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Problems and Prospects of Animated Video Clips in Agricultural Extension in Nigeria

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Abstract

There has been increased agitation about the relevance of the National Agricultural Research Institutes in Nigeria judging from their impacts on rural farmers. A lot of technologies have been developed by the Institutes for use by these unlettered farmers who constitute more than 65% of Nigeria's labour force. Studies have shown that majority of the agricultural extension problems have been linked to communication. Earlier forms of visual communications such as extension guides, manuals, posters and fliers have enjoyed relative success. However, there are still farmers who find learning by visual collaterals alone challenging. Animation as a form of audio-visual communication has enjoyed unprecedented progress in other critical sectors of the nation's economy such as education and health. This paper reviewed the prospect of adapting 3D animation as a tool for agricultural extension in Nigeria as well as its attendant challenges. The types, stages, software and processes of 3D animation capable of impacting rural farmers in Nigeria were reviewed. The finding revealed that deploying 3D animation in agricultural extension has enormous potentials. The review concluded by recommending that further research should be conducted to deliver agricultural extension messages using animated video clips to drive behavioral changes towards the adoption of on-shelve technologies developed by National Agricultural Research Institutes in Nigeria.

Keywords: Unlettered, National Agricultural Research Institutes, Technologies, Visual Communication, Animation, Behavioral Change

Introduction

THE POWER OF VISUAL COMMUNICATION IS BASED ON BOTH EVOLUTION and science. Successful visual communication stimulates viewers intellectually and elicits behavioural response from them. A complex notion, method, or concept can be shown as a stationary or moving image in visual communication (Pricewater House Cooper, [PWC], 2017). As observed by Dale (1969), www.business.inquirer.net (2021), People only tend to remember 10% of what they hear and 20% of what they read, while over 50% tend to recall what they see.

Economists have severely identified agriculture as the most viable tool to bring Nigeria out of the current economic dilemma. In the long run, technological advancement is also the most essential factor in improving agricultural output and reducing poverty (Asfaw *et al.* 2012). Agriculture has immense potential as a mainstay of the Nigerian economy. According to Agricultural Research Council of Nigeria [ARCN] (2018), Agriculture currently employs 65 percent of Nigeria's labour force. ARCN (2010) observed that when technologies are developed, the mechanisms of diffusion and adoption are often ineffective or non-existent. In many cases, the expected users are not aware of the existence of these new technologies. In other circumstances, less than ten percent of these technologies are used due to access issues, excessive costs, or insufficient transfer techniques.

Many of the difficulties linked with extension initiatives are due to extension's inability to address communication issues (Annor-Frempong *et. al.* 2006). According to Price Waterhouse Cooper [PWC] (2017), Human beings remember and learn from images more successfully than text. Despite this, the majority of agricultural communications are still text-based. Unlike images, text is a recent invention in human history that requires character-by-character reading, recognition, and synthesis into words and sentences before comprehension can occur. Agricultural extension materials are still predominantly text-based, regardless of the languages used to explain agricultural technologies.

The decline of extension workers in Nigeria and the surge in Information Communication Technology (ICT) improvements as well as the emergence of new agricultural paradigms, warrant challenging the conventional methods of agricultural communication targeted at specific populace. ICT has the potential to provide farmers with all of the information they require for their crop production, credit facilities, input supply, pest and disease control, post-

harvest techniques and improving market access. Agricultural extension systems can help rural people to adopt and effectively use these ICT tools in obtaining their needed services once they are available, in ways that will have positive impact on their production and income (Rahman and Hamid, 2012).

Several studies in Central/South Asia, Latin America, and parts of Africa have examined learning gains via educational/instructional animated videos against typical agricultural extension methods, such studies have not only found target populace demonstrating increased learning gains from such videos but they have also suggested them as a form of information sharing.

Challenges of Visual Communication in Agricultural Extension

There has been public outcry on the impact ofresearch findings of the National Agricultural Research Institutes (NARI) in Nigeria, on their immediate communities and the nation at large. The consequence of this is that the farmers continue to use primitive method for farming and animal production without significant improvement in their livelihood. To date, some agricultural extension programs in Nigeria have tended towards a top-down flow of technical information (Musa *et al.,* 2015; Alao, 1982), with dissemination of current research findings remaining low (Faborode & Ajayi, 2015).

For example, ARCN (2010 & 2018) observed that, the National Agricultural Research Institutes domiciled in the Ahmadu Bello University (ABU), Zaria Agric/Vet. Complex has developed a combined 90 agricultural technologies in the last 20 years. New technologies such as improved varieties of crops, livestock, fish as well as their production and processing methods have been generated by national agricultural research efforts. Despite these efforts, progress on productions of these commodities have not kept pace with domestic demand talk less of exports (ARCN, 2018). This problem points to the fact that while these Institutes have developed a number of technologies, they have not done much in the dissemination of these technologies to the rural farmers who constitute more than 65 percent of the farmers in Nigeria (Enete & Amusa, 2010).

More so, it has been observed that several agricultural research outcomes are not linked to development and information dissemination processes (ARCN, 2018). However, taking the multi-disciplinary research approach, on-shelf technologies can be revisited and developed to the adoption stage using alternative visual communication methods such as animation video

clips. A single animation clip can also be replicated in different languages to ensure extension instructional materials are tailored to audience characteristics. Ema (2010) observed as a major challenge, the extrinsic and intrinsic barriers towards the mitigation oflearning gains using animation. Such extrinsic factors can include; access, time, support services, resources and training. While the Intrinsic barriers consists of; attitude, beliefs, practises and resistance.

This position would buttress the findings of(Ndahi, 2015) who identified some constraints limiting the optimal usage of visual instructional materials among farmers of North-West, Nigeria as language barrier and literacy level of target audience. Also Danladi (2018) reported that other methods of dissemination of agricultural information by extension services should be developed for better understanding of farmers towards attaining better productivity.

Against this background, majority of the existing visual communication extension materials deployed towards the transfer of agricultural technologies by NARI's in Nigeria are largely in print format. As such, there is the need to examine the prospects and challenges of transmitting agricultural technologies using animated videos.

Therefore, this study would review the role of animation in development communication as well as enumerate the stages of production of animated videos capable of impacting agricultural technologies.

Visual communication as a panacea for technology adoption in agricultural extension in Nigeria

Communication

Many academics have defined communication in a variety of ways. Communication, according to Nwabueze (2014), "is the flow of information, ideas, experiences, and data of all kinds that ensures the normal and structured existence of people in every society". To further reiterate Nwabueze's position, Lasswell (1948) in Ebibagha (2006) outlines that the best way of describing the communication process is by answering these questions: Who? Say? What? Through which channel? To whom? And with What effect? By asking these questions, Lasswell asserts that communication must elicit some effect or feedback from the receiver before it can be considered complete.

Principles of technology transfer in Agricultural Extension

Principles serve as guidelines for consistent decision-making and action. According to the Food and Agricultural Organization [FAO] (2019), agricultural extension must adhere to certain principles to ensure effective technology transfer. These principles include recognizing cultural differences, beginning with local organizations and circumstances, and prioritizing the interests and needs of the people. Extension efforts must be based on the perceived needs and interests of the people to be successful

Strategies for development of content for low-literate learners

Nigeria has a diverse population with various ethnic groups, including Hausa-Fulani, Yoruba, Igbo, Ijaw, Kanuri, Ibibio, and Tiv. Most farmers in Nigeria reside in rural areas, and due to the diversity of language and culture, pictorial and spoken forms of information are preferred over written. Live videos and animations are the main options for viewing on ICT enabled devices (www.refworld.org, 2022).

Live action film

The major advantage of live-action film with local actors is that the people can relate to it. They see the cast as people from their local environment. However, among the disadvantage includes the large filming crew in each area where the video is produced and that it has to be tailor made to a specific audience in different languages and cultural attires. Continued refilming in different cultural and language group is expensive.

In contrast, Bello-Bravo (2011) agreed that live action filming does not generally lend itself to the development of a virtual network of collaborators (including volunteers) who can develop materials in different areas of the world for deployment into targeted regions. Animations, in contrast, can be developed through networks of individuals located in most regions around the world and do not have many of the other aforementioned limitations described for live action filming.

Animations and voice overlays

Animation can be defined as the art of producing a series of differing images that create the appearance of movement when played in rapid succession over time. According to Etim *et. al* (2016), the impact of animation in

understanding abstract processes have been tested by several studies. As such, animation can be seen as a visualization technique.

There are four basic techniques used in animation. They include: drawn animation, model animation, stop motion animation, as well as computer animation or computer generated imagery (CGI)

Plate 1: Depiction of2D and 3D images using lettering
Source: www.mediafreaks.com retrieved 3/10/2021

Types of Animation

2D Animation

Flat, 2D characters and environments are produced using 2D animation. Recent advances in technology and software has enabled animators to edit frame by frame. The process of traditional 2D animation is time consuming. However, today, there abound a lot of digital tools, techniques and software that helps to simplify the work process. Such software includes: Adobe Animate (Formerly known as Flash), Tv Paint, Toon Boom Harmony, as well as Adobe After Effects.

Stop motion

An object is physically moved during stop motion animation to make it appear to move on its own. Clay figures or dolls with movable joints are frequently utilized in stop motion because they are simple to reposition. The object is moved in small increments between separately photographed frames, providing the illusion of movement when the series of frames is played as a fast sequence. Clay-mation

The art of using plasticine or clay to create characters in stop motion animation is called "clay-mation". Clay models have an inner metal skeleton designed to allow realistic movements and expressions, these movements are then shot or photographed in sequence like in traditional 2D animation.

Motion graphics/capture

This is a modern form of 3D animation that allows creators to create ultra-realistic animations using graphic elements, shapes and text, based on live action scenes. The motion capture process involves dressing actors up in suits that track their movements and interactions so that they can be recreated using computer graphics.

3D Animation

3D animation is also referred to as computer generated images (CGI). It is a screen revolution of the 21st century. It has been applied in medicine and architecture (www.creativehumans.com, 2022). It works basically by generating images using the computer. Such image series becomes the frames of an animated shot. As noted by Kanojia (2020), both 3D and Stop Motion animation are similar as both deals with animating and posing of models.

3D animation is often used for learning gains in education (Bello-Bravo, 2017), full length movies, interactive advertisements, commercials and other marketing materials (www.creativehumans.com, 2021).

3D Animation softwares

i. Blender: The blender 3D software is open source soft ware which presents opportunities for sculpting, animation, rendering and video editing.

ii. AutoCAD: Autodesk's AutoCAD is one of the most versatile and widely used 3D modelling application in the engineering, environmental, industrial as well as graphic environments.

iii. Rhino: This is one of the industry versatile 3D modeling software. It has the capability to create mathematically precise models of 3D surfaces. Its application includes product design, architecture, industrial, graphic design and multimedia fields.

iv. Revit: This software is also from Autodesk. It is used mainly in architectural design and structural engineering especially Building information Modeling (BIM).

v. 3DS Max: Another Autodesk software. 3DS Maxis a mode 1 in g, an i mat i o n , simulation and rendering software used in Industrial design, film, games as well as motion graphics.

vi. Maya: Maya c a n b e used for game development, animated films and visual effects. It offers high-end tools for characters and effects.

vii. Cinema 4D: Developed by Maxon, Cinema 4D is a 3D modelling, animation and rendering application that is used by motion graphics designers, architects and 3D animators. It is widely used in the film industry.

Process of 3 Dimensional Animation

Plate 2: Process of 3D Animation
Source: (Abubakar, 2023) adapted from www.media-freaks.com/the-process-of-3d-animation/ retrieved 21/10/2021

Stages of 3D Animation

The stages of 3D animation include:

i. Concepts and Storyboard
ii. Character Modeling
iii. Texturing
iv. Rigging and Skinning

v. Animation
vi. Lighting
vii. Camera Angles and Techniques
viii. Rendering
ix. Compositing and Special VFX
x. Music and Foley
xi. Editing and Final Output

1. Concepts and Storyboard: A storyboard is a chain of illustrations that presents the storyline in two dimensions. The first dimension is time; this phase illustrates in a frame what happens first, next and last. The second is interaction. This phase interrogates how the voiceover (the story) interacts with the images, how does the voice overs interact with the musical sound track? The story board is the place to plan and ensure that all elements interact and make an impact on the target audience.

2. Ch a r act er Modelling: The next stage is ch a r act er modelling. This stage involves the building of props, environment and character. Here, the different shape in the story is molded into a completed 3D mesh.

Plate 3: A modeled animation character
Source: blenderartist.org retrieved 26/01/2023

3. Texturing: This is the art of giving clothes to 3D models. Sometimes, animators can use real images of the textures they are trying to create by altering them to create repeatable patterns. 4. Rigging and Skinning: The technique of creating a controllable skeleton for a character meant for animation is called rigging. Skinning on the other hand is the process of giving skin or cloth to the rigged skeleton so the 3D model can be manipulated by the controls of the rig. The rigging and skinning brings the character to life.

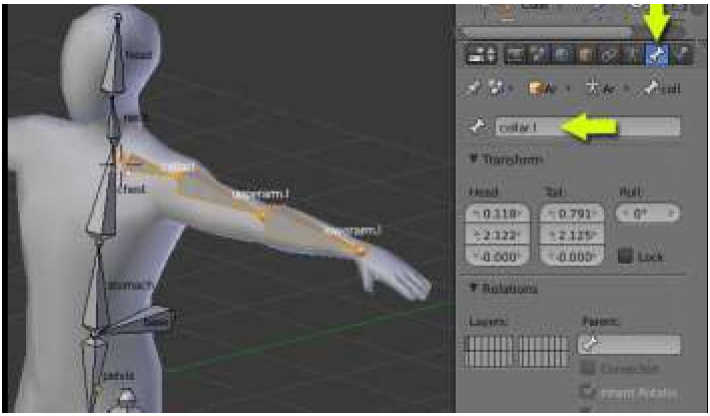

Plate 4: A human figure being rigged and skinned
Source:https://cgi.tutsplus.com/tutorials/building-a-basic-low-poly-character-rig-in-blender--cg-16955 retrieved 26/01/2023

5. Animation: Animation is the process of creating movement for the rendered 3D object. The process of animating objects varies. Animation can also be created using 3D application's built-in physics engines, or importing motion capture data and applying it to character rig.

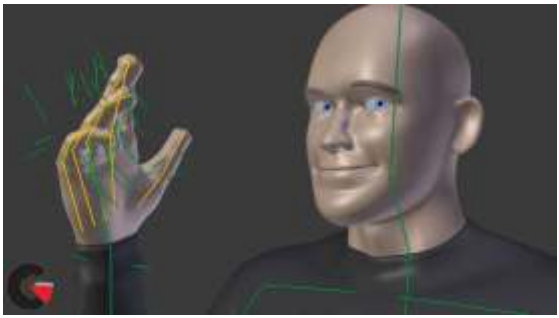

Plate 5: A Character being animated in 3D software
Source: https://cgarchives.com/blender-character-rigging-with-blenrig/ retrieved 26/01/2023

6. Lightning: Lightning (in combination with textures, camera angle etc.) enables animation scenes to come alive. If used properly, it can make a scene come alive like in real life situation. Where it is inappropriately applied, it has the potential to wash out a scene by making objects appear flat or hard.

7. Camera Angles and Techniques: What distinguishes a good cinematography from a bad one is the camera angle from which the film is shot. The advantage of 3D is that, software is used to mimic the work of the real life camera such as depth of field, focal length etc. using the camera in 3D software can enable a designer assign a view to a camera such that the result would show the scene from the perspective of the camera.

8. Rendering:

Plate 6: A movie scene rendered in 3D software
Source: https://www.upwork.com/services/product/ design-a-fully-rigged-character-for-your-blender-animation-1399470226579873792 retrieved 26/01/2023

Rendering is the most important step in the 3D production process. Before rendering, attention should be paid to the camera placement, lightning choices, which may affect mood and shadows, reflections and transparency, and special effects, like fluids or glasses.

9. **Compositing and Special VFX:** This is where the final renders are brought into compositing programmes to edit, touch up and add on special effects. However, blending live footage with digitally created footage such as animation would be regarded as compositing.

10. **Music and Foley:** this is the stage where music and voice overs are added to give the animation depth as well as boost in audio enjoyment. Sound effects for film, television and radio productions are created by a Foley artist.

11. **Editing and Final Output:** This is the stage where all compositions are integrated to create a final output. Upon satisfaction, the animated video or film is now exported as a final product in any video format desirable.

Sources of Information for Development of Content

In Nigeria, the National Agricultural and Extension Research Liaison Services (NAERLS) is an Institute with a mandate of developing, collating, evaluating, and disseminating proven agricultural innovations and research extension methodologies and policies to farmers all over the country (www.naerls.gov.ng, 2023). They validate and develop contents targeted at specific populace. But, most times, other NARis has their extension arm. Such is the Livestock Systems Research Programme (LSRP), in the National Animal Production Research Institute (NAPRI), ABU, Shika-Zaria as well as the Agricultural Extension Services Programme (AESP) of the Institute of Agricultural Research (IAR), ABU, Samaru-Zaria. At least some of the previously mentioned organizations have a history of developing techniques and educational content that benefitted farmers all over the country.

Other sources include: peer reviewed and non-peer reviewed literatures, inventors and indigenous knowledge. Combining these sources could create a strong method of producing relevant content. Examining materials from past extension communication and understanding the history of methods and materials used will ensure the target audience receives high-quality content.

Prospects of Animation for Instructional Purposes in Agricultural Extension in Nigeria Earlier animations have targeted populations to educate

people of natural disasters such as earthquakes, tornadoes, floods, hurricanes, wildfires and what to do when faced with such situations. Others targeted prevention, control and treatment of diseases. Simple messages can help people prepare for catastrophic and emergency situations. For example, the Scientific Animations Without Borders (SAWBOSM) has been at the forefront of creating animation for learning gains. The SAWBO team led by Julia Bello-Bravo has created animations to address agricultural and health issues. One of such animation was created for the prevention and control of cholera in Haiti and the Dominican Republic (Bello-Bravo, Dannon, Agunbiade, Tamo, & Pittendrigh, 2013). According to Bello-Bravo (2011), a script was given to the team to develop into an animated video. The language overlays were created in Creole, French, Spanish and English, and the animation were given out to different stakeholders for free distribution.

The cholera outbreak in Haiti represents an excellent example of how animations can be used to mitigate crisis situation in a developing nation. As concluded by UNESCO (2010), text messages and other forms of written information would have been largely ineffective since 40-50% of the Haitian population is illiterate. Since many of the illiterate people in Haiti speak Creole, the animated video was developed in Creole (in addition to those in other languages) with a local accent to facilitate the understanding of techniques for the prevention of cholera.

Conclusion

Visual communication in agricultural extension through guides, training manuals, posters and fliers have been a success over the years, as there have been impressive records of learning gains (Ndahi, 2015). Having reviewed the principle of technology transfer in agricultural extension vis-a-vis the types, processes as well as stages of 3D animation, the potential of knowledge and technology transfer in agricultural extension through 3D animation is enormous. The rapid development of ICT in Nigeria as well as major breakthroughs in artificial intelligence and big data have created opportunities for the modeling of realistic 3D characters and by extension believable animated video clips which can be created to replicate or topple successes recorded in other sectors of the nation's economy which animation have been deployed for learning gains. This is because Clark & Mayer (2008) observed that animations help learners to understand complex ideas more easily. The process of teaching

and learning animation takes a different dimension and presents a novel experience. Both teacher and student find it more comfortable to explain or understand a topic (Kwasu & Ema, 2015). Animation also creates long retention among learners (Itighise and Ofili, 2012). This notion supports that of Bello-Bravo *et. al* (2017), where she conducted an experiment on the role of information technology for development; assessment of learning gains from educational animated videos versus traditional extension presentations among farmers in Benin Republic. The major results from the review of the study concluded that video animations would foster greater learning gains than traditional extension presentations. The study also observed that once exposed to video animations, people give more attention to learning compared to the traditional extension learning presentations. Therefore, future studies should be undertaken in Nigeria to corroborate the stand of the researcher in this study.

To sum up, Animation has a bright future as a visual tool for disseminating agricultural innovations. This is because compelling animated video materials may be tailored for a specific audience, taking into account their social conventions, language, cultural beliefs, and religious beliefs (Bello-Bravo *et. al.,* 2015, Bello-Bravo *et al.,* 2017).

More so, the reviewed studies have buttressed the fact that animation videos for learning gains have the potential to impact a large audience effectively. Trying this communication method in Agricultural extension in Nigeria shows great possibilities.

Findings and Recommendation

The following findings were made from the review of this study

1. Animation can serve as an alternative source of visual communication for agricultural extension in Nigeria through proper application of 3D animation processes, stages and methods.
2. With the success recorded with 3D animated video clips for knowledge gain and technology transfer in different sectors of the Nigeria's economy, on-shelve technologies developed by National Agricultural Research Institutes can be revisited and transferred to target audience through 3D animation
3. With the rapid progress being recorded with ICT, rural farmers in Nigeria can receive animated video clips through the various ICT

platforms available in the country as exhibited by rural populace in various countries of North and Central America as well as part of Africa.

This review recommends future studies be conducted to deliver agricultural technology information using animated video clips that can elicit behavioural changes towards the adoption of on shelf technologies that have been developed by Nigerian agricultural research efforts, which are capable of impacting the lives and livelihood of rural farmers in Nigeria.

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