effort to identify learning content that already exists and adapt it.
- Contract with eLearning experts to do the instructional design and module authoring.

## Integration of eLearning

- Many students and tutors have had little, if any, previous experience using technology for learning, resulting in their discomfort and anxiety when using technology. The curriculum at HTIs should include digital skills in addition to health informatics so that students become comfortable using the technology for learning.
- Regular follow-up and/or monitoring visits are effective for providing HTIs with technical support, mentoring tutors, and assessing eLearning implementation. The MOH should schedule regular visits to HTIs to provide training on how to use Moodle for the administrator, tutors, and students. MOH visits should also include support for tutors on content development and how to integrate the technology into their classroom.

This brief is made possible by the generous support of the American people through the United States Agency for International Development (USAID) under the terms of the Cooperative Agreement AID-OAA-A-14-00028. The contents are the responsibility of the Maternal and Child Survival Program and do not necessarily reflect the views of USAID or the United States Government.