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# The innovative instructor and the innovative learner in Africa-A review

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## Abstract

Innovation is currently a topical word globally owing to its capacity to address socio-economic, political and environmental problems. Innovation concept is often misunderstood in educational sector particularly in developing regions including Africa. Education must facilitate creativity and critical thinking among learners for them to gain and deliver skills which support societal development. Learning is an act of knowledge gaining based on its vigour, affordability, clarity and excitement in addressing society's current needs. To produce skilled candidates, existing education system must create a conducive environment which support innovation for both instructor and leaner. This review paper sought to provide clear insight towards the issue of the innovative teacher and the innovative learner. Major research questions include (a) What is the role of education in innovation? (b) What are the opportunities that are presented for both the instructor and the learner to be innovative? (c) What are the challenges faced by the instructor and the learner in education for them to be innovative? (d) What is the nexus between African educational policies and innovation practices? (e) What is required to increase the link between education and innovation in Africa? To address demands of the questions, cross-sectional literature review was carried out through desktop literature search to gather already existing data. Published and grey literature with aspects related to Africa will be highly considered, although global literature was be included for comparison. Inclusion and exclusion of documents was determined by key words and abstract content. Literature show that educational innovations equip the instructors and learners for challenges faced by society and instructors are considered as key drivers of didactic innovations. Educational innovations expose instructors to new teaching methods and gives emphasis on lifelong learning. Learners have the opportunity to interact with the instructor and among themselves as well as the flexibility to learn at their own pace providing them flexibility. Nevertheless, literature identifies challenges that include poverty, digital literacy and internet connectivity, cultural issues, political factors, socio-economic factors and brain drain. The study recommends investment in research, promotion of practical activities, incorporating technologies with user friendly applications, creating supportive environments, and policy formulation and implementation.

**Key Words:** Innovation, Education, Innovative instructor, Innovative learner, Creativity, Africa



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## Introduction

The Oxford Dictionary defines education as a process of receiving or giving systematic instruction, especially at a school or university. Guisanni (2019) defines education as the process of introducing to another person or group reality through communication in a rationale and manner combined with experience. The aim is to give the receiver a better understanding of their external reality after going through an enriching educational process. The perception of education from an economic point of view is to upgrade human capital (Becker, 1993) through a system that public administrators should guarantee freedom of choice for individuals and parents (Friendman, 1955). Education is therefore given an important role in the society and it requires a certain level of co-production just like any service. Research points out that education requires core-production, collaboration, and co-creation (Honigh et al., 2020; Lambriex-Schmitz et al., 2020). Rubalcaba (2022) prefers to equate the education process as the phenomenon of osmosis in which those who are regarded as having superior or more knowledge share it with those who have less.

It has been observed that investing in education brings better benefits to society (Deming & Waters, 2017; World Bank, 2018; *Psacharopoulos & Patrinos, 2018*). Romer (1986, 1990 & 1994) is the main proponent of the model of endogenous growth whose theory education that suggests human capital and non-rivalry as two critical components. The production of knowledge requires human capital to augment it. Non-rivalry refers to the ability to be used by others to enhance knowledge even if they have not created it. Biasi, Deming and Moser (2021) content that a corollary is that private individuals do not internalize the social benefits of education and therefore chance are that the level of investment by private individuals in education is very low, thereby calling for the public system to invest in education.

At this juncture, it is important to highlight the difference between the role of education in innovation and the role of innovation in education. The former aims at designing a learning process that produces innovative graduates while the latter aims at coming up with strategies within the learning environment that produce innovative human capital. In short, the first identifies the needs of the outside environment and produces an innovative learner while the latter is informed by the outside environment but works within the learning environment to produce an innovative graduate. UNESCO (2023) defines educational innovation as the intentional process of introducing and implementing new

ideas, methods, tools, or practices in education to improve learning outcomes, enhance equity, and address systemic challenges. Educational innovation goes beyond technological advancements and includes pedagogical, curricular, and organizational changes that foster creativity, critical thinking, and lifelong learning. The question is, can the relationship between the two be compared to the old-time relationship between the egg and the chicken? Another slight difference between the two is that educational innovation is limited to the activities that take place during the learning process while innovations in education tend to embrace an explosive nature in that the teachings within the educational systems equip and encourage the learner to become a problem solver.

## Background of the study

Education is an indispensable component of society because the survival and prospering of society depends on knowledge that is acquired (Serdyukov, 2017). It is imperative that education evolve on a continuous basis in addition to being superb, sustainable and comprehensive because the world is ever-changing. Even though innovations do not produce the desired outcomes always, it is still important to be innovative in educational circles. Research likens educational systems to nature's evolutionary process in which emerging ideas and practices seek to address changing needs of learners and societies (Fullan, & Langworthy, 2021; Peters, & Besley, 2022; OECD, 2023). The ephemeral change in educational innovation was first prophesied more than 60 years ago by Matthew (1964) who pointed out that revolution was in progress whether trite or not. However, this transition is still in its infancy as evidenced by the learning outcomes of higher education institutions whose products are far from meeting the needs of the ever-changing world (Serdyukov, 2017). An education system that lacks innovation is heading for social and economic doldrums.

The basic reason for innovations in education is to raise the productivity and efficiency of the learning system to ultimately improve the quality of learning. Technology in education was envisaged to yield better results than what was there some decades ago, but research shows that a gulf has been created (*Warschauer, & Matuchniak, 2020; Van Dijk, 2021; Selwyn, 2021; Zheng, & Warschauer, 2022; Ertmer, & Ottenbreit-Leftwich, 2022; Livingstone, & Helsper, 2023; UNESCO, 2023).* The two most important components that are invested in learning are time and cost and these must be allocated efficiently (Serdyukov, 2017). There are several stakeholders

to innovative education that include the learner, parents, the instructor, educational administrators, researchers and policy makers. The learning process involves identifying and developing skills and key competencies that include individual attitudes, individual behaviours, motivations, dispositions, self-assessment, communication skills, collaborative skills, engagement skills and some degree of autonomy (Serdyukov, 2017). There is an interdependency relationship between educational innovation and society. For example, historical, political, economic, social, and technological systems within a state shape the education system and that educational system in turn shapes the political, social, economic and technological environment. Research points out that innovations can classified as evolutionary or revolutionary (Christensen, Raynor, & McDonald, 2020; Tidd, & Bessant, 2021; Utterback, & Acee, 2021; Schumpeter, 2021; Garcia, & Calantone, 2022; Damanpour, & Aravind, 2022; Rogers, 2023; Bessant, & Tidd, 2023).

## Methodology

Systematic literature review was employed in the study on a cross-sectional survey approach using literature from high impact academic journals and peer-reviewed articles. Figure 1 depicts the process that was conducted in systematic literature review. High impact academic journals and peer-reviewed articles are regarded as the gold standard for scientific literature because they go through rigorous back-to-back review processes (Osobajo et al., 2022). These were extracted from Scopus, Web of Science, ERIC and Google Scholar. Systematic literature review was used because it improves the quality of the review process, and it also permits large quantities of data to be reduced into palatable pieces of information that are easy to digest. It is also considered as a reliable and valid method of synthesizing research findings in a specific field (Kitchenham & Charters, 2021).

To construct the search string, the following keywords and Boolean operators were used ("didactic innovation" OR "educational innovation" OR "innovative instructor" OR "innovative learner") AND ("curriculum integration" OR "pedagogical practices" OR "creativity") AND ("traditional methods" OR "emerging practices"). Additional filters were applied to include only English-language publications and exclude non-educational contexts. The initial yield from the search was 1250 articles and from these 300 were removed because of duplication and those that were irrelevant. The next stage resulted in 885 articles being removed based on publication dates earlier than 2018, titles,

and abstract. The initial inclusion process considered 65 studies that focused on didactic innovations in higher education and those that addressed the integration of curriculum content in innovative ways. Further, the exclusion process narrowed on studies that solely focused on technological tools without linking with pedagogy or the impact of these tools on pedagogy as well as studies that lacked empirical evidence or theoretical frameworks. The final 18 articles were selected based on the clarity of research objectives, how rigorous the methodologies were and how relevant the findings were to the research questions. Results of the literature review were organized into themes such as; the role of the instructor and the learner, opportunities presented for both the instructor and the learner and challenges faced by the instructor and the learner. The next section presents the literature review section of the chapter.

## Literature Review

### *Role Of Education In Innovation*

Literature emphasizes the importance of deliberate, intentional, systematic approaches to educational innovations as opposed to reactive and random approaches (Fullan, 2021; Hargreaves, & Shirley, 2022; Peters, & Rizvi, 2022; Levin, & Datnow, 2023; OECD, 2023). Rivals et al., (2017) posit that these planned actions drive deep changes based on the desire to teach and to learn fostering connections between knowledge and learning. Instructors are key drivers of didactic innovations as they often break away from the traditional approaches to curriculum-based approaches in teaching and learning that are learner centered (Darling-Hammond, & Hyler, 2021; Fullan, & Langworthy, 2021; Laurillard, 2022; Peters, Rizvi, & Roberts, 2022; Paniagua, & Istance, 2022; Ertmer, & Ottenbreit-Leftwich, 2023; Hargreaves, & O'Connor, 2023). Educational innovations are understood to be planned changes directed towards the improvement of the teaching and learning processes (Rivals et al., 2017). Innovation in education is viewed as more than just technical progress, but rather as advocating for broader perspectives that includes pedagogical, social and systematic dimensions (Peters, & Besley, 2022; Selwyn, 2021). Educational innovation gives learners the opportunity to develop interpersonal and social skills, the ability to be a team player, equips learners with effective communication skills, ability to resolve conflicts and creative thinking skills. Wagner Dintersmith (2021) advocates for a shift toward inquiry-based learning and critical questioning while Robinson and Aronica (2022) argues that innovative educational practices should prioritize critical thinking and problem-solving over rote learning. Jain et al., (2017) posit

that educational innovation brings drastic change if it is properly implemented with some purpose and determination in mind.

Research shows that education has shaped the knowledge society by putting more emphasis on lifelong learning, examining the role of information communication technologies, discussing that knowledge has become a key driver of growth and innovation (*UNESCO 2023; Castells, 2021; Stehr, & Adolf, 2023; David, & Foray, 2022; Hargreaves, 2023).* Wagner (2020) proposes traits that are fundamental to innovation namely; critical thinking and problem solving, ability to collaborate, influence and lead others, agile and adaptable to changing environments, initiative and entrepreneurial skills, effective communication skills for both oral and written domains, and assessing and analyzing information. The innovative thinking approach aims at producing innovative entrepreneurs whereas the traditional educational system produces employment-oriented individuals. This new approach requires individuals to go beyond the degree of knowledge acquisition but possess the ability to use the knowledge gained to manipulate one's surroundings. Educational innovation has been defined as the ability of an individual to possess entrepreneurship skills that leads to economic growth and social transformation (Fullan, & Langworthy, 2021; Paniagua, & Istance, 2022). Innovation focuses more on creativity and behavioural change. Continuous innovation in the educational sector is essential for achieving sustainability (Kutieshat & Farmanesh, 2022).

### *Opportunities Presented For Both The Instructor And Learner.*

The everchanging world has put pressure on instructors (Findikoglu & Ilhan, 2016) but that change has also presented opportunities for instructors to be innovative. Innovation in education transforms learners from the consumer to the manufacture of knowledge (Findikoglu & Ilham, 2016). Reconstruction of the concept of knowledge is a must in the knowledge economy and along with this comes educational innovation which enriches human capital through continuous schooling (Rubia, 2023).

Puranik (2020) content that educational innovation gives learners that chance to play roles of making decisions in given scenarios whose limitations can be around available resources and organizational or state policies. This enhances the performance of learners (Naz & Murad, 2017) by providing learners with more experience and the chances to solve related problems (Sethilkumar & Kannappa, 2017).

### *Opportunities for The Instructor*

Instructors are constantly exposed to new teaching methods and tools in educational innovations. For example, during the pandemic instructors had to use online teaching and assessment methods and that required exposure to new technological tools and new online teaching and learning platforms. These platforms keep learners engaged and the instructor can quickly notice students who could be at risk in a course and take appropriate action to salvage the learning experience of the student. Educational innovation brings with it opportunities for the instructor to enjoy an increase in interaction with the learners, thereby improving the chances of effective learning. Instructors are permitted to personalize instructions to cater for individuals or groups of learners with similar learning demands. For example, if an instructor wants learners to attempt an online assessment such as a quiz, s/he can set the parameters to open within specified time period with specific running time. This give all learners chances to attempt the quiz at different times but the allocated time will be different and possibly each learner getting a different set of question to thwart cheating. The instructor has the opportunity of creating content that s/he deems rich to engage learners, make them comprehend the subject and meet the course learning outcomes.

Educational innovation has brought with it learning management systems (LMS) which are institutional platforms supervised managed by an IT department to support the needs of the instructor and the learner. Assignment submissions, grading and other forms of communication can be automated to easy the load on the instructor who can then use the spare time to address each individual student's needs. Another opportunity presented by educational innovations is high level of collaboration with peers, instructional designers and technologies. These collaborations usually focus on continuous improvement and timely feedback.

### *Opportunities to The Learner*

The learning process in today's world presents greater opportunities for the student to enjoy fun, be engaged and have the opportunity to interact with other learners and the instructor. Simulations in the aviation industry for example, are an example of learning tools that make learning exciting. Augmented reality tools and virtual reality tools are also another dimension of educational innovation that makes life active for the present-day learner. There is greater flexibility and accessibility that is presented in educational innovations. For example, learners

have access to teaching and learning materials anytime, anywhere and at the most convenient time for them. This provides learners with vast opportunities to learn at their own pace and time accommodating their work schedules, reducing the problem of geographic constraints and enabling learners to adopt their own learning styles. Learners are presented with an opportunity of global learning experience as they can interact with other learners across the globe whose cultures are also diverse.

### *Challenges Faced By The Instructor And The Learner.*

In African countries the instructor and the learner face a myriad of constraints hindering aspects of creative and innovative learning. The various challenges can be grouped into political, economic as well as social problems. This asserts that various challenges are impeding attainment of creative learning, meaning an integrated approach is a panacea in dealing with the problem. Challenges are experienced in countries like Uganda Tusiime et al., (2022), Zimbabwe (Bashir et al., 2018; Mawere & Sai, 2018), Egypt (Rashid, 2019), and Nigeria (Hennessy et al., 2022) among other countries.

### *Poverty*

One of the major problems is poverty, a number of families are failing to afford schools which deliver creative and innovative learning aspects to aspects. As a result, learners from poor family backgrounds are exposed continuously to traditional learning methods. Learning institutions in impoverished communities, particularly rural areas, lack facilities including textbooks, internet connectivity and computers (Mpungose, 2020; Oketch, & Mutisya, 2022; Chavango, & Mabila, 2023; Muyoya, & Krystalli, 2023), yet these are basic requirements to achieve creative and innovative learning.

### *Digital Literacy and Internet Connectivity*

Digital divides between African countries and developed nations hinder the ability of learners to be equipped with digital literacy skills (Bashir et al., 2018; Barakabitze et al., 2019). Muyoya, and Krystalli (2023) point out that in rural areas the quality of education is affected by lack of internet connectivity and the computers. Failure to adopt innovative and creative learning may also be attributed to high expense of resources for instance digital equipment in South Africa (Mpungose, 2020). In order to practice innovative learning and teaching skills in the 21st century, digital skills are crucial. However, in Africa adoption of information technology is at an embryonic stage due to ineffective

information technology policies in countries like Tanzania (Barakabitze et al., 2015). Additionally, innovation learning and teaching is difficult to achieve in Botswana since universities' vision, values and mission are mostly traditional (Liyanage & Netswera, 2021). Therefore, creative and innovative learning and teaching is alien to conventional knowledge existing at various African universities.

### *Cultural Issues*

Cultural issues play a pivotal role in widening the gap to reach innovative learning in African countries (Barakabitze et al., 2019). This is attributed to the fact that most of the societies in Africa value education differently, leading to insufficient motivation among learners. Gender inequality is among cultural problems affecting access to education among females (Mariscal et al., 2019; Williams et al., 2018). This limits the opportunity of female learners to pursue education, thus blocking their ability to be creative and innovative. Moreover, most of the instructors in Africa discourage critical thinking among learners through focusing on traditional ways of teaching particularly teacher centred instruction and memorizing in Tanzania (Ndibalema, 2014) and Mozambique (Muianga et al., 2019). Major inhibitors of creative and innovative learning in Africa encompass the attitude and beliefs of the instructors at various learning institutions.

### *Political Factors*

Political factors such as conflicts contribute to problems causing innovative and creative teaching and learning difficulties. Internal and external conflicts result in temporary or permanent closure of schools, affecting the learning process negatively. Conflicts disrupted the entire learning system in various African countries namely South Sudan (Tarricone et al., 2021) and Nigeria (Bertoni et al., 2019). In these countries, instructors and learners are internally displaced or forced to leave their homes and live as refugees in other countries. This caused a gap in the learning system which is difficult to cover after the conflicts, therefore it became impossible to pursue creative and innovative learning. Furthermore, corruption driven by political power among certain individuals poses detrimental impacts to learning practices. This is because corruption may result in misuse of resources budgeted for creative and innovative learning. Several African governments allocated inadequate finance to the education system (Liyanage & Netswera, 2021) making it impossible to implement innovative and creative learning activities. Research echoes the

same sentiments by highlighting that in Africa, there are inadequate financial allocations in the education systems thereby impacting accessibility, equity and the quality of education (Oketch & Mutisya, 2022; UNESCO, 2023; World Bank, 2023). This entails that lack of political will to invest in education poses significant problems to achieve current learning programs. Owing to lack of investment, quality of education remains low since instructors fail to access the latest teaching materials and approaches.

### *Economic Challenges*

**M**oreover, numerous African countries are experiencing economic problems, for instance Botswana (Liyanage & Netswera, 2021). Consequently, different schools are operated devoid of basic amenities including electricity, clean water and infrastructure suitable for innovative learning. In Mozambique educational resources namely libraries, incubators and labs are limited threby hindering the quality of education which is vital for the development of skills necessary for economic and social progress (Chavango, & Mabila, 2023). This situation creates an environment which impedes carrying out experiments in laboratories and the use of computers. In Africa economic meltdown is usually associated with skyrocketing inflation (Lewis, 2019), hence most of the instructors are overworked while underpaid. This increases challenges to various learning institutions including universities in Zimbabwe (Chinyoka & Mutambara, 2020), yet universities should act as epicenters for creative and innovative learning. This degrades the performance and morale of instructors, who in turn fail to deliver quality education.

### *Brain Drain*

**M**ost African countries are affected by brain drain due to economic challenges (Docquier, & Machado, 2022; Adegoke, & Adepoju, 2023; Ncube, & Lufumpa, 2023). Implementation of innovative and creative learning became difficult since it required instructors with specialized skills. A view upheld by Chi (2008) and Danquah and Amankwah-Amoah (2017) that human capital is significant to achieve innovation processes and outcomes. However, there is a deficit of experts with critical skills in Sub Saharan Africa (Barakabitze et al., 2019). Professionals with critical skills are scarce in Sub Saharan Africa since they leave the continent looking for greener pastures. Learning institutions in Africa are plagued by shortages of experienced staff and are served by ill-equipped instructors with less experience. Rampant inflation in countries like Zimbabwe increase difficulties for learning institutions to purchase enough resources

required to practice research and innovative learning (Lewis, 2019; Chinyoka & Mutambara, 2020). This situation is currently cropping up at various tertiary learning institutions in Africa (Molla and Cuthbert, 2016; Chinyoka and Mutambara, 2020), resulting in inadequate funding for creative and innovative research.

### *Environmental Challenges*

Attaining innovative and creative teaching as well as learning is a daunting task in Africa, owing to environmental challenges. Africa is regarded as home of different environmental challenges namely climate change (Schilling et al., 2020), which is experienced in Zimbabwe (Chanza & Gundu-Jakarasi, 2020) and East African countries (Mueller et al., 2020). Climate change results in the occurrence of floods causing destruction of infrastructure including school buildings, houses of people and bridges. This threatened education system in countries exemplified by Cyclone Idai in Zimbabwe and Mozambique (Tevera et al., 2021), since this leads to displacement of instructors and learners while causing closure of learning institutions. Occurrence of drought in the African continent is attributed to climate change translating to shortage of food (Kchouk et al., 2022), resulting in poor performance of both instructor and learner. During drought periods people, particularly children, are affected by ailments associated with malnutrition, thus impacting the health of learners and resulting in school dropouts. Climate change results in shortage of enough water (Schilling et al., 2020; Chanza & Gundu-Jakarasi, 2020; Kchouk et al., 2022), resulting in use of contaminated water in most African countries. Utilisation of contaminated water results in outbreak of poor sanitation related diseases, namely typhoid and cholera. In order to suppress the spread of these diseases, learning institutions are sometimes closed, thus disturbing innovative and creative activities of both learners and instructors. Anthropogenic activities result in loss of biodiversity in Africa, particularly Sub-Saharan Africa (Song et al., 2018; Ross et al., 2021). Loss of biodiversity causes extinction of some vegetation species and medicinal plants are not spared, yet they are essential for the learner and instructor in development of new medicine. Regarding challenges experienced in Africa, various approaches are required to support the instructor and innovative learner in Africa.

## Requirements To Increase The Link Between Education And Innovation In Africa

### *Investment in Research*

The African educational system needs to be changed so that it suffices demands of modern standards including science and technology (Palvia *et al.,* 2018; Barakabitze *et al.,* 2019). This is germane since it provides learners and instructors with knowledge and skills which are necessary for innovation. Innovation in less developed countries focuses on research as a key driver (Christofi *et al.,* 2022; Magni *et al.,* 2022) and the African continent is not spared. As a result, the African government must invest more in research to foster innovation. Fischer *et al.,* (2018) and Shahidan *et al.,* (2019) noted that collaboration of industries and academia is essential to promote innovation. Partnerships between industries and learning institutions particularly universities can upheld innovative learning among learners in Africa. Consequently, learning institutions must work closely with industries so that learners are exposed to real world scenarios which enable them to be innovative. Furthermore, policies namely funding schemes, tax incentives as well as intellectual property rights can propel innovation (Shahidan *et al.,* 2019). Governments across Africa particularly Sub-Saharan Africa should develop and implement policies that support innovative instructors and learners at various institutions and organisations. Attainment of innovative learning requires innovative culture to be implanted in both learners and instructors. This entails that a culture that supports risk taking, creativity, problem solving skills alongside entrepreneurship can improve innovation among bonafide Africans.

### *Promote Practical Activities*

Countries in the African continent should put much attention on practical learning which encompass hands-on experience as well as experimentation. This is regarded as an effective strategy to promote innovative activities among learners (Richardson and Mishra, 2018). Therefore, instructors must emphasise on providing opportunities for learners to carry out practical activities including experiments, field trips and group projects. Additionally, instructors must expose learners to activities which support critical as well as independent thinking. Independent thinking enables learners to come up with new ideas which are crucial for societal development (Ratten & Jones, 2018). In the African context, instructors and learners consisting of different experts and people with varying experience but with common goals must collaborate. Promotion of collaboration

in Africa requires group teamwork among learning institutions during research among other learning activities. Fischer *et al.,* (2018) and Shahidan *et al.,* (2019) concur that collaboration is among essential aspects required to narrow the gap to achieve creative and innovative learning activities.

### *Incorporate Technological Applications*

Palvia *et al.,* (2018) and Ratten and Jones (2018) highlighted that technology is among powerful tools utilized for creative and innovative learning. Learners' instructors must incorporate technological applications, problems tools and online resources into their teaching strategies. Learners must be exposed to problem solving tools namely Remote Sensing and Geographic Information Systems. Nevertheless, for the learners to grasp the concept quickly, effective mentorship by the instructors is required. Experienced instructors are essential to guide, support and provide inspiration to African learners who are eager to pursue innovative careers. According to Ratern and Jones (2018) and Richardson and Mishra (2018) appropriate mentorship is significant to insert innovative and creative thinking among learners. In order to increase the number of experienced educators at learning institutions, African governments should offer quality working conditions to instructors. This might minimise movement of experience from African countries to other continents looking for greener pastures. A view upheld by Ogaboh *et al.,* (2020) that brain drain can be reduced by creating good working environments in a country. Additionally, innovative and creative activities need educators with vast knowledge and skills (Kettler *et al.,* 2018; Richardson and Mishra, 2020). This entails that countries in North Africa, East Africa, Southern Africa and Western Africa should invest in quality professional training to equip instructors with skills necessary to foster innovation. Innovative knowledge enables instructors to incorporate innovative teaching approaches into their classroom lecturers.

### *Supportive Environments (Political, Social, Economic)*

Furthermore, the political environment should support innovative teaching and learning for every citizen across the region (Williamson et al., 2020; Cole, 2022) and Africa is not spared. In the African context, the political terrain must offer both formal and informal instructors and learners opportunities to demonstrate their innovative abilities. In terms of informal instructors and learners, those with vast knowledge on traditional and indigenous knowledge should not be excluded. Indigenous knowledge is relevant carrying out practises and research which benefit local people (Tunstall, 2020; Baskin, 2022). Politicians,

specifically those in ruling governments must provide resources including computers, internet and experimental equipment which facilitate innovative teaching and learning. Existing governments should engage and partner Non-Governmental Organisations which provide resources to learning institutions. Innovative and creative learning is among key drivers for economic growth, poverty reduction and increasing general well-being of the people (Palvia *et al.,* 2018; Fischer *et al.,* 2019; Christofi *et al.,* 2022). Hence, to propel economic growth, African governments should provide finance to learning institutions so that they purchase adequate resources to practise innovative learning and teaching. Another way politics propel innovative teaching and learning is by developing policies which encourage risk taking and experiments. This means both learners and instructors are free to try their innovative and creative thinking without fear of reprisal. Governments must also implement policies which support provision of innovative training and incentives to instructors who utilise teaching strategies which support innovation. This coincide with Fischer *et al.,* (2019) and Christofi *et al,* (2022) that policies and techniques which support innovative and creative learning are pivotal for socio-economic development in a country.

### *Policy Formulation and Implementation*

Also, African countries should create educational policies which offer both male and female instructors as well as learners equal opportunity to be innovative. This can be achieved through gender sensitive awareness campaigns and implementation of policies which suppress gender discrimination during innovative activities. Mariscal *et al.,* (2019) argued that gender equity assists in creation of an inclusive learning environment which supports innovative and creative thinking. This suggests that African countries' governments are urged to encourage female instructors and learners to participate in Science, Technology, Engineering and Mathematics (STEM) fields through addressing barriers to females' involvement in STEM related activities. This unlocked the full potential of African countries to attain innovative teaching and learning. During wars and conflicts, countries must support learning initiatives which are community based as well as distance learning programs (Rajab, 2018; Ferri *et al.,* 2020). These alternatives are more adaptable and flexible, allowing innovative learning and teaching methods. African countries experiencing conflicts must emphasise on technologies that are applicable during wars and conflicts. Government must implement policies which upheld investing in supporting learners to study in other countries which are spared by wars and conflicts. This

also facilitates crosspollination of ideas among the learners, thus enabling them to gain innovative and creative skills and knowledge from other countries. Dealing with climate change problems, namely drought, require government to support learners and instructors through drought relief programs. Appropriate siting of learning institutions using various technological tools coupled by building resilient structures reduce vulnerability of infrastructure to floods. A view upheld by (Shah *et al.*, 2018; Mavhura & Mucherera, 2020).

### *Comparison Of Africa And Other Regions*

Literature reveals that in Europe, North America and Asia, instructors have access to advanced technologies, get trained and obtain institutional support (Fullan, & Langworthy, 2021; Laurillard, 2022). These regions are focused on integrating cutting-edge tools such as artificial intelligence, virtual realities and pedagogical approaches. However, instructors face the challenge of over-reliance on technology, balancing technology with curriculum and resistance to change. Learners have benefits such as access to advanced technologies, well-equipped institutions and supportive learning environments. Additionally, learners in developed nations are early adopters of new technologies and methods.

## Discussion And Conclusion

Education plays an important role in society in that it upgrades the huma capital. It is essential that during the learning process the instructor and the learner be innovative to have better experience of learning. Society cannot live without education and when it decides to do so, it is heading for doldrums. The basic reason for innovation is to raise productivity, increase efficiency and improve the quality of learning. Innovation should not be random and reactive, but rather it should be intentional and planned. Wagner (2020) proposes traits that are fundamental to innovation as critical thinking, problem solving, ability to collaborate, influence and lead others. Rivals et al., (2017) prefer to call innovation as planned change that are directed towards improving the teaching and learning process. Jain et al., (2017) content that if innovation is properly implemented with some purpose in mind, it brings drastic changes while Salhberg (2006) argues that it leads to economic growth and social transformation. Kutieshat and Farmanesh, (2022) point out that innovation in education is important because it leads to sustainability. Opportunities that are presented by innovation in education include enriching human capital (Rubia, 2022), enhancing student performance (Naz & Murad, 2017), giving learners

the chance to solve related problems in real life situations using simulations (Sethilkumar & Kannappa, 2017).

Overall, educational innovation creates opportunities for instructors to improve their teaching approaches, collaborate with peers, and reduce administrative processes within their working environments by automating some tasks. Innovation presents active learning opportunities for learners and gives them a better learning experience that may be personalized and provides them with access to global educational resources. This improves the learning outcomes and increases engagement among learners and with their instructors, resulting in a more inclusive and dynamic education system.

Despite the opportunities that are presented by educational innovation, a host of challenges bedevil the teaching and learning process thereby affecting the instructor and the learner. These challenges stem from political, social, economic, technological, and/or legal angles (Tusiime et al., 2022; Hennessy et al., 2022; Rashid, 2019; Bashir et al., 2018; Mawere & Sai, 2018). Mpungose (2020) sights the cost of learning as hindering learners to be innovative in South Africa. Research orates that financial allocations to institutions of higher education are insufficient hindering the process of innovation (Liyanage & Netswera, 2021; Altbach, & de Wit, 2022; Cloete, & Maassen, 2022; Levy, & Ziderman, 2023; Johnstone, & Marcucci, 2023). Barakabitze et al., (2015) point out that poor policies are a hinderance to innovations in educational learning. The same sentiments about poor policies were echoed by Leyanage and Netswera (2021) even though they refer to them as traditional policies. Culturally the girl child in African context is not allocated the same resources and attention for education as the male counterpart (Mariscal et al., 2019; Wlliams et al, 2018).

### *Proposed Model For Enhanced Innovative Learning In Africa*

Currently, there is recognition of the significance of innovative learning to attain economic development in Africa. Nevertheless, various African nations continue to face problems in providing required aspects to support institutions and human capacity in innovative learning. In the African context a model which enhances innovative learning is required. Consequently, a model which facilitates continual improvement of innovative learning was proposed. Through utilization of the proposed model, it is anticipated that African countries may create a dynamic as well as innovative ecosystem which upheld socio-economic development. The initial stage of the model is **Innovation Learning Policy** (ILP) development (**Figure 2**). The ILP development should be a

responsibility of all responsible stakeholders including experts of various fields and both female as well as males. The policy must support linkage of different stakeholders and sharing of ideas in innovation activities The responsible stakeholders should include government and its ministerial sectors, learning institutions, Non-Governmental Organisations, Industries, private sectors, and local people for example Chiefs, traditional healers and headman with vast indigenous knowledge on various issues. ILP should promote revision of the learning curriculum, investing in current technology, instructor's training and demonstrating public participation techniques. ILP are expected to address Africa's unique challenges as well as global sustainable development goals. ILP should ensure that both instructors and learners are supplied with adequate resources to practice innovation at various institutions in urban and rural areas. Moreover, ILP must offer opportunities for adults, particularly local people, to illustrate their innovative ability through opening adult vocational training centers as well as adult literacy classes.

The second stage is **Planning for Innovative Learning Practices** (PFILP). PFIL must involve identifying sources of resources to be utilised by both the instructor and learner as well as setting goals targeted by the innovative practices. During planning strategies required to achieve the objectives and train the learners and instructors should be noted. PFILP should aim at attaining sustainable development in the country. In order for the planning stage to be effective, various stakeholders particularly those involved during policy development should be consulted. Planning as one of the crucial aspects must take into account ideas from all stakeholders equally and well as crafting plans to facilitate collaboration with those involved in innovative learning issues. PFL must be followed by **Implementation of Innovative Learning Practices** (IILP). In order to ensure appropriate implementation of innovative policies and plans, stakeholders who participated during the first and second stage should be involved. During the IILP phase experts in innovative learning practices should train instructors and learners to improve their awareness towards innovation. Learners and instructors in both rural areas and urban areas should be provided with sufficient information and resources which enables practicing innovative activities. The IILP process must target the demands of innovative policies and planned goals. At the implementation phase various innovative learning activities are ignited at different institutions and organisations.

Furthermore, the model (**Figure 2**) demonstrated that **Reviewing of Implemented Innovative Learning Practices (RIILP)** is at fourth stage. This

stage can be done by all stakeholders who participated from policy development, planning and implementation stage. However, experienced auditors can be consulted. Conformity of the implemented innovative learning activities to innovative policies, sustainable development goals and planned objectives is checked. Reviewing process involves checking the effectiveness of the innovative learning activities in addressing socio-economic and environmental challenges in the African continent. RIILP facilitates unearthing strengths and weaknesses of the innovation policies developed in a country. Reviewing facilitates understanding of gaps and challenges experienced during implementation of innovative learning strategies. Also, if the review process indicates that implemented innovative activities are failing, adjustments should be done by all the stakeholders. The fifth stage is **Improvement of Innovative Learning Systems** (IILS) which involves acting to cover gaps and solve challenges during the implementation stage. If implemented approaches fail to deal with existing problems, revision of the process is carried out. Corrective actions to attain sustainable innovative learning should be done by all accountable stakeholders. This phase is done through adjusting the policies, re-planning and carrying out implementation again. As a result, the proposed model (**Figure 2**) offer room for continual improvement of innovative learning activities in African countries.

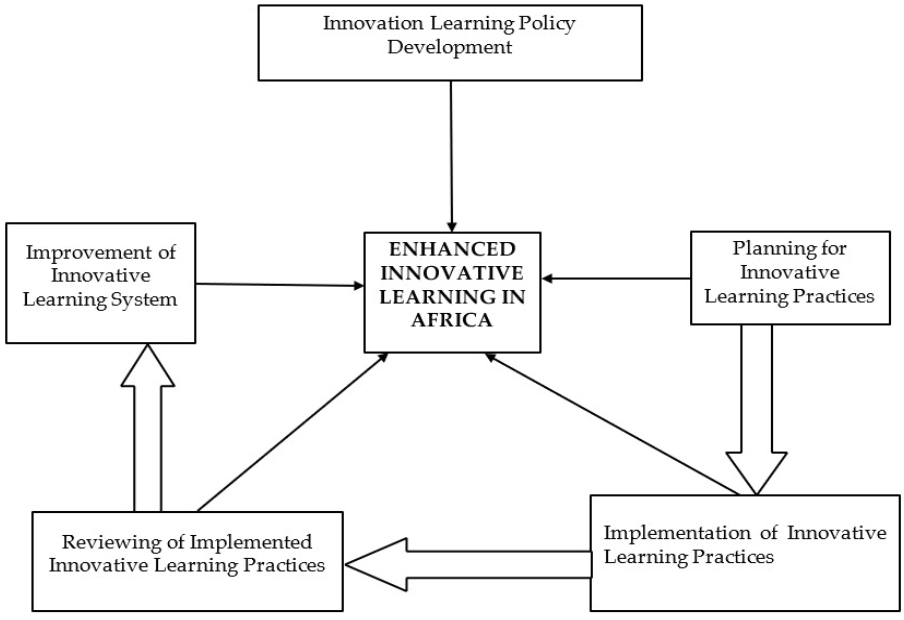


**Figure 2:** ***A proposed model for enhanced innovative learning in Africa.***

**Source:** ***Authors***

## References

Adegoke, Y., and Adepoju, A. (2023). Brain Drain in Sub-Saharan Africa: Causes, Consequences, and Policy Responses. African Development Review, 35(1), 78-92.

Altbach, P. G., and de Wit, H. (2022). The Challenge of Innovation in Higher Education: A Global Perspective. Journal of Studies in International Education, 26(3), 213-228.

Barakabitze, A. A., Kitindi, E. J., Sanga, C., Kibirige, G. and Makwinya, N. (2015) "Exploring students skills and attitudes on effective use of ICTs: case study of selected Tanzanian public secondary schools," *Universal Journal of Educational Research*, vol. 3, no. 6, pp. 407–425.

Barakabitze, A. A., William-Andey Lazaro, A., Ainea, N., Mkwizu, M. H., Maziku, H., Matofali, A. X., and Sanga, C. (2019). Transforming African education systems in science, technology, engineering, and mathematics (STEM) using ICTs: Challenges and opportunities. *Education Research International*, *2019*, 1-29.

Bashir, S., Lockheed, M., Ninan, E. and Tan, J. P. (2018). *Facing forward: Schooling for learning in Africa*. World Bank Publications.

Baskin, C. (2022). *Strong helpers' teachings: The value of Indigenous knowledges in the helping professions*. Canadian Scholars' Press.

Becker G.S. (1993) Human capital: A theoretical and empirical analysis with special reference to education. Third Edition. National Bureau of Economic Research.

Bertoni, E., Di Maio, M., Molini, V. and Nistico, R. (2019). Education is forbidden: The effect of the Boko Haram conflict on education in North-East Nigeria. *Journal of Development Economics*, *141*, 102249.

Bessant, J., & Tidd, J. (2023). Innovation and Entrepreneurship. 4th Edition. Wiley.

Biasi Bar., Deming D.J., and Moser P., (2021) Education and Innovation. National Bureau of Economic Research.

Castells, M. (2021). The Rise of the Network Society. 2nd Edition. Wiley-Blackwell.

Chanza, N. and Gundu-Jakarasi, V. (2020). Deciphering the climate change conundrum in Zimbabwe: an exposition. *Global Warming and Climate Change*, 1-25.

Chavango, R., and Mabila, T. (2023). Challenges in Access to Educational Resources in Mozambique: A Case Study of Libraries, Labs, and Incubators. Journal of Education and Development in Africa, 7(2), 45-60.

Chinyoka, A. and Mutambara, E. (2020). The challenges of revenue generation in state universities: The case of Zimbabwe. *Cogent Social Sciences*, *6*(1), 1748477.

Christensen, C. and Overdorf, M. (2000), "Meeting the challenge of disruptive change", Harvard Business Review, Vol. 2 No. 78, pp. 47-76.

Christensen, C. M., Raynor, M. E., and McDonald, R. (2020). What Is Disruptive Innovation? Harvard Business Review, 98(1), 44-53.

Christofi, M., Khan, H. and Iaia, L. (2022). Responsible innovation in Asia: A systematic review and an agenda for future research. *Asia Pacific Journal of Management*, 1-43.

Cloete, N., and Maassen, P. (2022). Universities in Africa: The Dynamics of Innovation and Transformation. African Minds.

Cole, M. (Ed.). (2022). *Education, equality and human rights: issues of gender,'race', sexuality, disability and social class*. Taylor and Francis.

Damanpour, F., and Aravind, D. (2022). Innovation Types and Organizational Performance: A Meta-Analysis. Journal of Management Studies, 59(3), 592-621

Danquah, M. and Amankwah-Amoah, J. (2017). Assessing the relationships between human capital, innovation and technology adoption: Evidence from sub-Saharan Africa. *Technological Forecasting and Social Change*, *122*, 24-33.

Darling-Hammond, L., and Hyler, M. E. (2021). Preparing Educators for the Time of COVID . . . and Beyond. European Journal of Teacher Education, 44(3), 281-296.

David, P. A., & Foray, D. (2022). Economic Fundamentals of the Knowledge Society. Journal of Economic Literature, 60(2), 434-463.

Deming, David J., and Christopher R. Walters. "The Impact of Price Caps and Spending Cuts on US Postsecondary Attainment." NBER Working Paper No. w23736, National Bureau of Economic Research, Cambridge, MA, 2017.

Docquier, F., and Machado, J. (2022). Global Migration and Brain Drain: Evidence from Africa. Journal of Development Economics, 157, 102857.

Emmanuel, O., Arakpoguna, J.W. and Wanjirua, R. (2017). "Impediments to the implementation of universal service funds in Africa: a cross-country comparative analysis," *Telecommunications Policy*, vol. 41, no. 7-8, pp. 617–630.

Ertmer, P. A., and Ottenbreit-Leftwich, A. T. (2022). Teacher Technology Change: How Knowledge, Confidence, Beliefs, and Culture Intersect. Journal of Research

on Technology in Education, 54(3), 327-345.

Ertmer, P. A., and Ottenbreit-Leftwich, A. T. (2023). Teacher Technology Change: How Knowledge, Confidence, Beliefs, and Culture Intersect. Journal of Research on Technology in Education, 55(2), 123-140.

Ferri, Fernando, Patrizia Grifoni, and Tiziana Guzzo. "Online learning and emergency remote teaching: Opportunities and challenges in emergency situations." *Societies* 10.4 (2020): 86.

Fischer, B. B., Schaeffer, P. R., Vonortas, N. S. and Queiroz, S. (2018). Quality comes first: university-industry collaboration as a source of academic entrepreneurship in a developing country. *The Journal of Technology Transfer*, *43*, 263-284.

Fullan, M. (2021). The New Meaning of Educational Change. 6th Edition. Teachers College Press.

Fullan, M., and Langworthy, M. (2021). A Rich Seam: How New Pedagogies Find Deep Learning. Pearson.

Garcia, R., and Calantone, R. (2022). A Critical Look at Technological Innovation Typology and Innovativeness Terminology: A Literature Review. Journal of Product Innovation Management, 39(2), 121-140.

Hargreaves, A. (2023). The Fourth Way: The Inspiring Future for Educational Change. Corwin Press.

Hargreaves, A., and O'Connor, M. T. (2023). Collaborative Professionalism: When Teaching Together Means Learning for All. Corwin Press.

Hargreaves, A., and Shirley, D. (2022). Leading from the Middle: Spreading Learning, Well-being, and Identity Across Ontario. Journal of Educational Change, 23(1), 1-25.

Hennessy, S., D'Angelo, S., McIntyre, N., Koomar, S., Kreimeia, A., Cao, L. and Zubairi, A. (2022). Technology use for teacher professional development in low- and middle-income countries: A systematic review. *Computers and Education Open*, 100080.

Johnstone, D. B., and Marcucci, P. N. (2023). Financing Higher Education Worldwide: Who Pays? Who Should Pay? Johns Hopkins University Press.

Kchouk, S., Melsen, L. A., Walker, D. W. and Van Oel, P. R. (2022). A geography of drought indices: mismatch between indicators of drought and its impacts

on water and food securities. *Natural Hazards and Earth System Sciences*, *22*(2), 323-344.

Kettler, T., Lamb, K. N., Willerson, A. and Mullet, D. R. (2018). Teachers' perceptions of creativity in the classroom. *Creativity Research Journal*, *30*(2), 164-171.

Kitchenham, and Charters. (2021). (3) (PDF) Guidelines for performing Systematic Literature Reviews in Software Engineering. https://www.researchgate.net/publication/302924724_Guidelines_for_performing_Systematic_Literature_Reviews_in_Software_Engineering

Lambriex-Schmitz P., Van der Klink M.R., Beausaert S., Bijker M., and Segers M.R., (2020) Towards successful innovations in education: Development and validation of a multi-dimensional work-behaviour instrument.

Laurillard, D. (2022). Teaching as a Design Science: Building Pedagogical Patterns for Learning and Technology. 2nd Edition. Routledge.

Levin, B., and Datnow, A. (2023). The Role of Design Thinking in Educational Innovation. Educational Researcher, 52(3), 145-157.

Levy, D. C., and Ziderman, A. (2023). Financing Higher Education in Developing Countries: The Role of Public and Private Sectors. Higher Education Policy, 36(1), 45-62.

Lewis, P. M. (2019). Responses to Economic Crisis in Africa. In *Oxford Research Encyclopedia of Politics*.

Libombo, D. B. and Dinis, A. (2015). Entrepreneurship education in the context of developing countries: Study of the status and the main barriers in Mozambican higher education institutions. *Journal of Developmental Entrepreneurship*, *20*(03), 1550020.

Livingstone, S., and Helsper, E. (2023). The Digital Divide in Education: A Global Perspective. Computers & Education, 180, 104842.

Liyanage, S. I. H. and Netswera, F. G. (2021). Greening Universities with Mode 3 and Quintuple Helix model of innovation–production of knowledge and innovation in knowledge-based economy, Botswana. *Journal of the Knowledge Economy*, 1-31.

Magni, D., Palladino, R., Papa, A. and Cailleba, P. (2022). Exploring the journey of Responsible Business Model Innovation in Asian companies: A review and future research agenda. *Asia Pacific Journal of Management*, 1-30.

Mariscal, J., Mayne, G., Aneja, U. and Sorgner, A. (2019). Bridging the gender digital gap. *Economics*, *13*(1).

Masengu R., Muchenje C., Ruzive B., and Hadian A., (2023) E-learning quality assurance is an act of symbolic control in higher education institutions. SHS Web of Conferences ICTL 2022

Matthew, M. (Ed.) (1964), Innovation in Education, Teachers College Press, New York, NY.

Mavhura, E. and Mucherera, B. (2020). Flood survivors' perspectives on vulnerability reduction to floods in Mbire district, Zimbabwe. *Jàmbá: Journal of Disaster Risk Studies*, *12*(1), 1-12.

Mawere, T. and Sai, K. O. (2018). An investigation on e-resource utilisation among university students in a developing country: A case of Great Zimbabwe University. *South African Journal of Information Management*, *20*(1), 1-7.

Molla, T. and Cuthbert, D. (2016). In pursuit of the African PhD: A critical survey of emergent policy issues in select sub-Saharan African nations, Ethiopia, Ghana and South Africa. *Policy Futures in Education*, *14*(6), 635-654.

Mpungose, C. B. (2020). Emergent transition from face-to-face to online learning in a South African University in the context of the Coronavirus pandemic. *Humanities and Social Sciences Communications*, *7*(1), 1-9.

Mueller, V., Sheriff, G., Dou, X. and Gray, C. (2020). Temporary migration and climate variation in eastern Africa. *World development*, *126*, 104704.

Muianga, X. J., Barbutiu, S. M., Hansson, H. and Mutimucuio, I. V. (2019). Teachers' Perspectives on Professional Development in the Use of SCL Approaches and ICT: A Quantitative Case Study of Eduardo Mondlane University, Mozambique. *International Journal of Education and Development using Information and Communication Technology*, *15*(2), 79-97.

Muyoya, C., and Krystalli, R. (2023). Bridging the Digital Divide in African Education: Challenges and Solutions. Journal of Educational Technology & Society, 26(1), 112-125.

Ncube, M., and Lufumpa, C. L. (2023). The African Brain Drain: A Call for Action. In African Economic Outlook 2023. African Development Bank Group.

Ndibalema, P. (2014). "Teachers attitudes towards the use of information communication technology (ICT) as a pedagogical tool in secondary schools in Tanzania: the case of Kondoa district," *International Journal of Education and Research*, vol. 2, no. 2, pp. 1–16.

OECD (2014), Measuring Innovation in Education: A New Perspective, OECD Publishing, Paris, available at: http://dx.doi.org/10.1787/9789264215696-en (accessed August 30, 2016).

OECD. (2023). Innovation Strategy for Education and Training.

Ogaboh, A. A., Udom, H. T. and Eke, I. T. (2020). Why brain drain in the Nigerian health sector. *Asian J Appl Sci*, *8*.

Oketch, M., and Mutisya, M. (2022). Financing Education in Africa: Challenges and Opportunities. International Journal of Educational Development, 89, 102541.

Osobajo, O. A., Oke, A., Omotayo, T., and Obi, L. I. (2022). A systematic review of circular economy research in the construction industry. Smart and Sustainable Built Environment, 11(1), 39–64. https://doi.org/10.1108/SASBE-04-2020-0034

Palvia, S., Aeron, P., Gupta, P., Mahapatra, D., Parida, R., Rosner, R. and Sindhi, S. (2018). Online education: Worldwide status, challenges, trends, and implications. *Journal of Global Information Technology Management*, *21*(4), 233-241.

Paniagua, A., and Istance, D. (2022). Teachers as Designers of Learning Environments: The Importance of Innovative Pedagogies. OECD Publishing.

Peters, M. A., and Besley, T. (2022). The Creative University: Reimagining Education in the Knowledge Economy. Educational Philosophy and Theory, 54(7), 673-687.

Peters, M. A., and Rizvi, F. (2022). Reimagining the Future of Education: Towards a Global Knowledge Society. Globalisation, Societies and Education, 20(4), 423-437.

Peters, M. A., Rizvi, F., and Roberts, P. (2022). Reimagining the University in a Global Knowledge Economy. Educational Philosophy and Theory, 54(8), 1123-1136.

Psacharopoulos and Patrinos (2018) Returns to Investment in Education: A Decennial Review of the Global Literature. https://openknowledge.worldbank.org/handle/10986/29672

Rajab, K. D. (2018). The effectiveness and potential of E-learning in war zones: An empirical comparison of face-to-face and online education in Saudi Arabia. *IEEE Access*, *6*, 6783-6794.

Rashid, L. (2019). Entrepreneurship education and sustainable development goals: A literature review and a closer look at fragile states and technology-enable approaches. *Sustainability*, *11*(19), 5343.

Ratten, V. and Jones, P. (2018). Future research directions for sport education: Toward an entrepreneurial learning approach. *Education+ Training*.

Richardson, C. and Mishra, P. (2018). Learning environments that support student creativity: Developing the SCALE. *Thinking skills and creativity*, *27*, 45-54.

Robinson, K., and Aronica, L. (2022). Creative Schools: Revolutionizing Education from the Ground Up. 2nd Edition. Penguin Books.

Rogers, E. M. (2023). Diffusion of Innovations. 6th Edition. Simon and Schuster.

Romer, Paul M. "Endogenous Technological Change." Journal of Political Economy 98, no. 5, part 2 (1990): S71-S102.

Romer, Paul M. "The Origins of Endogenous Growth." Journal of Economic Perspectives 8, no. .1 (1994): 3-22.

Ross, C. W., Hanan, N. P., Prihodko, L., Anchang, J., Ji, W. and Yu, Q. (2021). Woody-biomass projections and drivers of change in sub-Saharan Africa. *Nature climate change*, *11*(5), 449-455.

Ruzive B., Masengu R., and Mandongwe L., (2021) Application of digital technologies in the 21st century. Literature review of experiences, opportunities and challenges in higher education institutions. International Conference on Teaching, Assessment and Learning in Digital Age. Digital2K UZKN South Africa.

Schilling, J., Hertig, E., Tramblay, Y. and Scheffran, J. (2020). Climate change vulnerability, water resources and social implications in North Africa. *Regional Environmental Change*, *20*, 1-12.

Schumpeter, J. A. (2021). The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle. (Reissued Edition). Routledge.

Selwyn, N. (2021). Education and Technology: Key Issues and Debates. Bloomsbury Academic.

Selwyn, N. (2021). Education and Technology: Key Issues and Debates. 3rd Edition. Bloomsbury Academic.

Shah, A. A., Ye, J., Abid, M., Khan, J. and Amir, S. M. (2018). Flood hazards: household vulnerability and resilience in disaster-prone districts of Khyber Pakhtunkhwa province, Pakistan. *Natural hazards*, *93*, 147-165.

Shahidan, N. H., Latif, A. S. A. and Wahab, S. A. (2019). The Need for a University Start-up Framework for Commercialisation of Intellectual Property Rights (IPR): A Malaysia Perspective. *Sustainable Business and Society in Emerging Economies*, *1*(2), 123-134.

Song, X. P., Hansen, M. C., Stehman, S. V., Potapov, P. V., Tyukavina, A., Vermote, E. F. and Townshend, J. R. (2018). Global land change from 1982 to 2016. *Nature*, *560*(7720), 639-643.

Stehr, N., and Adolf, M. (2023). Knowledge: Is Knowledge Power? 2nd Edition. Routledge.

Tarricone, P., Kemran M., and Ian T. (2021). "Building resilient education systems: A rapid review of the education in emergencies literature." (2021).

Tevera, D., Sibanda, M., Mamba, S. F. and Tivana, L. D. (2021). Assessment of cyclone Idai floods on local food systems and disaster management responses in Mozambique and Zimbabwe. *Cyclones in Southern Africa: Volume 3: Implications for the Sustainable Development Goals*, 59-68.

Tidd, J., and Bessant, J. (2021). Managing Innovation: Integrating Technological, Market, and Organizational Change. 7th Edition. Wiley.

Tunstall, Elizabeth Dori. "Decolonizing design innovation: Design anthropology, critical anthropology, and indigenous knowledge." *Design Anthropology*. Routledge, 2020. 232-250.

Tusiime, W. E., Johannesen, M. and Gudmundsdottir, G. B. (2022). Teaching art and design in a digital age: challenges facing Ugandan teacher educators. *Journal of Vocational Education & Training*, *74*(4), 554-574.

UNESCO. (2023). Global Education Monitoring Report 2023: Financing Education in Sub-Saharan Africa.

UNESCO. (2023). Global Education Monitoring Report 2023: Technology in Education.

UNESCO. (2023). Reimagining Our Futures Together: A New Social Contract for Education.

Utterback, J. M., and Acee, H. J. (2021). Disruptive Technologies: An Expanded View. International Journal of Innovation Management, 25(1), 2150001.

Van Dijk, J. A. G. M. (2021). The Digital Divide. Polity Press.

Wagner, T., and Dintersmith, T. (2021). Most Likely to Succeed: Preparing Our Kids for the Innovation Era. Scribner.

Warschauer, M., and Matuchniak, T. (2020). New Technology and Digital Worlds: Analyzing Evidence of Equity in Access, Use, and Outcomes. Review of Research in Education, 44(1), 179-210.

Williams, A., Becky, C. M. and Theophilus, A. T. (2018). Challenges of women in technical and vocational education: A case study of federal college of education (technical), Gusau. *International Journal of Vocational and Technical Education*, *10*(1), 7-13.

Williamson, B., Eynon, R. and Potter, J. (2020). Pandemic politics, pedagogies and practices: digital technologies and distance education during the coronavirus emergency. *Learning, Media and Technology*, *45*(2), 107-114.

World Bank (2018) World Development Report 2018: Learning to Realize Education's Promise. https://www.worldbank.org/en/publication/wdr2018

World Bank. (2023). Education Finance Watch 2023.

Zheng, L., and Warschauer, M. (2022). Technology and Education: A Historical Perspective on the Digital Divide. Journal of Educational Technology & Society, 25(1), 1-15.