

---

## E-learning in Higher Education of Nurse and Midwife Educators in Developing Countries: The Case of Liberia

Mary E. Riner<sup>a</sup>, Peter S. Wainpa<sup>b\*</sup>, Edwin Beyan<sup>c</sup>, Audrey P. Taire<sup>d</sup>, David S.  
Kollie<sup>e</sup>, Peter G. Kwehmie<sup>f</sup>, Williette S.K. Jallah RN<sup>g</sup>, Lydia Johnson<sup>h</sup>,  
Theophilus Youngqui<sup>i</sup>, Yei Zentoe<sup>j</sup>, Blossom Hodges<sup>k</sup>, Vivian Gbanyan<sup>l</sup>,  
Phyllis W. George<sup>m</sup>

<sup>a</sup>Indiana University School of Nursing, 600 Barnhill Drive, Indiana, 46202, USA

<sup>b,m</sup>Phebe Para-Medical Training Program, Phebe, Suakoko, 10-1046, Liberia

<sup>c,d</sup>Mother Patern College of Health Sciences, Monrovia, 10-1470, Liberia

<sup>e</sup>Mabel McCombs College of Health Sciences, Monrovia, Liberia

<sup>f,l</sup>Esther Bacon School of Nursing & Midwifery, Zorzor, 10-1046, Liberia

<sup>g</sup>United Methodist University (UMU), Monrovia, Liberia

<sup>h</sup>Tubman University (TU), Harper, Liberia

<sup>i,j</sup>Nimba County Community College, Sanniquellie, Liberia

<sup>k</sup>Cuttington Junior College University, Kakata, Liberia

<sup>a</sup>Email: mary.riner@gmail.com; <sup>b</sup>Email: sgbolu2011@gmail.com; <sup>c</sup>Email: edwin\_28beyan@yahoo.com;

<sup>d</sup>Email: audreytaire71@gmail.com; <sup>e</sup>Email: gbandiikollie@gmail.com; <sup>f</sup>Email: peter.kwehmie@gmail.com;

<sup>g</sup>Email: jsonnie@yahoo.com; <sup>h</sup>Email: blorhwortee@gmail.com; <sup>i</sup>Email: tgyounquoi@gmail.com; <sup>j</sup>Email:  
yzeantoe78@gmail.com; <sup>k</sup>Email: blossomhodges@yahoo.com; <sup>l</sup>Email: gbanyanvivian@gmail.com; <sup>m</sup>Email:

phylliswgeorge1@gmail.com

### Abstract

This case study describes the use of e-learning in a new graduate program in nursing and midwifery education in Liberia, a developing country recovering from a decade long internal conflict and more recently an Ebola epidemic.

---

\* Corresponding author.

The program was established to prepare the educator workforce with current educational concepts and practices as well as health information. Issues involved in making the hardware and internet access are addressed. Through the voices of eleven graduate students who were also nurse and midwife instructors in education facilities throughout the country, perceptions of using e-learning for course work as well as the experience of beginning to use technology in teaching pre-service students are identified. Sustainment and expansion of e-learning challenges are addressed. To further global health security and equity in access to education the Liberian government, administrators, educators and bi- or multi-national partnerships need to prioritize investments technology and e-learning in developing countries.

**Keywords:** Nurse Educator; Midwife Educator; E-Learning; Developing Country.

## **1. Introduction**

The World Health Organization (WHO) has recognized the need for scaling up the health workforce in order to meet the demand for 4.2 million more health care workers [1]. To accomplish this objective, educational institutions need to “increase their infrastructure capacity, update curricula, link the disease burden to training, improve competencies of existing staff, and use evidence-based educational strategies to maximize learning” [2, p.5]. The WHO study team called for promoting the use of an e-learning as a tool for developing countries to access current clinical knowledge and engaging pedagogical formats [2]. The literature is emerging from developing countries regarding adoption of e-learning by faculty, staff, and students. Studies on Critical Success Factors (CSF) associated with e-learning and web-based management systems are revealing important issues. Faculty and information and communication technology (ICT) staff, curriculum design, technology awareness, motivation, and changing learners’ behavior have been found to be prerequisites for successful e-learning implementation [3]. For students, perceived usefulness was a key determinant of user satisfaction, which in turn predicted continual usage intention [4]. Further, CSF associated as student predictors of perceived usefulness and satisfaction include instructor and system quality related factors. A Cameroonian study of medical faculty, residents and students found favorable perceptions towards e-learning. However, 66% of the students were not familiar with the concept of e-learning, 84% of students and 58% of residents had never had access to e-learning resources [5]. There are a range of ways and extents to which programs and instructors can make use of technology. One way is to create programs and courses that include a mix of in-class instruction and e-learning. This blended learning approach can serve as a global transformative force that offers ways of bridging the global health workforce gap [6]. Yet, studies are still needed to demonstrate effectiveness. A systematic review of blended learning found few high-quality studies exist evaluating the role of blended learning in clinical education [7]. This case study advances knowledge through inclusion of perspectives of faculty learners who experienced taking graduate classes and beginning to teach with e-learning tools and strategies. Situated within the graduate education environment of Liberia, the perspectives of faculty learners are shared. The literature relevant to e-learning is reviewed of adoption of e-learning in health professions programs in developing countries. This approach is a foundational step in developing a research agenda regarding the impact of adoption and sustainment of e-learning in developing countries and the potential benefit to clinical practice.

### **1.2. Literature Review**

It is well recognized that technology plays a vital role in modern higher education. E-learning can greatly improve access to modern learning strategies and up-to-date content [8]. It can serve as a way to level the playing field regarding who has access to current, evidence-based clinical health information. In a study involving educators around the globe, an inclusive conceptual definition of e-learning was developed: E-learning is an approach to teaching and learning, representing all or part of the educational model applied, that is based on the use of electronic media and devices as tools for improving access to training, communication and interaction and that facilitates the adoption of new ways of understanding and developing learning [9,152]. There is an ethical component to providing global access to health knowledge. Providing access to relevant and timely information to health professionals is potentially the single most cost-effective and feasible strategy for health care improvement in lower- and middle-income countries [10]. Developing countries face many challenges in engaging in e-learning including access to hardware, broadband, faculty preparation, and student engagement [11]. These issues must all be addressed within the local environment. Liberia prioritized making internet access widely available, including for government services, higher education, and retail communications services. In 2011, the Liberian government launched an Excellence in Higher Education for Liberian Development (EHELD) project to work with Liberia's leading universities to transform the fields of science, engineering and agriculture [12]. The arrival of the Africa Coast to Europe (ACE) Submarine Cable and the launch of the Cable Consortium of Liberia (CCL) in 2013 had a major impact on the supply of retail broadband Internet [13]. The Government of Liberia's (GoL's) e-Government Strategy, the Digital Liberia and e-Government Project is designed to improve the GoL's performance and bring it closer to the people through the development of internet and computer technology capability [14]. These efforts are making it possible for higher education institutions to provide faculty and students access to e-learning resources. While the Liberian government chooses to focus on public universities, these increased resources are also available to private institutions, like faith-based universities.

### ***1.3. Considerations for adopting technology***

The role of institutional support is critical for successful adoption of e-learning. In recognition of this, ten recommendations for training, empowering and supporting health workers in resource-limited setting through the use of information and communitarian technologies were presented at a United Nations summit [6]. They addressed the role of Ministries of health, education, finance and information technology and communities; health professional institutions; training of faculty and students; use of a full range of e-learning tools; self-evaluation and regular curricular updates; and establishment of new public-private partnership models [2]. The Framework of Complex Adaptive Blended Learning Systems places students at the center and in dynamic interaction with the teacher, content, technology, learning support, and institution [15]. This serves as a reminder that the introduction of e-learning into an education system requires attention to multiple aspects simultaneously. This is especially true in developing countries with limited resources.

### ***1.4. Nurse and midwife graduate education in the Liberia context***

The health care delivery system in Liberia is plagued with a desperate need for capacity-building for the mid-level healthcare workforce. Since civil order was re-established in 2005, there has been a growing number of

new nurse/midwife training institutions (TIs) established to meet the demand for nurses/midwives. This growth in TIs has increased the need for well-prepared faculty in pre-service education. The United States Agency for International Development (USAID), responded to this need through teacher workshops beginning in 2009 [16]. This initiative provided training for three TIs to better equip educators for their role. While this was helpful, it was apparent further effort was required to fully address the country's demand for educators prepared to produce healthcare workers in sufficient supply and with the knowledge and skills required to improve clinical care and population health. A graduate program was required to prepare educators to closely link classroom, learning lab, and e-learning with learners' clinical practice. Mother Patern College of Health Sciences (MPCHS). MPCHS, established in 1993 as the health professions unit of the Stella Maris Polytechnic University (SMPU), a post-secondary, private institution of higher learning is owned and operated by the Roman Catholic Archdioceses of Monrovia. The Master of Science in Nursing Education Program was established in 2010, and is one of two graduate nurse programs in the country. The program was designed through a collaboration between the Lutheran Church of Liberia and the Catholic Diocese. The curriculum (Table 1) was designed by a Lutheran nurse educator from the United States who served as a missionary in a school of nursing for many years [17]. Based on competencies for nurse educators [18] (NLN, 2005), students have the opportunity to meet international standards for the nurse educator role.

**Table 1:** Masters of Science in Nursing Education Curriculum at MPCHS

Program Course	# credit hours
1. History and Trend in Nursing Education	2
2. Nursing Theories	3
3. Professional Writing I	3
4. Professional Writing II	2
5. Computer Literacy	0
6. Evidence-based Nursing Research	4
7. Statistics for Behavioral and Social Sciences	3
8. Advanced Pathophysiology/Pharmacology	3
9. Advanced Health Assessment	3
10. Learning Theories	3
11. Teaching Strategies	4
12. Ethics in Teaching	2
13. Evaluation and Testing in Nursing Education	3
14. Leadership and Management in Nursing Ed.	3
15. Curriculum Development and Design	3
16. Teaching practicum	11
52 total	

### ***1.5. Technology infrastructure at the school of nursing***

A variety of institutional strategies put into place at MPCHS support development of learners' effective use of

their computers and internet subscriptions. First of all, MPCHS provides staff support to teach learners to use the computer and how to access the internet. It is important to note the program is offered in-person in Monrovia, where internet access is consistently available. At MPCHS, wireless modems exist throughout the campus and the subscriptions are managed through the College for the learners for 19 months of the program. Course faculty assist students in learning to communicate online and to help one another as they develop new skills and try new programs. E-learners learned to conduct complex searches for scholarly articles and current clinical guidelines, identify e-learning resources, communicate with professors, and write online final exams. See Table 2 for the technology skills developed in courses.

**Table 2:** Technology skill development in courses

Course name	Development of Technology Skills	How skills were developed	Use of skills as a graduate student and educator
Evidence Based Research Nursing	<ul style="list-style-type: none"> <li>• Introduce online platforms</li> <li>• Hinari* scientific literature searching software</li> <li>• Pubmed</li> <li>• Cochrane Library</li> <li>• WHO journal</li> <li>• Other national clinical guidelines repositories</li> <li>• NICE glossary of terms used on United Kingdom clinical health websites</li> </ul>	<ul style="list-style-type: none"> <li>• Faculty tutoring</li> <li>• Hands on navigation of websites and programs</li> </ul>	<ul style="list-style-type: none"> <li>• Search for research articles in scientifically indexed journals</li> <li>• Download and save articles.</li> <li>• Critique, synthesize</li> <li>• Gather the best available evidence based works (national guideline etc.</li> <li>• Define unfamiliar words</li> <li>• Receive, complete and return learning assignments to professor.</li> </ul>
Health Assessment	<ul style="list-style-type: none"> <li>• YouTube videos</li> <li>• Hinari</li> </ul>	<ul style="list-style-type: none"> <li>• Faculty provide titles to find on YouTube</li> <li>• Tutoring on how to search and assess online videos for relevance and quality</li> <li>• Formulate ideas for interesting topics and searched individually</li> <li>• Use of knowledge from previous course</li> </ul>	<ul style="list-style-type: none"> <li>• Use videos to learn how to carry out a health assessment.</li> <li>• Use Hinari to download evidence about assessment strategies for different conditions</li> <li>• Use skills to download imagery to include in teaching to make conditions come alive for pre-service students</li> </ul>
Learning Theories	<ul style="list-style-type: none"> <li>• TEDEx</li> </ul>	<ul style="list-style-type: none"> <li>• Faculty tutoring</li> <li>• Personal exploration</li> </ul>	<ul style="list-style-type: none"> <li>• Motivational videos via Ted Talks</li> <li>• Complete online assessment to identify my learning style</li> </ul>
Teaching Strategies	<ul style="list-style-type: none"> <li>• YouTube</li> <li>• Coggle Concept Mapping software</li> <li>• Using software to make multiple revisions to lesson plan</li> </ul>	<ul style="list-style-type: none"> <li>• Faculty tutoring</li> <li>• Peer assistance</li> <li>• Personal exploration</li> </ul>	<ul style="list-style-type: none"> <li>• Learn by preferred teaching style</li> <li>• Use Coggle program for presenting essential information in a visual manner to students.</li> <li>• Teaching videos</li> </ul>

\* Hinari is an online software program developed and maintained by the World Health Organization that allows access at no or very low cost, to the major journals in biomedical and related social sciences to local, not-for-profit institutions in developing countries.

To date the literature has minimally focused on the perceptions of graduate students in developing countries as they begin to use technology in their course work and teaching practicum. The research problem explored was to identify how e-learning is considered useful in the professional development of nurse and midwife instructors who are graduate students in a nurse educator program.

## **2. Method**

### ***2.1. Population and Setting***

The reflections in this case study are from eleven of the nineteen nurse and midwife instructors who were graduate students enrolled as the fourth cohort in the graduate Nurse Educator Program at MPCHS. The instructors had completed the third of the five-semester program. The instructors were asked to provide an optional reflection on how technology benefitted their learning in course work and in the teaching practicum. The reflections were provided after the completion of the semester when grades had been submitted. The reflections included here are those of instructors who are co-authors of the paper rather than subjects of a study.

## **3. Results**

Based on social science guidelines for case study papers [19], the following section presents and discusses the key findings together. Perspectives of the emerging benefits of e-learning identified by graduate student instructors are presented that include how computers, internet access and e-resources were used in course learning experiences, the significance of the experiences, and their response to using technology to teach pre-service students. Current literature is reviewed in relation to the benefits identified.

### ***3.1. Ethical call to engage in becoming skilled in using technology***

When faculty challenge themselves to learn to use e-learning, they become active participants in the evolving demand to prepare clinicians for a healthcare delivery future that increasingly relies on technology for daily patient care [20]. With the richness of e-learning available through educational sites and health-related agencies, faculty can engage learners in evidence-based learning. The following is an instructor's perspective: "As a result of experiencing education supported by technology, I (DK) believe access to technological resources and processes in higher education is an ethical imperative in preparing nurse educators to develop the future healthcare workforce. It enhanced my learning and improved my performance as a nurse educator through developing more disciplined internet searching skills; gaining deeper knowledge of clinical conditions; identifying innovations and best practices in caring patients; discovering best educational practices across settings; and learning new strategies to provide instruction using technology. In as much as computer and internet access is available and I am technologically literate, I am obliged to use e-resources in my research to identify new knowledge and practices in teaching my pre-service students to care for their patients".

### **3.2. Engagement with the Global Nurse/Midwife Educator Community**

During the Teaching Strategies course, one of the learning experiences involved learners reviewing international nurse educator competencies [18,21] to identify how they link to their graduate studies. Based on specific interest in the use of technology, one instructor commented “I (PW) accessed and explored international nurse educator competencies online. Through this work, I learned the nurse educator role is an advanced specialty area of practice and came to appreciate more deeply the richness and complexity of the faculty role. I was interested in how technology fit into the competencies and coordinated the development of a document with fellow students that links the core competencies with technology skills we were developing in our courses.”

### **3.3. Employing evidence-based learning models**

During the Learning Theories course, students selected and conducted an in-depth review of a specific learning theory. In the subsequent Teaching Strategies course, students applied the theory in developing a lesson plan and providing a microteaching session as a course requirement. Following are three themes addressed in instructors’ comments. *Empowerment*: “I (AT) chose Gagne’s Conditions of Learning theory for my brief teaching session because I believed it to be an excellent theory that empowers novice-educators with the requisite skills and tools for planning instructional design. Technology played a key role in supporting the development of my teaching plan as I was able to make multiple revisions throughout the planning process to refine it. I was able to use a projector to provide classroom instruction which was new to the class as students were accustomed to reading from pamphlets. It made my presentation more organized and allowed me to be creative by adding graphics that enhanced the learning process.” *Meeting students where they are*: We (YZ & PK) applied Knowles Adult Learning Theory while developing our lesson plans. To promote self-directed learning, we included a reading assignment on the class topic found online. We also developed and distributed real-life clinical scenarios to enhance students’ critical thinking and problem-solving skills. This allowed us to begin rehearsing the pre-service students for the actual clinical practice component.”

*Understanding Learning Style*: Two instructors commented:

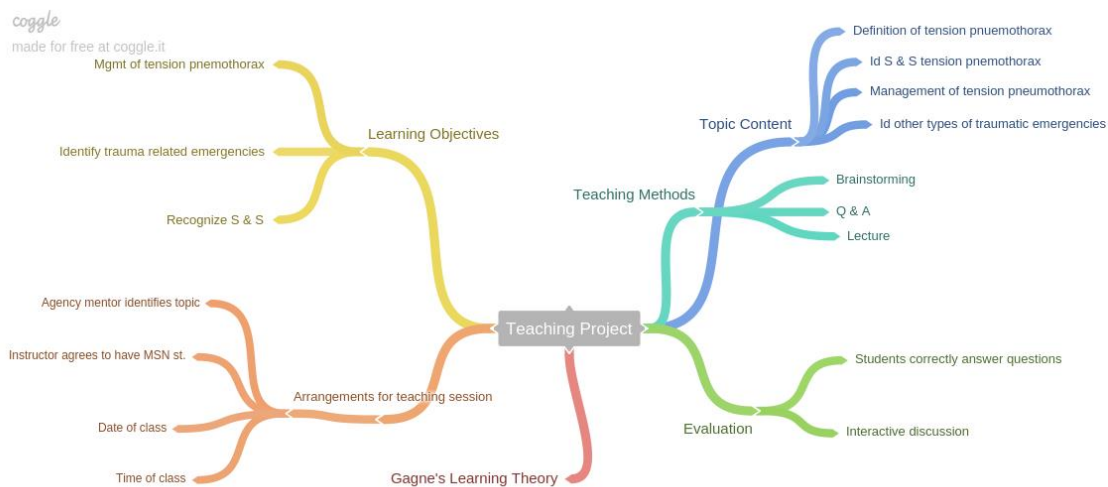
“As we (YZ & PK) continued to learn about the Kolb Educator Role Profile and its application, we realized all of these roles are integral in a well-developed educator. Knowing my educator role profile is beneficial because I gained insight about myself and my personal teaching preferences. As an educator I am expected to create a learning environment that engages all learners based on their preferred learning styles. Through technology it was possible to access and complete the online profile.”

### **3.4. Enhancing didactic instruction**

#### **3.4.1. Developing critical thinking**

An important aspect of higher education is to develop students’ critical thinking skills. Critical thinking involves critiquing, analyzing, and giving careful thought to an issue, situation, and topic under discussion. The importance of teaching critical thinking in nursing and midwifery education is to develop an e-learning student’s

capacity to address unfolding situations that require evaluation and response to an array of critical issues. It helps develop student self-efficacy in responding to clinical and non-clinical information. Faculty instructors further developed critical thinking during class sessions and from learning assignments by writing case studies and using concept maps to show the relationships between variables or topics of a clinical issue. In turn, they used these skills in developing lesson plans and conducting their class. One instructor wrote of the experience: “To teach critical thinking the instructor needs firm knowledge of the subject in order to develop and evaluate potential strategies of action. For instance, during my (LJ) teaching session, higher order clinical questions about a scenario were given to upper level students that had completed previously required courses. Developing a critical thinker is a gradual process involving step-by-step movement. Figure 1 shows a concept map of my work in planning my teaching session.”



**Figure 1:** Coogle map of lesson planning

### 3.4.2. Problem-based learning

Developing increased skill using case-based learning was a goal of the Teaching Strategies course. One method many instructors investigated was Problem-based Learning (PBL). PBL is a learning strategy that engages students in defining learning issues and conducting research to further understand them and to devise solutions that can be applied [22]. As one instructor describes her experience:

“In using PBL methodology I (BH) developed a case linked to learning objectives using the steps I found online. Using the word processing feature of the computer software, I developed a PBL case for a midwifery course I taught involving a 28-year-old women appearing to have preeclampsia. My learning objectives for students were to understand the relationship between diet and blood pressure (BP) during pregnancy and why monitoring the woman’s BP at antenatal visits is important. I used internet resources to find current diagnostic and treatment information to construct the case. Through multiple revisions I developed a case that had clear issues that students identified and researched in class.”

### 3.4.3. Developing teaching aids



The combination of computers and internet can be used to overcome barriers and create new types of interactive learning media for improved quality, equity, and access in higher education [23,24]. For teachers interested and willing to engage in skill development, basic instruction in developing learning aids can serve them well [25]. As one instructor commented “With the use of technology, I (PG) developed a lesson plan to teach breast self-examination (BSE) based on retrieving information in the Midwifery curriculum. I created a visual handout with images of the various types of breast lumps and added text to help the students learn. I learned that is very important to always take into consideration time when planning to develop a teaching aid as it can require many edits.”

#### **3.4.4. Accessing current health information**

A critical factor in educating future generations of nurses and midwives is access to current health information that is evidence-based and relevant to the local community [26]. Health-professional programs in developing countries often rely on outdated textbooks and students must copy pages and share among themselves due to lack of supply. The internet can serve as a powerful force in disseminating health information in schools and employing e-technology in healthcare agencies [20]. One e-learner commented “I (VG) realized that using technology readily eased my workload because I could access the internet for current information. This meant I did not need to use valuable time looking for books that were often dated, to gather information. I also showed a video found on the internet about family planning counseling.”

#### **3.4.5. Reflecting on response by pre-service students**

Developing skill in reflecting on teaching is a valuable way for an instructor to improve his or her teaching [27,28]. Noticing how students respond to teaching strategies, especially when an instructor is trying something new, like using technology for the first time, is critical to successful implementation and subsequent retention. An instructor commented:

“When I (WJ) showed a diagram of the structure of the respiratory system, the class got quieter. After the explanation of the diagram, I saw that they were very excited just by seeing the diagram. When I showed the concept map they began to ask what it was. I could see that it was very strange to them and they wanted to know about it. When I started to explain the concept map they were all paying attention. After the explanation some of them said that the concept map made it easy for them to understand the whole lecture.”

### **3.5. Summary**

Findings from instructor-learner reflections included increased knowledge, competence, and acceptance as well as noting how pre-service students responded to their efforts to include e- learning. Key perspectives shared include: ethics of employing e-learning; engagement with the global educator community; employing evidence-based education models that supported a sense of empowerment, being able to meet students where they are, and increased understanding and valuing of student and educator styles; and enhancing didactic instruction, including the sub-themes of critical thinking, PBL, developing learning aids, and accessing current health information.

### **3.6. Limitations**

This case study involved one cohort of graduate nurse and midwife instructor-learners in Liberia. It may not be generalizable to other developing countries. Eleven of the nineteen students chose to participate voluntarily by submitting comments at a mid-point in the program. Therefore, it may not represent the views of instructor-learners with less favorable attitudes to use of e-learning.

### **3.7. Further research**

The use of a case study approach allowed for examining the literature within a frame of hearing the voices of graduate students who were also instructors in pre-service programs. Further research is needed to advance understanding of the learning conditions, characteristics of learners, and organizational policies and resources associated with specific adoption and sustainment of e-learning across varying settings. Mixed methods studies involving more than one cohort, setting, and country will allow for more robust understanding of the contributions of e-learning in developing countries. Initial work on developing an e-learning conceptual model includes major constructs as e-learning systems stakeholders, e-learning technologies, and e-learning activities [29]. Each of the constructs includes specific issues to address in future research.

### **3.8. Recommendations**

In using technology to prepare nurse educators in low-resource counties, there are two aspects to consider: (a) the nurse educator learner with e-learning technology (computer and internet subscription) and access to consistently available electricity and (b) the nurse educator without these e-learning resources. Liberia is a developing country that fought a devastating civil war that ten years later it continues to present challenges in the energy sector including destruction of the major hydroelectric plant. In light of recent government efforts to increase the healthcare educator and provider workforce, progress is reflected in the number of graduates majoring in nursing education and yet most of these graduates lack full electricity support that is the major source for educational technology. Some of the accredited nursing institutions in Liberia also lack a continual electrical power supply which serves as barrier for nurse educator learners to perform effectively in terms of procedures, clinical research and advance study in carrying for patients. In preparing nurses to become educators with e-learning skills, health care systems and nursing/midwifery education institutions need to have the capacity to make hardware, software, internet access, and electricity available. Educational technology is a complex, integrated process involving people, procedures, ideas, devices and organization for analyzing problems in this modern dispensation. The full employment of education technology in developing countries for nurse educators will need continued support at individual or institutional level. When nurse educators have this support, they will be able to provide current clinical information using engaging learning strategies that maximize pre-service learners' readiness for future performance in an increasingly technological and connected world.

## **4. Conclusion**

This case study described how technology infrastructure was established and used to support e-learning in a

graduate nurse and midwife educator program at a private faith-based university in Liberia. E-learners shared experiences as both a student in the classroom and as an instructor beginning to incorporate e-learning in their own teaching. The employment of technology in education for health professionals is an important development in ensuring current evidence-based information is available globally. Ensuring all learners have access to the rich array of educational pedagogical and health information available through electronic resources is a critical step in global social justice and promotion of health. Schools of nursing and midwifery engaged in bi-national partnerships with education institutions in developing countries need to integrate e-learning into proposal development, faculty preparation, and budget requests. This can support effective preparation of the faculty cadre for a future increasingly reliant on e-learning for optimal preparation of healthcare providers of the future.

### **Acknowledgements**

Support for Riner to teach onsite in Liberia during a sabbatical was provided by Global Health Service Partnership/SEED and Peace Corps. No conflict of interest has been declared by the author(s).

### **References**

- [1]. World Health Organization, Resolution WHA 59.23. Rapid scaling up of health workforce production. In: Fifty-ninth World Health Assembly, Geneva: World Health Organization, 2006.
- [2]. World Health Organization. Transforming and scaling up health professionals' education and training. [http://apps.who.int/iris/bitstream/10665/93635/1/9789241506502\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/93635/1/9789241506502_eng.pdf), 13, July 6, 2017.
- [3]. W. Bhuasiri, O. Xaymoungkhoun, H. Zo, J. J. Rho, & A.P. Ciganek, "Critical success factors for e-learning in developing countries: A comparative analysis between ICT experts and faculty." *Computers & Education*, 58(2), 843-855, 2012.
- [4]. E. Lwoga, "Critical success factors for adoption of web-based learning management systems in Tanzania." *International Journal of Education and Development using ICT*, 10(1), 4, 2014.
- [5]. G. Bediang, B. Stoll, A. Geissbuhler, A. M. Klohn, A. Stuckelberger, S. Nko'o, & P. Chastonay, "Computer literacy and E-learning perception in Cameroon: the Case of Yaounde Faculty of Medicine and Biomedical Sciences." *BMC Medical Education*, 13(1), 1-8, 2013.
- [6]. R. Bollinger, L. Chang, R. Jafari, T. O'Callaghan, P. Ngatia, D. Settle, et al. "Leveraging information technology to bridge the health workforce gap." *Bulletin of the World Health Organization*, 91, 890-892, 2013.
- [7]. M. Rowe, J. Frantz, and V. Bozalek. "The role of blended learning in the clinical education of healthcare students: a systematic review." *Medical Teacher*, 34(4), e216-e221, 2012.
- [8]. S. Frehywot, Y. Vovides, Z. Talib, N. Mikhail, H. Ross, H. Wohltjen, et al. "E-learning in medical

education in resource constrained low-and middle-income countries." *Human Resources for Health*, 11(1), 1-15, 2013.

- [9]. A. Sangrà, Albert, D. Vlachopoulos, and N. Cabrera. "Building an inclusive definition of e-learning: An approach to the conceptual framework." *International Review of Research in Open and Distributed Learning*, 13(2), 145-159, 2012.
- [10]. R. J. Limaye, S. Deka, N. Ahmed, & L. Mwaikambo, "Designing eLearning courses to meet the digital literacy needs of healthcare workers in lower-and middle-income countries: Experiences from the Knowledge for Health Project." *Knowledge Management & E-Learning: An International Journal*, 7(4), 601-615, 2015.
- [11]. Y. Vovides, S. B. Chale, R. Gadhula, M. B. Kebaetse, N. A. Nigussie, F. Suleman, et al. "A systems approach to implementation of eLearning in medical education: five MEPI schools' journeys." *Academic Medicine*, 89(8), S102-S106, 2014.
- [12]. United States Agency for International Development. (October 2016). Excellence in Higher Education for Liberian Development, <https://www.usaid.gov/sites/default/files/documents/1860/EHELD%20Fact%20Sheet%20October%202016.pdf>, Dec. 26, 2018.
- [13]. Export.gov Liberia. (7.13.2017). Telecommunications. <https://www.export.gov/article?id=Liberia-Telecommunications-Services>, Dec. 26, 2017.
- [14]. United States Embassy in Liberia. (March 22, 2017). USAID and Government of Liberia Launch New ICT Support Project. <https://lr.usembassy.gov/usaaid-government-liberia-launch-new-ict-support-project/>. Dec. 26, 2017.
- [15]. Y. Wang, H. Xibin, and J. Yang. "Revisiting the blended learning literature: Using a complex adaptive systems framework." *Journal of Educational Technology & Society* 18(2). 380-393, 2015.
- [16]. United States Agency for International Development. (October 2016). Excellence in Higher Education for Liberian Development. Accessed December 26, 2018 at <https://www.usaid.gov/sites/default/files/documents/1860/EHELD%20Fact%20Sheet%20October%202016.pdf>.
- [17]. E. Beyan, Masters of Science in Nursing Education Curriculum. Mother Patern College of Health Sciences. Monrovia, Liberia, 2019.
- [18]. L. S. Christensen, & L. E. Simmons. The scope of practice for academic nurse educators and academic clinical nurse educators. Lippincott Williams & Wilkins, 2019.

- [19]. University of Southern California, Organizing Your Social Sciences Research Paper: Writing a Case Study. <http://libguides.usc.edu/writingguide/casestudy>, Dec. 26, 2018.
- [20]. J. A. Blaya, H.S.F. Fraser and B. Holt. "E-health technologies show promise in developing countries." *Health Affairs*, 29(2), 244-251, 2010.
- [21]. World Health Organization, Nurse Educator Core Competencies, [http://who.int/hrh/nursing\\_midwifery/nurse\\_educator050416.pdf](http://who.int/hrh/nursing_midwifery/nurse_educator050416.pdf), 2016.
- [22]. J. R. Savery, "Overview of problem-based learning: Definitions and distinctions." *Essential readings in problem-based learning: Exploring and extending the legacy of Howard S. Barrows*, 9, 5-15, 2015.
- [23]. M. S. H. Khan, S. Hossain, M. Hasan, & C. K. Clement, "Barriers to the introduction of ICT into education in developing countries: The example of Bangladesh." *International Journal of Instruction*, 5(2), 61-80, 2012.
- [24]. L. Mingaine, "Skill challenges in adoption and use of ICT in public secondary schools, Kenya." *International Journal of Humanities and Social Science*, 3(13), 61-72, 2013.
- [25]. H. K. Bett. "The cascade model of teachers' continuing professional development in Kenya: A time for change?." *Cogent Education*, 3(1), 1139439, 2016.
- [26]. J. Frenk, L. Chen, Z. A. Bhutta, J. Cohen, N. Crisp, T. Evans, et al. "Health professionals for a new century: transforming education to strengthen health systems in an interdependent world." *The Lancet*, 376(9756), 1923-1958, 2010.
- [27]. Schön, Donald A. *Educating the reflective practitioner: Toward a new design for teaching and learning in the professions*, Jossey-Bass, 1987.
- [28]. F.A. Amobi & L. Irwin. "Implementing on-Campus Microteaching to Elicit Preservice Teachers' Reflection on Teaching Actions: Fresh Perspective on an Established Practice." *Journal of the Scholarship of Teaching and Learning*, 9(1), 27-34, 2009.
- [29]. M. Aparicio, F. Bacao, and T. Oliveira. "An e-learning theoretical framework." *An E-learning Theoretical Famework*, 1, 292-307, 2016.