

## Chapter 5

# Viral Education via Mobile Phone: Virtual International Networks and Ebola Prevention in Sierra Leone

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### ABSTRACT

*This chapter documents a strategy for the development and deployment of educational content on Ebola prevention and treatment targeted at low-literate learners speaking diverse languages. During the outbreak of Ebola in Sierra Leone, Njala University partnered with Scientific Animations Without Borders (SAWBO) at the University of Illinois Urbana-Champaign to create educational animations on Ebola. Drawing on an international network of collaborators, these animations were then placed into multiple languages for Sierra Leone. Njala University in turn acted as the central hub for engaging local partner groups to deploy this content throughout Sierra Leone. This chapter describes the development process, which occurred during the outbreaks and the ICT tools now available to the global health community. The educational animations created during the 2014 Ebola outbreak are now available in multiple languages for Sierra Leone, as well as other West African countries, along with a highly scalable deployment pathway that can be rapidly operationalized during future outbreaks or modeled for other outbreak or health crisis situations.*

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## **INTRODUCTION**

The role of mobile phones during the Ebola outbreak continues to be documented. For instance, Eric King, an Innovation Specialist at the United States Agency for International Development (USAID), stated that the mobile phone played a critical role in the recent aid efforts in Ebola-ravaged West Africa (Wagner, 2015). Mobile phone technology is one of the fastest growing development tools in Africa today. In the health sector, mHealth uses mobile phones to address healthcare needs (WHO 2011; World Bank 2012). One of the major challenges facing mHealth applications and their potential impact on healthcare is ensuring the content and quality of the health information are culturally appropriate. A World Bank report (2012) on mHealth identifies two major obstacles to the use of mobile phones in healthcare: 1) lack of trust in the information provided and 2) lack of information provided in local languages and cultures. When dealing with a health crisis such as Ebola, trust and communication are essential to successful treatment and stopping the spread of the epidemic. This chapter will provide lessons on how the international community can best use technology to work efficiently and effectively with local partners in a health crisis situation. Additionally, this chapter will examine one collaborative mHealth approach to combatting Ebola through the use of educational animated videos in local languages in Sierra Leone during the 2014 outbreak.

For a long time, the radio, television, film, and community meetings have historically been used as spaces and means of communicating needed behavior change in healthcare. Presently, technology has improved and through social media a variety of Internet based communications, tools and aids referred to as participative Internet have taken the center stage in the promotion of behavior change in health care (Korda & Itani, 2013; Jones & Fox, 2009). The advantages of this online communication are that they offer easy and cost-effective access to large numbers of people across geographic distances. Specifically, such technologies that are interactive and allow collaborative content sharing are called Web 2.0 social media and they are found on platforms such as Facebook, MySpace, Youtube, Twitter, wikis, blogs, and two-way mobile messaging platforms that connect people through cell phones such as WhatsApp (Korda & Itani, 2013). The assumption behind these tools is that the users are literate and can navigate the various platforms on their own. Scientific Animations Without Borders (SAWBO) leverages the logics of these technological tools while focusing on low-literate users as consumers and creators of knowledge. To achieve inclusivity, the information is translated into accessible languages and animated characters that perform the action explaining the content of what has to be learned.

## **BACKGROUND ON THE SAWBO PROJECT**

SAWBO is a Michigan State University based program (formerly based at University of Illinois Urbana-Champaign from 2011 to 2016) that creates and distributes educational animated videos on topics of agriculture, health, and women's empowerment. The videos are designed to be accessible to all people regardless of literacy and linguistic backgrounds throughout the world. The animated videos are developed using international academic collaborators to ensure the videos are scientifically accurate and culturally relevant. Experts on specific topics such as infectious disease assist in the development of each video's script and storyboard, which is then transformed into a two to five minute 2D or 3D animation. The SAWBO team then recruits volunteer native speakers to translate the script and provide the audio

overlay in diverse languages and dialects from regions where the video will be deployed. SAWBO videos are available for free online and can also be widely distributed through Bluetooth® technology from mobile phone to mobile phone.

The SAWBO project was inspired by the fact that there are upwards of one billion low-literate learners on the planet, speaking highly divergent languages. Many of these individuals live in rural areas and many do not have access to the critical life-improving knowledge that exists in academic literature and print documents. SAWBO's research team explores how to deliver such solutions in a high throughput and cost-effective manner as well as how to obtain practical outcomes. An examination of how SAWBO was able to create and distribute Ebola awareness videos in Sierra Leone in response to the 2014 Ebola outbreak could have useful lessons for developing health care systems and communications in nations dealing with similar health crisis situations.

## **HEALTH COMMUNICATION AND INTERNATIONAL CRISIS RESPONSE**

The ultimate goal of health communication is to change behaviors to improve health outcomes. This goal is usually achieved through knowledge transfer or health education (Schiavo, 2007). Schiavo (2007) argues that successful health communication campaigns are research based and take into account the target population's culture and environment. Just as Paul Farmer et al. (2013) advocate for a "biosocial" approach to global health that takes into account, not only the biology of a disease, but the socio-historical, political and economic context in which a person with the disease lives. Cultural competency is increasingly recognized as a crucial aspect of successful health communication. Health workers must take the patients' ethnic, linguistic, religious and environmental context into account when developing health communication plans and providing treatment (Betancourt et al. 2005; Schiavo 2007). In a health crisis situation, communication is considered the most important aspect of crisis management (Coombs, 2010).

SAWBO videos provide a research-based communications platform that is well suited to addressing crisis situations in diverse cultural contexts. SAWBO has proven lifesaving information through the creation and deployment of health related videos, especially the treatment of water to prevent cholera that was essential information for the victims of earthquakes in Iran and Nepal. Animated educational videos that can be easily played, replayed, and shared on cell phones provide a powerful communications device during a crisis situation when basic health infrastructure and systems are not reliable, and in the case of Sierra Leone, were in very poor shape even before the Ebola crisis. Additionally, all SAWBO animated videos can be easily downloaded onto Android phones using the SAWBO Deployer App when the user is near WiFi, and the videos can be kept on cell phones for use when the user is not near an Internet connection such that the animation can be played on cell phones or transferred to other cell phones using Bluetooth® technology.

Scholars of cognition and learning theory such as Moreno and Mayer (2002), point to the benefits of animated videos as a tool for successful knowledge transfer and retention. Moreno and Mayer (2002) also argued that successful learning occurs more often when learners are presented with audio and visual input simultaneously, such as in an animated video. Data from studies on learning gains from SAWBO animated videos (Bello Bravo unpublished data) show that low-literate farmers in Benin for example, retained more detailed information after watching videos on malaria and cholera prevention than they did after attending traditional extension agent presentations on the topics. Furthermore, a previous SAWBO intervention in a crisis situation (deployment of cholera prevention videos in Farsi directly

## ***Viral Education via Mobile Phone***

following the 2012 Iranian earthquake) showed the unique potential of the SAWBO model to rapidly respond to emergency needs through reliance on a global network of collaborators and the strength of mobile technology (Miresmailli et al. 2015).

## **mHealth and the Ebola Outbreak in Sierra Leone**

Mobile phones are now widely used to educate and advance farming and agriculture practices, to support community organizing and women's empowerment movements, to promote business development, entrepreneurship, and health care (World Bank 2012). In the field of global health the use of mobile phones to address urgent health care needs has been coined "mHealth" and like the mobile sector itself, has been rapidly expanding in recent years (WHO 2011; World Bank 2012). Mobile phones are being used across the African continent to improve data collection, access to health information and guidance, provision of health services in remote regions, and awareness building campaigns, among others (World Bank 2012). Access to mobile phone technology has increased exponentially in Africa over the past few years. In Sierra Leone, for example, one of the countries hardest hit by the Ebola outbreak, mobile phone subscriptions increased from just 14.3% of the population in 2005 to 37% in 2012 (World Bank 2014). When the Ebola outbreak struck West Africa in 2014 mobile phone technologies played a crucial role in prevention and treatment efforts (USAID 2015).

Traditional health crisis response paradigms, both within the United States and globally, are constantly challenged in a world where technology is rapidly changing the way people seek out and gain knowledge. Since the 2014 Ebola outbreak, much attention has been focused on restructuring and strengthening weak health infrastructure and services in West Africa. Rebuilding a health care system is a long and costly process, and one that cannot easily be achieved in time to address a crisis situation. In the absence of a strong health infrastructure, there is much potential, as well as the need, for non-traditional approaches to crisis management.

The use of mobile phone technology empowers non-traditional players to share and distribute knowledge, and to actively participate in the creation of educational content for local communities during a crisis situation. Schiavo (2007; 2015) argues that key for successful global health communication efforts is creating ownership among local communities and taking cultural context into account. Relying on the power and efficiency of mobile technologies and the Internet, it can also present the risk of disseminating incorrect information especially when not verified by experts. This is why empowering organizations, no matter how small or large, with scientifically accurate materials in local languages that can be shared and duplicated, at little to no cost, is critical to the development of effective strategies that allow for greater impact. The SAWBO model allows for this "democratization" of deployment of knowledge that means that even an "NGO of one" (i.e. an individual) can go into the field and transfer highly accurate, relevant and life-saving information to target populations.

## **Virtual International Collaboration Networks**

Collaboration networks can come together to solve problems, especially a "wicked problem". According to Rittel and Weber (1973) these are problems that are difficult or impossible to solve because of the incomplete or contradictory information, the changing environment and increasing interdependencies. Examples of such problems are impoverished education, healthcare, justice system, transportation, energy, climate change, food and water shortage, infectious diseases, human trafficking, terrorism, and illegal arms trade.

Further, collaborative networks enable collaborative learning. Heikkila and Gerlak (2013) developed a framework of collaborative learning that illustrates its process and products. To them, collective process comprises of knowledge development, interpretation, evaluation and dissemination to the members. Secondly, collective products come from learning process and they are: “new, shared ideas, strategies, rules or policies” (Gerlak & Heikkila, 2011. p. 5). Tsai (2009) observed that studies on collaborative networks indicate that on one hand these relationships are negative or insignificant while on the other hand they are deemed to be positive. Some problems that collaborative networks face are that over one half of established networks do not function as planned or fail over time (Barringer and Harrison, 2000). Thirdly, in their study about *Interorganizational Networking Patterns Among Development Organizations*, Atouba and Shumate (2010) observed that in international development sectors, the type of organization in development determined the kind of network joined for instance intergovernmental organizations tended to for relationships with others intergovernmental organizations.

While learning as individuals, groups, organizations and inter-organization is well documented, the process of learning by a network specifically as an entity has received limited attention (Dyer & Nobeoka, 2000; Knight 2002). Similar to physical organizations, virtual organization can now benefit from learning through the Internet. The recent proliferation of communication technologies has not only transformed communication but also how people learn (Chiumbu 2012, Sanya 2013). Chiumbu (2006) wrote that the arrival of the digital era provides great opportunities for developing countries in accessing information and knowledge especially those based in rural areas.

According to Engeström (2007) outcomes of learning include knowledge, skills and changed behavior. When learning is deeper the outcomes include new collective work practices such as thinking and discussion. Other benefits of learning in organizations include adapting to changing environments, innovation, better performance and group and gaining a competitive advantage. Since knowledge is broadly distributed and yet it holds the promise of gaining competitive advantage, innovation or creation of new ideas emerges in inter-organizational relationships. Intra-organizational learning networks are formed by individuals or teams that belong to an organization while inter-organizational learning networks are due to collaboration between employees in an organization and others in another organization.

## **Theoretical Framework: Communities of Practice**

The term communities of practice denotes a group of people or network of connections between people who share a concern or a passion for something they do and learn to better their knowledge and skills as they do it. One of the proponents (Wenger, 2001) of this construct observed that communities of practice “address the informal and tacit aspects of knowledge creation and sharing, as well as the more explicit aspects” (p. 3). Communities of practice are often defined by a shared domain of interest regarding a common practice. Membership in a domain is tied to a shared competence. These members engage in relationship building, activities and discussions to help each other and share information. In short, communities of practice are suitable in understanding collaborative networks that engage in research and development.

Although the communities of practice model did not originate in the organizational development field, it resembles Senge’s (1990) concept of a learning organization, which aims to increase organizational capacity and creativity. Lave and Wenger’s work on communities of practice (1991, 1998) proposes that such communities are an essential context for learning. Lave, an anthropologist, and Wenger, a computer scientist, argue that engagement in social practice is the fundamental process by which we learn and

## ***Viral Education via Mobile Phone***

become who we are. In this conceptual framework, the primary unit of analysis for learning is neither the individual nor formal institutions, but rather informal communities of practice that form the social fabric for learning.

According to Wenger (2001), communities of practice address both the informal and tacit features of knowledge creation as well as sharing. A community of practice is inclusive of shared histories of learning, where participants derive meaning, sense, and understanding of their work. Through mutual engagement and interrelated forms of participation, members of a community of practice negotiate meaning of their practices and form an identity of who they are. Adults are drawn to communities of practice “not only to engage in pursuing some enterprise but also to figure out how their engagement fits in the broader scheme of things” (Lave & Wenger, 1991, p. 162). Communities of practice provide a place for the negotiation of meaning, the preservation and creation of knowledge, the spreading of information, and the creation of identities. Lave and Wenger (1991) also hold a view that learning provides a means of becoming an insider and acquiring knowledge and skills hence becoming a practitioner. The learning of language, cultural knowledge and technical skills occurs through increasing levels of participation.. The theoretical perspective on learning in communities of practices has been expanded and is now included in the field of knowledge management.

Learning within communities of practices involves conversations and stories about the elements of practice and particularly problematic and difficult. Furthermore, the learning process encompasses conversation, telling stories, action in trying things, and commenting on each other’s solutions. Learning emerges through working or actually practicing; one’s craft and knowledge is gained and draws its meaning from the activities of the community. What emerges from the learning is the social production of knowledge that helps in solving problems and communities of practice making sense of the world.

In brief, communities of practice are self-organizing systems of informal learning, and they differ from other communities in three main ways. First, they focus on a domain of shared interest, and membership implies a level of competence and knowledge of that domain which distinguishes members from other people. Second, they interact and learn together by engaging in joint activities and discussions, helping each other, and sharing information. Through these interactions, they build relationships and form a community around the domain. Third, they develop a shared collection of experiences, stories, best practices, and ways of solving problems.

Related to this study is the concept of *virtual communities of practice*. Raelin (2008) explored the value of virtual communities and electronic communication in support of collaboration. What keeps communities of practice together tends to be their focus on functions or interest, rather than physical proximity. Technology means that geographical distance can be overcome, reduces travelling and allows saving and archiving learning material. Other benefits that can accrue from virtual communities of practice are (a) the widespread sharing of information for handling divergent-thinking tasks, (b) reducing barriers such as domination by high status members or inequality of participation, and (c) removing the distractions of irrelevant stimuli (Valacich & Schwenk, 1995). The collaboration between Njala and SAWBO reflects a virtual community of practice. During the outbreak of Ebola SAWBO team members could not travel to Sierra Leone but still the ongoing collaboration and support was crucial to put into practice the ongoing efforts of both groups. The initiative to address the eradication of Ebola through sharing information and knowledge with the affected victims, came from the group of students and the support of faculty in Njala that proposed creating educational content on Ebola in a form of animations to be deployed via mobile phones. Most of the communication and development of material occurred through consulting via cellphone or the Internet.

## **The Illinois-Njala Partnership: Mobilization for Ebola Prevention**

The University of Illinois and Njala University in Sierra Leone have a long-standing history of collaboration that dates to Njala University's founding in 1963 with support from USAID and the University of Illinois. Over the years Illinois and Njala faculty and students have engaged in numerous exchanges and collaborative projects. The collaboration between Njala University and SAWBO began in February of 2014, when members of the SAWBO team and the University of Illinois' Global Health Initiative traveled to Sierra Leone to meet with representatives at Njala University. This exploratory trip focused on determining potential collaborative links between the two institutions specifically in regards to research and exchange on global health topics. During this visit, the SAWBO team met with Njala students to perform translations and voice recordings of several existing SAWBO health animations; developed a script with a local NGO on a charcoal water filtration system being used in nearby villages, and spoke on a local one-hour radio show about their work. This initial visit sparked an ongoing collaboration between SAWBO and Njala University faculty, students and staff.

Within a few months of the SAWBO trip to Sierra Leone, Ebola cases were reported in the country. Njala University students were the first to contact the SAWBO team to alert them to the emergence of Ebola cases in Sierra Leone. SAWBO immediately began the process of script development working together with the emerging Njala University team (under the leadership of Thomas Songu), the Global Health Initiative on the Illinois campus, and global health experts, in this case former consultants for the World Health Organization. SAWBO created the educational content for the Ebola animations and then, working with Njala University; the animations were vetted through the appropriate government approval processes in Sierra Leone, specifically the Ministry of Health. The videos were then translated into multiple languages (Mende, Krio, Themne, and Kono) for the country, and made publically available online.

It is critical to note that the "delay" between being informed of the outbreak and the creation of this educational content only occurred due to a lack of resources to create the animations. Once SAWBO obtained the necessary funding (in this case through a private donation from the University YMCA) to cover the labor costs associated with the creation of the script, storyboard and animation, the SAWBO team was able to proceed with content development and deployment quite rapidly.

## **Virtual Collaboration: Distribution Through National and International Channels**

Due to the nature of Ebola, the SAWBO team was not able to be on the ground in Njala, Sierra Leone. Therefore, this project took place virtually via computers using skype as well as emailing and cell phone calls. According to Peters and Manz (2007) virtual collaboration refers to when members of organizations in different geographic settings work together to meet common goals using communication technologies. For Peters and Manz (2007), virtual collaborations are successful when members have existing relationships, trust and shared understandings though they call for further research in understanding the key antecedents of virtual team collaboration. SAWBO and Njala University had a prior relationship before the Ebola epidemic and this was leveraged when joining in the global effort to prevent the spread of Ebola. In this section, the authors give a detailed account of how the project was implemented. Using the discourse of conversational knowledge, the authors of this chapter outline the informal dialogue that took place to convey tacit and explicit knowledge. According to Akoumianakis and Mavraki (2016) conversational knowledge involves patterns of conversations that form into narratives and stories that are

## ***Viral Education via Mobile Phone***

orally and technologically shared to question and add to existing knowledge in order to solve a problem. In the section below the authors illustrate the inner workings of conversational knowledge as it relates to learning through interactions in communities of practices.

### **Viral Education: Learning Content Through Conversational Patterns**

Due to the proliferation of technology, viral education especially in the health sector is now ubiquitous. Viral education connotes the use of open platforms such as youtube together with an inspirational manner of conveying content in combination with easy to understand animations. This then leads to the lesson to be heard and viewed by many people thus the coining of the term 'go viral'. Because of its nature, viral education is therefore described as an effective way of providing learning content online. The process of developing the Ebola animation was an organic one given the partnership relationship that existed between SAWBO and Njala University. SAWBO team looked for the resources to create the animation, co-created the animation with global experts and Njala University based input, and Njala University worked on the translation, voice overs in local languages and was in charge of disseminating the animation. SAWBO videos are freely available online, however to increase the impact and distribution of the Ebola videos, it was necessary to have the videos formally approved by the Sierra Leone government so that the videos could be used as part of the official, national Ebola prevention efforts. In November of 2014 the videos received formal approval and endorsement from His Excellency Ernest Bai Koroma the President of Sierra Leone and Chancellor of Njala University.

With formal approval in place, efforts at the national and local level were in place to disseminate information on Ebola and share the videos. Meanwhile Njala University was able to use the videos on campuses and share them with the communities via students. The animations were shared with and/or distributed out to national and international groups working on Ebola prevention and treatment. Notably, all organizations that received the SAWBO video were given explicit instructions that the videos were to be used for educational purposes only. National organizations that were involved included the Office of the President, National Ebola Response Center (NERC), United Nations Development Programme (UNDP) Sierra Leone, Tertiary Education Commission, National Youths Commission, Ministry of Health and Sanitation (MoHS), National Ebola Museum (NEM) and Njala University. International organizations that joined and worked on this project include: United Nations Monitoring of Ebola Emergency Response (UNMEER), UN Information Management Working Group (IMWG), United Nations pillars (WHO, UNDP, and OCHA) and the United Kingdom Department for International Development (DFID).

During this process SAWBO also established a partnership with the Youth Development for Healthy Living for Social Responsibility (Illinois University YMCA), which funded the creation of the Ebola animation and who had recently established a partnership with the YMCA of Sierra Leone. The Sierra Leone YMCA, which has 23 branches throughout the country, worked closely with representatives at Njala University and SAWBO to distribute the animation once it was ready to be deployed.

As part of Njala University's community awareness and public education program for Ebola, various workshop-style seminars were organized for all schools and departments at Njala University to share the animations with a wider audience. SAWBO animations were successful to quickly teach the students and community members because they are anchored on George A. Miller's chunk concept. Miller stated that working memory could hold seven (plus or minus two) chunks of information at once, it is now thought that the number is closer to four, maybe five bits of information. Also, cognitive researchers now know

that the capacity of working memory depends on the type of information, the features of the information and the abilities of the person under experimentation.

Chunking refers to the strategy of breaking down information into negligible sizes because the brain can only process certain amounts of new information. The reason the brain needs this assistance is because the working memory where information is manipulated can store a limited information at a time. Based on this knowledge, SAWBO designed messages that can ignite conversations that would lead to learning about Ebola prevention and causes using the logic of conversational patterns. Conversational patterns are chunks of information that responds to a question and problems are termed as conversational patterns (Akoumianakis and Mavraki, 2006). For instance in this case where the context is Ebola prevention the conversational patterns would be introduction to what Ebola is, how it spreads, its symptoms, and how we can stop it from spreading.

Apart from learning the messages, the students learned how to download and upload the video animations on mobile phones. The ability to follow the video and to explain to the community members was emphasised. After meeting these requirements, staff and students from Njala University shared the animations back in their communities on their cell phones. The staffers and students were key in using the cell phones, clarifying, correcting misunderstanding, confirming understanding, emphasising the messages, answering emerging questions and encouraging conversations that led to learning for quick behaviour change. Copies of the animations were then made available at the newly established International Research Archive (IRA) and the National Ebola Museum (NEM) on the Njala campus for public viewing and reuse. As the animations can be easily copied and viewed by many people, the Njala University team conservatively estimates a minimum of 15,000 people have viewed the Ebola animations in Sierra Leone since they were first deployed in November of 2014. Currently, there is no empirical data on the extent of the impact of the animations; nonetheless plans are underway to study knowledge gain in various communities that used the video.

## **SOLUTIONS AND RECOMMENDATIONS**

The combination of mobile technology and animations during the Ebola outbreak in Sierra Leone brought together two non-traditional partnerships; Njala University and SAWBO, working together in the area of disease prevention and deployment of crucial information. The spread of Ebola in Sierra Leone raises key points for future collaborations: 1) the importance of the mobile technology as a tool for the deployment of health information to prevent diseases such as Ebola and 2) the potential of creating educational content in local languages targeting local populations and making such content accessible through mobile phones.

The most affected population; young people in rural areas, are more likely to have access to cellphones and could view videos on Ebola prevention and measures to eradicate the virus. SAWBO Ebola video being short, less than five minutes, repetitive, translated into local languages from Sierra Leone and Liberia, made it easy for NGOs, Njala University and students to share the video and is very effective to prevent future outbreaks. Furthermore, the Ebola video inspired Njala University to open a museum to teach future generations about the devastation of families and communities that lost an important number of family members from Ebola virus. Further approaches are needed to assess the impact of health videos such as Ebola and how this information could lead to behavior change toward adapting control measures to prevent Ebola as demonstrated in the SAWBO video.

## ***Viral Education via Mobile Phone***

Various forms of effective health technologies when faced with epidemics such as Ebola and Zika are instrumental in reaching remote areas and vulnerable populations. Using video animations especially on mobile phones can help in containing the disease while carrying out research and development. The exchange of information is not only with community members but relevant data can be mined to shape and inform national and international actors. Other opportunities include building the capacities to the community for behavior change, implementing practices and sharing of knowledge when faced with emerging diseases in low-income and middle income countries.

## **FUTURE RESEARCH DIRECTIONS**

In a health crisis situation time and communication are essential to combatting an infectious disease. As illustrated in the timeline above, it took four months to create and deploy the SAWBO Ebola animation videos. SAWBO and its international partners are working to increase the video collection and to add additional language options to existing videos so that videos such as those addressing Ebola are ready to deploy as soon as a crisis situation emerges. In Sierra Leone the International Research Archive (IRA) and the National Ebola Museum (NEM) on the Njala campus are preserving knowledge and experience from this most recent outbreak to assist not only the international research community, but to build and improve access to resources for the local population and other countries working on outbreak preparedness.

In order to obtain widespread educational impact SAWBO and its partners are now working on re-producing the Ebola animation in other languages for West Africa in including over a dozen languages specifically for Liberia. Once the Liberia language narrations are complete, the Ebola videos will be available in over 40 languages. Approval has been sought, where necessary, from the Ministries of Health in other African countries and the animations can and has been altered if required by any given Ministry of Health. For example, SAWBO worked with the Ministry of Health in Liberia to adapt the animation for use in Liberia, including placing the animations into over a dozen languages useful for Liberia.

All animations, once they are approved are available to those with Android phones that have Internet access through SAWBO's Deployer App, which is freely available through Google Play. The App allows anyone to download animations on a specific topic, language and even the accent for the specific country. Once downloaded to the first phone, the animation exists on the phone and can be accessed on the phone at any time or place (regardless of any Internet connection). The animations can be shown on the cell phone to others, as a portable "movie theater" or transferred to other cell phones using Bluetooth® technology. The App itself was completed and released in spring of 2015, and is now available for any current or future uses. SAWBO is also engaged in conducting virtual or in-country ICT train-the-trainer sessions at which attendees learn how to use the SAWBO App to deploy educational animations throughout their region. Through virtual training sessions and the subsequent deployment, it is highly feasible to scale deployment of these educational animations through extension agents, governmental, NGO and healthcare workers across any number of West African nations.

## **The SAWBO Model for Health Crisis Communication**

Over the past four years, the SAWBO team has moved towards the development of a "one step" expert to in-country deployment model. The final steps of this system were completed in the spring/summer of 2015 with the release of the SAWBO Deployer App. Within the context of such an outbreak this

complete model may have provided for a highly efficient way to deploy, however, this strategy is now in place and may be useful for future outbreaks of Ebola or other transmittable diseases.

The “one step” system allows the SAWBO team to work with multiple global experts on any given topic through virtual online interactions, with a resultant scientifically accurate educational animation being produced, all without the need for any member of the group to travel. Additionally, voice overlays in diverse languages can be continually added to this system and once approved they exist in a database that can be easily accessed by anyone with an Android device (phone or tablet) and access to the Internet. Once a given animation is downloaded onto an Android device, individuals or groups can in turn deploy these offline through their networks through displaying the animations on their phones or transferring to the cell phones of others or both.

Within the context of Ebola, content now exists and the SAWBO team has continued to translate this content into more languages, however, for other communicable diseases a proactive effort to create such content is necessary so that readily available materials could be used by the global health community in real time in the field, within minutes or hours (immediate download from the App of available content) or days (where new languages are needed) of a crisis outbreak. In short, the case of SAWBO’s work in Sierra Leone depict two ways that animations can be organized, one can be for longtime learning and another one for short term mobilization. Creating long-term learning videos allows for videos to be created and organized for gradual and incremental learning while short term mobilizing videos can be used to organize people quickly due to a crisis in order to solve a problem, they too require a library but unlike the long-term learning ones require working along a given protocol when deploying the animations. Here, long-term learning videos refers to animation videos on agriculture, healthcare and women empowerment that target audiences can refer to when receiving training and afterwards. On the other hand short term videos focus on emergency situations such as outbreaks and earthquakes, here the users are under pressure to access, learn and share the videos to solve the problem at hand. To this end, SAWBO urges for an expansion of emergency learning materials so that other organizations can tap onto this library when faced with an emergency.

## **CONCLUSION**

Sachs (2005) argues that, “The key to ending poverty is to create a global network of connections that reach from impoverished communities to the very centers of world power and wealth and back again” (p. 242). It is precisely this type of global network that enabled the creation and distribution of the Ebola prevention videos in Sierra Leone in 2014.

The SAWBO model is an innovative health communication approach that draws heavily on international networks and local community engagement. The global engagement of health experts and international partnership and collaboration between universities in the United States and Sierra Leone, in collaboration with global experts, allowed for the creation of scientifically accurate and culturally appropriate educational material. Mobile technology coupled with local engagement on the ground in Sierra Leone allowed for a mass deployment and distribution of the educational materials. The first step, of developing accurate educational content that is adaptable across countries, local needs and adaptable through time as new scientific knowledge emerges, has already occurred. A second step of making such content easily accessible and easily scalable for future uses already exists. Moving forward SAWBO intends to use the Ebola outbreak experience to further health crisis response research and practice. To better prepare

for future crisis situations, the SAWBO team is focused on getting the Ebola animation (and videos on other infectious diseases) into as many other languages as possible, such that if there is a need for it in the future the video will be available proactively in real time as opposed to reactively as was the case in this most recent situation. Long term, further study is needed on the reception of the Ebola prevention videos in Sierra Leone and neighboring countries. Future studies will focus on an assessment of learning gains from the videos as well as an examination of behavior change post video intervention. A study on how and if people change their disease prevention and treatment behaviors as well as their attitudes towards the disease would shed much needed light on the impact of this type of educational intervention.

## REFERENCES

- Africa News. (2014). International Organizations and Africa; Urgent Action On Ebola Needed to Avert Regional Collapse, Say UN Development Officials. *Africa News*. Retrieved October 21, 2015, from <http://allafrica.com/stories/201410071344.html>
- Akoumianakis, D., & Mavraki, D. (2016). Using Conversational Knowledge Management as a Lens for Virtual Collaboration in the Course of Small Group Activities. In *Intelligent Computing Systems* (pp. 115-131). Academic Press.
- Atouba, Y., & Shumate, M. (2010). Inter-organizational networking patterns among development organizations. *Journal of Communication*, 60(2), 293–317. doi:10.1111/j.1460-2466.2010.01483.x
- Barringer, B. R., & Harrison, J. S. (2000). Walking a tightrope: Creating value through inter-organizational relationships. *Journal of Management*, 26(3), 367–403. doi:10.1177/014920630002600302
- Bello-Bravo, J. (n.d.). An Assessment of Learning Gains from Educational Animations versus Traditional Extension Presentations among Farmers in Benin. *Unpublished Manuscript*.
- Betancourt, J., Green, A., Carrillo, J. E., & Park, E. (2005). Cultural Competence and Health Care Disparities: Key Perspectives And Trends. *Health Affairs*, 24(2), 499–505. doi:10.1377/hlthaff.24.2.499 PMID:15757936
- Boslaugh, S. E. (2013). Sierra Leone. In *Health care systems around the world: A comparative guide* (pp. 407–410). Thousand Oaks, CA: Sage Publications. doi:10.4135/9781452276212.n153
- Center for Disease Control. (2016). *Ebola in Sierra Leone*. Retrieved October 12, 2016. <http://wwwnc.cdc.gov/travel/notices/warning/ebola-Sierra-leone>
- Center for Disease Control. (2016). *Ebola*. Retrieved October 10, 2015, from <http://www.cdc.gov/vhf/ebola/>
- Chiumbu, H. S. (2006). Communication and global intellectual property rights: ICTs and development in Africa. *Critical Arts*, 20(1), 83-95, 193–206.
- Chiumbu, H. S. (2012). Exploring mobile phone practices in social movements in South Africa: The Western Cape anti-eviction campaign. *African Identities*, 10(2), 193–206. doi:10.1080/14725843.2012.657863

- Coombs, W. T., & Holladay, S. J. (2010). *Handbook of Crisis Communication*. Retrieved October 15, 2015, from <http://www.eplib.com>
- Dyer, J. H., & Nobeoka, K. (2000). Creating and managing a high-performance knowledge-sharing network: The Toyota case. *Strategic Management Journal*, *21*(3), 345–367. doi:10.1002/(SICI)1097-0266(200003)21:3<345::AID-SMJ96>3.0.CO;2-N
- Engeström, Y. (2007). From communities of practice to mycorrhizae. In J. Hughes, N. Jewson, & L. Unwin (Eds.), *Communities of Practice: Critical perspectives*. London, UK: Routledge. doi:10.4324/NOE0415364737.ch4
- Farmer, P., Yong Kim, J., Kleinman, A., & Basilio, M. (2013). *Reimagining Global Health*. Berkeley, CA: University of California Press.
- Gerlak, A., & Heikkila, T. (2011). Building a theory of learning in collaborative institutions: Evidence from the Everglades Restoration Program. *Journal of Public Administration: Research and Theory*, *21*(4), 619–644. doi:10.1093/jopart/muq089
- Heikkila, T. H., & Gerlak, A. K. (2013). Building a conceptual approach to collective learning: Lessons for public policy scholars. *Policy Studies Journal: the Journal of the Policy Studies Organization*, *41*(3), 484–512. doi:10.1111/psj.12026
- Jones, S., & Fox, S. (2009). *Generations online in 2009*. Washington, DC: Pew Internet & American Life Project. Retrieved from <http://www.pewinternet.org/Reports/2009/Generations-Online-in-2009.aspx>
- Korda, H., & Itani, Z. (2013). Harnessing social media for health promotion and behavior change. *Health Promotion Practice*, *14*(1), 15–23. doi:10.1177/1524839911405850 PMID:21558472
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, MA: University Press. doi:10.1017/CBO9780511815355
- Miresmailli, S., Bello-Bravo, J., & Pittendrigh, B. (2015). Scientific Animations Without Borders and crowd-sourced emergency relief knowledge in local languages: A case study of the Iranian earthquake. *The International Journal of Science in Society*, *6*, 203–220.
- Moreno, R., & Mayer, R. E. (2002). Verbal redundancy in multimedia learning: When reading helps listening. *Journal of Educational Psychology*, *94*(1), 156–163. doi:10.1037/0022-0663.94.1.156
- Peters, L. M., & Manz, C. C. (2007). Identifying antecedents of virtual team collaboration. *Team Performance Management: An International Journal*, *13*(3/4), 117–129. doi:10.1108/13527590710759865
- Raelin, J. A. (2008). *Work-based learning: Bridging knowledge and action in the workplace*. San Francisco, CA: Jossey-Bass.
- Rittel, H. W., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, *4*(2), 155–169. doi:10.1007/BF01405730
- Sachs, J. (2006). *The end of poverty: Economic possibilities for our time*. New York, NY: Penguin Books.
- Sanya, B. N. (2013). Disrupting patriarchy: An examination of the role of e-technologies in rural Kenya. *Feminist Africa*, *18*, 12–24.

## **Viral Education via Mobile Phone**

Schiavo, R. (2007). *Health Communication: From theory to practice*. San Francisco, CA: Jossey-Bass Press.

Senge, P. (1990). *The Fifth Discipline: the Art and Practice of the Learning Organization*. New York, NY: Doubleday Press.

USAID Blog. (2012). *How Technology is Transforming Ebola Response Efforts*. Retrieved October, 2015, from <https://blog.usaid.gov/2015/06/qa-how-technology-is-transforming-ebola-response-efforts/>

USAID Blog. (2016). *Fighting Ebola with Information*. Retrieved October 14, 2015, from <https://blog.usaid.gov/2015/05/fighting-ebola-with-information/>

Valacich, J. S., & Schwenk, C. (1995). Devils Advocacy and Dialectical enquiry on face-to-face and Computer-mediated decision making. *Organizational Behavior and Human Decision Processes*, 63(2), 158–173. doi:10.1006/obhd.1995.1070

Wagner, C. (2015, June 30). *Q & A: How Technology is Transforming Ebola Response Efforts* [Web log post]. Retrieved from <https://blog.usaid.gov/2015/06/qa-how-technology-is-transforming-ebola-response-efforts/>

Wenger, E. (1998). *Communities of Practice: Learning, meaning and identity*. Cambridge, MA: Cambridge University Press. doi:10.1017/CBO9780511803932

World Bank. (2012). *Information and Communications for Development 2012: Maximizing Mobile*. Retrieved, October 21, 2016, from <http://siteresources.worldbank.org>

World Bank. (2014). *The Little Data Book on Information and Communication Technology 2014*. Retrieved on October 21, 2015 from <http://data.worldbank.org/products/data-books/little-data-book-on-info-communication-tech>

World Health Organization. (2011). *mHealth: New horizons for health through mobile technologies: second global survey on eHealth*. Global Observatory for eHealth series – Volume 3. Retrieved October 21, 2016, from [http://www.who.int/goe/publications/goe\\_mhealth\\_web.pdf](http://www.who.int/goe/publications/goe_mhealth_web.pdf)

## **ADDITIONAL READING**

Murphy, L. L., & Priebe, A. E. (2011). My co-wife can borrow my mobile phone! Gendered Geographies of Cell Phone Usage and Significance for Rural Kenyans. *Gender, Technology and Development*, 15(1), 1–23. doi:10.1177/097185241101500101

Wyche, S., Steinfield, C., Cai, T., Simiyu, N., & Othieno, M. E. (2016, June). Reflecting on Video: Exploring the Efficacy of Video for Teaching Device Literacy in Rural Kenya. In *Proceedings of the Eighth International Conference on Information and Communication Technologies and Development* (p. 8). ACM doi:10.1145/2909609.2909667

## KEY TERMS AND DEFINITIONS

**Bello-Bravo Julia:** Co-founder of Scientific Animation Without Borders (SAWBO).

**Collaboration:** Collaboration is a process in which entities share information, and evaluate a program of activities to achieve a common goal. This concept is derived from the Latin *collaborare*, meaning to work together. It implies sharing risks, resources, responsibilities, and rewards, which if desired by the group can also give to an outside observer the image of a joint identity. A collaborative network consists of a variety of entities that are largely autonomous, geographically distributed, and heterogeneous in terms of their operating environment, culture, social capital and goals, but committed to jointly achieve common or compatible goals.

**Collaborative Network:** A collaborative network consists of a variety of entities (e.g. organizations and people) that are largely autonomous, geographically distributed, and heterogeneous in terms of their operating environment, culture, social capital and goals, but collaborate to better achieve common or compatible goals.

**Conversational Knowledge:** Conversational knowledge involves patterns of conversations that form into narratives and stories that are orally and technologically shared to question and add to existing knowledge in order to solve a problem.

**Conversational Patterns:** Discussions that involve series of related messages between teams or peers.

**Koroma Bai Ernest:** President of Sierra Leone since 2007 and also the Chancellor of Njala University.

**mHealth:** is an abbreviation for mobile health. It is also a general term for the utilization of mobile phones and wireless technology in healthcare, especially in public health.

**Njala University:** This is a public university based in Sierra Leone.

**Partnership:** Hierarchical and legal unification of organizations based on shared goals, mutual respect, support and shared information.

**Pittendrigh Barry:** Co-founder of Scientific Animation Without Borders (SAWBO).

**Scientific Animation Without Borders:** Scientific Animations Without Borders™ (SAWBO) is a University of Illinois at Urbana Champaign based program. SAWBO transforms extension information on relevant topics such as agriculture, disease, and women's empowerment into 2D, 2.5D, and 3D animations, which are then voice overlaid into a diversity of languages from around the world.

**Songu Thomas:** Thomas is the information communication and technology director at the Njala University.