



Securing Nigeria: The Effect of Coronavirus (Covid-19) Pandemic on Nigerian School Mathematics Curriculum and Education Systems

¹Abubakar Attahiru; ²Adegoke Olalekan Isiaka; ³Lawali Abubakar; ⁴Nasiru Muhammad & ⁵Abdulrahman Muhammad Danjuma

^{1,2} Department of Mathematics

Shehu Shagari College of Education, Sokoto, Nigeria

¹aanaha2013@gmail.com/Tel: +2348032628820

²adegokeisiaka080@gmail.com/ Tel: +23408144156364, +2347040299486

^{3,4,5}Department of General Studies

College of Agriculture and Animal Science Wurno, Sokoto, Nigeria

³Lawalicaptain2gmail.com/Tel: +2348163885964

⁴Nasiruzainab1@gmail.com/+2348031352275

⁵ibuwalle@gmail.com/ Tel: +2348067858479

ABSTRACT

This paper examines mathematics curriculum and the effect of corona virus pandemic on Nigerian education systems. With all learning institutions prematurely closed on 20th March, 2020 and all citizens advised to self-isolate in a bid to control the spread of COVID-19 pandemic. It has affected people regardless of nationality, level of education, income or gender, but the same has not been true for its consequences which have hit the most vulnerable hardest. Education is no exception, students from privileged background, supported by their parents and eager and able to learn, could find their way past closed school doors to alternative learning (computers) opportunities. Those from disadvantaged background often remained shut out when their schools shut down. Infact the effect cannot be overemphasized include; public financing of education, Nigerian international student mobility, the loss of instructional time delivered in a school setting, measures to continue students learning mathematics/other subjects during the lockdown, teacher's preparedness to support digital learning, class size, a critical parameter for the reopening of schools and mathematics education during the corona virus lockdown. Throughout this crisis, education systems are increasingly looking towards international policy experiences data and analysis as they develop their policy responses.

Keywords: Mathematics Curriculum, Education Systems, Mathematics Education, COVID-19, Mathematics.

INTRODUCTION

The global "stay home" mandates to mitigate the spread of corona virus pandemic (COVID-19) in early 2020 provided an unexpected opportunity to understand how much digital applications influence our daily lives. In some part of our lives, we hardly needed to skip a beat-particularly advancements in video conferencing and online shopping that helped make that situation considerably more bearable than what it

might have been even four years earlier. Still, we also discovered that one of the most vital institutions in the Nigeria education was very under prepared to continuation with educational processes, especially most of the first and second generation universities in Nigeria. While we could keep attending our weekly yoga class via online streaming, teachers, students and parents were scrambling to figure out how to realize learning from home. What the corona virus pandemic (COVID-19) revealed was that, despite significant advances in recent years in video conferencing, technologies, existing digital learning technologies yet fall short of helping teachers provide the kind of challenging, collaborative problem solving that is needed for all students to develop robust mathematical understanding (Perienen, 2020). This crisis has exposed the many inadequacies and inequalities in our education systems – from access to the broadband and computers needed for online education and the supportive environments needed to focus on learning of mathematics and other subjects (Frid, 2020 and Iwai, 2020) up to the misalignment between resources and needs.

The lockdowns as a result of COVID-19 have interrupted conventional schooling with nationwide school closures in Nigeria which lasted for roughly seven months. While educational community have made concerted efforts to maintain learning continuity during this period, pupils and students have had to rely more on their own resources to continue learning remotely through the internet, television or radio, and some teachers in private schools that does not get salary, organized an extramural causes in various area in Sokoto. Teachers also had to adapt to new pedagogical concepts and modes of delivery to teaching and learning of mathematics (Perienen, Bieda, Going, Kursav and Edson, 2020) for which they may not have been trained. In particular, the learners in the most marginalized groups, who don't have access to digital learning resources or lack the resilience and engagement to learn on their own, are at risk of falling behind.

Moreover, the coronavirus pandemic (COVID-19) has also had a severe effect on higher education as universities closed their premises couple with the strike of the university lecturers and shut of Nigerian borders in response to lockdown measures. Although higher education institutions were supposed to replace face-to-face lectures with online learning, these closures and strike affected learning and examinations as well as the safety and legal status of Nigerians international students in their host countries. Infact most importantly, the crisis raises questions about the value offered by a university education which includes retraining and social opportunities as well as educational curriculum contents (Agnolotto and Hafidah, 2020). To remain relevant, universities will need to reinvent their learning environment so that digitalization expand and complements students-teacher and other relationships.

Reopening schools and tertiary institutions will bring unquestionable benefits to students and the wider economy; it will bring economics benefits to families by enabling some parents to return to work. But those benefits however, must be carefully weighed against the health risks and the requirements to mitigate the tool of the COVID-19 pandemic (Sintema and Phiri, 2018). The need for such trade-offs calls for sustained and effective coordination between education and public health authorities at different levels of government; enhanced by local participation and autonomy, tailoring responses to the local context. Several steps can be taken to manage the risk and trade-offs, including physical distancing measures, establishing hygiene protocols, revising personnel and attendance policies and investing in staff training on appropriate measures to cope with the virus.

However, the challenges do not end with the immediate crisis, because spending on education may be compromised in the coming years. As the public funds are directed to health and social welfare, long-term public spending on education is at risk despite short-time stimulus packages in Nigeria. Private funding will also become scarce as the economic weakness and unemployment rises (Wu & Mc Googan, 2020). The following are the major effects of corona virus (COVID-19) pandemic on Nigerian school mathematics curriculum and education systems: Public financing of education, Nigerian international mobility, the loss of instructional time delivered in a school setting, measures to continue students' learning mathematics and other subjects during lockdown, teachers' preparedness to support digital learning, class size, a critical parameter for the reopening of schools and mathematics education during corona virus lockdown.

The Effects of the Crisis on Education

The spread of COVID-19 has sent shockwaves across the globe. The public health crisis, unprecedented in our lifetimes, has caused severe human sufferings and loss of lives (Hopman, Allegran and Methar, 2020). As government grappled with the spread of the disease by closing down entire economic sectors and imposing widespread restrictions on mobility, the sanitary crisis evolved into a major economic crisis which is expected to burden societies for years to come. While the long-term effect of the crisis is uncertain, the pandemic affect public spending on education mathematics as funds are diverted into health sector and the economy, eleven percent (11%) of public expenditure was devoted to education before the pandemic (Chinazzi, Davis, Ajelli Giounnini, Livinova and Merler, 2020). Even on the present and next year budget education does not have much. Infact in Nigeria short term support measures have been introduced like on supply of digital mathematics learning devices, financial support to students and schools and fund for safety and cleaning equipments (Chinazzi et al., 2020). Since the components of mathematics curriculum are the objective, contents, learning experience and the evaluation, COVID-19 crisis left teachers in confusion, to achieve the behavioural objective, teaching and learning of the contents cannot be achieved, learning experience is left out because, there is no face-to—face learning in the schools and thus evaluation (examination) cannot take place (Hopman et al., 2020).

The effect of COVID-19 pandemic also depends on tax money which is the key to tomorrow's tax income. Decisions concerning budget allocations to various sectors including education, healthcare, social security and defence, depend on Nigeria government priorities and the prevalence of private provisions of these services, (Bieda et al., 2020). As there is no guarantee that markets will provide equitable access to educational opportunities, government funding to educational services is needed to ensure that education is not beyond the reach of some members of society. At this point, in the short-term, Nigeria government need to implement financial measures to support students and education systems in coping with the disruptions and economic effect of schools and the universities closures, among are;

- i. The High Education Relief package need to be launched which will provide funds for those that have been displaced as a result of the COVID-19 crisis and who were looking to improve the skills or retain.
- ii. The launch of the Nigerian emergency student benefit for the polytechnics, colleges of education students and recent high school graduates who are unable to find work due to COVID-19 crisis.
- iii. Distance learning support measures to equip schools with digital platforms and tools for distance learning, lend digital devices to less well-off students and train school staff in methodologies techniques for teaching and learning.

Nigerian International Students Mobility

There was a great reduction in the international students flow due to COVID-19 pandemic crisis. The crisis has affected the continuity of learning and the delivery of course material, the safety and legal status of international students in their host countries and students perception of the value of their degree (CMP, 2020). International students were particularly badly hit at the beginning of the lockdown as they have had to sort out the implications on the status on campus and within their host country, they had to decide whether to reform home with limited information about when they might return, or remain in their host country with restricted employment and education opportunities, all while sorting out their visa status.

To ensure the continuity of education despite the lockdown, higher education institutions has sought to use technology and offer online classes learning experience as a substitute for in-class time (Iwai, 2000 and Perienen, 2020). However, many universities struggled and lacked the experience and time they needed to conceive new ways to delivery instruction and assignments; examinations were also affected, causing disruption to students learning trajectories and progressions. Although many higher education institutions offered online courses before the pandemic, few students considered it has the sole alternative to physical ill-person learning (Agnolotto and Hafidah, 2020). Beyond the transactions learning experience, these students are also losing out other benefits of international mobility such as international exposure, access to foreign job market and networking. Perhaps most importantly, the crisis has exposed the value proposition of universities. Students are unlikely to commit large amount of time and money to consume online curriculum content. To remain relevant, universities will need to reinvent learning

environments so that digitalization expands and complements, but does not replace, students-teacher and student-student relationship (Sintema and Phiri, 2018).

The Loss of Instructional Time Delivered in a School Setting

The initial attempts to contain the spread of the virus, lock-down was imposed on schools up to tertiary institutions in March 20th in Nigeria, without necessarily completely ceasing teaching and learning as the pandemic expanded. In addition some countries have reorganized their school years to minimize the loss of instruction time like Australia, Korea and Lithuania but in Nigeria, the instructional time was completely less and remote learning is a poor substitute for the experience of studying because the teaching of mathematics involve instruction with methodology which is the basis translation of the mathematics curriculum and the instructional method which a teacher chooses to use, it should feed directly off the curriculum for each class (Zu, Jiang, Xu and Zhang, 2020). The effect of the pandemic does not allow face-to-face teaching and learning, students' loss the instruction that suppose lead to relationships between mathematics learned in school and real-life situation, teachers on their side loss the instructional methodologies (Frid, 2020).

It is difficult to estimate accurately the number of instruction weeks/months affected in Nigeria but in other countries, individual schools or local authorities have autonomy over the organization of the school year and the reopening of schools (Wu & McGoogan, 2020).

Measures to Continue Students' Learning During the Lockdown

Nigerian used a variety of resources to support students' learning while they were unable to come to school, including instructional packages like textbooks, worksheets and printouts, radio education, educational television and online instructional resources. Nigerian usually used several tools in order to reach the largest proportions of student's possible (Bieda et al., 2020). Online platforms were the most popular tool used during school closures, online learning tools ranged from educational contents which students could explore at their own discretion and formalized learning programmes conducted at their own pace, to real time lessons led by the teachers using virtual meeting platforms (Perienen,2020).

Another popular learning arrangement was television and radio broadcast providing contents to continue students learning. In Nigeria, TV programmes mostly catered for younger children in primary schools who may have had difficulty using online learning platforms or conducting self-directed learning. TV broadcast are also a way to reach students who do not have adequate resources for online instruction. Despite these advantages, broadcast can be limited to covering only a few subjects due to the short amount of time diverted to these TV programmes, like Voice of Nigeria (VON) and Federal Radio Corporation covered one of five subjects, that is mathematics, physics, chemistry, biology and computers studies per day a one-hour slot. These measures were conducted by the government with active involvement from individual schools and this was used to help students' learn at home due to corona virus pandemic effect (Agnolotto & Hafidah, 2020). Nigerian used a variety of remote learning resources, including instructional packages, online instructional resources; educational content for exploring if desired, real-time lessons on virtual meeting platforms, online support services for parents and students, then self-paced formalizes lesson (Chanazzi et al., 2020).

Teachers Preparedness to Support Digital Learning

During the pandemic, remote learning became a lifeline for education systems in Nigeria, but the opportunities that digital technologies offer go well beyond a stopgap solution during a crisis. Digital technology offers entirely new answers to the questions of what people learn, how they learn and where and when they learn (Perienen, 2020). Technology can enable teachers and students to access specialized materials well beyond textbooks in multiple formats and in ways that can bridge time and space. Working alongside teachers, intelligent digital learning systems don't just teach students science, but can simultaneously observe how they study, the kind of tasks and thinking that interest them and the kind of problems that they find boring or difficult (Wu & McGoogan, 2020). The systems can then adopt the learning experience to suit student's personal learning styles with great granularity and precision.

Similarly, virtual laboratories can give students the opportunity to design, conduct and learn from experiments, rather than just learning about them (Frid, 2020).

Moreover, technology does not just change methods of teaching and learning, it can also elevate the role of teachers from imparting received knowledge towards working as co-creators of knowledge, as coaches, as mentors and as evaluators. And that being said, the COVID-19 crisis struck at a point when most of the education systems covered by the Federal Inspectorate Service (FIS) on education in 2018, were not ready for the world of digital learning (Zu et al., 2020). Infact, teachers need to renew their skills, regularly in order to be able to innovate their practices and adapt to the rapid transformation inherent in the 21st century. This is even more important in the current context, where the COVID-19 health crisis has pushed teachers to adopt very quickly, especially in Nigeria where they do not necessarily have the pedagogical and technical skills to integrate tools into learning.

Class size, a Critical Parameter for the Reopening of Schools

Social distancing has proven to be one of the most effective measures to prevent the spread of the COVID-19 pandemic. Within a school context, this means reducing contact between pupils and staff. In some countries the safety distance depends on the level of containment of the virus achieved but in Nigeria, the class size is 25 pupils in the class and distancing of 2 metres. Guidance in many other areas in Nigeria has been to reduce or halve the size of the classes in order to maintain the required distance between students (Chanazzi et al., 2020). Ensuring a minimum safety distance between pupils and staff will depend on many factors such as classroom size, room availability and the number of students per class. Areas or states in Nigeria with smaller class sizes may find it easier to comply with new restrictions on social distancing provided they have the space to accommodate the number of student's safety.

While returning to schools is compulsory, students were committed except for sick students or those with a vulnerable sick family, member; attendance is optional but not in tertiary institutions. These hybrid measures aim to secure support for the reopening of schools while optimizing their capacity for social distancing (Schleicher and Reimers, 2020). To ensure all students have the opportunity to benefit from face-to-face teaching in a context of reduced class sizes, schools organized shifts to alternate students throughout the day when the class cannot accommodate them all on site (Schleicher and Reimer, 2020). Unless schools can establish effective forms of hybrid learning which combine on-site and online learning experiences, the consequences of such a measure will be reduced classroom instruction time than before school closures.

Mathematics Education During the COVID-19 Lockdown

Since remote learning has offered some education continuity when it comes to academic learning, mathematics education and training has been particularly hard hit by the crisis (Iwai, 2020) compared to general subjects, the programmes suffer a double disadvantages as social distancing requirement and the closures of schools and problems of most teachers and students involve in computer training for effectiveness. Yet education mathematics plays a central role in ensuring the alignment between education and mathematics, the successful transition of students into the teaching and learning through computer into the labour market and for employment and economic recovery more generally (Sintema and Phiri, 2018). Not at least many of the professions that formed the backbone of economic and social life during the lockdown hinge on mathematics education qualifications.

Whether they are school based or combined school and work based programmes practical teaching (teaching practice) forms an essential part of the mathematics education curriculum. This involves in preparation of lesson note, lesson plan; that consist of previous knowledge, behavioural objective, teaching aids and laboratories or in the class activities (Zu et al., 2020), by using specific equipments for the teaching content, and careful attention from teachers to ensure that tasks are correctly performed. Students will struggle the most to adjust to remote learning, even in cases where practical training can be simulated remotely, the learning experience is more limited (Wu and McGoogan, 2020).

CONCLUSION

As we enter the corona virus pandemic (COVID-19) recovery phases, it will be critical to reflect on the role of education systems and particularly mathematics education – in fostering resilient societies. The global health crisis and the lockdown that followed have brought to the fore teaching profession and other professions that have often been taken for granted, renewing our awareness of their value to society. This has helped restore a sense of esteem for those teachers and workers who have worked relentlessly during this time to keep economies afloat.

The outlook is very uncertain. But if anything, the pandemic has exposed our vulnerability to crisis and revealed how precarious and independent the economies we have built can be. Disruptions, it causes are not limited to pandemic, but may also result from natural, political, economic and environmental disorder. Our capacity to react effectively and efficiently in the future will hinge on governments foresight, readiness and preparedness.

Though, their roles in developing the competencies and skills needed for tomorrow's society, education systems will need to be at the heart of this planning which includes rethinking how the economic should evolve to guard against adversity and defining the skills, education and training required to support it.

Real change often takes place in deep crisis and this moment holds the possibility that we won't return to the status quo when things return to "normal". While this crisis has deep disruptive implications, including educations, it does not have predetermined outcomes. It will be the nature of our collective and systematic responses to these disruptions that will determine how we are affected by them.

In this sense, the pandemic is also a call to renew the commitment to the Sustainable Development Goals. Ensuring that all young people have the opportunity to succeed at school and develop the knowledge, skills, attitudes and values that will allow them to contribute to society is at the heart of the global agenda and education's promise to our future society. The current crisis has tested our ability to deal with large-scale disruptions. It is now up to us to build as its legacy a more resilient society.

RECOMMENDATIONS

1. Mathematics student should allowed to send their difficult mathematical problems to various expert through on-line to enable obtain immediate answer to those problems
2. Mathematics teachers should ensure appropriate application of wide range of technologies for effective teaching and learning in mathematics classroom.
3. Mathematics teachers should develop ICT skills by specialty the necessity of continuous professional learning for effective development their teaching
4. Curriculum planner should involve teachers planning their curriculum for proper teaching and learning. They should incorporate in the curriculum many areas that have been superseded by technology as soon as possible.
5. There is need for Ministry for education to train pre-services and in-service teachers on the pedagogical element that focus on focus the use ICT in mathematics classroom for enhancing teaching and leaning by organizing conference seminar and workshops.
6. The government should assist by providing computer facilities directly or provide financial assistance to schools to enable them have enough computer facilities in mathematic in mathematics in mathematics classroom.
7. It is highly recommended for the government and concerned educational personnel should ensure there are futuristic plans to in case of another similar experience. This is COVID-19, nobody knows what other occurrences will happen in future and will lead to interruption of the activities of the educational system of Nigeria.
8. Therefore plans are to be made in ensuring the future of the education system is secured and not been disrupted with emergence of disease.
9. Having observed that even the E-Learning chosen as the alternatives to be used in reaching out to the learners in the period of lockdown has not successfully work because of non unemployment of expert to manage the ICT section of the Nigeria Education system, huge tariff charges from various network providers in Nigeria.

10. Therefore it is advisable for the Nigeria ministry of education to employ experts in the area of ICT to further introduce programs that will enhance the productivity of the education sector in order to compete with the outside world even in the period of global pandemic lockdown.
11. Experts should design the teaching learning activities through social media platforms such as Google Classroom which is a free web service that is developed by Google for schools that aims to simplify creating, distributing and grading assignments in a paperless way with the purpose of streamlining the process of sharing files between lecturers and students.

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