Case Study: The Role of eLearning in Midwifery Pre-Service Education in Ghana

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Abstract

The issues and challenges of implementing eLearning in pre-service health education were explored through a pilot study conducted in six nurse-midwifery education programs in Ghana. Case-based, interactive computer mediated eLearning modules, targeted to basic emergency and obstetrical signal functions, were delivered both online and offline using a free-for-use eLearning platform, skoool HE®. Key success factors included broad stakeholder support, an established curriculum and student and tutor interest. Challenges included infrastructure limitations, large class sizes and added workloads for tutors and information technology staff. National scale up is planned.

Introduction and Background

Ghana, like much of sub-Saharan Africa, faces critical health worker shortages that significantly constrain its ability to meet national maternal and newborn health needs (Alhassan et al. 2013; Bell et al. 2013; Grobler et al. 2009; UNFPA 2014). Ghana's maternal mortality ratio is estimated at 350 per 100,000, with only 68% of births attended by a skilled health provider (UNFPA 2014). Workforce challenges include inadequate numbers and uneven distribution of midwives across regions; both known to be related to poor health outcomes (Lori et al. 2012). Midwifery shortages are further exacerbated by emigration to developed countries (Donkor and Andrews 2011; Kwansah et al. 2012) and an aging midwifery population that faces mandatory retirement at age 60. The number of practicing midwives is far short of the number needed to provide adequate and equitable skilled childbearing services for the whole country (Lori et al. 2012).

In response to workforce shortages and concern for meeting Millennium Development Goals 4 and 5, the Government of Ghana significantly increased the number of midwifery schools, from 13 in 2012 to 38 in 2015, and increased the class sizes in existing schools with numbers per class as high as 450 (Bell et al. 2013). Tutor numbers did not increase with larger class sizes, leading to significantly greater workloads and high student-to-instructor ratios (Bell et al. 2013; Fullerton et al. 2011). The country has not yet achieved the benefit of an increase in newly licensed midwives from this substantial increase in the student population, given that the majority of these students are only now graduating from the schools, and the pass rate on the licensing examination has decreased. The Ministry of Health (MOH) identified the need for updated learning materials as a partial approach to address the licensing examination results. eLearning, defined in this context as digitally delivered instruction to support learning (Clark and Mayer 2011), was selected as a method to provide updated content and to help mitigate tutor workloads.

A recent World Health Organization (WHO) systematic review of eLearning for undergraduate health professional education noted that many countries are using technology to address teacher and faculty shortages and increase access to education (Al-Shorbaji et al. 2015). Evidence-based, interactive self-study modules that are linked to the curriculum can provide learners with accessible information on critical topics, and eLearning modules may be more quickly and cheaply updated than textbooks and can be adapted to country context. eLearning can be equally as or more effective than face-to-face instruction (Alhassan et al. 2013; Bluestone et al. 2013, George et al. 2014), but the materials must be interactive and prioritize essential content. eLearning increases efficiency by allowing learners to progress based on their individual learning needs rather than being dependent on group progress and content may be reviewed as many times as the learner wishes. Learner-centred methods can also facilitate critical thinking and promote student responsibility for learning (Bluestone et al. 2013; Fullerton et al. 2013).

We developed a pilot study to evaluate the feasibility and effectiveness of this eLearning approach for midwifery pre-service education in Ghana. The eLearning content for this pilot study included four existing interactive, case-based modules on the basic emergency and obstetrical signal functions. The modules had been previously developed in collaboration with UNFPA, with expert review and validation from a technical advisory committee from the International Council of Nurses, International Confederation of Midwives and International Federation of Gynecology and Obstetrics. Two additional modules, on reducing HIV stigmatization and malaria in pregnancy, were developed locally; these were not available in time for this study. The modules are delivered to students either wirelessly or via flash drive, and completion was

tracked in a simple, cloud-based management system, skoool HE, a free-for-use eLearning platform from Intel. skoool HE allows both online and offline use, a critical feature in a region with unreliable Internet connectivity. All the modules are relatively short, interactive and case-based and include pre-tests, post-tests and spaced assessments throughout the course to increase learner involvement. This case study assesses the feasibility of using targeted supplementary eLearning modules in midwifery pre-service education.

Intervention

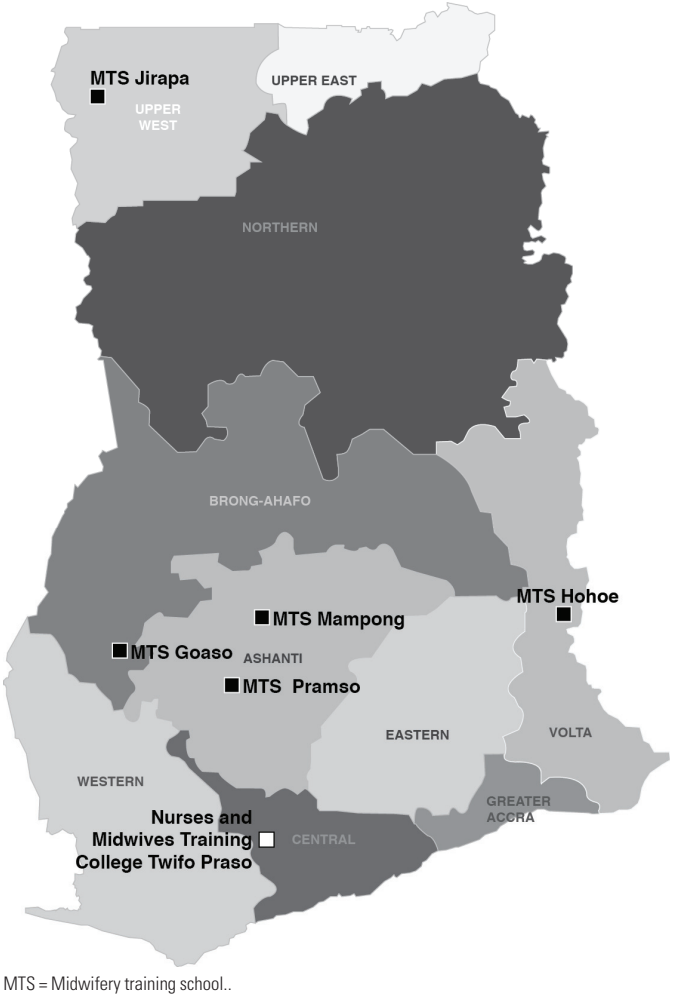
The pilot study was conducted in six schools in order to understand the issues and challenges of implementing eLearning in midwifery and nursing education. Human subjects research approval for the study was received from the Ghana Health Services Ethical Review Committee and the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

The MOH selected schools for diversity in size and the length of time schools had been in operation (a mix of older, well-established and newer schools) (Figure 1). The selection also included a mix of diploma and certificate programs. Midwifery instructors from each of these schools had recently participated in faculty and preceptor development activities and had expressed interest in eLearning to supplement teaching. The modules were used as supplementary learning materials for the existing curriculum.

Preparation for eLearning activities included a rapid readiness assessment of each school's technology resources and infrastructure conducted by a MOH information technology (IT) team. Findings from the assessment revealed connectivity problems, poor computer lab functionality and limited IT staff. The team recommended that dedicated and qualified IT staff be hired at each school and that improvements be implemented, as necessary, to resolve connectivity and sustainable power supply problems.

The government addressed these recommendations, to the degree possible, prior to the initiation of the pilot study. IT tutors were hired for each school, connectivity was

Figure 1: Map of Ghana showing midwifery pre-service education eLearning pilot school locations



MTS = Midwifery training school..

established and computer lab issues were partially addressed. Connectivity bandwidth and sustainable power supplies remained ongoing issues for the schools. Principals advocated for further funding for some infrastructure improvements.

The MOH IT team was first oriented to the skoool HE platform so that they could provide ongoing support to the schools' IT tutors. The MOH IT team then initiated a structured introduction of the eLearning activity to the schools, including selecting and training IT tutors for each school and orientating tutors and principals. The MOH IT team and the newly oriented IT tutors installed the skoool HE platform and the initial (pre-existing) four eLearning modules on computers in each school. Technical delays reduced the time that modules were available at the schools from the planned four months to two months.

Methodology

Qualitative and quantitative methods were used to understand the experience and feasibility of implementing an eLearning system from a variety of viewpoints. Quantitative data sources included a tracking database of registered users and results of survey questionnaires completed by students and tutors. Survey data were collected during visits to the schools where convenience samples of students and midwifery tutors were queried about their experience with the modules. Qualitative data were obtained from interviews with IT tutors, school principals and the MOH IT team. IT tutors and principals or their designees were interviewed regarding their role in supporting eLearning, their views of eLearning implementation and both the benefits and the costs to their schools of implementing eLearning. The MOH IT team was asked about the technical support they provided to the whole system, in particular to the IT tutors.

The study population was drawn from students, teachers or implementers at participating schools who interacted with the modules. Participants were a convenience sample of those available during data collection visits to the schools. A total of 336 of the 872 final-year students enrolled at these six schools were surveyed; the analysis is based on reports from the 328 of those students who reported using at least one eLearning module. Twelve (of 26) midwifery tutors from four of the schools were surveyed. No tutors were surveyed from two schools due to scheduling problems at the time of the data collection visit (Table 1). Five (of six) of the principals (heads) of schools, all six school-based IT tutors and three of the five MOH IT team members were interviewed. These interview data were reviewed for the emergence of common themes.

Table 1. Numbers of respondents by school

Midwifery Training School (MTS)	Final-Year Students		Midwifery Tutors	
	N	Respondents *n* (%)	*N*	Respondents *n* (%)
MTS Goaso	96	45 (46.8)	4	3 (75.0)
MTS Jirapa	131	50 (38.2)	3	3 (100.0)
Nursing and Midwifery Training College Twifo Praso	29	28 (96.5)	5	3 (60.0)
MTS Pramso	59	31 (52.5)	5	0 (0.0)
MTS Mampong	407	125 (30.7)	5	0 (0.0)
MTS Hohoe	150	49 (32.6)	4	3 (75.0)
Total	872	328 (37.6)	26	12 (46.2)

Survey data from students and midwifery tutors were analyzed to identify issues related to accessibility, usability and acceptability of the eLearning activities (Table 2). Students and midwifery tutors reported a high level of personal computer ownership, though schools varied in access to onsite computer availability. Respondents reported that initial problems in using the modules were primarily resolved by the IT tutors, with support as needed from the MOH IT team. School principals were supportive, but noted significant infrastructure challenges and reported the need to continue to advocate for funding for such things as computers, generators, servers and strategies to resolve issues that affected the reliability of Internet connectivity. Certain infrastructure challenges were unexpected, such as the almost complete lack of current antivirus software noted by the MOH IT team and the school IT tutors. IT tutors and the MOH IT team mentioned an increase in their workload but expressed satisfaction at being a part of the project (Textbox 1).

Table 2. Participant responses

Student responses (*N* = 328)	*n* (%)
Do you own a computer?	
Yes	238 (73)
Were computers available at school for class assignments?	
Yes	169 (52)
No	150 (46)
What type of problems did you have using the modules? (all that apply)	
Logging on	159 (48)
Completing modules	136 (41)
Taking quizzes	63 (19)
Other	12(4)
Who helped with skoool HE problems?	
IT tutor	236 (72)
Friend	62 (19)
Course tutor	19 (6)
Where did you use the eLearning modules? (all that apply)	
Personal computer	238 (73)
Computer lab	34 (10)
Friend's computer	101 (31)
In class	68 (21)
What was your experience with the modules? (all that apply)	
Helped understand content	166 (51)
Know more about topics	46 (14)
Able to review content on own	83 (25)
Would like to use additional modules	117 (36)

Tutor responses (*N* = 12)	*n* (%)
Do you own a computer?	
Yes	12 (100)
Computer availability in school:	
Available for students	7 (58)
IT support available	8 (67)
IT short courses available for tutors	2 (17)
How easy was it to learn to use the skoool HE?	
Very easy	8 (67)
Somewhat easy	3 (25)
Somewhat difficult	1 (8)
What types of problems did you have with the modules? (all that apply)	
Logging on	3 (25)
Following student activity	3 (25)
Using the module in classrooms	5 (42)
End user difficulties	3 (25)
Who helped with these problems? (all that apply)	
IT tutor	7 (58)
Colleague	2 (17)
Figured it out	5 (42)
How did you use the modules? (all that apply)	
Individual assignment	9 (75)
Group assignment	2 (17)
In-class work	5 (42)
How useful were the modules in teaching the content?	
Very useful	12 (100)
What challenges did you face using the modules? (all that apply)	
Time needed to revise syllabus	4 (33)
Inadequate access to computers	4 (33)
Electricity outages	3 (25)

Textbox 1. Interview themes and exemplary quotations: IT tutors, principals, MOH IT team

Change in roles
- *I see myself as the facilitator of the program*—IT tutor
- *[I have] increased responsibilities, but now am part of the midwifery education program*—IT tutor
- *Where we needed help, the MOH assisted*—Principal
- *Added responsibility, MOH pulled people from different directorates for this project*—MOH IT

Challenges
- *Infrastructure is inadequate – small number of computers shared with other departments*—Principal
- *The number of computers we have is woefully inadequate (noted found funds to order more)*—Principal
- *We didn't have Internet connectivity at first*—Principal
- *Infrastructure; we have 38 computers shared by over 1,300 students*—IT tutor
- *Student computers are infected with viruses, I have to clean them, reinstall software before installing the platform*—IT tutor
- *We need modern computer laboratories … more IT help at MOH*—MOH IT
- *IT tutors spent their own money for airtime (for troubleshooting)*—MOH IT

Structured rollout
- *Started with the workshop (MOH oriented IT tutors), then introduced to the principals, then the tutors then the students*—IT tutor
- *Started with needs assessment, then workshop with IT tutors. We empowered the IT tutors at the schools; we gave them our full support and had confidence in them*—MOH IT
- *First briefed by MOH, then the IT tutor went to a workshop and showed us how the modules were used*—Principal
- *IT tutor first discussed it, then we heard about it at principal meetings*—Principal

Overall experience
- *Now this new thing, it's creating passion to understand … a good platform for their (students) knowledge base*—MOH IT
- *Students have benefited from access to material, reduced tutor workload, support from MOH to the MOH IT team*—MOH IT
- *In my school, we are very, very welcoming to change. My level of engagement was to ensure that the whole staff, the IT/tutors/ students was ready to embrace it*—Principal
- *I would say I played an advocacy role*—Principal
- *It has come to enhance our teaching. When you use it, everything is there and explained*—Principal
- *The students love the inter-activeness of the modules*—IT tutor
- *The leader of the school is a big picture leader, very supportive*—IT tutor

Discussion

Our findings indicate that using eLearning modules in midwifery education is feasible in terms of acceptability, accessibility and usability. As computer use has become increasingly common across Africa, students and tutors are eager to make use of technology in teaching and learning.

Because there is very little literature about eLearning for health professionals in low- and middle-income countries, this study assumes additional importance. Existing literature is primarily from high-income countries; and literature from low- and middle-income countries is derived primarily from the results of pilot projects, most commonly based on in-service training, with small numbers of participants. No studies from Africa were included in the WHO systematic review of eLearning for undergraduate health professional education (Rasmussen et al. 2014).

Several key factors enabled us to implement an eLearning system that was acceptable, accessible and usable for stakeholders. First, the MOH had identified eLearning as a means of closing gaps in student learning and was politically supportive. This governmental support enlisted other stakeholders including the Nursing and Midwifery Council, the body responsible for licensing, curriculum and accreditation of schools, which laid a foundation for formal integration into the curriculum (acceptability). Second, to enhance implementation, the government provided computers to the schools and students, which enabled a greater percentage of students to access and use the materials. Third, the integration of eLearning into an already established curriculum made it easier to implement eLearning as supplemental material for existing courses. Fourth, students, tutors and other stakeholders reported an enthusiasm about eLearning. Midwifery schools embraced the idea of eLearning and principals recognized the benefits to their students and tutors of these enhanced learning options and additional education tools. IT support at both school and national levels was critical to the success of the project. The schools' IT tutors were instrumental in implementation at the institution level and the MOH IT team provided backstop to the schools.

However, the complexity of introducing eLearning into pre-service education should not be underestimated. It must be noted that introducing eLearning into pre-service education requires extensive coordination among all stakeholders. In this pilot study, the early and continuing inclusion of stakeholders such as ministry, school, regulatory bodies and partners promoted strong ownership of the project. Sustainability over the longer term requires local capacity building, including the ability to develop additional educational modules to expand the content available for eLearning.

There were several limitations of the study. The small number of schools and modules limit generalization and the convenience sample and self-reported responses may not reflect the total population of users in Ghana or in other settings. The study evaluated module use for a short time, limiting information about long-term experience. The MOH IT staff had limited time to develop stronger systems to manage the platform. Nevertheless, based on the success of this program, Ghana plans to scale up eLearning to all 38 midwifery education programs as well as to nursing programs.

It is important for future research to examine both capacity building and student outcomes. Additional modules are being developed by teams of country stakeholders and will be disseminated by local IT teams. Having demonstrated feasibility, the next cohorts will be evaluated on whether their exposure to the eLearning topics results in increased knowledge and confidence as demonstrated on examinations and by self-report. The sustainability of eLearning will rest on the ability of faculty to develop their own high-quality, learner-centred teaching materials. Future research should examine how supplemental eLearning materials affect teaching effectiveness.

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