

ANIMATED VIDEOS AS A LEARNING TOOL IN DEVELOPING NATIONS: A PILOT STUDY OF THREE ANIMATIONS IN MARADI AND SURROUNDING AREAS IN NIGER

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ABSTRACT

Access to information and knowledge has always been a challenge for illiterate or low literate learners in developing nations. As a consequence, pedagogical advances, for low literate learners, have lagged behind, as compared to educational strategies for literate or highly literate learners. The technological revolution based on access to Internet and cell-phones has brought new opportunities to one billion low literate learners in the planet. There is evidence that cell-phones are becoming easily available for users in developing nations. "Scientific Animations Without Borders" (SAWBO) creates educational animations that can be watched on cell-phones and other devices and can be transmitted from mobile phone to mobile phone through Bluetooth® technology. In this article we report the results of a short survey conducted by students from Maradi (Niger) with different groups; farmers, teachers in rural areas, informal entrepreneurs and women in which several 3 D animations were showed on mobile phones: cholera prevention, neem seed extract for insects pest control and triple bagging for storage to prevent post harvest losses. The objectives were to find out the perception of usefulness of the content and easiness of the technology used as a mode of transmission of information and knowledge.

KEYWORDS: Animations, mobile phones, education, information technology, videos, Niger.

1. INTRODUCTION

Innovative information deployment strategies have the potential to help usher in a new era of educational tools that can be used to bring life altering concepts into the realm of accessibility to the approximately one billion low literate learners on the planet. According to UNESCO (2008), around 18 percent of individuals worldwide could not write or write in 2005. As full worldwide literacy is not likely going to be a reality in the near future, there is instead a need to make knowledge accessible to people regardless of their ability to read or write; this knowledge needs to be accessible in their own language and potentially even in their own regional accents. With the advent of the Internet, and the ability to transmit information instantaneously around the planet, along with local communication and video capable devices – these educational needs for low literate learners has the potential to be partially met through innovative educational approaches. An increasing number of people throughout the world are gaining greater access to relevant information through Internet and mobile-phone technology. Internet and mobile phones could provide a unique opportunity to address constraints that affect to low literate learners or illiterate in developing countries. However, technology in itself is not the solution – the development of effective educational content that can be deployed through these strategies is what is critical.

The decrease in the cost of mobile phones has contributed to the rapid spread of accessibility of information throughout the poorest countries in the world. The cell-phone industry has exceeding expectations in some of the poorest countries in Africa (Aker &

Mbiti, 2010). Mobile phones have the potential to have a great impact on social and economic development in developing countries (Corbett, 2008; Aker & Mbiti, 2010). Aspects like reduce costs on communication technology and the increase of coverage are facilitating the rapid adoption of cell-phones in developing countries. Like many other African countries the mobile phone industry in Niger is growing rapidly. Even though the the Gross National Income per capita, in Niger, was 700 USD in 2010, 25% of the population owned cell phones in the same year (UNICEF, undated) up from 4.6% in 2005 (Les Afriques, 2009). Considering that in Niger 71.3 percent of the population, 15 years of age and older, has been classified as illiterate (INS and Macro International, 2007) visual and auditory based educational programs on cell phones have a potential impact a large number of people in Niger. Although access to information through mobile phones is only one channel in multimedia, like other forms of information deployment, it needs to be developed with the appropriate content and in the local language of the user.

Offering educational information in local African languages where many people, especially in rural areas, cannot speak the mainstream languages could allow these individuals to obtain useful information and transform this given information into entrepreneurial ideas with the potential for profitable outcomes. For instance, access to agricultural information through mobile phones about how to use better practices for harvesting or, how to store seeds in triple bagging to control insect attack could increase productivity for the farmers. Mobile phones have the capacity to facilitate entrepreneurship opportunities in the informal sector. Thus, entrepreneurs could start business around mobile phones, selling, repairing, and recharging batteries, renting mobile phones in rural areas. The rapid insertion and adoption of mobile phone technology in West African countries could transform the lives of people living in these countries.

This paper offers the results of a pilot study about three short animations placed on mobile phones and the perception of the participants about the content of the animations and the mode of transmission. We explore the potential of educational materials in a form of animated videos in local languages and the use of mobile phone as an educational tool.

2. OBJECTIVES

Scientific Animations Without Borders (SAWBO) is a University of Illinois initiative focused on the dissemination of relevant information and knowledge around the world in a format of animations showing specific techniques in local languages that can serve to improve peoples' lives. Animations could provide a pedagogical platform for information and knowledge that could contribute to positive educational inputs and outputs. Information technology could facilitate skill acquisition for low literate learners (Linden et al., 2003). We explore the potential of creating animations based on techniques or activities scientifically validated that could improve the daily lives of low-literate learners in developing countries. Animations have the flexibility, in many cases, to have greater accessibility across cultural boundaries, as compared to live-action filming, and can be altered through a reiterative process in order change scenes in order to increase their educational potential.

Niger was one of the countries in West Africa where some of the SAWBO animations have been deployed and tested. This paper reports the results of a preliminary survey conducted by the Institut National de la Recherche Agronomique du Niger (INRAN) in Maradi, Niger (Figure 1), related to the impact of three different animations created by the SAWBO program: cholera prevention, neem seeds to prevent pest control and triple bagging for storage to prevent post-harvest loss. INRAN is the national agricultural research institution for Niger. The survey was performed in French and was conducted by a group of 9 students from INRAN. The supervisor of the project from INRAN organized three teams with

three students in each group. Each team consisted of three students for each village, a mix of females and males in each of the three groups. They focused on different target groups: women groups, farmers, and teachers in rural schools as well as mobile phones dealers. The survey was conducted in the region of Maradi (Niger) and the target groups were randomly selected allowing differences in age, education and occupation among other variables. The randomized target population for the study of the impact of these aforementioned animations allowed INRAN an initial assessment of reactions of people to the SAWBO videos before beginning the process of exploring other strategies for the deployment of these animations.



Figure 1. Map of Niger with the location of Maradi ([13°29'30"N 7°5'47"E](#)).

3. METHODOLOGY

This pilot study investigates the perception of usefulness that the participants experienced watching short animated videos explaining a technique that can improve the quality of people lives and their crops. Thus, these animations can be placed into mobile-phones and transmit from mobile phone to mobile phone through Bluetooth technology. Mobile phone technology is becoming more sophisticated and commonplace in many developing countries. In keeping with this general trend, many people Niger are also experiencing an increase access to mobile phones including both urban and rural communities. The usage of mobile phones in rural communities is becoming valuable as a source of communication, education, and entertainment. Farmers with limited access to other media use mobile phones to find relevant information for their farming activities as well as for entertainment to watch videos and movies that can be transmitted from mobile to mobile using Bluetooth® technology. Based on the increase of mobile phones usage in Niger, INRAN conducted a pilot study in March of 2012 to assess the potential for local acceptability of three different SAWBO animations: (i) triple bagging for storage of cowpeas, (ii) neem fruits to prepare biological pest control and (iii) treatment of water for cholera prevention.

INRAN developed a survey of ten short questions to better understand individual perceptions of usefulness of content in a form of animations that they can be watched on mobile phones. Additionally, INRAN tried to find out about some of the key factors that

influenced the positive or negative reception of the aforementioned animations based on what content, how is presented and why the reception could be positive or negative based on factors like usefulness, easy access, easy use of the technology and ease transmission through Bluetooth® technology (Rose & Straub, 1998; Gefen et al., 2003). Additionally, the survey focused on the adequacy of mobile phone technology as a tool to transmit information and acquire knowledge about specific scientific validated techniques or activities that could improve people's lives in developing nations.

Nine students who were employed by INRAN were trained and conducted the surveys. A meeting was organized with the researcher and the nine students to discuss the intricacies of the survey and the videos. At this meeting, students formed four teams in order to visit the assigned villages, distribute the assigned video and ask the questions of the survey to the different groups. Students were trained prior to the survey to show the animations through mobile phones. The students from INRAN that conducted the survey had some expertise in the project and pilot tested the answers with a researcher from INRAN to identify issues with wording, content, format and procedure.

The pilot survey was conducted in four different villages: Sae Saboua, Tsanwa, Karanguia and Chadokori, near Maradi situated about 539km from the capital, Niamey, Niger. The main reason for choosing these villages was for logistic purpose; students that conducted the survey were located in Maradi and these villages are nearby Maradi. From the village of Sae Saboua 14 participants watched a video. From the village of Tsanwa 15 participants watched a video. From the village of Karanguia 15 participants watched a video. Lastly, from the village of Chadokori 16 participants watched a video. A total of 60 randomly participants, 17 women and 43 men, watched a selected video. The survey was performed in March of 2012.

Participants have different occupations: farmers, business people, teachers, cell-phone sellers, and members of women associations. The age of the respondents ranged from 18 to 70 years. The respondents' level of education was very diverse, ranging from 13 completing primary school, 3 secondary school, 15 attending Koranic schools, 17 had some adult education and 6 stated that they were illiterate with no formal education of any sort.

4. DATA COLLECTION

Data was collected after participants had watched the assigned video. A list of simple questions were asked regarding their reactions to the video, perception of usefulness of the content of the video, easiness of transmission of the video, proposals for new topics that participants may be interested in watching based on their community needs and other questions related to the adequacy of mobile phones as a tool used to place educational content in the format of videos. Students conducted informal interviews and group discussions with participants, regarding their observations of some key elements in the videos. The key factors that influenced the positive reception of the videos were based on easy understanding of the content, practical solution to solve a problem, new information about a technique that can be easily applicable in the field or in the house and easy transmission of the knowledge to other groups.

The second stage of the survey focused on mobile phones as a tool used for educational materials in the form of videos, strengths and weakness as well as technical constraints that could affect easy access to information in Niger in terms of current technology and accessibility to these technologies. Mobile phones offer new possibilities to countries in West Africa like Niger. Mobile phones connect individuals living in rural areas and facilitate access for farmers to practical information like prices in local markets.

Additionally, the cost of communication is dropping allowing economic benefits for different groups (Jensen, 2007; Aker, 2010; Klonner and Nolen, 2008).

5. FINDINGS

The main findings are shown in Tables 1 to 6. All the participants in the survey watched one selected video, for instance, teachers in rural areas watched the animation about how to treat water to prevent cholera while group members of the women associations, farmers, households and mobile phone vendors watched educational videos on agriculture such as the neem and triple bagging videos. After watching a selected video the first question for each participant was very simple; if they liked the video, 59 of the participants agreed that they liked the video while one of them did not like the video. Another question that followed the likeness of the video was if the message of the video was clear and we obtained the same feedback. Of the 60 people surveyed, 59 agreed that the message of the video was very clear while one of them agreed that the message was not very clear (see table 1).

Questions	Yes Response	No Response
Do you like the video?	59	1
Was the message clear?	59	1

Table 1: Basic questions associated with the initial reactions to the videos out of 60 respondents.

5.1 Neem Video

The video of the neem extract shows a technique that can be used to extract neem from neem seeds and produce biological insecticide that can be used to spray different crops. A group of 20 farmers watched the neem video. After watching the video, 18 farmers recognized the easiness of how to prepare the mix to produce neem extract as a major strength of the video. One of the farmers mentioned how important the use of neem is as natural insecticide and one perceived the fight against insects that attack cowpea as the major strength of the video. Thus, the majority of the viewers remembered the important message of how to prepare neem juice to spray into their crops. The question about if they enjoyed the video was unanimous; they liked the video and the visualization techniques used to show every step of the process. The main outcome was that the video has the potential to educate farmers in agricultural practices. They all agreed that the message of the video was clear and the main character of the video was also funny. Viewers of this video commented about how the message could be applicable to fight insect attack especially during the rainy season. Farmer's experiences in producing neem extract promote better practices with local techniques. This animation helps with the visualization of every step that farmers need to remember to produce neem extract. Without this animation in hand, important steps such as the mix of neem extract with the right amount of water could be confused or mixed up. When the video showing this technique is used in the field, the process of preparing the mix is easier for the farmer. Lastly, the majority of the farmers that watched the video agreed on the practical solution the video offered. It was very interesting to hear some comments about entrepreneurial opportunities; some farmers thought they could make money preparing neem juice and selling it in the market. Some of their suggestions for the deployment of the video were that farmer's organization could diffuse the message of the video and share the video with their members. Farmers found that sharing the video using Bluetooth® technology was very easy.

5.2 Cholera Prevention Video

The video shows different techniques used for the treatment of water to prevent cholera. This animation was well received by women's groups and teachers at rural schools. They liked the video and thought the message of the video was very clear and the video offered very practical solutions; they could use the content of the video to improve their health. Teachers at rural schools mentioned the possibility of creating a supportive network of people that could share the video. They suggested sharing the video with students and neighbors. The perception of what was more relevant in the content of the video was diverse: eleven participants appreciated the technique used to treat water for prevention of cholera and agreed to help people in their villages with the information that was presented in the video, 6 participants remembered how important it was to wash hands before food preparation, one participant appreciated the information about how to prevent cholera using every step of the video, one participant appreciated finding information about the causes of cholera and one participant appreciated the recommendation about going to the near medical facility after contracting cholera. The general use of the message was to improve the health of the people with no access to clean water. Women also liked the video, which in turn created a dialogue about ways to disseminate the information in ceremonies like baptism and marriage. Furthermore, women mentioned other diverse topics for the creation of videos. As for women and girls it is more difficult to obtain information about controversial topics like forced marriage, divorce, the animation approach providing this information could help to solve that gap. One of the constraints raised by the participants, especially women, was the lack of access to cell-phones due to the cost of buying one therefore easy access to cell-phones was a problem for them.

5.3 Triple Bagging Video

This video shows how to store cowpea beans in triple bagging to prevent insect attack. This animation was showed at the marketplace to farmers, cellular recharger entrepreneurs and women groups. Every step of the message in this video was well-understood. Seventeen participants recognized the use of triple bagging to storage agricultural products. The technique was safe and the outcome was also important; three participants agreed on the non-use of commercial pesticide. One interesting comment was that the transmission of the video could help to save time for farmers since they didn't need to meet regularly to share the information.

Other general questions were asked for the three animations in the survey. For example, one of the questions was what they would do with the videos and, the answers were very diverse: twenty-three participants agreed that they would show and share the video with other farmers and with their neighbors, thirteen would view the video again in their mobile phones, twelve would send the video via mobile phone to other people and two would memorize the message. The viewers of the three videos perceived the usefulness of the content of the videos and share their suggestions for the topics on the creation and production of new videos that could be appropriate to the needs of people in Niger. For instance, in the area of agriculture techniques about millet and sorghum storage, striga control, millet pest control, seed growing, cowpea pest control, soil fertility restoration, irrigation and agriculture intensification were some of the topics that farmers suggested. Women and teachers at rural schools suggested visual education on other areas such as forced marriage, public hygiene, scholarization of young girls, prevention of divorce, sensibilization of pregnant women for safe deliver, malnutrition, malaria prevention among other topics.

These suggestions demonstrate that visual content could be useful to initiate discussions about other topics, which might have not been explored with other mechanisms

of communication. Visual content together with voice overlaid in local languages could be the initial point for engagement in a participatory system (see table 2 and 3):

Video	Message	Number
Neem	Preparation of the mix	18
	Use as a natural insecticide	1
	Fighting insects	1
Cholera prevention	Technique to treat water	11
	Washing of hands	6
	Follow steps for prevention	1
	Causes of cholera	1
Triple bagging	Proper Storage	17
	Non use of commercial pesticides	1

Table 2: Messages perceived from each of the three videos as given to 20 respondents for each video in open-ended questions.

Use of the videos	Number
Show and share	23
Watch multiple times to learn	13
Share the video with others	12
Memorize the techniques	2

Table 3: Answers from respondents about their perceptions of use of the videos.

5.4 Adequacy of Mobile Phones for Transmission of Information

The focus group also examined how communication technology such as mobile phones could be used to transmit information and knowledge in the format of animated videos. Information technology through mobile phones could improve communication and education especially in rural areas. Mobile phones could provide useful information about how to deal with pest control and prevent post harvest loss. Communication among the members of a group and a social network could influence social learning allowing the adaptation of agricultural techniques that can improve people's crops (Bandiera & Rasul, 2006; Conley & Udry, 2010). Based on the potential of mobile phones as a useful tool for farmers in developing countries, the second part of the survey focused on questions related to the adequacy of mobile phones as a mode of communication and information, weakness and strengths, and other uses for this technology.

The question about if the mobile phones were the adequate mode of communication for the transmission of videos 48 agreed that the transmission of the messages from mobile phone to mobiles phone was easy, seven mentioned that the problem was that not everyone has a mobile phone and five discussed that some cheap mobile phones do not have enough memory to properly play videos. Thus, twelve participant did not recognized any flaws in the use of mobile phones to play videos, 28 stated that there was not enough mobiles phones to keep people inform through this technology, ten discussed that sometimes videos did not run

properly in mobile phones, seven agreed that charging batteries in the mobile phones was a problem sometimes, two recognized that illiteracy could be a problem to play videos into mobile phones and one participant wouldn't agree on using mobile phones to share video with others.

The question about communication technology using mobile phones was: 51 of the participants agreed that communication technology using mobile-phones with Bluetooth capacity was adequate to scale the message and reach other groups that did not have easy access to information and technology; one farmer that have watched or placed the video in his/her mobile phone could also inform and share with other farmers so they all could benefit from the information. However, eight disagreed about the use of mobile phones to disseminate information and one found communication technology very difficult for the transmission of information. Some of their main comments about the mobile-phone were the scarcity of mobile-phones with memory cards and limited availability to electricity in rural areas, which condemns some farmers to carry mobile-phones that consume less energy. The discussion in turn of other uses of mobile phone technology was sixteen suggested that it was important to increase the access to mobile phones and internet, eighteen offered a different solution for the problem of technology; improve extension work in rural areas especially in remote places where access to mobile phones could be limited, thirteen agreed that improving the economy of farmers could help with access to information and technology and thirteen suggested that animation could also be played on television and the auditory component of the videos should be play on radio stations.

The perception of the participants was that mobile phones could be used to watch and transmit educational videos but not everyone has access to mobile phones and sometimes mobile phones don't have enough memory capacity to play, store and transmit a video therefore more than one approach should be necessary (see Tables 4, 5, 6):

Mobile phones and videos	Number
Easy transmission	48
Difficult access to phones	7
Poor memory of cheap cell-phones	7

Table 4: Answer of respondents of their perception of the use of cell phones as a mechanism to transmit animated educational messages.

Strengths/Weakness of cell-phones	Number
No flaws at all	12
Scarcity of cell-phones	28
Not well developed technology for videos	10
Batteries	7
Illiteracy	2

Table 5: Answer of respondents of their perception strengths and weaknesses of cell phone usage for transmission of animated educational messages.

Other Solutions	Number
Increase access to cell-phones	16
Improve extension work	18
Improve the economy of farmers	13
Use of other media radio/Television	13

Table 6: Suggested solutions by respondents to increase the impact of animated educational messages

6. DISCUSSION

The aforementioned pilot study in some villages near Maradi (Niger) have illustrated how animations have the potential to be educational and entertainment for people with limited access to information and knowledge which in turn could create new entrepreneurial opportunities for farmers. Animations deployed through mobile phones or any other mechanism still face some constraints that could limit the impact of such educational approaches. Some of the constraints were identified by the participants, like limited access to electricity to recharge batteries in the case of mobile phones. However, other limitations such as low literacy rate, multiple local languages and limited access to information have been solved through our approach of using animations. We could voice overlaid in multiple languages and reach low literary learners. White (2003) and Lunch and Lunch (2006) state that in Africa and Asia the video approach builds visual literacy and empowerment. The target groups that watched the videos shared a similar opinion about the usefulness of the content. Mobile phones could enhance access to information but other factors such as roads, coverage, electricity, infrastructure, etc., could limit the effectiveness of mobile phones as a tool for economic development.

Responses from participants help to understand how information in local languages has more significant impact for success. Additionally, mobile phone technology offer new opportunities to transform educational information in a form of animations into tangible outputs. In the case of the neem video, some farmers suggested the possibility to create a business producing neem extract and selling it in local markets. Furthermore, there are other opportunities that can help reforestation planting neem trees that can be profitable for farmers. It is important that information systems in developing countries support education as a driven force to improve people's lives and solve some of the most urgent problems in developing countries. An educational material in a form of animated videos in local languages is pioneer solution to some of the needs due to the lack of information that peoples face in rural areas. However, the adoption and implementation of these techniques should be perceived as opportunities of some source; economic.

Scientific Animations Without Borders (SAWBO) is doing deployment at small scale but also other local groups like NGOs and extension agents have started the process of deploying educational materials in a form of animated videos. The strength of this innovative approach to development is both the content of the animated videos in local languages based on scientific research offered in a format of an easy technique that individuals can remember and, the mobile phone communication technology to deploy and store the videos so users can watched as many times as they need it. The increase subscription of mobile phones in West African countries is becoming cheaper for the subscriber (Ahmed et al., 2007). This means in the near future more people will have access to mobile phones in developing countries

through ownership or sharing. The potential consequences for economic development could surpass expectations.

7. CONCLUSION

The pilot study raises several key factors associated with important implications for future educational approaches for low literate learners and illiterate. First, the general reactions to the videos were positive by a large majority of participants in the study (all but one person). The fact that these animations were not adapted for the local context (i.e., characters were not made to look like local people and the landscape were not localized) lends credence to the concept that animations can potentially be used as a generalized learning tool – a concept that needs to be further addressed in future studies. If this holds true across multiple groups (something which needs to be tested in future studies), then the use of animations with voice overlays in different languages, has significant potential as a generalizable learning tool.

However, the exact pathway or pathways for deployment in the Maradi region are still not clear at this time; however, such approaches will likely involve a mixture of strategies. The trend towards increased diffusion of mobile phones in West Africa could represent one logical approach for the diffusion of educational animated content. This study suggests the potential to use cell phones to target at least one component of these populations in Maradi, however, extension programs and NGOs who choose to use such educational materials may also need to use other devices and other strategies to deploy or use these animations in their educational programs. Such strategies, like other educational approaches, should take into consideration the reliability of the technology, costs, availability and infrastructure to support continued use of these technologies. As the SAWBO videos are available in a diversity of file formats, they can be viewed on laptop computers, DVD/vCD players, small hand-held projectors, and a host of other video-capable devices.

The approach of animations should also include a clear and easy message that work on individual's perceptions to adapt the technique showed in the video. This may require effective deployment strategies that aim to work through different ways with outsourcing and different partners in the ground. As the findings of this study indicate, one approach does not fit all and identified technological constraints may limit those that can directly gain access to the animations. However, if trends continue of increasing access to video-capable cell phones, the deployment of animations through this mechanism may become increasingly useful.

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Appendix 1. Survey instruments used in the study.

Enquête sur les nouvelles techniques de communication en milieu rural.

FICHE D'ENQUÊTE Enquêteur : _____ Vidéo visionnée : _____ date __/__/__

1. Informations générales sur la personne enquêtée :

Nom et prénom : _____ Sexe : _____

Age : _____ Occupation : _____

Niveau d'instruction : _____

2. Impressions après avoir vu la vidéo :

Aimez-vous la vidéo ? _____ Les messages sont-ils clairs ? : _____

Quels sont les éléments clés que vous avez retenu : _____

Quelle(s) utilisation(s) pouvez-vous faire de ce(s) message(s) : _____

Voulez-vous avoir cette vidéo dans votre cellulaire ? _____

Qu'allez-vous en faire : _____

Pensez-vous que ce mode de communication est adéquat pour atteindre un public plus large ? _____

Pourquoi ? _____

Quels sont les points faibles de ce mode de communication ? _____

Quelles sont les autres contraintes importantes au niveau du village qui nécessitent des vidéos de sensibilisation ? _____

3. Autres contributions : _____