

The prospect of animated videos in agriculture and health: A case study in Benin

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ABSTRACT

Cell-phone ready educational videos, translated into local languages, are a recent phenomenon in developing nations. One of the reasons for the emergence of this approach is due to the scarcity of other forms of educational materials with appropriate content for low literate learners. Additionally, the World Wide Web (WWW) has very little to offer in regards to audio-visual training materials that could be used to educate people in their own local languages without the need for literacy. Scientific Animations Without Borders (SAWBO) creates and works with local groups to deploy educational videos in local languages facilitating access to information and knowledge to individuals in the developing world. This paper is based on a survey conducted with 83 individuals on the perception of three SAWBO educational animations - neem extracts for insect control, cholera and malaria prevention; and their potential as training tools for health and agricultural extension in Benin. These animations provide information and knowledge in a simple way, on complex ideas and techniques that could improve livelihoods. The results obtained in this study suggest that animated videos are a well-received approach as a training tool in agriculture and prevention of diseases amongst populations with diverse literacy levels.

Keywords: Animated Videos, Cell-Phones, Benin, Neem, Cholera, Malaria Prevention

INTRODUCTION

Developing countries have recently faced an increasing growth of information technology tools especially in the area of communications. As a consequence of improved mobile phone technology for communications, there has been a substantial increase in access to information. In turn, information transmission through educative videos is gaining importance in the world and in Africa (Zossou *et al.* 2009a, b). Educational live action videos have been used in Bangladesh and introduced in Africa since 2005 by the African Rice Center as a new approach to deploy information and knowledge (Van Mele 2006). Agriculture and health are areas where Scientific Animations Without Borders (SAWBO) animated videos have been used to deliver educational

messages for low literate learners in their own languages (Bello-Bravo *et al.* 2011; Bello-Bravo & Baoua 2012; Bello-Bravo & Pittendrigh 2012; Bello-Bravo *et al.* 2013). Educational videos have been used in an attempt to improve the dissemination of agricultural and health-related innovations. Indeed, video-mediated learning may contribute to widespread information and public video screenings could lead to more behavioral or institutional changes than classical extension techniques do; a hypothesis that remains to be tested. The constructive learning theory contends that individuals learn by building on their own knowledge and experiences (Röling & Wagemaker 1998; Van Mele *et al.* 2005). To this end, animated approaches, which incorporate feedback from end users, can in turn provide for new variations of educational content that builds upon such experiences, which can, in turn, be shared with others. Video mediated learning has the potential to strengthen learning for rural individuals in Africa as well as providing a way to share innovations from region to region (Bello-Bravo & Pittendrigh 2012).

In Benin, a country in West Africa with about nine million inhabitants who speak more than seventy languages, there exist significant challenges for enhancing learning systems. Although video animations have not been common in the traditional extension system, it represents an emerging option for scaling up sustainable technologies and better techniques and practices. To this end, SAWBO develops animated videos to teach farmers about different techniques and better practices that can improve their livelihoods. This approach integrates educational materials into local languages based on research with learning tools technology such as educational 3-D animated videos that can be placed into mobile phones. Local and scientific knowledge is captured in the animations to illustrate known solutions to agricultural and health problems that have the potential to be adopted by the target audience.

Here we present the results of a survey involving three educational videos dealing with (1) a neem seed extract preparation for crop protection, (2) cholera prevention and (3) malaria prevention. The survey was conducted at Tokan, a village located in the Abomey-Calavi municipality in Southern Benin. The objective of the study was to assess the potential reaction of local populations to the use of animated videos as an educational tool in technology dissemination.

MATERIALS AND METHODS

Survey Location

The survey was carried out in December of 2012 (for the neem and cholera videos) and January of 2013 (for the malaria video) using short questions to assess the perceptions and effectiveness of the methods in terms of the ease of adoption of the technology and gain of knowledge about the technique shown in the animated videos. In the study we also assessed the perceived ease of use of cell-phones as a method of diffusion. A questionnaire was developed focusing on content, as well as perceived potential for deployment and scalability. The questionnaire included a short ten-question survey administered by students from the International Institute of Tropical Agriculture (IITA) to the participants. A translated version of the questionnaire was standardized prior to the deployment of the survey. To assess the perceptions of the methodology used, we relied on the answers of the participants that watched the respective animated videos. The program coordinator brought one mobile phone on which the three videos were transferred. Some volunteers from the participants had mobile phones and allowed the transfer of the videos onto their phones after completion of the surveys. The numbers of the respondents were 26, 27 and 30 individuals respectively for the neem, cholera and malaria videos.

The sample included all participants who watched the videos and claimed their willingness to fill in the questionnaires. The sample only included participants that watched the videos for the first time.

The survey was conducted in Tokan, a cosmopolitan village in Abomey-Calavi. Abomey-Calavi is a suburb of Cotonou, the economic capital of Benin. Like the whole municipality of Abomey-Calavi, Tokan comprises several ethnic groups and migrants come from different parts of the country especially the Fon, Goun, Yoruba and Toffin people. Abomey-Calavi is a dormitory area for many people working in Cotonou. It hosts the Campus of Université d'Abomey-Calavi, (UAC); the Benin Station of the International Institute of Tropical Agriculture (IITA) and many public and private secondary schools. The economic sectors include agriculture, livestock, fisheries, food processing, trade and tourism.

Selection of the participants

The research purpose was explained to the chief of each village during each of the visits. The date and hours to carry out the survey had been pre-arranged with the village's chief. A town crier was used to advertise the study in the local community. People that were interested then participated in the meeting. The participants who responded to the research questions were randomly selected among people that watched the videos and claimed their willingness to respond to questions.

Administration of Survey

Survey data were collected through semi-structured interviews after showing the three designated videos. The three videos were shown to a total of 83 participants, which included women, men, farmers, traders, students as well as technicians and workers at IITA. All of the participants had not previously watched any of the videos. Each video lasted 2-3 min and they were played twice. Following the viewing of each video, the contents of each of the videos were discussed with the participants for 12-13 min, giving, in total, a 15 min duration of interactions with each of the participants. The survey included participants with different educational backgrounds. To be consistent and for the benefit of the illiterate and low literate learners, the survey was conducted in Fon which is a widely spoken language in the study area. Before the videos were shown, the aim of the survey was explained to the participants by one of the researchers. Also, the use of each video was also explained to the participants.

Collection and Analysis of Data

The data collection was based on a semi-structured questionnaire, which elicited personal information of the respondents, awareness, perceptions, and feedback on access to mobile phones and usage. The study was divided in two parts. Each of the three videos was transferred on to mobile phones that the students showed to the participants. After the participants had watched the videos, a questionnaire targeting the participants' perception of the videos and the videos' effectiveness in communicating the content was administered. The questionnaires were in French; however, a student who participated in the survey explained it to all participants in the local language (Fon). Responses were coded and analyzed in excel using descriptive statistics.

RESULTS AND DISCUSSION

Neem Video

Local knowledge and practices vary from country to country but there are techniques (both in agriculture and disease prevention) that can be taught and used relatively consistently across many West African countries. For example, many native and some introduced plants in West Africa have insect repellent properties. One specific example is the neem tree, which is available in West Africa. In some countries, women extract oil from neem seeds, and in other places, neem seeds are used as insecticide repellent and for medicinal purposes. Thus, the neem video that was shown was first translated and voice overlaid in Fon before the interview. It is readily available for anyone to download and use in their own educational programs (from the SAWBO websites: sawbo-illinois.org/OnlineMaterials/VIDEO/AGR/NEEM01/FON/ and <http://sawbo-illinois.org/mobile/project.php?name=NEEM01&language=FON>). The other videos discussed in this paper are also available on the SAWBO websites, as are the video descriptions.

General Information on Participants

A high percentage of the participants (73%) were below 40 years (Table 1). More than half of them were women. Fifty percent of the participants belonged to a women association and 12% and 12% were respectively agricultural technicians or farmers. About 38% of people surveyed were illiterate while 19%, 12% and 31% had respectively primary, secondary, and university education. The percentage of students surveyed could be explained by the fact that many students live in Tokan because of the proximity of the University of Abomey-Calavi.

Participants' Impressions and Lessons Learnt

The quality of the animation in 3D appeared to be a factor in the positive reception by the participants. We did not ask, in our questionnaire, if the quality of the animation helped participants in the learning process or in the techniques that were shown. However, all (100%) of the participants claimed to like the animated video on neem extract preparation and that the message was clear to most of them (96%) (Table 1). The same percentage of people retained key elements of the process of neem extract preparation. All of those surveyed expressed an interest in applying the lessons learned by (1) practicing (65%) or (2) by training other people (23%). The majority of the respondents (92%) wished to have the video transferred onto their cell phones or, in a few cases, computers. About 88% of the respondents felt that the video could be adapted to a larger audience for several reasons, such as the use of visual technique and the clarity of the message. However, the unavailability of suitable equipment such as laptops and video projectors could limit this communication mode. Perceived strengths of this video were the use of audiovisual technique and the clarity of the message. Several weak points have been cited including power failure, cell phone affordability, and most importantly the low video volume on some of the phones making the animation less understandable. Only a small percentage of people were concerned with the use of fictional characters. The voice over for this video was slightly lower in volume than the other two animations tested in this study. Interestingly, the greatest concern for this video (potential negatives) was too low a volume, an issue that can be addressed with technical modifications to the video.

Since animated videos can be scalable, participants shared their opinion about important topics that can be disseminated through this educational system. Many issues have been identified for future awareness campaigns. Among them, protection of stored products and food processing were featured prominently. The participants recognized women's associations, farmer field schools, television or radio broadcasting and extension services as good channels to disseminate videos on neem extracts. A majority of the participants suggested that the best way to deploy such information would be through video showings or television/radio broadcasting.

Table 1: Survey information on neem video*

| Order | Parameter | Number |
|-------|--|------------------------|
| 1 | Age: - Below 40 years - Above 40 years | 19 7 |
| 2 | Gender: - Male - Female | 11 15 |
| 3 | Occupation - Women association - Agricultural technician - Student - Housewife - Farmer | 13 3 6 1 3 |
| 4 | Level of education - Illiterate - Primary school - Junior secondary school - Senior secondary school - University | 10 5 2 1 8 |
| 5 | Did the respondent like the video - Yes - No | 26 0 |
| 6 | Message clarity - Yes - No | 25 1 |
| 7 | Key elements learnt - Seeds selection - Extract preparation - Spray technique - All three elements | 1 0 0 25 |
| 8 | Information usage - Yes - No | 26 0 |
| 9 | How to use information - Practice - Training - Both | 17 6 3 |
| 10 | Willingness to place the video on a phone or computer - Yes - No | 24 2 |
| 11 | Adaptability video large audience - Yes - No - Not sure | 23 2 1 |

| Order | Parameter | Number |
|-------|------------------------------------|--------|
| 12 | Reasons | |
| | - Clarity | 6 |
| | - Larger audience | 8 |
| | - Computer availability | 1 |
| | - Audio-visual technique | 7 |
| | - Smaller audience | 4 |
| 13 | Video strengths | |
| | - Audio-visual technique | 10 |
| | - Clarity | 12 |
| | - Language | 4 |
| 14 | Video weaknesses | |
| | - Power failure | 6 |
| | - Cell phone affordability | 5 |
| | - Fictitious images | 5 |
| | - Weak video volume | 10 |
| 15 | Important issues for awareness | |
| | - Protection stored products | 14 |
| | - Food processing techniques | 9 |
| | - Disease prevention | 1 |
| | - Groups management | 2 |
| 16 | Best way to project video | |
| | - Women association | 8 |
| | - Extension agents | 5 |
| | - Television or radio broadcasting | 7 |
| | - Farmer Field schools | 6 |
| 17 | Best way to deploy information | |
| | - Video animation | 12 |
| | - Extension agents | 1 |
| | - Television or radio broadcasting | 8 |
| | - Interpersonal communication | 2 |
| | - Groups/associations | 3 |

* The total number of respondents was 26.

Cholera video

General Information on Participants

More than half of the respondents (63%) were less than 40 years old (Table 2). Women accounted for 59% of the group. About 56% of the participants belonged to a women's association. Agricultural technicians and students represented respectively 15% and 19% of the group. Many of the participants were illiterate while 22% and 26% respectively attended primary school and the university. This high proportion of surveyed people who reached the university is likely due to the proximity of the university campus of Abomey-Calavi.

Participants' Impressions and Lessons Learnt

All participants liked this video and the message transmitted was clear to all of them. They found the message very useful and expressed the intention to implement it (85% of the people surveyed). A high percentage of them (89%) requested to save the video on their cell phone or computer. For them, the video could be adapted to a large audience because of its clarity and attractiveness. Respondents stated that the major strength of the video was the use of audio-

visual techniques (74% of the surveyed people). On the other hand, the participants stated that power failure and computer availability were the main constraints limiting its use. The participants that viewed the cholera video suggested that the key issues that could be targeted by future awareness campaigns were protection of stored products and food processing. Women association and farmers' field schools were reported to be major channels that fit with this video dissemination. Moreover, television or radio broadcasting and video animation were suggested to be the most important ways to deploy such information.

Table 2: Survey information on cholera video*

| Order | Parameter | Number |
|-------|---|--------|
| 1 | Age: | |
| | - Below 40 years | 17 |
| | - Above 40 years | 10 |
| 2 | Gender: | |
| | - Male | 11 |
| | - Female | 16 |
| 3 | Occupation | |
| | - Women association | 15 |
| | - Agricultural technician | 4 |
| | - Student | 5 |
| | - Housewife | 2 |
| | - Farmer | 1 |
| 4 | Level of education | |
| | - Illiterate | 11 |
| | - Primary school | 6 |
| | - Junior secondary school | 2 |
| | - Senior secondary school | 1 |
| | - University = 5 | 7 |
| 5 | Did the respondent like the video | |
| | - Yes | 27 |
| | - No | 0 |
| 6 | Message clarity | |
| | - Yes | 27 |
| | - No | 0 |
| 7 | Key elements learnt | |
| | - Boiling water | 1 |
| | - Addition bleach/chlorine | 2 |
| | - Aqua tab pill addition | 2 |
| | - All = 4 | 22 |
| 8 | Information usage | |
| | - Yes | 27 |
| | - No | 0 |
| 9 | How to use information | |
| | - Practice | 23 |
| | - Training | 1 |
| | - Both | 3 |
| 10 | Willingness to place the video on a phone or computer | |
| | - Yes | 24 |
| | - No | 3 |

| Order | Parameter | Number |
|-------|--|------------------------|
| 11 | Adaptability video large audience - Yes - No - Not sure | 23 3 1 |
| 12 | Reasons - Clarity - Larger audience - Computer availability - Attractiveness video - Smaller audience | 7 10 5 4 1 |
| 13 | Video strengths - Audio-visual technique - Clarity | 20 7 |
| 14 | Video weaknesses - Power failure - Computer availability - Fictitious images - Weak video volume - Smaller zoom | 8 10 3 4 2 |
| 15 | Important issues for awareness - Protection stored products - Food processing techniques | 8 19 |
| 16 | Best way to project video - Women association - Extension agents - Television or radio broadcasting - Protection in social centers - Farmer Field schools | 15 3 2 1 6 |
| 17 | Best way to deploy information - Video animation - Television or radio broadcasting - Interpersonal communication - Groups/associations | 7 12 4 4 |

*The number of responders was 27.

Malaria Prevention Video

General Information on Participants

The majority of the participants interviewed (77%) were below 40 years old and half of them were women (Table 3). About 37% of them belonged to a women's association, while agricultural technicians and students respectively accounted for 20 and 40%. Only 20% of people surveyed defined themselves as illiterate. About 57% of the people interviewed had university education.

This group suggested that the main channels that could be used to disseminate information on malaria prevention would be women's association, farmer field schools and extension services. The group also suggested the major ways to deploy such information would be through video animations as well as television or radio broadcasting.

Participants' Impressions and Lessons Learnt

All participants liked the video on malaria and found the message clear. About 63% of them retained key information from the video, which they intended to apply mainly through practice (90% of those interviewed). A high percentage of the participants (97%) expressed the interest of transferring the video on their cell phone or computer. Respondents suggested that the malaria video could be adapted to a large audience because of its clarity and attractiveness. One of the major strengths of the video, by a majority of respondents, was the use of audio-visual techniques and the clarity of the message. However, factors such as computer availability, low video volume on some of the cell phones and small zoom were suggested, by the participants, as limitations. Several issues were suggested for future awareness campaigns. These included the mistreatment of children, domestic hygiene, AIDS prevention, and diabetes prevention.

Table 3: Survey information on malaria prevention video*

| Order | Parameter | Number |
|-------|---|------------------------|
| 1 | Age: - Below 40 years - Above 40 years | 23 7 |
| 2 | Gender: - Male - Female | 15 15 |
| 3 | Occupation - Women association - Agricultural technician - Student - Farmer | 11 6 12 1 |
| 4 | Level of education - Illiterate - Primary school - Junior secondary school - Senior secondary school - University | 6 4 2 1 17 |
| 5 | Did the respondent like the video - Yes - No | 30 0 |
| 6 | Message clarity - Yes - No | 30 0 |
| 7 | Key elements learnt - Use of Bed nets - Plastic or metallic screen - Malaria symptoms - Bed nets + metallic screen + sanitation | 7 2 2 19 |
| 8 | Information usage - Yes - No | 30 0 |
| 9 | How to use information - Practice - Training - Both | 27 0 3 |

| Order | Parameter | Number |
|-------|--|--|
| 10 | Willingness to place the video on a phone or computer - Yes - No | 29 1 |
| 11 | Adaptability video large audience - Yes - No - Not sure | 25 5 0 |
| 12 | Reasons - Clarity - Larger audience - Computer availability - Attractiveness video - Smaller audience | 9 3 4 11 3 |
| 13 | Video strengths - Audio-visual technique - Clarity | 19 11 |
| 14 | Video weaknesses - Power failure - Computer availability - Fictitious images - Weak video volume - Smaller zoom | 1 9 4 8 8 |
| 15 | Important issues for awareness [†] - Children mistreatment - Prevention cerebral accidents - Domestic hygiene - Water purification - AIDS prevention - Environment protection - Diabetes prevention - Avian influenza prevention in poultry - Importance biological control - Insecticide spray techniques - Abortion consequences | 6 1 4 1 11 1 7 1 1 2 7 |
| 16 | Best way to project video [†] - Women association - Extension agents - Television or radio broadcasting - Farmer Field schools - Church | 18 5 0 7 7 |
| 17 | Best way to deploy information - Video animation - Extension agents - Television or radio broadcasting - Interpersonal communication - Poster | 14 1 12 2 1 |

*The total number of responders was 30.

[†]Multiple responses were given by some of the respondents for questions 15 and 16.

Similarities and Differences in the Responses to the Perception of the Videos

Interesting similarities and differences emerged across the three different video test groups. Across all three videos, a very high percentage of the respondents (1) liked the videos, (2) wanted to obtain the videos for their own use, (3) were interested in using the knowledge, and (4) were highly positive about the use of these animations for educational purposes. Also, in all three videos the majority of the respondents stated that they recalled the major key elements of the video; certainly, further studies need to be performed to determine actual retention of the knowledge in the short and long-term. Across all three videos, women's associations were the top suggested mechanism for deployment. In terms of weaknesses, the trend was fairly similar across videos, except for the volume level, in which the neem video was perceived to have a lower volume. Interestingly, for all three videos, the fact that the characters are "cartoonish" or "fictional" was only a concern for a small percentage of respondents. The fact that using this approach makes the videos cheaper to produce and across cultures, supports the contention that using "cartoonish" or "fictional" characters are likely not to be a major concern. In two out of three of the videos, the respondents indicated that cell phone videos were the top approach for deployment and in the third group, television was the top choice; however, animations could certainly be played on television for educational purposes. Finally, each video resulted in a different set of suggestions for new videos. The neem video resulted in suggestions for primarily more agricultural videos, the cholera video resulted in suggestions primarily for safer food processing, and the malaria video resulted in suggestions focused on a diversity of medical issues.

CONCLUSION

This survey on educational videos targeting three important issues of everyday life in Benin (the use of neem seeds extracts for crop protection, cholera and malaria prevention) has demonstrated the importance of combining different media, especially audio-visual techniques, in deploying information. Educational animated videos deployed on cell phones are a new tool for facilitating communication for human behavioral changes. Integrating such tools in extension systems might improve the adoption rates of innovations. Compared to traditional extension methods, video animations are reported to reach many people in a short period of time and to significantly reduce dependence on group leaders (Zossou *et al.* 2009b).

Some of the traditional approaches used in agricultural extension, for example farmer field schools for Integrated Pest Management (IPM), have been shown to be effective in enhancing farmers to adapt local sustainable practices through individual and communicative learning (Braun *et al.* 2000; van de Fliert *et al.* 2007). However, scaling up a proven method has been a challenge especially in countries with a large diversity of languages. Educational animated videos in local languages used for training farmers and to prevent diseases may have the potential to promote enthusiasm for learning associated with entertainment. The learning can be reinforced by repetition, discussion and through demonstration of techniques or practices that could strengthen capacity building of low literate populations in developing countries. Additionally, the methodology used could reduce the presence of the traditional extension agents and promote scalability.

RECOMMENDATIONS

Based on the findings of the potential use of animated videos as a potential tool for health and agriculture extension in Benin, we definitely recommend the creation and use of educational videos translated into local languages and readily available for mobile phones. Such an approach was well received by a very high percentage of participants. We recognized that cell phone affordability can be a constraint in the deployment of the videos. We suggest that cell-phones are only one of the multiple tools that can be used for educational purposes. However, we also believe that mobile technology is growing at a rapid pace in developing countries and represents a long-term strategy for such an educational approach.

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