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Review Article

Using Digital Learning Tools During the Ongoing MPOX Response in Africa: Proposing a Strategy

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Abstract

On August 14, 2024, the Monkeypox outbreak was declared a Public Health Emergency of International Concern (PHEIC) by the World Health Organization (WHO) shortly after the Africa Centers for Disease Control and Prevention (Africa CDC) labelled it a Public Health Emergency of Continental Security (PHECS). A continental plan to scale up the Mpox outbreak response was launched. The engagement of stakeholders, including health workers, communities, and various other parties, is crucial to the success of this endeavor. Digital learning technologies have significantly improved the efficiency of major public health education campaigns worldwide but in Africa their full potential is not yet harnessed. As digital literacy grows in Africa, people are increasingly able to communicate and receive information using digital platforms. Digital citizenship opens a new era of opportunities and digital citizens represent a pool of remotely accessible individuals. In 2024, over 534 million registered mobile phone subscriptions occurred in sub-Saharan Africa. Our objective was to review the various digital learning methods that health workers and communities could utilize to enhance case management, improve general awareness and literacy on Mpox, then, propose a deployment strategy. Videos shared on social networks, podcasts, thematic websites, virtual learning communities, AI chatbots and MOOCs are available tools. The proposed short-, mid-and long-term strategy will function only if there is a common vision and ownership among all stakeholders, as well as availability of internet connectivity and data assessment.

Keywords

Mpox Response, Digital Learning Tools, Deployment Strategy

1. Introduction

On August 14, 2024, the Monkeypox outbreak was declared a public health emergency of international concern (PHEIC) by the World Health Organization (WHO) for the second time in two years [1]. This declaration came one day after the Africa Centers for Disease Control and Prevention (Africa CDC) labelled it a Public Health Emergency of Continental Security (PHECS) [2]. On July 23, 2022, the WHO declared Mpox a PHEIC for the first time [3], and since then, over 102,977 cases have been recorded worldwide [1]. Mpox is a double-stranded DNA virus in the Orthopox genus of the Poxviridae family [4]. The first-ever Mpox case was discovered in 1970 in a nine-month-old child in the Democratic Republic of Congo (DRC) [5]. Mpox has been endemic in two main regions: West Africa and Central

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Africa [5]. These regions harbour two genetically different monkeypox viruses: clade I (Central African, CA) and clade II (West African, WA). Variation between clades produces Clade Ia, Ib, and Clade IIa and IIb [6]. The 2022 Mpox outbreak was primarily due to clade II [5], whereas the current 2024 outbreak is mostly clade I variants [7]. Between January and August of this year, the epidemic has caused approximately 17,541 cases and 517 deaths reported from 13 AU countries. The DRC accounts for 96% of all cases and 97% of all deaths. Other hotspots include Burundi, the Republic of Congo-Brazzaville, and the Central African Republic [7]. The case fatality rate is high at 3.9%, and children younger than 15 years account for 60% of deaths [6, 7]. Many in-hospital practitioners, including doctors and nurses, who are faced with these patients are not well-trained to manage these cases. Additionally, populations globally are not well-informed about this disease, leaving room for vaccine hesitancy [8].

Public health measures implemented to respond to this hazard aim to detect and contain clusters of infection and interrupt community transmission. The Africa CDC and WHO have jointly launched a continental plan to scale up the Mpox outbreak response [9]. The Mpox strategic preparedness and response plan enhances surveillance, laboratory testing, case management, infection prevention and control (IPC), vaccination, risk communication and community engagement (RCCE), and research and innovation. Improving case management and community engagement requires sustained educational efforts by public health officers [10, 11]. Digital learning technologies (DLT) have significantly improved the efficiency of major public health education campaigns. Digital citizenship opens a new era of opportunities, as digital citizens represent a pool of remotely accessible individuals [12, 13]. It is more cost-effective to increase awareness through digital campaigns. During the COVID-19 pandemic, digital tools were extensively used to enhance public health response efficiency [14, 15]. As digital literacy grows in Africa, people can increasingly communicate and receive information using digital platforms. By 2024, sub-Saharan Africa will have over 534 million registered mobile phone subscriptions [16, 17]. Our objective was to evaluate the various digital learning tools that health workers and communities could utilize to enhance case management and awareness of Mpox and propose a strategy to reach them.

2. Digital Learning in Health

Due to the rapidly shifting Mpox epidemiological situation [2], digital learning strategies are increasingly focused on empowering stakeholders at both central and remote levels to combat this epidemic effectively. Improving health literacy among populations and educating health practitioners about recent updates in Mpox case management requires enhancements in learning strategies [18]. Public health institutions struggle to address these educational gaps, representing a vital pillar in the response measures implemented by the Africa CDC and WHO against Mpox.

Digital learning encompasses all educational strategies that effectively utilize digital technologies, such as smartphones, computers, and associated devices, to enhance awareness and literacy on one side or to provide updates on case management on the other [13, 19]. The COVID-19 pandemic has accelerated the adoption of digital health technologies (DHT) to improve public health responses [14]. Many institutions are developing digital learning strategies to boost demand generation for vaccination. The World Health Organization has established a collaborative center for digital learning in health emergencies to train health personnel in case management. The Project ECHO [20, 21] has promoted online digital learning courses for case management. The WHO has a Digital Health 2020-2025 Global Strategy [12], aimed at promoting healthy lives and well-being for everyone of all ages; this can only be achieved through robust digital learning strategies that enhance health literacy [13, 22, 23].

Some local institutions in Cameroon, such as the Expanded Program on Immunization, employ a blended communication method that combines digital education strategies with physical outreach initiatives, like paper posters and loudspeakers [24, 25]. As the response to Mpox escalates across Africa, leveraging digital learning strategies could be a crucial approach to overcoming the challenges posed by limited financial and human resources for education and awareness campaigns. This effort is supported by rising internet penetration and a young, tech-savvy generation in Africa [26]. Blended learning can also enhance the effectiveness of response mechanisms to raise awareness by combining the advantages of digital and physical education [25]. Mobilizing the mHealth capabilities due to smartphone penetration could be a game changer [26-29].

For those engaged in stopping community transmission of Mpox, it is concerning to observe the low levels of health literacy associated with the infection [30-33]. Greater emphasis must be placed on ensuring that the growing pool of digital citizens benefits from life-saving educational materials about this disease. These materials should comprehensively cover the nature of the virus, its symptoms, diagnostic and treatment centers, available vaccines, and strong evidence of their efficacy to prevent individuals from falling into the misinformation vortex that often characterizes African populations during epidemics.

The vaccine hesitancy that plagued the COVID-19 vaccination campaigns in Africa, with less than 20% uptake in Cameroon [8, 34, 35], highlights the urgent need for action. Digital learning strategies must be prioritized to fill this gap, as any void left will inevitably be filled by misinformation.

2.1. Problems of Standard Physical Health Education Tools Solved by Digital Learning

Standard physical public education tools used (Figure 1) during epidemic responses such as posters, loud speaking, and physical contact groups face 3 major challenges that digital health educational tools attempt to solve: Funding limitations, availability of trained educators and preparing the population for the future [18, 19, 36, 37] see table 1.

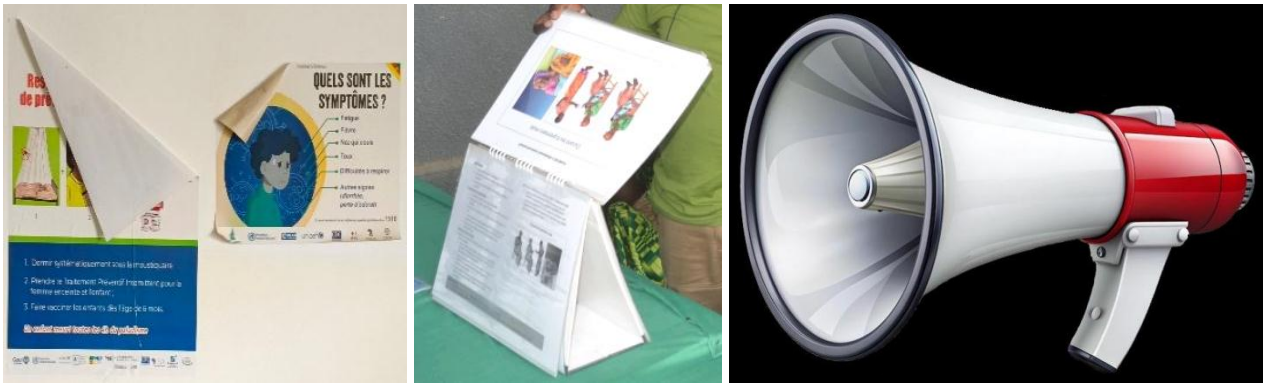

Figure 1. *Standard physical education campaigns: posters, flipcharts and loudspeakers.*

Table 1. *Challenges of physical health education methods.*

challenge	Description in the standard physical model	How digital learning solves it
Funding limit	The cost of printing, pasting and transport is high	Digital learning campaigns are cheaper, do not increase budget investments.
Good educators	Available well trained educators that know the disease are scarce and cannot multiply In different geographical locations	One educator can meet people in different geographical locations via digital networks. This makes them more accessible to the masses
Tomorrows' need	The population has to be brought to a level of preparedness where they are auto-reactive to the next epidemic. Physical campaigns do not prepare the populations for the next epidemic as they have no anchor points.	The digital environment offers anchor points (knowing where to look) where people can rapidly search for information during the next epidemics for example National ministry websites, WHO web portal etc. They already know how to use their digital outlets to actively search for information.

Independently, these challenges are significant, but in combination, they create an imperative for swift action to create and sustain more innovative and effective education systems during epidemic responses [23]. Changing the way educators reach populations and health professionals during epidemics is imperative, as with the old paper method, many people leaked out of the literacy pipe and never really reached good literacy levels (Figure 2).

Hasanica et al showed that from 100 people exposed to traditional paper posters, some people dropout because of listening just once to the message, some drop out because of lack of interactivity i.e. their questions are not always answered and only 11% [36] actually improve their health literacy level.

More over standard physical education campaigns face setbacks like broken loudspeakers or torn paper posters; personnel could be exposed to physical aggression; the language written could only be French or English whereas the native languages are mostly spoken, so disqualifying analphabets [38].

Digital learning strategies have shown improvements in the percentages coming out of this health literacy pipeline by exposing the smartphone owner many times to the message and enabling swift interactivity [39, 40].

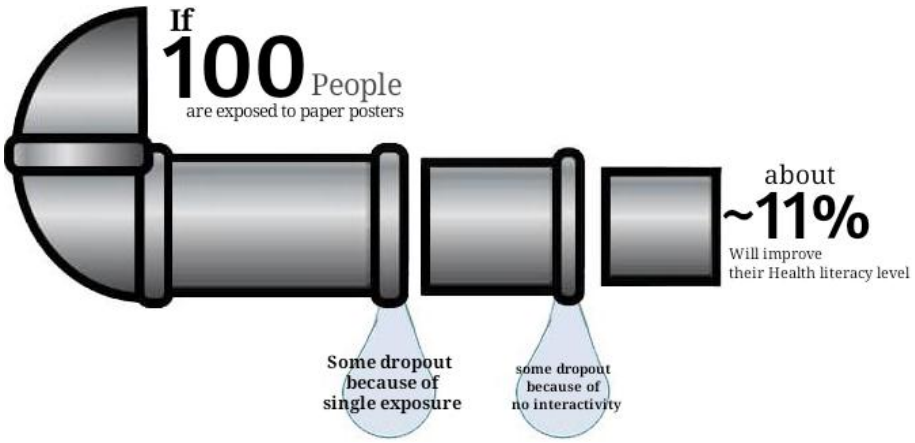

Figure 2. *The leaking pipe of health literacy when using printed posters.*

2.2. Challenges in Implementing Digital Learning

2.2.1. Leveraging Digital Competence by Educators

An increasing number of people in sub-Saharan Africa are digitally literate [41]; they own smartphones that allow them to navigate the internet, use WhatsApp and Facebook, access videos and podcasts, and interact with artificial intelligence chatbots [42]. Qualified educators who understand population psychology and possess technical knowledge related to diseases should develop digital competence [18, 19, 22].

Specialized institutions, such as centers that produce digital health educational tools, have successfully implemented this approach. A study published by one such center demonstrated that a digital video created by health experts significantly improved adherence to treatment protocols [43]. In contrast, non-medical experts struggle to achieve similar results [44, 45]. As Greg Whitsy states, "It is first about the pedagogy, then comes the technology" [18, 46], emphasizing that health services should prioritize pedagogy over technology. Thus, qualified educators in the health field must gain competence in leveraging digital technologies. Digital health education should adhere to the core methodologies of health practices, supported by the metaphor of the 'pedagogical horse' driving the 'technological cart' [47].

2.2.2. Digital Divide and Low Digital Literacy

As of 2020, smartphone and internet penetration in Africa stood at 41% [41], presenting opportunities; however, rural areas remain underserved, posing challenges for implementing digital learning technologies [48]. Disparities in the availability of high-quality digital services, tools and resources persist across countries, particularly in remote and economically disadvantaged regions [41, 49]. This situation is exacerbated by Africa's significant usage gap, driven by various factors, including affordability constraints, inadequate infrastructure, skills and insufficient digital literacy [15, 50].

2.2.3. Energy

The energy supply in many African countries remains deficient and unstable [51, 52], complicating efforts to charge smartphones and maintain internet infrastructure [53-55]. Achieving universal access to modern energy services by 2030 and fully implementing all African climate pledges [56] is crucial. African nations must take the lead with clear strategies and policies, while international institutions should enhance their commitment to significantly increase support for achieving energy security [57].

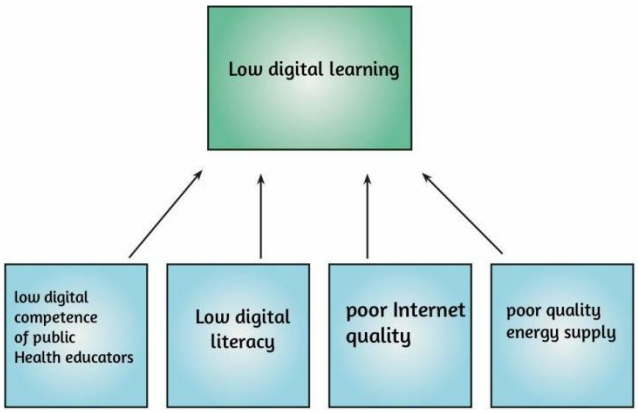

Figure 3. *The problem tree.*

The Digital competence of the main educators becomes a crucial factor to properly harness these technologies for Mpox response among digital literacy of populations, internet quality and quality energy supply.

2.3. Benefits of Digital Learning in Improving Health Literacy and Community Engagement

Effective digital learning campaigns should adhere to standard pedagogical practices, including clarifying goals, providing appropriate feedback, assessing the process with questions, debunking misinformation, and offering independent learning options [22, 58, 59].

The main benefits of digital learning are that it provides access to Experts: Digital platforms provide access to health experts, even in remote areas; Diverse Learning Options: Users can use various formats, such as videos, podcasts, and thematic websites; Interactivity: Digital learning fosters interactive experiences that enhance engagement; Personalized Learning: Learners can pursue additional research tailored to their needs; Safety for Personnel: Digital methods protect health personnel by minimising direct exposure; Cost-Effectiveness: Digital learning solutions are often more economical than traditional methods [60].

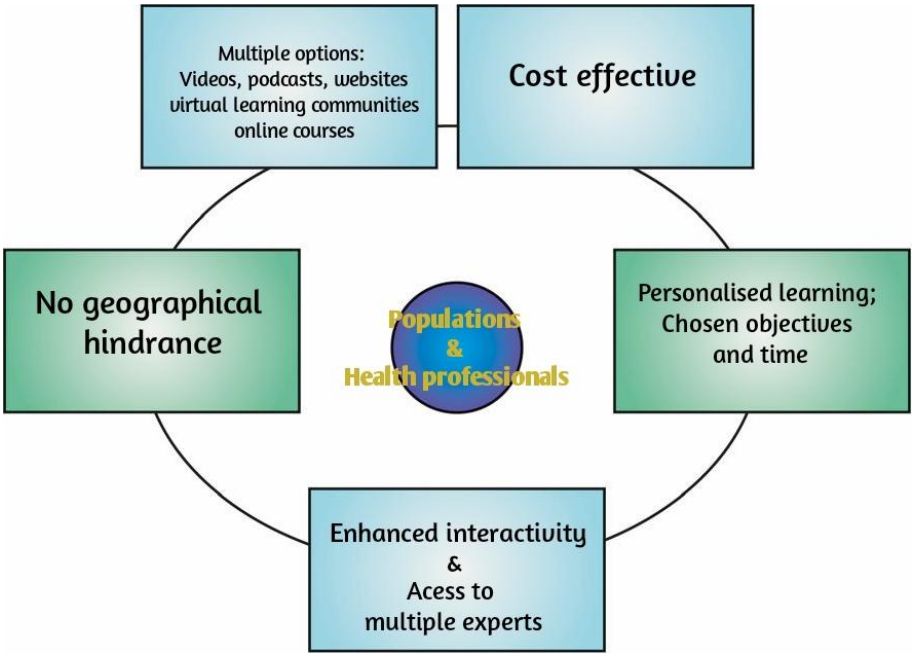

Figure 4. Advantages of digital learning.

A thoughtful well planned out implementation is critical for digital learning to lead to improved literacy levels and community engagement outcomes [61, 62]. it has to be based on a strong vision and ownership with all stakeholders, availability of tools and data assessment [18, 19, 63, 64].

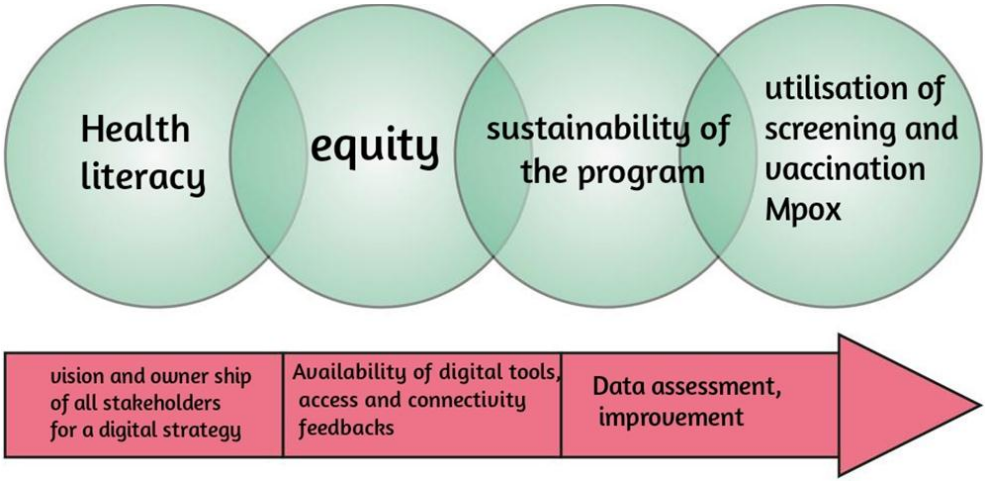

Figure 5. Requirements when using a digital strategy to improve community engagement during the Mpox response.

3. Types of Digital Learning Tools Usable for MPOX Response

3.1. Videos, Posters, Texts and Quizzes in Social Media Campaigns

Today, millions of people watch pedagogic videos on various terminals [65], such as smartphones, computers or tablets connected to social media [66, 67]. Following a recent study, an adult spent 3 hours per day today watching videos compared to 76 minutes per day in 2015 and only 17 minutes in 2011 [65, 68]. This increase can be explained by the blooming offer, multiplication of platforms and attractiveness of this activity [69, 70]. Furthermore, some terminals, such as smartphones, are mobile and can follow you everywhere you go [71]. 96% of people have watched an explainer video to learn more about a product or service [65].

The use of videos in education and training is increasingly adopted, many institutions or training centers propose educational content during epidemics [72]. The WHO in Cameroon office produced a video on vaccines termed "vaccines work" in 2024 (AF WCO/CM BID. RFQ/WCO/025/2024,"personal communication", August 23, 2024). The center specializing in the production of digital health educational tools published an article proving that psycho-educational cartoon videos can be used to improve adherence to treatment recommendations [43].

One of the reasons for the videos is the attractiveness of the format. The social media networks have transformed our environment, inducing millions of people of different age ranges, from the oldest to the youngest, to be constant video consumers [73]. These can be harnessed for proper digital learning campaigns exploiting WhatsApp®, Tiktok® or Facebook® during this Mpox response [74]. The expanded program on immunization in Cameroon shared educational cartoon videos during the introduction of Malaria vaccine in early 2024 [24]. Videos offer many advantages over traditional paper learning, the association of audio, images and transitions is more engaging for the brain in our regions, where learning by reading is not a deeply anchored culture [75, 76].

Figure 6. *An educative video shown on a smartphone, you can recognize the smartphone environment.*

Utilizing platforms like Facebook, Twitter, and Instagram to share educational content videos, info-graphics, and personal stories to raise awareness and engage the community. Create engaging e-learning courses that incorporate videos, posters, texts and quizzes to teach about Mpox transmission, symptoms, and prevention.

3.2. Podcasts

Podcasting, or audio casting is a simple realization of audio content that mainly targets mobile digital devices via audio blogs on the web [77, 78]. Meng et al defines podcasting as the process of capturing an audio event, sound, speech, or mix of sounds and then posting that digital sound object to a website or blog in a data structure called an RSS 2.0, also termed "feed" [79]. This audio recording is then automatically distributed to people who have subscribed [80-82].

Podcasting has two major characteristics: firstly podcasting aims to distribute content to be used with mobile and digital audio/video players such as MP3 players, cell phones. Secondly, it is based on a web syndication protocol such as RSS and/or Atom.

Web syndication is a way of automatically publishing updates about a website to people who subscribe to these feeds [83]. It was initially called podcasts because they were related to Apple iPods [84]. Most users of the RSS 2.0 syndication system were iPod owners [85]. A more suitable term, however, could be audiocasting because audio syndication and distribution via RSS can be applied to all

kinds of mobile audio players today [86]. It is highly likely that in the future, the term podcasting will be replaced by audiocasting.

Podcasting is an innovative method of e-based broadcasting of audio files. It can be used to automatically transfer audio Mpox related content to mobile devices. These audios could contain a definition of Mpox, the symptoms, treatment and the vaccine availability, etc. in a way respecting medical pedagogy. This technology can be used to speed up mobile learning as the learners are not tied to any geographical location and can be reached remotely. The convenience of learning by listening to resources blends with the portability of mobile phones. The podcasts are automatically downloaded to the phones of syndicated people. The learner can then listen to it at their own time and place. Designing podcast as epidemic response technologies enables their inclusion and rapid utilization in response sequences. Reinforcing the digital learning immediate response palette. Learning through listening is more attractive than learning by reading in our context [80, 87]. For many people, listening may be more attractive and tedious than reading. It is well known that oral transmission of knowledge has been a culture in African contexts [88, 89]. The podcast can be made attractive by incorporating popular songs and mixing a variety of public figures vocal notes on Mpox responses. Furthermore the visually challenged, who cannot see, will find much pleasure in listening to Mpox information in the linear presentation of podcasts [90].

It is important that the design of the podcast follow medical pedagogy; as we earlier said, it is first about the medical pedagogy, then comes the technology. A specialized center in medical education can be of help in making these podcasts while respecting educational values in health. These podcasts can be collected on podcast repositories for health (learning online repositories, LOR) on RSS server feeds and then dispatched to people [91, 92].

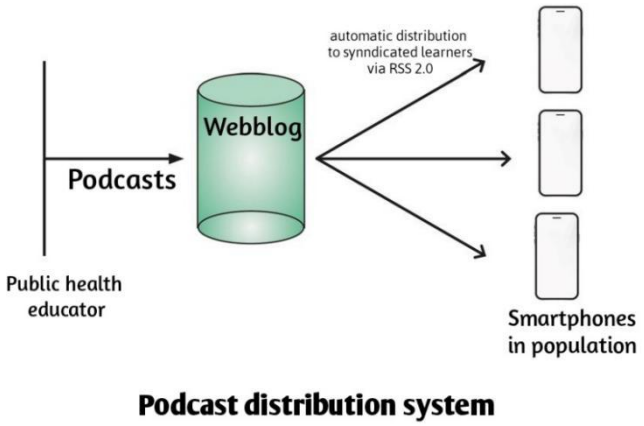

Figure 7. *The podcast distribution system and RSS20 syndication.*

Most of our population in sub-Saharan Africa are auditory learners, talking things through, so with verbal dissertation and listening to what people say, they can rapidly understand. Podcasts fall in line with this culture.

3.3. Virtual Learning Communities and Interactive E-learning Modules

A virtual learning community is an e-network of public health experts and the population who share a domain of interest [93, 94]. This could be a WhatsApp, Telegram, or Facebook group. Where the population can come and request information from Mpox and receive answers from experts. This is an e-learning model that requires all people to have access to the group link and join freely. The presence of public health experts with knowledge on Mpox will permit all questions of populations to be addressed. The learning from this community is collaborative, collaborative knowledge is greater than individual knowledge [95].

Vygotsky argued that a person's learning may be enhanced through engagement with others, which enables the extension of that person's capacity to a new and higher level [96]. Much emphasis is given to the concept of sharing, the group animators and public health experts will enable a conducive environment for this. McDermott discussed how common ground is found by participating members as they feel connected and have invaluable insights they can learn from each other [97, 98]. Developing a group of people who share concern, set of problems on Mpox and who deepen their knowledge of this disease by interacting on an ongoing basis is fruitful [99]. Knowledge development on MPox in this community will be cyclical and fluid. Robey describes this as a "situated or situational learning," which occurs when people engage in problems they face in the real world [100, 101]. Public health officers have the important role of guiding the debates and leading the learners with medical pedagogy. Facilitating the actual knowledge improvement of the whole group and ensuring the necessary interaction that improves knowledge occurs between digital membership.

The link to the virtual learning community can be shared over to invite more people. The community does not have to result in the perpetuation of commonalities rather than supportive growth, change and diversity [102, 103]. The MPox topic suits well for this type of learning community. The differences in language backgrounds of both learners and public health facilitators or experts can be a barrier. Experts should have the capacity to break down the language of explanation. Also, the reluctance to engage has to be subdued, breaking the ice in this non-face-to-face setting is crucial. Public health officers have to work hard to maintain energy and a high degree of participation. Also, be aware of the fact that when sharing information electronically, many members might not just get it, and you may not spot that.

It is important to fix a time course for the community, as this creates a sense of urgency in the members to learn, improving efficiency, although this time has to be relatively long. Critical success factors [93, 94, 104] described by Elsa

Fontainha for these communities are, ICT skills on both the learner and the public health experts sides and trust building. Trust is belt with time, continuous interactions and developing common values and shared understanding [105, 106]. Leveraging the membership of people who already know themselves can help consolidate trust, it may be a whole community with their chief included. This will help to foster shared understanding, break cultural barriers and hesitancy. Control of abusive messages is important, the "word ecology" has to be gracious to ensure a satisfactory experience for the e-members [104]. The control of misinformation by excluding tenacious members with entrenched points of view on unproven or inefficient theories has to be envisaged.

3.4. Chatbots and AI Assistants

Deploy chatbots on websites and social messaging platforms to provide instant answers to common questions about Mpox, helping to dispel myths and misinformation.

3.5. Thematic Websites

Designing a website for Mpox learning during the ongoing response, and targeting populations, can be an interesting move. This is termed website-based learning [92, 107]. A website, web portal or weblog is a window of webpages that contains important basic information in the form of text, videos, or graphics accessible through the *WWW*. World Wide Web link. This method distinguishes itself from the previously described methods by the fact that it is an active learning strategy. Contrary to the other tools, where information passively reaches the learners through algorithms, here the person has to click on a specific link to land on the website [107].

The digital habits of people of just connecting to the social media and receiving passively lots of videos brought to them by algorithms are an impediment to the use of the website in epidemic response [108]. The website has to be designed as a real learning object where populations visiting will have simple learning goals, for example, on how the Mpox epidemic sprouted, how response measures are defined, and how the vaccines are secured. The link to the website can be shared with e-communities so that learners click on it to reach the website. Websites offer the advantage of presenting information on a continuum [109]. The tab bar offers a continuum where they can navigate through the presented tabs. This appeals for a deeper research on the topic as the tabs pop up. Another impediment to website use is that they are less interactive.

3.6. Zoom Online Courses

Zoom is a private cloud-based service that offers meetings and webinars and provides content sharing and videos conferencing capabilities [110]. It enables distance learning courses to learners [111]. Zoom can be described as an elite learning digital tool, suitable for high-level stakeholder engagement, such as health personnel. This method is widely used to train health personnel of Mpox case management. The WHO and ECHO projects delivered Zoom courses in October 2024 [21]. Zoom can easily be downloaded on smartphones and computers, and it is free of use on the learner's end. PowerPoints, images and visuals of the presenter can be diffused by sharing the screen. Zoom enables educators to annotate their shared screen. Recording of the Zoom session can be done for further assessments. The strength of an online distance learning course is that it provides easy access to resources independent of geographical location, chats and interactivity via questions and answers when opening and closing your microphone or camera [111]. Images of Mpox cases can be shared on PowerPoint. Enables specialists from distant zones to train nurses and doctors of Mpox management. Furthermore, it reduces training costs.

The success of these courses depends on the quality of the course, the availability of an internet connection and electricity, and the degree of motivation of the learners [112]. When the medical pedagogy is well applied, it produces quite satisfying results. The virtual class can be held at night, since matching international timezones is sometimes difficult. The video quality of Zoom is better than that of competing products like Microsoft teams [113] permitting remote participants to see the faces of the facilitators when need be. Zoom has the major disadvantage that it does not permit shared documents on the platform. They have to be shared otherwise. But Zoom remains an opportunity for elite learners, such as nurses and doctors, in this Mpox response.

3.7. Massive Open Online Courses

The first massive open online course was developed by Stephen Downes and George Siemens called connectivisme and Connective Knowledge in 2008, CCK/8 [114]. The term Massive open online course can be understood word for word. Massive as it invites large numbers of learners; open as it is usually free or poses no condition of age or educational level to access it apart from learning desire; online as it is usually internet-based digital learning; and finally courses as they have a certain pedagogic methodology with clear objectives stated [115-118]. An example of a MOOC is COURSERA, MOOCS have been used in public response, and the Clinton Health Access initiative is developing a MOOC on malaria case management [119]. This type of courses can be for the long-term responses to MPox inviting the population and health personnel to gain more knowledge on the disease [117]. Simple topics like what is a viral disease, what is MPox and how epidemics are declared. At the end of a MOOC, an evaluation is done, and the person obtains a certificate. This can boost empowerment [120].

Figure 8. Definition of a MOOC.

4. Proposed Strategy for Digital Tool Deployment

In the diagram below we propose a short mid and long term deployment strategy during the Mpox response with the suitable tool for each period.

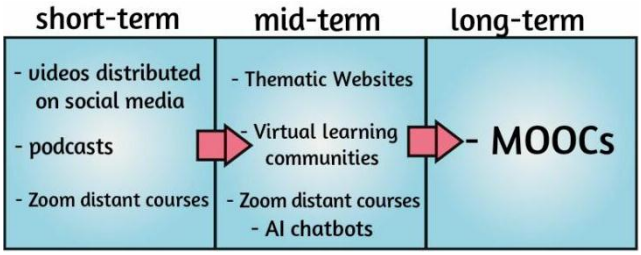

Figure 9. Proposed digital learning tool usage with time during the Mpox response.

5. Conclusion

The Mpox strategic preparedness response plan, supported by the Africa CDC and the World Health Organization highlights the importance of enhancing case management and population awarness through education. Physical education strategies face challenges that digital learning technologies can solve. In this paper we reviewed the available DLTs and some examples of their use in African context. Using these DLTs in a structured deployement strategy can unleash their full potential and maximise their impact. These information technologies can significantly increase the number of individuals reached, overcome geographical barriers and reduce the cost in delivering essential health education messages to healthcare workers and communities. In this course, it is crucial to use the pedagogy first mantra, prioritizing pedagogy before technology. Therefore, qualified public educators should develop digital competence to ensure the success of these educational campaigns. The diverse range of tools available allows for both short—and long-term strategies to achieve predefined goals. We discussed the characteristics, advantages and critical success factors of each DLT. The advancement of digital literacy and digital citizenship in affected areas of Africa presents a valuable opportunity to capitalize on. On the whole, it is critical to leverage all available technologies to save more lives during public health responses such as the ongoing Monkeypoxs'. Future works evaluating implementation difficulties, acceptance, practicality and satisfaction of these tools during responses should be led.

Abbreviations

WHO	World Health Organisation
AFRICA CDC	Africa Centers for Disease Control and Prevention
Mpox	Monkeypox Disease
PHEIC	Public Health Emergency of Intrenational Concern
PHECS	Public Health Emergency of Continental Security
CA clade	Central African Clade
WA clade	West African Clade
RCCE	Risk Communication and Community Engagement
IPC	Infection Prevention and Control
ECHO	Extension for Community Healthcare Outcomes
DHT	Digital Health Technology
DLT	Digital Learning Technology
RSS	Really Simple Syndication
AI	Artificial Intelligence
MOOC	Massive Open Online Courses

Author Contributions

Rudy Arnaud Nana: Conception, methodology, draft writing and editing

Lydia Gara Jummai: Editing and sharing ideas on DHTs

The authors read and approved the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest.

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