# Science Teacher Education Considering the Covid-19 Pandemic: The African Account

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**Abstract**

The outbreak of Covid-19 the world over is devastating. The responses to the disruptions experienced had left many nations in doubt of a possible recovery in years to come. Various sectors of human needs were distorted, and the socioeconomic impact cannot be overestimated. The education sector is one of the first sectors to be locked down immediately after the emergence of the pandemic and about the last to be recalled after the first wave of Covid-19. Education institutions are experiencing massive reforms globally amid the Covid-19 outbreak and the effect of the lockdown is enormous. The economic impact of the pandemic is more pronounced than the academic, especially in science and science teacher education. This paper investigated science teacher education considering the Covid-19 pandemic. Specifically, this research explored the African account of Covid-19, the effect of Covid-19 on science teacher education, the rationale for a rethink in science teacher education amidst Covid-19, the limitations to science teacher education post-Covid-19 and the way forward for stakeholders amid/post Covid-19. This article concluded among others that more is required in terms of investment in the education sector to actualize the modern approaches required to cope with the pandemic situations in Africa.

**Keywords:** science, teacher, education, Covid-19, pandemic

## INTRODUCTION

The emergence of Covid-19 at the start of the year 2020 met the world unprepared. Scientists alike were left dazed at the rate of spread with little or no answer to how best to prevent, manage and treat the new pandemic. Starting from Wuhan (a city in China), the virus traveled all over the world and changed the way humans live, interact, work, teach and learn (Mellish et al., 2020). While staying at home have calculated economic implications in term of projections, profit and loss. The implication of the pandemic on education is yet to be accurately described, but it will surely be more challenging for educators and learners in more fragile and unstable contexts. Most countries of the world experienced total or partial lockdowns which led to the immediate closure of universities and other schools (Flores & Swennen, 2020).

Consequently, teaching and learning activities were instantly suspended during the early period of the lockdown. Beyond the early stage, the need to rapidly adapt to new contexts of teaching and learning to cope with the pandemic exposed teachers, educators, and learners alike to unusual teaching mediums, especially for those in rural communities (Butler-Henderson et al., 2020). The experiences and challenges present rare opportunities to explore new ways to cope with such unexpected circumstances. In this period, it is important to look at how teachers have adapted to the restriction in interaction and moved to new ways of teaching and learning in preparation for future learners in a world marked with uncertainty (Bozkurt et al., 2020; Johns Hopkins University & Medicine, 2020). The expert awareness of Covid-19 as a pandemic in many African countries was through the Director-General of the World Health Organization (WHO).

On 10th May 2020, the Covid-19 pandemic was reported to have gripped 215 countries across the globe, and many of these countries were on lockdown (Dein et al., 2020). Education was among the first few sectors to face a rapid shutdown of all its activities. Thousands of schools and millions of students are affected by the lockdown due to the Covid-19 pandemic. The first response from the education sector was to completely halt its operations (Rajhans et al., 2020). This directive was advised by the WHO to various heads of government all over the world. Many responded swiftly to this directive while others delayed the action. The consequence of such delays was first experienced across Europe and later America with limited casualties from Asia and Africa (UNESCO, 2020). The coronavirus pandemic triggered significant changes in the management of various sectors of nations. Chief of these sectors is the education community globally.

After about 7 months of the global crisis, Nigerian and many African countries have started realizing that Covid-19 is here to stay and its attendant consequence will have to be confronted head-on (Mbombo, 2022). This crisis can be looked upon as an opportunity to restructure our longstanding education systems for better and update practices in an academic institution to suit the present generation of learners. As Science teachers/educators, we must prepare ourselves for the changing world when the Covid-19 pandemic is over (Fishbane & Tomer, 2020). The reality resulting from the Covid-19 crisis raises questions about the nature of teaching and ways of supporting the learning of student teachers, but it also challenges teachers to rethink ways of re-educating themselves for scenarios that are unpredictable but raise questions related to equity and social justice in the face of Covid-19 pandemic.

While we struggle to make sense of our lives during the global pandemic, questions on whether the health and well-being of citizens should be prioritized over reviving the economy have ensued. Caught in the middle are businesses, industries, and educational institutions whose business models depend on and thrive on interactions among people, places, and experiences in various spaces (Verma et al., 2020). Prominent among dependent spaces are our children, teenagers, and students who have experienced an unrivaled disruption in their academic experiences (Arendt et al., 2019).

They are expected to quickly adjust to homeschooling, online learning, and/or other versions of new learning modalities. Similarly, the basic, post-basis, and tertiary schools have had to result in remote/online learning in the middle of this pandemic. This transition to online learning has come with its share of challenges. The first assumption to successfully participate in these new online learning spaces is that families must have access to multiple internet-enabled devices. However, many families, especially those in rural areas lack access to mobile devices as well as reliable internet services (Akerlof & Kranton, 2002; Carrillo & Flores, 2020).

### *The African Account of Covid-19*

The first case of coronavirus was discovered towards the end of February 2020 in Africa. A nationwide lockdown was declared in March, 23rd 2020 in Nigeria. Across Africa, the lockdown was about the only meditated strategy to combat the scourge. During this period, only workers and artisans delivering essential services were permitted to carry on their daily activities, other citizens were required to obey the new normal through law enforcement strategies (Stocklin-Weinberg et al., 2019). While this position seems commendable at the time, many African countries were only willing to survive through the period, as other media for learning and education were not considered especially in the first four months of the pandemic. Surviving the pandemic emerged as the way forward after China's systemic reopening and dolling out coping strategies to sustain economic dominance (Aknin et al., 2022).

Until June 2020, most businesses and education institutions were on total lockdown without any attempt to explore blended learning or online classes to either remediate or palliate academic paralysis. Educational divide already exists in African societies owing to school location, parents' socio-economic ability, and even access to the internet (Strauss, 2020). The pandemic may further widen the gap for the already disadvantaged students. Moving forward, universities and other institutions may have no choice but to continue to offer online instruction (Dhawan, 2020). This will mean that educators around Africa will have to move content, classes, materials, and opportunities for experiential instruction to online classrooms.

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The absence of a reliable treatment and/or vaccine for Covid-19 around the globe is a new normal to the way Africans live, work, study, travel, gather, and how access day-to-day services (Jandrić et al., 2022). For science educators, the need to acquire the requisite skills to traverse this unfortunate occurrence is most desired. Although, the economic status of science educators in developing countries remains poor (Quezada et al., 2020). However, more is desired from science educators and teachers alike despite their limited resources. Science educators during this period are expected to introduce learning approaches that are alien to their usual practice (Onishchuk et al., 2020). Among these are distance learning, blended learning. Several empirical studies have posited differently on these approaches.

A sizable number of studies concluded that online classes can be as effective as physical classrooms with the studies mostly done in tertiary institutions (Lin & Gao, 2020). Other scholars have speculated on the alternative. In situations like this, online classes are preferred for continuous education (Woolley et al., 2020). With the relaxation of various aspects of life at the tail end of the year 2020. Academic activities in Nigeria and other African schools were rapidly halted from March up until August 2020 when exit classes were allowed to sit for general examinations. With the current trends of events, a science teacher in Nigeria and Africa must strive to provide quality education, and ensure uniformity, equity, and universal accessibility to all (Ikoni & Ogundele, 2020).

Since face-to-face interaction between teachers and students is minimized owing to the rapid transmission of Covid-19, innovative use and promotion of technology in ushering educational reforms to create a vibrant knowledge society are desired (Muralidharan et al., 2019). There is an urgent need for the transformation of science education, from a traditional/conventional system to an e-learning environment, imparting updated competencies to our science teachers. Some universities across Africa have responded quickly to this crisis, considering guidelines issued by various Governments. Holding online conferences, classes, and webinars and the usage of other online media have alleviated the situation to a reasonable extent. Although, these opportunities are not equally available at various locations owing to remote/under-developed communities across Africa (Gupta et al., 2021). There is a need for imminent change in our practice of teaching. An appraisal of how and why the quick adaptation of new strategies is required, along with the challenges facing science teacher education during this Covid-19 transition period (Santika et al., 2022).

## RESULT AND DISCUSSION

### Effects of Covid-19 Pandemic on Science Teacher Education

The covid-19 pandemic has affected educational systems worldwide, leading to the near-total closures of schools, universities, and colleges. Most governments around the world have temporarily closed educational institutions in an attempt to reduce the spread of Covid-19. As of 30 September 2020, approximately 1.077 billion learners were currently affected due to school closures in response to the pandemic. According to the UNICEF monitoring team, 53 countries implemented nationwide closures and 27 implemented local closures, impacting about 61.6 percent of the world's student population. School closures impact not only students, teachers, and families, but have far-reaching economic and societal consequences. School closures in response to the pandemic have shed light on various social and economic issues, including student debt, digital learning, food insecurity, and homelessness as well as access to childcare, health care, housing, internet, and disability services.

The impact was more severe for disadvantaged children and their families, causing interrupted learning, compromised nutrition, childcare problems, and consequent economic cost to families who could not work (UNESCO, 2020). In response to school closures, UNESCO recommended the use of distance learning programs and open educational applications and platforms that schools and teachers can use to reach learners remotely and limit the disruption of academic activities. Efforts to slow the spread of COVID-19 through non-pharmaceutical interventions and preventive measures, such as social distancing and self-isolation have prompted widespread closure of primary, secondary, and tertiary institutions schooling across Africa (UNESCO, 2020).

### The rationale for Rethinking Science Teacher Education amidst COVID-19 Pandemic

The Covid-19 pandemic may well change our world and our global outlook; it can also teach us about how education needs to change to be able to better prepare our young learners for what the future holds. So, as science educators grapple with new ways of communicating with our students away from our classrooms and lecture theatres, it is a good time to reflect on how this disruptive crisis can help us define what learning should look like for our students. The following ways have been identified as rethinking strategies that could be employed amidst the Covid-19 pandemic (Tsagakis & Papatriantafyllou, 2020).

Usage of social media platforms (WhatsApp, Telegram, Twitter, video conferencing, dedicated educational portals, virtual classroom, or blended learning): These are promising applications or avenues to foster a self-learning attitude in science education students. An increasing number of institutions are encouraging the use of technology in day-to-day teaching as students find it enjoyable. Covid-19 has resulted in educational institutions across the world being compelled to suddenly harness and utilize the suite of available technological tools to create content for remote learning for students. Science educators across the world are experiencing new possibilities to do things differently and with greater flexibility resulting in potential benefits (Ferri et al., 2020).

The use of media houses such as Television and radio stations amongst others: Many countries introduced educational packages that were presented through media houses before the lockdown was lifted. Such media houses should continue because students can benefit from such presentations (Sahlberg, 2021). Educating Citizens in an Interconnected World: Covid-19 is a pandemic that illustrates how globally interconnected we are – there is no longer such a thing as isolated issues and actions. Successful people in the coming decades need to be able to understand this interrelatedness and navigate across boundaries to leverage their differences and work in a globally collaborative way. Redefining the Role of Science Instructors: The notion of a teacher as the knowledge-holder who imparts wisdom to their pupils is no longer fit for 21st-century instruction.

With students being able to gain access to knowledge and even learn a technical skill, through a few clicks on their phones, tablets, and computers, there is a need to redefine the role of the science teacher in the classroom and lecture theatre. This may mean that the role of science teachers will need to move towards facilitating young people's development as contributing members of society (Larimore, 2020). Teaching life skills needed for the future: In this ever-changing global world, young students require resilience and adaptability – skills that are proving to be essential to navigating effectively through this pandemic. Looking into the future, some of the most important skills that employers will be looking for will be creativity, communication, and collaboration, alongside empathy and emotional intelligence; and being able to work across demographic lines of differences to harness the power of collectiveness through effective teamwork (Edmondson et al., 2020).

## Limitations to Online Science Teaching/Instruction

*Resources Availability:* The majority of Nigerian schools (both Public and Private) are under-resourced. They are ill-equipped to respond to the teaching and learning challenges of the 21st century – let alone the latest demands of the Covid-19 pandemic. *Availability of Network:* The current lockdown has suddenly compelled teachers to adopt predominantly online, blended learning teaching practices. But most households in Nigeria are still without access to the internet. Very few schools had adapted to blended learning before the lockdown and few schools would be able to adopt it during the lockdown. *School Location:* Schools located in rural areas and villages may not be able to adopt e-learning as most of them do not have access to either network.

*High Cost of Mobile Devices:* There are challenges in having appropriate high-tech gadgets, computers, or laptops for every student. More often these electronic gadgets with students are shared between siblings or among two or more students. This does not favor e-learning among students. *Technological Know-How:* Most science teachers do not have the requisite knowledge to deliver this online teaching or lack knowledge of how to organize the virtual classroom. This will certainly affect how they discharge their duty during this crisis period.

## The Way Forward

Review of our Curriculum to Accommodate Changes Resulting from the

Covid-19 pandemic: The trend in pedagogy for theoretical content should be shifted from monotonous didactic lectures to interactive online lectures using video conferencing tools (e.g. Google meet, Microsoft teams, Zoom, etc.); reading and writing assignments should be done using various teaching-learning apps such as Google Classroom, Microsoft Team, etc. Re-orientation of our Students' Information Seeking Behavior: Students should be encouraged to become active learners by contributing to the inputs in the e-learning environment.

Training and Retraining of Science Teachers Toward the use of Technological Tools: Science teachers should be formally trained for efficient usage of various tools and online pedagogy why through training or teachers' development programs. Provision of highly subsidize computers and other gadgets to the students to give way to easy delivery of classes online or offline. Development of application packages that can be used by students offline to facilitate their learning. Science educators should use a wide variety of online tools and apps to keep going with their teaching.

## CONCLUSION

The Covid-19 pandemic situation is a reality check for the African government and stakeholders in education. The need to look within and bring about a meaningful, impactful, and purposeful direction to alleviate the needs of teachers permanently should be paramount. This will go a long way in solving the challenges associated with teachers' standard of living, teaching standards, teaching environment, and teaching resources. These are extraordinary times, with special needs to cope with the present-day rigor. The pandemic is proving to be a creative disruption with tough challenges for all educational systems allowing restructuring of the present conventional classroom-based educational system.

At the same time, there is a strong opportunity for us to adopt newer techniques that are more suitable for the present generation of learners. The rapid transition to online education will not only benefits science educators and students but will also create a momentum of continued education for practicing science educator in the continent. We will do well, as scholars if this situation is properly managed and come out better, on the other hand, failure to meet the needs of this period may leave us with yet another regret on the list of things we should have done as a people but refused.

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