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Increasing Lifelong Learning Using Video Animations: The Case of an Agriculture WhatsApp Group in Kenya

Anne Namatsi Lutomia and Julia Bello-Bravo

Abstract

Developing new ways of providing information and knowledge for lifelong learning to those on the margins of society with low literacy and access is complicated. Using a case study, this chapter generally demonstrates how smallholder farmers in Kenya engage in opportunities for lifelong learning offered by video animation programs in agriculture in their WhatsApp groups. The definitions of lifelong learning, affordances that technology provides for lifelong learning, and its relationship with Sustainable Development Goal 4 (SDG4) are offered. Moreover, African philosophies and practices such as *Palaver*, *Harambee*, *Umuganda*, *Ubuntu*, and *Omoluabi* and how they relate to and increase lifelong learning are discussed. The successes and challenges of the WhatsApp groups and video animations as sites for lifelong learning are also addressed.

Keywords: agriculture, technology, lifelong learning, video animations, WhatsApp, Kenya

1. Introduction

Lifelong learning has emerged as a critical concept in contemporary society, reflecting a shift from traditional, time-bound educational models to more dynamic and continuous forms of learning. The first major emphasis on lifelong learning was in the 1970s [1] and was visible in development and implementation of policies such as lifelong education (UNESCO, Council of Europe), lifelong learning (UNESCO), recurrent education (OECD), and *education permanente* (Council of Europe). Hager and Halliday [2] comment that this concept was not well-received in education initially; lifelong learning was misunderstood as devaluing traditional education, as it was mistakenly equated with lifelong education. This led to a decline in the interest in lifelong learning in the 1980s, with renewed interest in the 1990s. In that decade, lifelong learning experienced a renaissance to emerge as the dominant idea.

This resulted from numerous modern forces, including the growing importance of knowledge creation, globalization, and neoliberal economic imperatives. In the

modern, knowledge-driven world, people realize more and more how important it is to constantly update and learn new skills throughout their lives. Beyond traditional school environments, lifelong learning encompasses a range of (often specifically adult learning) experiences, including job training, independent study, and interaction with a variety of learning materials. Due to shifts in industry and technology, a demand arose for critical flexibility and staying abreast of cutting-edge knowledge. This has created a situation where lifelong learning can supply the knowledge and skills to remain competitive and relevant in the workplace. According to Jarvis [3], lifelong learning is a comprehensive strategy that views education as a continuous and integrated aspect of existence, stressing the value of social interaction, personal growth, and the accumulation of both explicit and tacit information.

Presently, lifelong learning applies to a vast number of situations. The information economy, globalization, and the speed at which technology is developing all highlight how important it is for people to always be learning new skills and expanding their existing ones. As such, lifelong learning not only promotes career advancement but also advances personal development and the welfare of society. It supports a proactive approach to skill acquisition and encourages adaptation in the face of change. Furthermore, by encouraging tolerance and understanding among people from different backgrounds and cultures, lifelong learning promotes social cohesiveness and inclusion in a society where these qualities are not readily available. The benefits of lifelong learning for society, according to Field and Leicester [4], include the development of an innovative and curious culture, enhanced employability, and more knowledgeable and involved citizens.

The purpose of this chapter is to demonstrate how video animations produced by a university-based program, Scientific Animations Without Borders (SAWBO), contribute to lifelong learning in agriculture through a WhatsApp group in Kenya.

2. Lifelong learning in principle and practice

2.1 Lifelong learning defined

Lifelong learning (LLL) covers the whole range of learning: formal, informal, and non-formal. It also includes the skills, knowledge, attitudes, and behavior that people acquire in their day-to-day experiences. Lifelong learning is closely linked to adult learning because it refers to the continuous, voluntary, and self-motivated pursuit of knowledge throughout one's life. It encompasses formal and informal learning experiences occurring in various settings such as the workplace, community, and personal life. Lifelong learning recognizes that individuals can and should continue to learn and adapt to new challenges and opportunities across their lifespan. The concept aligns with the idea that learning is not confined to specific stages of life but is a continuous and evolving process. Lifelong learning identifies the fact that there is no end to education. It is not just a means to an end but something that should be embraced and pursued for personal and intellectual growth [5]. This then introduces the question: how do we learn to learn? According to Medina et al. [6]:

Metacognition is an essential skill in critical thinking and self-regulated, lifelong learning. It is important for learners to have skills in metacognition because they are used to monitor and regulate reasoning, comprehension, and problem-solving, which are fundamental components/outcomes [6].

Metacognition is an important skill for lifelong learning because the learners are aware of understanding how they learn and therefore can evaluate and adapt honed skills for effective learning. Currently, the increased demand for lifelong learning increases the demand for metacognitive strategies:

Metacognitive skills also have a role in critical thinking and problem-solving. If you know what you know and do not know, your metacognitive skills help drive you to obtain the missing information, which we refer to as self-directed or self-regulated learning [6].

Currently, although lifelong learning is accessible through many channels—including online courses, extension university courses, workplace training, and certification courses, non-formal technical and vocational education and training (TVET), courses by professional organizations and master classes, and self-directed learning, even using ChatGPT [7]—it is most frequently *adult* learning, which can differ significant from formal primary, secondary, and college-level learning.

Specifically, Malcolm Knowles described *andragogy*, which focuses on how adults learn [8]. Knowles critically differentiates andragogy from pedagogy, which seeks to understand how children learn. Knowles [9] emphasized the necessity of considering adults' self-concept, experience, readiness to learn, and orientation to learning tasks in facilitating effective adult learning. Knowles [10] provides the most widely accepted definition of adult learning with eight elements: (a) it is a process (b) that is initiated by the individual, (c) which may or may not involve the help of others, (d) to identify their learning needs, (e) develop learning goals from these needs, (f) find the necessary resources to attain these goals, (g) select and implement the proper learning strategies to meet their goals, and (h) determine how to measure learning outcomes. According to Knowles, adult learning takes place away from the traditional formal education system and is self-directed. It is driven by the individual and leans toward experiences. Adults pursue andragogy to improve their work experience, personal development, and new interests or hobbies. Brookfield [11] examined Knowles's andragogy and critiqued it for not considering cultural differences, centering learning experiences of those in individualistic, not collectivistic societies, where learning takes place in groups and activities are more frequently done together. Hence,

This does not mean that self-directed learning is highly individualized [or that] learning is always conducted in isolation. Learners can work in self-directed ways while engaged in group-learning settings, provided that this is a choice they have made believing it to be conducive to their learning efforts [11].

Others see self-directed learning as influenced by variables like the personality of the learner, the experience in the content areas, availability of resources, and society's attitudes toward self-directed learning and other perceived cultural constraints [12]; importantly, self-directed learning is not simply a matter of a learner's innate capacity [11].

Given that lifelong learning occurs throughout our lives, it is vital to understand how we learn to learn, as this informs meaningful learning strategies to that end. This introduces the concept of *transformational learning*. Lifelong learning is transformational and occurs at all stages of life [3]. It leads to creativity and innovation and provides a basis for changes in knowledge, attitude, and behavior [13, 14]; it changes the *parameters* of learning, not just the content learned. Accordingly, transformational

learning is reflective and involves meaning making and raising consciousness in order to free oneself [14, 15]. It shifts one's worldview, assumptions, expectations, and earlier ways of interpreting, deciding, and evaluating conclusions [14].

Arguably, the educational theorist Paulo Freire contributed to the notion of transformational learning by urging learners to be involved in the societal transformation of their community [16]. For him, education should not produce passive learners who receive knowledge that does not resonate with their reality and therefore prevents them from being engaged in producing knowledge for a better community. Freire asserts that education should encourage dialog, raise consciousness, and aim for the liberation of people [16].

2.2 Lifelong learning and technology

Since the beginning of the twentieth century, forms of media like film, radio, television, computers, the Internet, mobile technologies, social media, and virtual, augmented, mixed, and extended reality have been hailed as having the potential to revolutionize the educational system [17, 18]. These modes of teaching have also been used in the agricultural sector to supplement face-to-face (adult) extension services.

The proliferation of mobile phones has allowed the use of social media platforms for information sharing and learning from each other [19]. WhatsApp groups have utilized this affordance and have enabled farmers in rural areas to share information on planting season, crop management, pest control, storage, and market trends [20–24]. These WhatsApp groups are important to farmers who sometimes cannot access extension service information due to gender, geographic remoteness, or perennial shortages of time and numbers of extension service officers.

This access to information using WhatsApp on mobile phones is supported by decreasing costs of mobile phones and Internet connectivity [20, 21, 25]. In various African countries, the capacity of mobile phones to deliver and provide services has led to *m-services*, including m-agri, m-commerce, m-banking, and m-health. These services are accessed with or without connectivity and are either free or require payment [24]. Their delivery is not without challenges. Disparities exist in terms of class, gender, educational attainment, and geographic (urban versus rural) location. Women farmers who live in rural areas especially face these digital, extension service, and m-service divides [21, 26]. Other barriers include exorbitant prices for data access, airtime, and reliable smartphones, unreliable charging points and electricity infrastructures, and issues around language, print literacy, and familiarity with mobile technology usage [27]. Women also experience particular social risks from men due to owning and using mobile phones [28–30].

Nonetheless, mobile telephony is important to lifelong learning because as people learn how to use the mobile phone, they acquire literacy skills, technology skills, and social skills that they can apply elsewhere. This especially concerns the emergence of large language models like ChatGPT, which is envisioned as providing much greater access to information, interactions, learning, and decision making [18, 31]. A critical feature of this is the learning interface itself. Although always with the risk that an LLM will provide erroneous or false information, the interface allows self-directed and self-paced probing of questions; unclear examples can be tagged as such and alternatives asked for. Examples can be asked for to be solved. Most of all, interpersonal conflicts between teachers and learners are not necessarily marked by problematic cultural dynamics; LLMs are infinitely patient, do not mind repeated questions, and do not have a schedule of curriculum or material they must get through within an

allotted period of time. When this works, it affords access to genuinely relevant information for decision making [32]. It can also translate languages, summarize information, respond to questions, and generate text as probed. Besides the risk of providing false information (which essentially requires the learner to already know the topic in order to spot the error), other learning-context shortcomings include privacy issues, cultural bias around normative assumptions (especially along race), plagiarism, and the ubiquitous risk of all technologies to amplify existing divides [33, 34].

Remaining cognizant of these issues, Artificial Intelligence LLMs like ChatGPT (and other digital forms of learning) enable lifelong learning for agricultural extension services, including adaptation, interactivity, and data analysis of existing content. A key emphasis in adult learning is the requirement to connect any information conveyed to the interests of adult learning; LLMs can directly provide this connection, as its users pose their own questions. As of yet, these interfaces are text-based. In the future, content developers, experts, scientists, and animators could leverage these technologies to build characters, overlay them with human-sounding, locally relevant (indigenous) languages, and afford appealing, visually animated figures and stories that learners can relate to.

Technological challenges would limit the reach of this (due to Internet access rates, data limitations and plans, smartphone availability, and so forth). But a template for such an interface already exists in animated videos by Scientific Animations Without Borders (SAWBO).

Founded in 2011, SAWBO researches, creates, and supports the mass dissemination of educational animations to support Sustainable Development Goal topics, including agricultural food security, personal and community health, improved livelihoods, and reduced poverty. Using visually engaging, locally translated, and culturally appropriate content, SAWBO aims to engage and empower the broadest demographic possible [35, 36]—especially communities spanning diverse languages, educational and literacy levels, socioeconomic status, and cultures. As a systems approach for mass-accessibility to such learning and knowledge content [25], SAWBO's animated video media demonstrate increased learning gains compared to traditional extension teaching, high levels of solution adoption and adaptation, and ready redistribution and sharing, especially through the now most widespread and familiar form of information and communication technology (ICT) access, mobile phones [19, 37–41]. The goal is to provide a maximally accessible and redistributable “menu” of innovations and solutions that people at all scales (from individual change agents to governmental and international global coalitions) can select, adapt, and apply to their local problems [42]. Making this kind of cutting-edge, “just in time” knowledge acquisition possible is critical for twenty-first-century lifelong learning [43–45]. Mobile phone Apps, like WhatsApp, thus become ideal vehicles for enabling lifelong learning [46].

3. Sustainable development goal 4 and lifelong learning

The 2030 Agenda for Sustainable Development describes 17 Sustainable Development Goals (SDGs) adopted by all United Nations member states in 2015. The SDGs provide a shared blueprint for peace and prosperity for people and the planet, now and into the future. Specifically, SDG 4 is “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all” [47]. Within the United Nations, UNESCO's Institute for Lifelong Learning (UIL) conducts research,

capacity-building, networking, and publication on lifelong learning with a focus on adult and continuing education, literacy, and non-formal basic education. Lifelong learning has been identified as crucial to the achievement of sustainable development and quality education in the *2030 Agenda for Sustainable Development*. With SDG 4, policymakers have recognized that education must reach beyond the formal institutional arrangements of primary, secondary, and tertiary or higher education to occur continuously throughout life.

While lifelong learning can be a nebulous term [5], when applied or used in policies and practice formulations, it gains clarity. Specifically, SDG 4 must incorporate lifelong learning or risk the SDGs generally:

While lifelong learning “holds” the high position as SDG 4, adult education is taken off the agenda. Only adult literacy and vocational education are excerpted as clear targets related to adults (and part of the target related to gender equality), which puts at risk the entire SDG agenda, since achieving (in a sustainable way) several other goals does depend on extensive use of adult education [48].

Thus, when lifelong learning and adult education are discussed as foundational issues, they can tend to focus too narrowly on literacy, numeracy, and computer literacy [48]. As such, *Education 2030 for Sustainability*—which would facilitate citizenship education and universal participation in decision making that informs a sustainable world—cannot be attained if adult education and lifelong learning are not robustly understood and pursued [48].

By curating a library of video animations in diverse languages and on diverse topics, SAWBO contributes to the attainment of 16 of 17 SDGs [35], including SDG 4. By providing access to information that empowers solutions to local problems, it preserves indigenous languages and practices, ameliorates recurring, “wicked” problems [42], creates a pathway for partnerships to explore new solutions, and increases forms of access (especially digital ones) to such knowledge for lifelong learning.

3.1 African indigenous knowledge and practices that increase lifelong learning

Education in African traditional societies was already largely a lifelong process that was included in everyday life activities. The purpose of African traditional education was to improve personally persistently, empower individual people to be active members of the community, and form an all-rounded human. Most communities had structures of knowledge and skills that were imparted through lifelong learning, including child-rearing practices, age-grade organizations, initiation ceremonies, apprenticeship systems, and festivals around marriages, births, rituals, and funerals [49].

All over Africa, there exist philosophies, worldviews, and life ways that center on interconnectedness, humanity, and communal harmony while emphasizing individual and community activities and therefore lifelong learning. **Table 1** summarizes some of the most widespread examples.

3.1.1 Palaver

Originating in Portuguese, the word *palavra*, meaning speech, or word, has evolved to represent intricate discussions, negotiations, or simply engaging in

Practice	Place	Details of philosophy or worldview
Palaver	Akan people of West Africa and other West African people	A communal process of conflict resolution and decision making that involves open dialog and consensus-building
Harambee	East Africa, especially Kenya	Pulling together, making a collective effort, or coming together for a common purpose, often with a focus on community development or social projects
Umuganda	Rwanda	Coming together for a common purpose is to achieve an outcome for the benefit of a person, society, or nation
Ubuntu	Nguni people of Southern Africa	Ubuntu, often translated as “I am because we are,” emphasizes interconnectedness, communal identity, and a shared sense of humanity
Omoluabi	Yoruba of Nigeria, West Africa, and the diaspora	Omoluabi is a Yoruba term from Nigeria that conveys the idea of a person of good character or a virtuous individual

Table 1.
Select African life ways.

conversation. In West African cultures, particularly among the Akan people, palaver refers to a communal process of conflict resolution and decision making that involves open dialog and consensus-building. This concept has transcended its linguistic origins to become a symbol of collaborative discourse and community involvement.

As a linguistic anthropological concept, palaver underscores the significance of language in shaping social interactions and reinforcing communal ties. According to Edward Sapir, who emphasized the role of language in mediating social relations [50], through its multifaceted interpretations, palaver encapsulates the essence of communication as a dynamic force in shaping human relationships and societal structures. Most importantly (and like the other terms), palaver does not simply represent a concept or practice but a recognized and shared cultural value that holds force among community members. People who do not act in the spirit of palaver can be guided back to better sociability by invoking the term.

3.1.2 *Harambee*

Meaning “pulling together,” Harambee originates in Swahili and is a term widely recognized across East Africa, especially in Kenya. It signifies a collective effort or coming together for a common purpose, often with a focus on community development or social projects. The concept of Harambee embodies the spirit of unity and collaboration within a community to achieve shared goals.

After Kenyan independence, the first president, Jomo Kenyatta, inspired Kenyans to pull together in the spirit of Harambee. It thus became a rallying cry for collective action and national development. Harambee is still used to invoke the spirit and importance of community engagement and collaboration in addressing social challenges and wicked problems [51].

3.1.3 *Umuganda*

Umuganda from Kinyarwanda can be translated as “coming together in common purpose to achieve an outcome for the benefit of a person, society, or nation.”

In traditional Rwandan culture, members of the community would call upon their family, friends, and neighbors to help them complete tasks, like building a house, a bridge, roads, schools, or churches. Currently, in Rwanda, as part of Umuganda, communal work is often done on the last Saturday of each month, with communities coming together to achieve a variety of public works, including infrastructural development and environmental protection [52].

Umuganda is further informed by the history of Rwanda. It emerged from the effects of the 1994 Genocide, in which thousands were killed and displaced. Umuganda has been used as part of the efforts to reconstruct Rwanda and nurture a shared national identity and togetherness. Umuganda reflects Rwanda's commitment to community development and social cohesion, especially in enhancing national unity. During the Umuganda day, most public activities or services are closed so communities can engage in activities like construction, cleaning, and digging drainage ditches and trenches. These embody a collective bid to make Rwanda better. In this way, Umuganda represents a traditional cultural initiative to transform Rwanda [53].

3.1.4 Ubuntu

The best-known of these terms outside of Africa, thanks to Desmond Tutu's invocation of it in post-Apartheid South Africa [54], Ubuntu, meaning humanism or humanness, is memorialized in the Nguni community saying, "umuntu ngumuntu ngabantu," frequently translated to "I am because we are" [55], "We are, therefore, I am," and "I am because we are; since we are, therefore I am" [55]. This philosophical and cultural concept, deeply rooted in many African traditions, holds significant potential for enhancing adult learning and lifelong learning experiences. Ubuntu emphasizes interconnectedness, intersubjectivity, communal identity, and a shared sense of humanity. This philosophy aligns with the principles of social constructivism, suggesting that learning is a socially mediated process that occurs through interaction with others [56]. In the context of adult learning, the Ubuntu philosophy promotes a collaborative and communal approach, fostering a supportive environment where individuals collectively engage in the learning process.

Embracing Ubuntu principles can contribute to transformative and emancipatory adult education, emphasizing the role of dialog, inclusivity, and collective knowledge construction [57]. For lifelong learning, Ubuntu encourages a holistic view of education, where individual people are not isolated learners but active participants in a broader social and cultural context. This resonates with the idea of lifelong learning as a continuous, socially embedded process [3]. Incorporating Ubuntu into adult and lifelong learning practices entails recognizing the interconnectedness of learners, valuing diverse perspectives, and creating collaborative learning communities. By embracing Ubuntu principles, educators can cultivate environments that support the ongoing development of individuals within a broader community, aligning with the essence of both adult and lifelong learning.

3.1.5 Omoluabi

Omoluabi is a Yoruban term from Nigeria that conveys the idea of a person of good character or a virtuous individual; it resonates with the Yiddish sense of what it means to be a *mensch* [58]. Hence, this value is deeply rooted in Yoruban philosophy and emphasizes the importance of moral values, integrity, and social responsibility [59].

Among the Yoruba, an Omoluabi is someone who exhibits qualities such as honesty, respect, humility, and compassion. The term extends beyond personal conduct to encompass a broader societal ethic, promoting the idea that individuals contribute to the overall well-being of the community. Omoluabi reflects the cultural values and ethical principles that guide interpersonal relationships and community cohesion in Yoruba society [60].

As with palaver, the point of the term is not simply to acknowledge valorized traits of a person, like the English acknowledgment *he is a good guy*. The word possesses socially corrective force, as does Ubuntu. One can say, “That’s not Ubuntu” or “that’s not omoluabi” as a corrective to unvalorized social behavior.

3.1.6 Lifelong learning

While each of these philosophical and cultural concepts offer unique insights that resonate with their setting, they also inform adult lifelong learning. Rooted in African communalism, they emphasize the interconnectedness of individuals and community knowledge, as well as the importance of dialog and idea improvement for resolving conflicts, fostering understanding and social ability, and aligning with the cooperative/collaborative nature of adult learning environments generally.

Focusing on collective efforts and community development, Harambee reflects the idea that adult learners can benefit from collaborative initiatives, sharing knowledge and experiences to enhance their learning journeys. Omoluabi’s emphasis on virtuous character and ethical values aligns with the personal and ethical development aspects of lifelong learning, promoting continuous growth and reflection. Similarly, Umuganda, with its monthly community service day, underscores the importance of civic engagement and the application of knowledge for the greater good, reinforcing the notion that learning is a lifelong process with ongoing opportunities for individuals to contribute positively to their communities. Together, these concepts underscore the cultural richness and communal perspectives that can inform and enrich adult learning experiences and the broader framework of lifelong learning.

Harambee and Umuganda are relatively similar because they aim to strengthen and build nationhood. They are anchored in the histories and national contests aiming at rallying citizens to embrace nationhood. These practices aim for joint effort, mutual assistance, social responsibility, and community self-reliance [52]. They reflect an assumption, largely absent in “individualistic” societies, that the health of the community and everyone generally requires the participation of its members [61].

Although it must happen (like elsewhere) that politicians, governments, and other public figures can co-opt the public spirit of these social values for self-serving ends, the key difference turns on the acceptance of a community, public, or even national destiny. As Agassi [62] stresses about individualism as a philosophy, it reflects a “basic (nominalist) assumption that only individuals (entities with aims) exist, not social wholes (societies and social institutions) ... *All versions of individualism share the denial that societies have aims or destinies*” ([62], emphasis added). The African life ways described here do not share this individualistic denial of social wholes. Consequently, the practice of lifelong learning involves not only *personal* improvement but also greater knowledge for the sake of others and the social whole in its entirety. Neither is this strictly selfless or self-sacrificing; because “I am because others are,” the well-being of individual people is reflected in and through the well-being of others.

4. Case study of WhatsApp groups in Kenya

For the past 3 years, a WhatsApp group in Kenya established as part of a knowledge-dissemination grant for food security and COVID-19 prevention has continued to operate beyond the formal end of the grant. The WhatsApp group has since emerged as a site where group members exchange information, dialog with one another, share and repost animated videos, and participate in the virtual life of the space. Currently, the Kenyan WhatsApp network has expanded to all 47 counties in Kenya, with at least 250 members disseminating curated and self-selected SAWBO animated educational content to their communities, learning from and forming relationships (both actual and virtual) with one another, asking questions, sharing their experiences, and deepening their knowledge and skills.

The WhatsApp group in Kenya can be understood as a virtual community of practice for lifelong learning. Communities of practice (CPs) are groups of people who share a concern, a set of problems, or a passion about a topic and who deepen their knowledge and expertise by interacting on an ongoing basis [63]. Lave and Wenger have emphasized the social aspects of learning, arguing that learning is inherently situated within social contexts and is a process of engagement in a community of practice [63, 64]. Communities of practice are essential for facilitating learning and knowledge sharing within organizations [64, 65]. They provide a space for individual people to exchange ideas, collaborate on projects, and develop shared understanding and expertise. By participating in communities of practice, WhatsApp group members not only learn from one another and contribute to the collective knowledge of the group but experience transformative learning as well.

Communities of practice are more structured, intentional groups that bring together individuals with a shared interest or profession. In agriculture, CPs may consist of farmers, researchers, agricultural experts, and policymakers who collaborate to enhance their collective knowledge and expertise. These communities promote a deeper understanding of agricultural practices through sustained interaction, shared resources, and collaborative problem-solving. Communities of Practice in agriculture may extend beyond virtual platforms to include face-to-face meetings, workshops, and field visits. The collaborative nature of CPs fosters a sense of belonging and shared identity among participants, leading to the development of a collective intelligence that benefits the entire community.

WhatsApp groups are suitable as virtual communities of practice because they afford the crucial elements for fostering collaborative learning, knowledge sharing, and community engagement within the agricultural sector, germane to lifelong learning in Kenya. These platforms serve as innovative tools to connect farmers, agricultural extension workers, researchers, and other stakeholders, promoting effective communication and the dissemination of valuable information.

The WhatsApp group's knowledge manager—a native Kenyan—moderates and facilitates the group. In this role, he ensures that discussions are focused, respectful, and inclusive. He guides the group and ensures that they focus on the learning objective [66]. He also shares resources for learning such as videos, blogs, and still photos of video animations to enhance the learning experiences. He also responds to questions and looks for other videos to provide supplementary information where needed.

The knowledge manager's significant role is to encourage the farmers to solve problems. Members seek advice for the problem they face on their farms, and they receive feedback from members of the group or the knowledge manager provides solutions where the collective does not respond [67]. He does this by providing other

videos to be watched from the library of videos and sharing solutions from his vast experience.

The knowledge manager continuously welcomes participants, adds them to the group, trains them on how to use the videos, and shares them. He shares the group guidelines and checks on them to ensure that they fit into the group. In some cases, he removes members who do not adhere to the group guidelines. There are instances where he deletes some information that is shared on the platform, especially if it is political or not related to the goal of the group.

4.1 Successes and challenges of WhatsApp groups for lifelong learning

As discussed above, one can glean that WhatsApp groups, when functioning as communities of practice, are a viable tool for providing proxy extension services to farmers, fostering a lifelong learning culture, and contributing to the resilience and sustainability of agricultural practices in a group. This is consistent with research examining the role of WhatsApp groups in supporting lifelong learning initiatives [46, 68, 69]. WhatsApp groups are germane to informal and community-based learning because they enable individual people to access knowledge instantly, connect with others, and be involved in problem-solving. Social media like WhatsApp are playing a vital role in democratizing learning and attaining lifelong learning [70].

WhatsApp groups in agriculture have gained prominence as dynamic spaces for real-time communication and collaboration. Farmers join these groups to find information, share their experiences, seek advice, and market their products. This encourages peer-to-peer learning and acts as an extension service where there is otherwise none. Agricultural extension service officers leverage WhatsApp groups to provide expert advice, conduct training, and visit farmers virtually. Such customized and instant communication enables farmers to get the feedback they need for decision making [70].

WhatsApp groups have become instrumental in facilitating adult learning in the agricultural sector in Kenya [70]. In the context of lifelong learning—specifically informal and community-based learning—these groups serve as dynamic platforms for knowledge exchange, skill development, and collaborative problem-solving. WhatsApp groups can enable agents to share valuable insights, exchange best practices, and collectively address challenges faced in the field [70]. Research identifies the primary characteristics of social media, which include ease of use, usefulness, credibility, flexibility and Internet availability [70]. Additionally, when using mobile applications for disseminating agricultural information, usability attributes increase solution adoption [70, 71]. This collaborative approach to learning through WhatsApp groups operates in tandem with the principles of adult education, metacognition, experiential learning, and peer interaction.

4.1.1 Successes

WhatsApp has affordances for lifelong learning such as information, knowledge sharing, resources, and collaboration while allowing the growth of a virtual community. The WhatsApp group has provided a platform for informal learning communities consistent with a (virtual) community of practice. These communities can increase learning from each other, mentorship, collaboration among members, and creation of friendships. These groups also are an available tool for lifelong learning because the farmer can access video animations on an as-needed, just-in-time basis and engage in discussions with farmers from all over the country, doing away with the need to physically meet.

While WhatsApp may not be a traditional learning platform, its versatility and widespread adoption make it a valuable tool for lifelong learning, particularly in informal or community-based learning contexts. By leveraging its strengths and addressing its limitations, educators and learners can harness its potential to enhance learning experiences and foster continuous personal growth. The Kenya WhatsApp group continues to be a space for farmers to learn from each other and share information that they would not access.

In particular, farmers have grappled with “understanding whether the information shared via YouTube videos is retained and/or knowledge transferred, and/or acted upon appropriately by recipients more precisely, that the knowledge is absorbed and that the videos contribute to knowledge and human progress” [72]. WhatsApp groups have become a virtual space where farmers who use SAWBO animations can provide evidence in the form of photos and narratives about how they are using their videos and implementing what they learn. Admittedly, empirical studies have not been carried out to provide robust data about the narratives. From evidence from the Kenya WhatsApp shared video animations, some SDGs are being addressed. **Table 2** summarizes the videos and their related SDGs.

4.1.2 Challenges

The challenges of WhatsApp for learning involve the technical and social limitations of its affordance. Technically, this involves its menu of features, i.e., text-based

Video animation topic	Description of the video animation	Related Sustainable Development Goals
The jerrycan technique	This animation explains how to avoid insect damage when storing beans and other legumes after harvest for a long period using the jerrycan method.	Goal 1: Reduce poverty Goal 2: Zero hunger Goal 3: Good health and well-being Goal 4: Quality education Goal 5 Gender Goal 10: Reduced inequality Goal 12: Ensure responsible consumption and production Goal 17: Partnerships for the goals
The Purdue Improve Crops Storage Bag (PICS Bag) video	Purdue Improved Crop Storage bags provide a simple, low-cost method of reducing post-harvest legume losses due to bruchid infestations	
Sweet Potato Roots for Timely Planting Material: The Triple S Method on How to Prepare and Store Roots	This animation explains the steps in preparing and storing root vegetables.	
How to Identify and Scout for Fall Armyworm	The Fall Armyworm is an insect that can damage your maize plants or even cause you to lose your whole maize crop. The best way to protect your maize crop is to scout early and treat early. In this animation, we will explain how to scout for the fall armyworm, so you can take action to protect your crop and yourself and family.	
The Newcastle disease video	This video points to the spread of Newcastle disease in chicken, how it spreads, the signs and symptoms in chicken, and how to keep them healthy for nutritious food.	

Table 2.
Video animation topics and SDG.

conversations, downloading of videos, video calls (non-text-based communication), posting and forwarding of messages and photos, videos, and PowerPoint slides. It does not provide any assessment tools or nuanced ways of tracking learning. Unless a group is intentional in using WhatsApp as a tool for learning and therefore provides housekeeping rules that maintain an ambiance of learning, there are high chances of not benefiting as robustly from the shared group as an information sharing or other type of learning space. The same can be said about leveraging indigenous philosophy; indeed, it remains unclear whether the relatively anonymous WhatsApp environment supports or inhibits the kinds of sociability that Ubuntu and other lifeways can foster in offline, face-to-face interactions.

Additionally, tension exists around moderating content to remain focused on the group's goal and members utilizing the platform for other purposes. This can also lead to silence or non-participation by some members and a general lack of deep conversations. In this WhatsApp group, the knowledge manager is also the administrator and ensures that the group does not post information that is not related to the group's purpose. Still, there are times when the information shared is about accessing markets for farm products and not focusing on the video animations shared or agriculture-related discussion.

Timing plays a role as well. WhatsApp group accounts can be bombarded with messages and content at certain hours of the day or sporadically, allowing little or no control or management and information overload on the part of the group participants. This can prevent learners from maintaining a threaded discussion and reviewing relevant videos or messages. Also, as already noted generally, the use of WhatsApp on smartphones involves data bundles or credits, reliable electricity infrastructures, and access to the Internet. Women can (wisely) resist disclosing information, with some not participating as robustly in anticipation of harassment from males. Consistent with other research, these factors can exacerbate digital divides.

Similar to face-to-face social interactions, where some people dominate the group, certain members of the groups dominate conversations or post messages more often than others. In the Kenya WhatsApp group, men tend to dominate the conversation and post information more than women. This could be cultural, given that men are afforded more voice than women and have more availability of time, social status, and access to funds for buying credit. There are cases where farmers who are outgoing and confident share their thoughts and opinions about their experiences in agriculture freely, thus contributing more frequently. The group administrator counteracts this by attempting to diversify the voices of the members, introducing new videos or information about agriculture, and referring members back to the goals and guidelines of communication of the group.

5. Conclusion

This chapter explores how video animations shared via WhatsApp groups can enhance lifelong learning among smallholder farmers in Kenya. It highlights the shift toward dynamic and continuous learning in modern society, driven by the demands of a knowledge-based economy and technological advancements. Lifelong learning is presented as essential for personal development, career advancement, and societal welfare, emphasizing the importance of adapting to new challenges and opportunities throughout one's life.

The case study focuses on the use of video animations produced by Scientific Animations Without Borders (SAWBO) to facilitate learning in agricultural practices. These animations, shared in WhatsApp groups, serve as an innovative tool for knowledge dissemination, particularly beneficial for communities with low literacy and limited access to traditional educational resources. Such efforts are enhanced by the presence and integration of African philosophies like Palaver, Harambee, Umuganda, Ubuntu, and Omoluabi, which value communal harmony and collective effort as part of lifelong learning practices. These philosophies underscore the importance of community and collective learning in African contexts.

Going forward, the challenges and successes of WhatsApp groups for lifelong learning include the creation of just-in-time virtual communities of practice that foster knowledge sharing, collaboration, and real-time communication. Challenges involve technical limitations of the interface, moderation issues, and the reproduction of existing digital divides along gendered and socioeconomic axes.

In general, the expanding knowledge economy demands leveraging technology, like mobile applications like WhatsApp, and in the future, artificial intelligence in conjunction with indigenous knowledge and practices to keep pace with that expansion and ensure lifelong learning and the attainment of Sustainable Development Goals in agricultural communities are achieved.

Conflict of interest

The authors declare no conflict of interest.

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