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EFFECTIVE STRATEGIES FOR TRAINING THE PHYSICALLY CHALLENGED ON DISCOVERING AND EXPLORING SUB-SAHARA AFRICAN RESOURCES AND OPPORTUNITIES WITH THE USE OF VIRTUAL BASED ARTIFICIAL INTELLIGENCE (AI) DURING COVID-19 LOCK DOWN FOR SUSTAINABLE DEVELOPMENT IN 21ST CENTURY

***I.K. OJUOPE[1]; A.O. ADETUNMBI[2]; & O.E. OYINLOYE[3]**

[1]Department of Computer Science, Aminu Saleh College of Education, Azare, Bauchi State, Nigeria. [2]Department of Computer Sci., Federal Uni. of Tech., Akure, P.M.B. 704, Akure, Ondo State, Nigeria. [3]Department of Comp. Sci., Ekiti State University, Ado Ekiti, Nigeria.

ABSTRACT

The world is currently facing a rapid and deep economic slowdown as a result of COVID-19 global pandemic. The gravity and depth of global nature of this recession, which may turn to depression, suggests that this pandemic may significantly affect global resources mining sector. The majority of countries consider resources mining to be essential tools for sustainable development, meaning that the effect of COVID 19 lock-down on the mining industry and production has been at increase (Simon, 2020). The global pandemic crisis of COVID-19 brought big challenge of enforcing lock – down to control the fast spread of the deadly

Introduction:

Artificial intelligence has been applied widely in our daily lives in a variety of ways and on various fields with lots of successful stories. AI equally contributes to dealing with the COVID-19 corona virus global pandemic disease which has been happening around the world (Simon, 2020). Mining industry is an essential part of resources that drive the world economy. This sector was also affected during the COVID 19 lock-down

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disease. Several employees brought their job home with the use of virtual technology. Some sections of works such as exploration of resources that cannot take home suffer much setback and loss; this affects bringing sustainable development into reality most especially in Sub-Sahara African. This calls for the training of the resources explorers most especially the physically challenged with the use of Artificial Intelligence for discovering and exploring of these resources during COVID-19 corona pandemic lock-down. As a result of this, this work focused on Effective Strategies for training the physically challenged on the Discovering and Exploring Sub-Sahara African Resources and Opportunities with the use of Virtual Based Artificial Intelligence (AI) during COVID-19 Lock Down for Sustainable Development in 21st Century. The report of World Health Organization (WHO) and World Bank (2011), persons carry a significant proportion of the world's population, about 15%. As a result of differences in access to exploration of resources to the normal individuals, they are rarely seen as contributor to productive human capital development of the Society. Most of the persons have little or no access to the resources that drive the economy. Training these people on the use of AI to discover and explore resources in Sub - Sahara African will enhance their ability to contribute to the realisation of the sustainable development goals.

Key words: , *Discovering, Exploring, Sub-Sahara African, Resources, Virtual Reality, Artificial Intelligence, COVID-19 Lock Down, Sustainable Development.*

Imposed to control the wild spread of the deadly disease. This is the reason why the training of the on the use of Artificial Intelligence for discovering and exploring of these resources becomes highly imperative. The outbreak of COVID 19 global pandemic has profoundly changed the way we live our lives and carry out our day–to-day activities. The COVID-19 pandemic has dramatically accelerated the adoption of Artificial Intelligence (AI) in different fields. We have now witnessed the equivalent of some years of digital transformation compressed into just a

few months. Learning Challenged persons find it difficult to learn and comprehend fast (Radka and Peter, 2016); as a result of this challenge, the need for artificial Intelligence to enhance their productivity ability cannot be overemphasised.

Despite the ease of COVID-19 lock down in several countries in Sub-Sahara Africa including, and schools were opened for normal academic activities, there are still lots of COVID-19 protocols observed to control the spread of this Pandemic disease. There is still tendency for the spreading of this disease by the that may find it difficult to observe the protocols put in place for the control of the spreading of this disease as a result of their level of IQ (Intelligent quotient) (World Bank, 2020). persons are vulnerable in the society, they find it difficult to learn and comprehend fast and they can easily spread the disease (Radka and Peter, 2016). As a result of these challenges, the need for training them on the use of Artificial Intelligent for discovering and exploring resources is very essential. This will help to control them from contacting and spreading this Pandemic disease and to support the sustainable development.

COVID 19 and Global Resources Exploration

The sudden emerging of global COVID-19 pandemic crisis has changed all aspects of human life, including resources production together with the industries that the mining sector supplies. This has brought about a slowdown in the global economy as a result of efforts to control the spread of COVID-19 by imposing lock - down. However, the effect of the crisis on the mining industry remains a subject of discussion. Most countries consider mining as essential resources; the sector hit setback with the COVID-19 outbreaks. The specific nature of mining means that the direct impact on the global mining sector may not be as significant as the impact on other economic sectors, such as transportation and leisure travel, which have been greatly checked. However, the fact that mining operations have remained open during the COVID-19 crisis cannot be overemphasised. The economic effect of COVID-19 pandemic crisis may be sharp and deep but a return to economic normality may not be equally as rapid (Simon, 2020). Some governments allowed mining to continue during the COVID-19 pandemic with somewhat limited restrictions relating to COVID-19 mitigation (Table 1).

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A complete shutdown occurred in some countries such as Mexico, where the mining industry was forced to cease operations on March 31, 2020, but was allowed to reopen on May 18, 2020. The South African government also initially approached their underground-dominated and often labor-intensive mining industry the same way, closing operations in March 2020 (Ramaphosa, 2020) but later changing this to only reduce mining capacity by 50%. This challenging situation call for training of resources workers most especially the on the use of Artificial Intelligence on exploration of mineral resources in Sub-Sahara African.

Table 1. Summary of the Mitigation Approaches to COVID-19 and Their Impacts on the Mining Industry in Selected Countries Listed by Value of Metallic Mineral and Coal Production

Country or state	Metallic mineral and coal production value 2016 (in billions of USD)	2018 MCI score	Production value as % of GDP	Major metals produced	Business operations restricted?	Mining allowed to continue?	Country-wide or state/province-wide mitigation?	Notes
China	626.3	53.1	3.6	Antimony, arsenic, bauxite, coal, cobalt, copper, diamonds, gold, iron ore, lead, lithium, manganese, molybdenum, nickel, REE, silver, tin, titanium, vanadium, zinc	Yes	Yes	State/province	Some reduction of production in significantly affected provinces
Australia	123.1	69.8	10.2	Bauxite, coal, cobalt, copper, diamonds, gold, iron ore, lead, lithium, manganese, nickel, REE, silver, tin, titanium, zinc	Yes	Yes	State/province	Internal travel restrictions restricting some FIFO operations
Russian Federation	97.5	77.9	7.1	Antimony, arsenic, bauxite, coal, cobalt, copper, diamonds, gold, iron ore, lead, molybdenum, nickel, platinum group elements (PGE), rare earth elements (REE), silver, tin, tungsten, vanadium, zinc	Yes	Yes	Country	
United States	89.7	41	0.5	Bauxite, coal, cobalt, copper, gold, iron ore, lead, lithium, molybdenum, nickel, PGE, REE, Silver, Titanium, Zinc	Yes	Yes	State/province although nonessentials are deemed essential	
India	77.0	36.9	3.4	Bauxite, coal, chromium, iron ore, lead, manganese, REE, titanium, zinc	Yes	Yes	Country	Mines allowed to remain open but downstream facilities suspending or lessening operations
South Africa	48.9	65.1	16.5	Coal, chromium, cobalt, diamonds, gold, iron ore, manganese, PGE, titanium, vanadium	Yes	Yes	Country	Initial countrywide closure of mining industry followed by change to allow mining at 50% capacity
Indonesia	47.5	38.8	5.1	Coal, Copper, Gold, Nickel, Tin	Yes	Yes	Country	Designation of mining as an essential business, varies from province to province; some mining operations closed as a precaution
Canada	39.4	53.1	2.6	Bauxite, cobalt, diamonds, gold, iron ore, lithium, molybdenum, nickel, PGE, titanium, zinc	Yes	Yes	State/province	
Brazil	36.6	35.3	2.0	Bauxite, diamonds, gold, iron ore, lithium, manganese, nickel, REE, tin, titanium, vanadium	Yes	Yes	Country	
Chile	33.5	69.1	13.4	Copper, iron ore, lithium, molybdenum, silver	Yes	Yes	Country	Mining companies requested to reduce workforce
Mexico	28.9	53.2	2.7	Antimony, copper, gold, iron ore, lead, manganese, molybdenum, silver, zinc	Yes	No	Country	Mining industry closed March 31, allowed to reopen May 18
Peru	27.1	60.1	14.1	Copper, gold, iron ore, lead, molybdenum, silver, tin, zinc	Yes	Partially	Country	Mine operators given partial exemption from closure orders, allowing necessary operations to proceed; 75% of mining workforce evacuated
Kazakhstan	18.6	76.7	13.6	Antimony, coal, chromium, copper, gold, iron ore, lead, manganese, zinc	Yes	Yes	State/Province	
Turkey	17.3	67.5	2.0	Antimony, chromium, lead, molybdenum	Yes	Yes	State/Province	
Germany	15.8	36.0	0.5	Coal	Yes	Yes	Country	
Poland	14.6	49.1	3.1	Coal, silver	Yes	Yes	Country	
Colombia	10.1	72	3.6	Coal, copper, gold, iron ore, nickel, PGE, silver	Yes	Yes	Country	Mining allowed to continue with restrictions
Ukraine	9.9	61.4	10.6	Iron ore, manganese, titanium	Yes	Yes	Country	
Finland	8.5	57.3	3.6	Chromium	Yes	Yes	Country	
DRC	7.9	46.4	2.2	Cobalt, copper	Yes	Yes	State/province	Limited shutdowns of operations have taken place in some provinces e.g., 48-hour closures in Haut Katanga
Mongolia	6.0	84.9	53.6	Molybdenum, tungsten	Yes	Yes	Country	
Ghana	5.5	90.9	12.8	Gold, manganese	Yes	Yes	Country	
Botswana	5.0	86.1	31.8	Coal, cobalt, copper, diamonds, gold, nickel, PGE, silver	Yes	Yes	Country	
Uzbekistan	4.4	89.1	6.6	Gold, molybdenum	Yes	Yes	State/province	Import duties on metal concentrates and export duties on metals suspended, and government encouraging some mines to remain open
Zambia	4.4	78.4	21.1	Cobalt, copper, gold, manganese, silver	Yes	Yes	Country	Curfews have restricted activities at certain mines, causing closures
Madagascar	4.2	87.1	41.6	Cobalt, REE, titanium	Yes	Yes	Country	

Source: Simon 2020

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Clinical description of the Intellectual Challenged

Among several physical challenges Intellectual challenge carries a significant proportion. From the report of Intellectual Disability Rights Service Inc. (2009), Intellectual challenge is a disability which occurs in the developmental period of life that is before the age of 18, and is characterised by below average intellectual functioning. Most people with Learning Challenged are born with the disability. Significantly sub-average general intellectual functioning is defined as approximately 70 IQ or below as measured by a qualified psychological examiner on individually administered, nationally formed standardized measures of intelligence

Clinically, and for the purposes of proving that a person has a Learning Challenged, Learning Challenged is best assessed by a psychologist as:

i) An IQ of 70 or under.
ii) deficits in at least 2 areas of adaptive behaviour, that is:
    a. Communication
    b. Self-care
    c. Home living
    d. Social skills
    e. Self direction
    f. Leisure and work
    g. Learning.

In clinical terms, Learning Challenged is often defined in terms of the severity of the disability.

Table 2 Clinical description of Learning Disability

Level of disability	% of people with Learning Challenge	IQ
BORDERLINE		70-75
MILD (Educable)	75%	55-70
MODERATE (Trainable)	20%	30-55

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SEVERE (Totally dependent)	5%	under 30	

Source: (IDRS Inc. 2009)

People with learning affected Person have little or no access to education due to reasons as:

a. poor societal perception of persons living with disability
b. poor funding
c. policy instability
d. lack of commitment
e. curriculum development and

LITERATURE REVIEW

Zaagsma et al (2020) worked on the use of online support by people with intellectual disabilities living independently during COVID-19. The global outbreak of the COVID-19 virus and the control measures imposed by governments focused on containing its spread have a dynamic impact on the provision of social care and support services made available for people with disabilities around the world (Armitage and Nellums 2020). It seems likely that also people living with intellectual challenges are at risk of experiencing a discontinuation of support to some extent. For example, in the Netherlands, while residential care services for people with Intellectual Disabilities (IDs) continued, visits from friends, family and relations were mostly prohibited. Services such as day activity centres and meeting centres, as well as other gatherings, were put on hold for several months (Woittiez et al. 2020). In the period of COVID-19 pandemic outbreak, service providers in the Netherlands had to move towards providing local support for people with intellectual challenges living independently.

Neece et al. (2020) worked on the COVID-19 pandemic introduced challenges to families with young children with developmental delays. Above the sphere of the widespread concerns surrounding physical challenges, sickness or loss of employment and social isolation, caregivers are responsible for looking after their children's educational and therapeutic programmes at home at times without the much needed

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support of professionals. The study sought to examine the impact of COVID-19 in 77 socioeconomically, linguistically and ethnically. The response of parents were taken on five interview questions on the impact of the COVID 19 pandemic, services delivered for their child, positive aspects, coping with the situation and their concerns about the long-term impact of the pandemic. From the study, it was discovered that Parents reported that their biggest challenge was staying home caring for their children without the presence of many essential services. Parents also reported the positive aspects of the pandemic, most especially being together as a family.

Ojuope, Adetunmbi and Oyinloye (2019) conducted a study on the use of assistive system for empowering persons with Intellectual Challenges for meaningful lives in the Digital Economy. The study described Digital inclusion as the concept where Information and communication technology (ICT) provide easy, reliable, and effective accessibility to all categories of users. It was observed that most interfaces were developed without considering the fact that, there are different categories of users including people living with disabilities. The paper focused on the developing service-security based usability interface that will empower and provide security for this category of users and also promote their user experience; and as well compare the degree of efficiency of a secured assistive Interface with the existing interfaces. Theoretical framework on Human computer interaction (HCI) and the new Security Human Computer Interaction (HCI-S), were also carried out and several related articles were reviewed. The user model was tested based on the concept of User Satisfaction Performance/Essential Usability Metrics.

Effectiveness/Efficiency/Analysis of reading Errors, The Mean Percentage, and Task Completion (in seconds) were used as the performance measure technique for evaluation. The result showed that the model developed had a mean percentage performance of 98% and the mean time taken to perform a task in 32secs. The model was successful for people with intellectual disability.

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Ojuope and Adetunmbi (2018) worked on Empowerment of Persons with Intellectual Challenges for sustainable Development. The aim of the paper is empowering individuals living with Intellectual disability and builds the skills necessary to ensure that human empowerment is an advantage to achieve sustainable development goals in Nigeria. Nigeria in recent time have been threatened with alarming scenario as a result of unemployment which resultant effects ranges from extreme poverty, hunger to insecurity. Consequently, the application of Information and Communication Technology have not be vigorously harnessed to its fullest despite its perceived vocational and wealth creation opportunities. Nigeria is the most populous state in Africa, The increase in population without availability of resources to manage this growth has become a worry to Nigerian citizens. Hundreds of Thousands of people living with disability are without any hope for the future. The advent of Information Technology has brought about various opportunities including job creation, business strategy and planning etc.

Belkacem and Pigot (2008) worked on the evaluation of a contextual Assistant interface using cognitive models (GOMS). Analytical evaluation techniques allowed us to predict, among other users, user performance, time execution of tasks, how a design will perform and to explain the performance of an existing interface. The PDA (personal digital assistant) is deposited at a distance of 15 cm from the touchscreen; participants remain standing at a distance of approximately 30cm from the touchscreen during the entire test.

Research Gap

Several related articles were reviewed on this paper, and we discovered that:

- Most of them did not address the area of training the physically challenged on the use of Artificial Intelligence for discovering and exploring resources.
- Most of the reviewed works did not solve the problem of inclusion of these people for economic growth and sustainable development.

METHODOLOGY

This section analysed the difficulties faced by the physically challenged persons in participate in exploration of Mineral resources most especially during this COVID 19 pandemic lock-down. From the research carried out by the author of this paper in Home School for Handicapped Children, Ibadan, Oyo State 2018, four students of the school were tested with the use of ICT base Assistive Technology to teach the physically challenged students. It was discovered that the students performed better with the use of ICT than normal class room learning. From the interview conducted with the staff of the school, it was discovered that, these people have little or no access to education due to poor curriculum development. The curriculum does not favour this category of persons due to their level of IQ. Developing a curriculum that can promote their learning ability with the use of Artificial Intelligence for discovering and exploring Sub- Sahara African resources is highly imperative; this will enhance study inclusion of these people and further promote job creation.

Artificial Intelligence and the challenge of Battle against COVID-19 Coronavirus on Resources Exploration in Sub-Sahara African

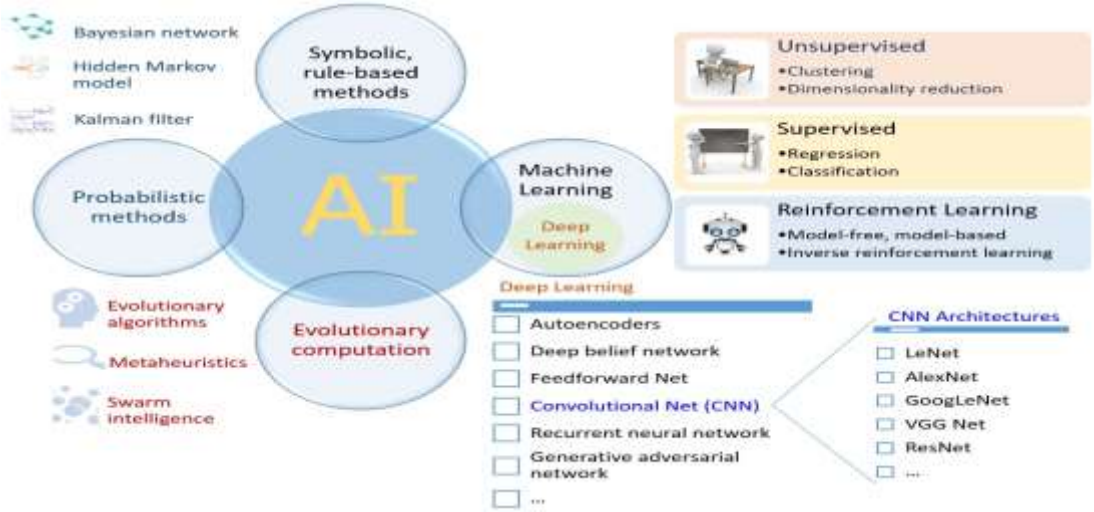

Fig. 1 An overview of common AI methods where machine learning constitutes a great proportion.
Source: Nguyen 2020.

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The development of deep learning which is one of the subsets of machine learning, has contributed tremendously to improving the power and posibilities of recent AI applications (Nguyen 2020). Series of deep learning convolutional neural network (CNN) architectures such as LeNet, AlexNet, GoogLeNet, Visual Geometry Group (VGG) Net and ResNet have been proposed and applied successfully in several areas, especially in the computer vision domain and of recent healthcare delivery during COVID-19 pandemic lock-down (Krzysztof et al., 2020). Other techniques such as auto encoders and recurrent neural networks are important components of many essential natural language processing tools. The deep learning methods in particular and AI in general may thus be employed to create useful applicationsfor discovering and exploring Sub-Sahara African resources during the COVID-19 pandemic lock-down.

Economic and social impact of Training the Physically Challenged on Discovering and Exploring Sub-Sahara African resources for sustainable Development.

Individuals living with physical Challenges have little or no access to education resources that drives economy based on:

f. poor societal perception of persons living with disability
g. poor funding
h. policy instability
i. lack of commitment
j. curriculum development and
k. focusing on resources base economy rather than knowledge base economy.

National Council on Disability (NCD) (2011) submitted that the power of learning inclusion pave way for high job opportunities in the society and digital barrier has brought about low employment among people with disabilities. Manipulation of information has pave way for job creation for people with disability; it gives opportunity for this category of users to work alongside non-disabled people. Consequently, the job opportunity rate of persons with disability still remains extremely low (fig.1).

Development and improvements in Artificial Intelligence can go a long way to bridge this gap. Information society is being built on technology, knowledge and intelligence; appropriate use of the knowledge by people with Physical Challenged during the COVID 19 pandemic contributes to economic and social development. Artificial Intelligence based Information technology facilitates fast, cheap, equitable, and resource efficient; access to information, adequate research for learning opportunities become a support tools for job creation and sustainable development.

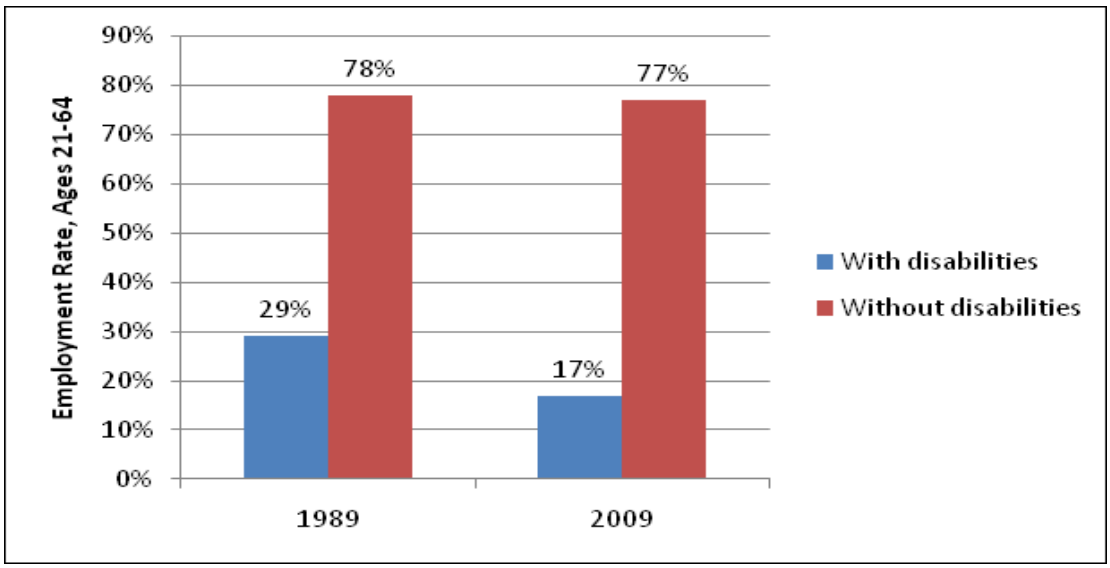

Figure 1: Comparing Employment Rates, 1989 and 2009. Source NCD 2011

The challenge of disabilities in the sustainable society

The 2011 World Report on disability presents that approximately one in seven of the world's population, over one billion people are persons with disabilities which include Learning Challenged. Some estimates suggest that 80% of persons with disabilities live in developing countries; it also expressed the compelling evidence of the barriers that women, men, girls and boys with disabilities face, such as inaccessible infrastructure, negative and discriminatory attitudes and out-dated laws and policies which infringe on their individual rights. These barriers result in persons with disabilities having poorer health, fewer educational achievements, less

economic participation and higher rates of poverty and inequality than persons without disabilities. In 2015, a new set of Sustainable Development Goals (SDGs) is to be agreed by world leaders over the coming years as the new development framework begins to be implemented. Inclusive of every individual including people living with disabilities become imperative in achieving the sustainable development goals (Groce, et al. 2011).

The challenge of Artificial Intelligence on Discovering and Exploring Sub-Sahara African Resources

According to the results of the findings, it is evident that almost all (92 %) of students were fairly positive or very positive (see Figure 2). Thus, it could be said that this students had a relatively positive attitude towards using ICT in their teaching.

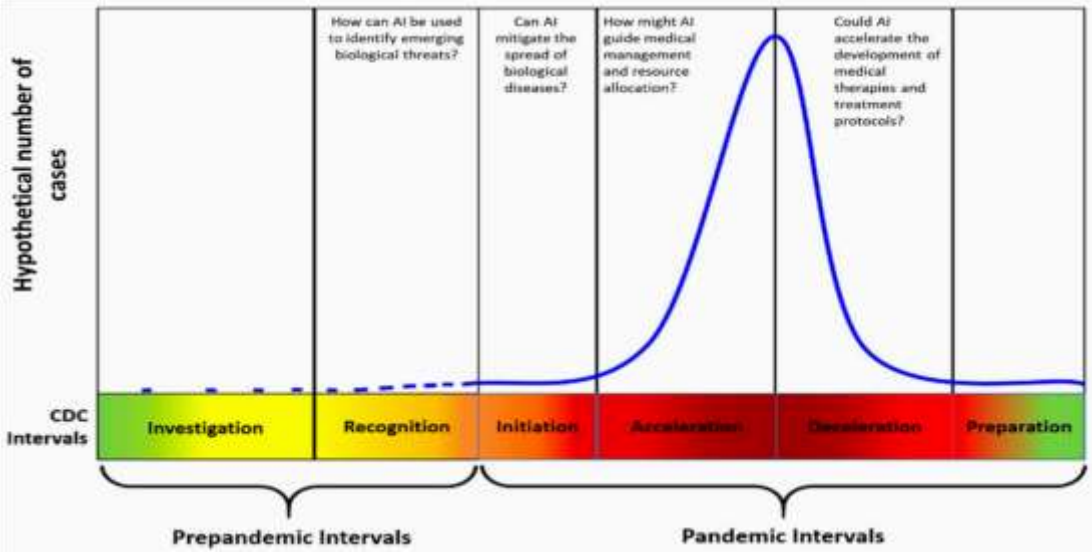

Figure2.. WHO pandemic response phases with distinctive AI applications. Source: Krzysztof et al., 2020

Artificial intelligence has the potential to address all these COVID 19 corona pandemic global challenges most especially in mining sector that cannot take home when there is lock down. Healthcare stakeholders have

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realized this fact (Krzysztof et al., 2020). In their manuscript, they define the AI as algorithms built on mathematical models, and it continuously and automatically refined through iteration within a "training dataset," that is, with the use of a set of examples used to increase their prediction capabilities (Davenpor and Kalakota, 2019). Their work utilized the WHO pandemic framework to organize consideration of four questions regarding AI's qualifications in each of the pandemic's intervals: (1) how can AI be used to identify emerging biological threats? (2) Can AI mitigate the spread of biological diseases? (3) How might AI guide medical management and resource allocation? (4) How might AI accelerate the development of medical therapies and treatment protocols? This article concludes with a consideration of AI's weaknesses and then three questions about the overall future of AI in healthcare and pandemic response.

CONCLUSION

The use of Artificial Intelligence by the physically challenged for discovering and exploring Sub-Sahara African resources seems to be an embraced option during this COVID 19 pandemic. It has been wide widespread across continents. The online method of learning is the best option during this COVID 19 challenge and best suited for everyone depending on their availability and comfort. This will help this category of people to be a contributor to the sustainable development of the society. As a result of wide set of opportunities it provides during the COVID 19 lock-down, AI has become very useful among the individuals across the countries particularly during the COVID 19 global pandemic lockdown.

To achieve sustainable development goals in Sub-Sahara African Continent in the fast moving world during this COVID 19 pandemic challenge, the use of Artificial Intelligent for resources exploration is highly imperative.

RECOMMENDATIONS

a. There should be constant training of the physically challenged on the use of AI for discovering and exploring Sub-Sahara African Resources.

b. The society should see persons living with physical challenges as functioning part of it.
c. There should be proper funding of the agency / commission in charge of these categories of people.
d. The policy guiding the physically challenged should be dynamic and stable.
e. Government should be more committed in tackling issues concerning this category of people.
f. Government, service providers, stakeholders and Individuals must wake up to this challenge.

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