EXPLORING DIGITAL TECHNOLOGY'S IMPACT ON EPISTEMOLOGICAL ACCESS FOR UNDERPRIVILEGED STUDENTS AT IVY LEAGUE UNIVERSITIES IN NIGERIA: A CASE STUDY OF THE UNIVERSITY OF NIGERIA, NSUKKA (UNN)

[1]Bukhari BADAMASI, [2]Musa M. HAYATU, [3]Habibu MOHAMMED & [4]Muhammad AHMAD

[1,2 & 3]Department of Library and Information Science Ahmadu Bello University, Zaria
[4]Department of Library and Information Science Federal Polytechnic, Daura, Katsina State

[1]bbadamasi@abu.edu.ng [2]ibnhayat@gmail.com [3]sokowochin@gmail.com
[4]babansadiq75@gmail.com

Abstract

This study explored the experiences of underprivileged students on the use of digital technologies for epistemological access at Ivy League Universities in Nigeria. Two research questions were raised and answered, these are: What are the transformational changes that occur when underprivileged students interact with digital technologies at University of Nigeria, Nsukka? and What are the structural conditions constraining underprivileged students from gaining epistemological access at University of Nigeria, Nsukka? Archer Morphogenetic Theory was used as theoretical framework and a Case Study research design was employed. Qualitative Data was collected using structured interview. A sample of 10 participants were used for the study. Thematic analysis was used for data analysis. The findings from the study indicated that the transformational changes that occur when underprivileged students interact with digital technologies includes personalized learning, global collaboration and connectivity, holistic learning and skills development, and inclusivity and global education. The study also found that the structural barriers that constrained underprivileged students from gaining epistemological access are; barriers to technology adoption and integration, digital inequality and infrastructural challenges, and equitable education. Findings interpreted using the Archer Morphogenetic Theory revealed one of the concepts (cultural/structural interactions) are in conformity with the study findings, while (cultural/structural conditioning, and cultural/structural elaboration) concepts are not in line with the study findings. The study concluded that the transformative potentials and structural barriers of digital technologies in promoting equitable access to education and preparing students for success in a rapidly changing world is necessary. The study recommended that University of Nigeria, Nsukka should integrate digital learning platform, enhance usability through user-centric design, implement transformative

educational strategies and training, and address structural conditions for students to gain epistemological access.

Keywords: *Epistemological access, institutional access, digital technologies, higher educational institutions, mobile learning, Virtual reality, underprivileged students, League Universities in Nigeria.*

Introduction

In the context of education, digital technologies have transformed traditional learning models, introducing online courses, interactive learning platforms, and virtual classrooms. The integration of digital tools in various sectors has increased efficiency, productivity, and connectivity, shaping the way users work, learn, and connect with others. However, as society embraces these technologies, it also grapples with issues like digital inequality, privacy concerns, and the ethical implications of widespread connectivity. Navigating the evolving landscape of digital technologies requires thoughtful consideration of their impact on individuals, communities, and the broader global context. Qureshi et al. (2021) defined digital technologies as the electronic tools, systems, devices and resources that generate, store or process data. These tools serve as powerful instrument that can help improve education in various ways, such as making it easier for instructors to generate instructional materials and providing new methods for people to learn and collaborate.

The use of digital technologies has fundamentally reshaped the landscape of education, ushering in an era of unprecedented opportunities and challenges. Incorporating digital technologies into learning environments has the potential to enhance the educational experience by offering dynamic and interactive platforms. From online resources and multimedia content to virtual simulations and collaborative tools, these technologies provide diverse pathways for acquiring and applying knowledge. Moreover, the accessibility of digital learning materials enables a more personalized and flexible approach to education, accommodating individual learning styles and preferences (Behari-Leak, 2015). The importance of digital technologies in learning lies not only in their capacity to facilitate information dissemination but also in fostering critical thinking, problem-solving skills, and digital literacy - essential competencies in today's fast-evolving globalized society by way of gaining epistemological access. However, ensuring epistemological access and addressing potential drawbacks, such as the digital divide and data security concerns, are critical considerations to use the full potential of digital technologies in the provision of education to both elite children and underprivileged students.

Epistemological access refers to the ability of individuals to connect with, and understand a particular body of knowledge or way of knowing. Willey (2007) defined epistemological access as access that is bestowed upon students to gain mastery of the subject

area in their disciplinary domain. It extends beyond physical access to educational resources and environments, delving into the realm of comprehension and cognitive engagement. This concept recognizes that access to information alone does not guarantee meaningful understanding (Carnevale & Smith, 2018); rather, it underscores the importance of creating inclusive learning environments that resonate with diverse perspectives and cognitive styles (Leuwol et al., 2023). Epistemological access involves acknowledging and validating different ways of knowing and learning, ensuring that educational content and methods are culturally responsive and accessible to individuals with varying backgrounds and learning preferences (Brown, 2017). By prioritizing epistemological access, educators and institutions can foster a more inclusive and equitable learning experience, empowering learners to engage with knowledge in a meaningful and personally relevant manner.

Statement of the Problem

In this current trends, there is a high level of institutional access in Nigerian universities, where students gain admission to the institutions which is referred to as institutional access, and it is different from epistemological access. Epistemological access is about providing access to knowledge and ways of knowing for students to attain academic success and thrive in their careers or professions (Maniram, 2018). Epistemological access has been a source of dispute in higher educational institutions, particularly about the preparedness of underprivileged students entering university especially in some of the Ivy League universities. Gaining epistemological access reflects and is mostly related to university education, even though it depends on the country's structure and educational system (Harland & Wald, 2018).

The Northern part of Nigeria, characterized by a rich cultural tapestry, faces systemic challenges that exacerbate the struggles of underprivileged students at the University of Nigeria, NSUKKA. Underprivileged students at the University of Nigeria, Nsukka, often struggle with limited access to essential learning resources, including textbooks, digital tools, and stable internet, hindering their academic performance and overall educational experience which contribute to a cycle of poverty that is difficult to break. As these students aspire to rise to the academic ladder, they find themselves in a disheartening juxtaposition when admitted into elite higher educational institutions. Another glaring issue faced by these underprivileged students is the unambiguous cultural difference between their humble backgrounds and the elite academic environment. The privileged atmosphere of this institution, often characterized by a more affluent student body, can foster a sense of alienation and inferiority among those grappling with financial hardships. The cultural shock is not just academic but also social, making it challenging for these students to integrate seamlessly into an environment that seems worlds apart from their own as a result of financial constraints.

This study, explored the digital technology's impact on epistemological access for underprivileged students at the University of Nigeria, Nsukka. Underprivileged students in this study are those who face socio-economic disadvantages that impede their access to quality education, including limited financial resources, inadequate learning materials, or unstable living conditions.

Objectives of the Study

The following are the objectives of this study:

1. To discover the transformational changes that occurred when underprivileged students interact with digital technologies at University of Nigeria, Nsukka (UNN).
2. To ascertain the structural conditions that constrain underprivileged students from gaining epistemological access at University of Nigeria, Nsukka (UNN).

Literature Review

Theoretical Framework

In this study, the Archer Morphogenetic Approach (theory) was used as a theoretical framework. The theory was propounded by Margaret Scotford Archer in 1995. The theory is considered appropriate for the study based on its proximity with the common underlying assumptions and explanatory power to the phenomenon, drawing from Okhuysen and Bonardi (2011); and Ononiwu et al. (2018) on theory choice and combination in social science research. The theory has three concepts namely; Structural/Cultural Conditioning, Structural/Cultural Interaction, and Structural/Cultural Elaboration as depicted in **Figure 1.** These concepts of the theory will be used to explain the phenomenon under investigation.

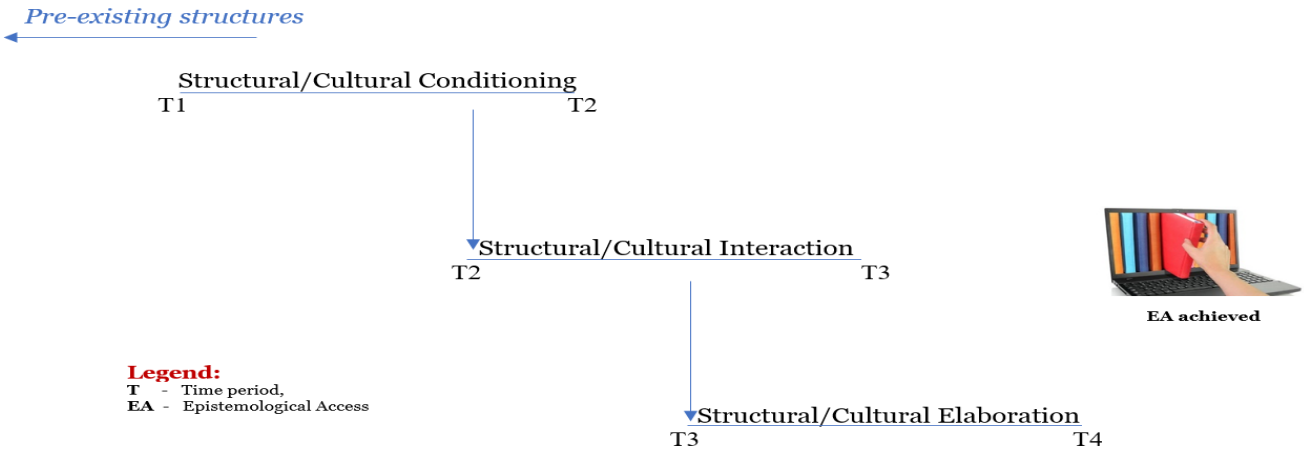

Figure 1: Archer Morphogenetic Approach (Source: Archer, 1995)

DIGITAL TECHNOLOGIES IN HIGHER EDUCATIONAL INSTITUTIONS

Digital technologies are powerful instruments that help improve education in various ways, such as making it easier for instructors to generate instructional materials and providing new methods for people to learn and collaborate. A new era has arrived with the

Internet's worldwide reach and many emerging and intelligent devices connected to it. Thus, it will be up to instructional designers and educationists to use advanced digital technology's potential to revolutionize education such that effective and efficient education could be available to everyone and everywhere (Carvalho et al., 2022; Varea et al., 2022). Technology has continued to play an essential role in delivering education to children outside the classroom. Digital learning fosters creativity and gives students a sense of success, encouraging additional learning by thinking outside traditional techniques. Most nations were able to adopt remote learning technologies utilizing a combination of television, radio, online, and mobile platforms, which is commendable. These provide easy access to information, easy retention of information, increased storage of information, and improved presentation of information; education became more interactive, easier sharing of knowledge, and increased enthusiasm for learning (Grainger et al., 2021; Lacka & Wong, 2021). With emerging technologies, instructors must learn to utilize various digital technologies like smartphones and tablet computers so as to be up to date in this current trends. Similarly, teachers must also harness available online resources to ensure that their materials are alive, engaging, and up to date (Major et al., 2018). Technologies are more than just playing video games and viewing animated films (Berger, 2017), their advantages are determined by how students, parents, and teachers use it to improve education. When technology is used effectively for instructional reasons, students' experience improves, and become more interested in learning (Henderson et al., 2017). Digital technology as an e-learning platform compatible with new smart devices such as phones and tablets has been a significant element in the ease of access and faster uptake for digital learning. Specialized learning such as animation, games, or AI-powered systems designed exclusively for edutainment, are also included. The importance of Big Data and the application of analytics to learning was an essential but generally overlooked part of educational technologies (Bergdahl & Nouri, 2021; Lewis et al., 2013). Higher educational institutions realize the value of students' and instructors' performance data as they extend their usage of virtual classrooms, e-learning platforms, and online exams.

Digital technologies are electronic tools, systems, devices, and resources that generate, store, or process data (Sailer et al., 2021). Well-known examples include smartphones, laptops, tablets, desktop computers, smartwatches, e-readers, digital cameras, virtual reality, augmented reality, and smart TV. Digital learning is any type of learning that uses technology. It can happen across all curriculum learning areas (Coleman, 2015; Olofsson et al., 2020). Digital technologies used in the university should be understood as a project encompassing the educational process, involving not only the teacher or the structural divisions of the university, but also the students and how they apply technology to improve their learning process (Pachler et al., 2013). Digital technologies such as information technologies, research technologies for scientific and educational information; technologies for the computer processing of educational information; technologies for organizing the

professional training to students; and technologies for the execution and defense of the graduation project or academic works (Ignatyeva, 2015).

The most used tools in this new educational era are multimedia technology, online learning or e-learning, mobile learning or m-learning, blogs, and social networks (Fojtik, 2014). On the other hand, multimedia technology allows the integration of text, numbers, graphics, still or moving images, presentations, a high level of interactivity, and besides, the possibility of navigating through different documents, which gives students the convenience of understanding words and teaching objects (Haleem et al., 2022). It has been shown that multimedia technology has four advantages: 1) it improves information reception and the quality of teaching; 2) it deepens students' memory and their understanding of knowledge through vivid images, videos, and refined language, 3) the application of multimedia technology can unite the process of recognition and the affective process; and 4) it can stimulate and motivate study among groups of students and improve the efficiency and the quality of teaching (Ausín et al., 2016). On the issue of improving the quality of teaching, although there is a universal notion that digital technology promotes improvements in learning, these improvements are challenging to measure at present. Thus, an unexplored field is precisely how and to what extent does ICTs affect higher education and how these technologies may lead to different careers.

EPISTEMOLOGICAL ACCESS

Investigating epistemological access is phenomenal; which attracted many scholars over the years (Du-Plooy & Zilindile, 2014; Luckett, 2019; Morrow, 2009). Epistemological access is an access that is bestowed upon students to gain mastery of the subject area in their disciplinary domain (Luckett, 2019; Willey, 2007). Consequently, epistemological access requires a process theorization approach, to ensure gaining disciplinary knowledge of the domain area and an in-depth understanding of a particular phenomenon (Fagan, 2020; Gamede, 2006; Luckett, 2019; Maniram, 2018; Mistri, 2016; Myers, 2019; Ongito, 2012; Venter, 2020). Some studies aligned with this view, though with varied perspectives. Some consider epistemological access which was first used by Willey (2007), a South African scholar, who problematized access to higher education. He used the term to describe two dimensions of access to higher education, being institutional (formal access) and access to knowledge, which he believes institutions distribute (epistemological access).

Epistemological access - access to the knowledge and ways of knowing within a discipline—remains a significant challenge for underprivileged students at the University of Nigeria, Nsukka (UNN). According to Ofoegbu et al. (2021), structural factors such as inadequate funding, limited library resources, and the lack of sufficient digital infrastructure constrain these students' ability to fully engage with academic content. These constraints not only hinder students' ability to access learning materials but also limit their engagement with diverse and high-quality educational resources essential for comprehensive understanding in

their fields. In addition, structural inequities such as outdated curricula and insufficient academic support services disproportionately affect underprivileged students, as highlighted by Okonkwo et al. (2021). They argue that limited access to digital tools, under-resourced libraries, and overcrowded classrooms contribute to a "knowledge gap" that makes it difficult for these students to achieve the same depth of understanding as their more privileged counterparts. This gap in epistemological access is further compounded by socio-economic barriers, which reduce opportunities for tutorial support and academic counseling, both of which are crucial for navigating university-level studies. Moreover, the lack of institutional focus on inclusive educational practices also limits epistemological access. As Igwe (2014) notes, a policy shift towards inclusive education - one that ensures digital resources, remedial programs, and effective mentorship - could mitigate these structural challenges. Until such initiatives are implemented, structural barriers will continue to obstruct underprivileged students at UNN from achieving equitable knowledge access.

However, this review corroborates the second perspective (i.e., access to knowledge which Morrow believes institutions distribute 'epistemological access'). Within this study, epistemological access is pinned on meaningful access to knowledge when learning is structured in a manner that ensures learners develop coherent ways of engaging with digital technologies and understanding different learning areas (Pendlebury, 2009, p. 24-25). This access, therefore, extends beyond mere physical access to include how learners are provided with quality teaching. This is because our outcome describes activity-based events as characterized by gaining the right knowledge of the disciplinary domain, which is continuously influenced by mechanisms of people, structures, and cultures that provide knowledge to students.

UNDERPRIVILEGED STUDENTS IN NIGERIA

Underprivileged students in Nigeria face significant challenges that hinder their educational advancement and overall development. Many come from impoverished backgrounds where access to basic necessities such as food, clean water, and healthcare is limited. This lack of resources extends to their educational environment, where schools often suffer from inadequate infrastructure, insufficient teaching materials, and a shortage of qualified teachers (Ogunode et al., 2022). The economic hardships these students endure frequently force them to juggle between schooling and various forms of labor to support their families, further impeding their academic progress (Kharas & Zhang, 2014).

Studies show that when underprivileged students at universities engage with digital technologies, they often experience transformative changes in academic engagement, skill development, and self-efficacy. At the University of Nigeria, Nsukka, access to digital tools has become increasingly vital for learning and personal growth. Research by Nwokedi (2023) highlights that digital platforms bridge the resource gap, providing students with alternative materials through e-books, online journals, and open-access courses. Furthermore, Nwokedi

(2023) study found that using digital technologies encourages underprivileged students to develop essential digital literacy skills, which are transferable to both academic and professional settings. These technologies help foster independent learning, improve research capabilities, and often lead to a significant increase in students' confidence, as they gain the ability to access information without physical limitations. However, the literature also notes that while digital interaction is transformative, sustainable access remains challenging. Bubou and Job (2021) emphasizes that the lack of stable internet and computer labs limits the extent of transformation for students from lower socio-economic backgrounds. Therefore, although digital technology access is transformative, adequate institutional support is crucial for sustaining these benefits and ensuring equitable learning opportunities for all students at UNN.

Moreover, the disparity in educational opportunities between urban and rural areas exacerbates the plight of underprivileged students. Rural schools, in particular, are plagued by neglect, with many lacking electricity, proper sanitation facilities, and transportation means. This geographical divide ensures that children in remote regions have even fewer opportunities to receive quality education (Anazia, 2021). Consequently, the cycle of poverty continues as these students are deprived of the skills and knowledge necessary to improve their socio-economic status, perpetuating a systemic issue that demands urgent and comprehensive intervention from both governmental and non-governmental organizations.

METHODOLOGY

Qualitative Research Methodology and Case Study Research Design was adopted for this study. Creswell (2017) stated that the qualitative methodology allows for the examination of data with a better understanding of the research problem as compared to using the quantitative methodology. Using the qualitative methodology, the researcher would be able to get more information from the study's participants, on the phenomenon under study (Cecez-Kecmanovic et al., 2020). Bandara et al. (2015); Creswell (2017); Gerlach and Cenfetelli (2020) and Gerlach and Cenfetelli (2020) also stated that qualitative methodology is the best way to collect information about a phenomena in a particular context. The study equally used an interpretive research paradigm for understanding underprivileged students' perception on digital technology for academic achievement. Population of this study consists of students from the University of Nigeria, Nsukka. Purposive sampling technique was used for the selection of 10 as sample size for this study upon attaining data saturation. Using very few participants in a qualitative study allows for in-depth exploration of each participant's experiences, perspectives, and contexts. This smaller sample size enables researchers to gather rich, detailed data, fostering a deeper understanding of complex phenomena rather than broad generalization. A semi-structured interview was used for data collection and data collected was analyzed thematically.

Data Presentation and Result

This section consists of the data presentation and analysis of the data in alignment with the objectives of the study;

Transformational Changes that occur when Underprivileged Students Interact with Digital Technologies at University of Nigeria, Nsukka (UNN)

The objective of the first research question is to discover the transformational changes that occurred when underprivileged students interact with digital technologies at University of Nigeria, Nsukka. Four major themes emerged from the narratives of the Participants of this study to include: 1) Personalized learning, 2) Global collaboration and connectivity, 3) Holistic learning and skills development, and 4) Inclusivity and global education.

Table 1: Transformational Changes that Occur when Underprivileged Students Interact with Digital Technologies at University of Nigeria, Nsukka (UNN)

RESEARCH QUESTION	THEMES	SUBTHEMES
RQ1: What are the Transformational Changes that occur when Underprivileged Students Interact with Digital Technologies at University of Nigeria, Nsukka?	**1. Personalized learning**	1.1 Flexibility in learning 1.2 Fitting a learning style 1.3 Learning at an individual pace 1.4 Exploration of diverse subject areas
	2. Global collaboration and connectivity	2.1 Collaboration 2.2 Global connectivity 2.3 Facilitate seamless communication 2.4 Enable effective networking
	3. Holistic learning and skills development	3.1 Understanding of complex phenomena 3.2 New skills 3.3 Immersive experiences 3.4 Multidisciplinary approach to learning
		4.1 Accessibility 4.2 Broaden the scope of the educational journey 4.3 Use of different languages for learning

4. Inclusivity and global education

Source: Interview Analysis, 2024

Theme One: Personalized Learning

The Theme Personalized learning emerged from the narratives of participants related to transformational changes of underprivileged students at University of Nigeria, Nsukka when digital technologies are used. The theme is made up of a subtheme. The theme is made up of four subthemes. These include: 1) flexibility in learning, 2) fitting a learning style, 3) learning at an individual space, and 4) exploration of divers subject areas. Responses of the participants are discussed in the section below:

P1: *...digital technologies have transformed my approach to education by providing flexibility in learning. .... it allow me to tailor my study schedule to fit my learning style and pace…*

P4: *...digital technologies have made education more accessible and flexible…*

P5: *...digital technologies have made education more accessible and flexible…*

Theme Two: Global Collaboration and Connectivity

The Theme Global collaboration and connectivity emerged from the narratives of participants related to transformational changes of underprivileged students at University of Nigeria, Nsukka when digital technologies are used. The theme is made up of four subtheme. The theme is made up of four subthemes. These include: 1) collaboration, 2) global connectivity, 3) facilitate seamless communication, and 4) enable effective networking. Responses of the participants are discussed in the section below:

P1: ... the integration of digital collaboration tools has expanded my learning network, I can connect with fellow students and experts in the field from anywhere…

P2: ...digital technologies enable effective teamwork regardless of physical location…

P3: ... using virtual reality simulations in a geography course enabled me to visit locations around the world.

Theme Three: Holistic Learning and Skills Development

The Theme Holistic learning and skills development emerged from the narratives of participants related to transformational changes of underprivileged students at the America University of Nigerian when digital technologies are used. The theme is made up of four subtheme. The theme is made up of four subthemes. These include: 1) understanding of complex phenomena, 2) new skills, 3) immersive experience, and 4) multidisciplinary approach to learning. Responses of the participants are discussed in the section below:

P2: *... the immediate feedback and real-time collaboration features allowed me to grasp complex coding concepts more efficiently than traditional methods…*
P4: *... online courses and resources have allowed me to explore diverse subjects beyond my major, it help in fostering a multidisciplinary approach to learning…*
P10: *... participating in online forums and collaborative platforms has expanded my learning …*

Theme Four: Inclusivity and Global Education

The Theme Inclusive and global education emerged from the narratives of participants related to transformational changes of underprivileged students at University of Nigeria, Nsukka when digital technologies are used. The theme is made up of four subthemes. These include: 1) flexibility in learning, 2) fitting a learning style, 3) learning at an individual space, and 4) exploration of divers subject areas. Responses of the participants are discussed in section below:
P2: *…digital technologies has broadening the scope of my educational journey…*
P4: *…digital technologies have made education more accessible and flexible…*
P9: *…digital technologies have personalized my learning experience…*

Structural Conditions that Constrain Underprivileged Students from Gaining Epistemological Access at University of Nigeria, Nsukka (UNN)

The objective of the research was to identify the structural conditions that constrain underprivileged students from gaining epistemological access at University of Nigeria, Nsukka. Three major themes emerged from the narratives of the Participants of this study to include: 1) Barriers to Technology Adoption and Integration, 2) Digital Inequality and Infrastructural Challenges, and 3) Equitable education, as depicted in Table 1.

Table 1: Structural Conditions Constraining Underprivileged Students from Gaining Epistemological Access

RESEARCH QUESTION	THEMES	SUBTHEMES
RQ2: What are the Structural Conditions Constraining Underprivileged Students from gaining Epistemological Access at University of Nigeria, Nsukka?	**1. Barriers to Technology Adoption and Integration**	1.1 Lack of know how to use the technology 1.2 Difficulties in handling the technologies 1.3 Technical challenges 1.4 Lack of access to software 1.5 Lack of support

	1.6 Inadequate digital literacy
2. Digital Inequality and Infrastructural Challenges	2.1 Limited access to well-equipped digital laboratories 2.2 Insufficient band-width 2.3 Outdate infrastructure 2.4 Insufficient funds
3. Equitable education	3.2 Disparities between learners

Source: Interview Analysis, 2024

Theme One: Barriers to Technology Adoption and Integration

The Theme Barriers to technology adoption and integration emerged from the narratives of participants related to structural conditions that constrain underprivileged students from gaining epistemological access at University of Nigeria, Nsukka. The theme is made up of six subthemes. These incudes: 1) Lack of how to use the technology, 2) Difficulties, 3) Technical challenges, 4) Insufficient training, 5) Lack of support, and 6) Inadequate digital literacy. Responses of the participants are discussed in the section that follows:

P1: *Hahaha, hmm… one of the major challenge I faced is lack of understanding on how to even use the digital technologies... The school where I came from, they never taught me how to use digital technologies, therefore it is difficult to use. There are times when the learning management system used by the institution faces technical issues. Insufficient training is a hindrance, insufficient support on how to use the digital tools and platforms is a big barrier, inadequacy of digital literacy hinder my ability to navigate….*

P2: *… insufficient training for students on how to use digital tools and platforms is a significant barrier…*

P3: *… one of the significant challenges is the lack of universal access to required software and applications… software like SPSS, NVivo, and reference software and so on…*

P5: … *the lack of consistent training and support for both students and faculty in using digital tools poses a significant barrier…*
P9: *…the lack of consistent training and support for both students and faculty in using digital tools poses a significant barrier, inadequate digital literacy programs …*
P10: *…the lack of consistent training and support for both students and faculty in using digital tools poses a significant barrier, inadequate digital literacy …*

Theme Two: Digital Inequality and Infrastructural Challenges

The Theme digital inequality and infrastructural challenges emerged from the narratives of participants related to structural conditions that constrain underprivileged students from gaining epistemological access at University of Nigeria, Nsukka. The theme is made up of five sub-themes. These incudes: 1) Limited access to well-equipped digital laboratories, 2) Insufficient band-width, 3) Outdate infrastructure, 4) Insufficient funds, and 5) Aging computers. Responses of the participants are discussed in section below:

P1: *…limited access to well-equipped computer labs and collaborative spaces with updated technology is also a big barrier to me…*
P3: *… insufficient bandwidth and network congestion during peak hours can result in slow internet speeds, making it challenging to download large files, attend virtual classes, or engage in multimedia-rich educational content, outdated infrastructure, slow internet connectivity….*
P4: *…one significant challenge is the lack of universal access to required software and applications, lack of some updated applications, insufficient bandwidth and network congestion during peak hours can result in slow internet speeds…*
P5: *…limited access to well-equipped computer labs…*
P6: *…insufficient bandwidth and network congestion during peak hours can result in slow internet speeds, again, in some classrooms, outdated infrastructure, aging computers and slow internet connections…*
P7: *… limited access to well-equipped computer labs…*

Theme Three: Equitable education

The Theme equitable education emerged from the narratives of participants related to structural conditions that constrain underprivileged students from gaining epistemological access at University of Nigeria, Nsukka. The theme is made up of a sub-theme. This includes: 1) Disparities between learners. Responses of the participants are discussed in section below:

P4: *…in some courses, students are expected to use specific tools, but not all have the means to purchase or access them, creating disparities in learning opportunities…*

The landscape of education is marred by so many hindrances and challenges that impede gaining epistemological access at higher educational institutions. Barriers to technology adoption and integration persist, while hindering the seamless incorporation of digital technologies into educational institutions increase. Consequently, digital inequality and

infrastructural challenges exacerbate these barriers, creating disparities for epistemological access among students. Moreover, digital divide contributes significantly to equitable education, amplifying disparities in learning opportunities among students. Addressing these issues requires a comprehensive approach that encompasses not only technological solutions but also systematic changes to bridge the gaps in access, infrastructure, and educational opportunities, fostering a more equitable learning environment for all.

Discussion and Findings

Transformational Changes that occur when Underprivileged Students Interact with Digital Technologies at University of Nigeria, Nsukka (UNN)

The study found that the transformative impact of digital technologies on underprivileged students at University of Nigeria, Nsukka is evident through personalized learning. This approach, encompassing flexibility in learning, fitting a learning style, learning at an individual pace, and exploration of diverse subject areas, signifies a profound shift in educational paradigms. By interacting with digital technologies, underprivileged students experience a personalized and adaptive learning environment that caters to their unique needs and preferences. The flexibility offered allows them to navigate educational content at their own pace, fostering a transformative experience that transcends traditional constraints and empowers students to explore a diverse range of subjects. This study corroborate with a study conducted by Ali (2023), where it was reported that learners at higher educational institutions can easily be transformed through flexible learning environment, and learning at individual pace.

The study further found that the global collaboration and connectivity, another facet of the transformational changes, highlight the shift towards a more interconnected and collaborative learning landscape. The components of collaboration, global connectivity, seamless communication, and effective networking highlight the potential for underprivileged students to engage with a broader academic community. Digital technologies facilitate real-time collaboration, breaking down geographical barriers and providing opportunities for students to connect with peers, educators, and resources on a global scale. This interconnectedness contributes to a transformative educational experience, offering underprivileged students access to diverse perspectives and enhancing their capacity for effective communication and networking.

Furthermore, this study revealed that, holistic learning and skills development, as facilitated by digital technologies, represent a significant transformation in the educational journey of underprivileged students at University of Nigeria, Nsukka. The elements of understanding complex phenomena, acquiring new skills, immersive experiences, and adopting a multidisciplinary approach signify a departure from traditional pedagogical methods. More so, digital technologies offer immersive and interactive learning experiences, enabling students to develop a comprehensive understanding of complex subjects while

acquiring practical skills. This holistic approach to learning aligns with the evolving demands of the modern workforce, empowering underprivileged students with the skills and knowledge necessary for success in a rapidly changing world.

Inclusive and global education, driven by digital technologies, further contributes to transformative changes for underprivileged students at University of Nigeria, Nsukka. The emphasis on accessibility, broadening the scope of the educational journey, and the use of different languages for learning reflects a commitment to inclusivity. Digital technologies break down barriers to access, ensuring that underprivileged students have equal opportunities to education. The broadened scope of the educational journey, facilitated by digital platforms, exposes students to a diverse array of learning resources and cultural perspectives. This inclusivity fosters a transformative educational experience that not only addresses the unique needs of underprivileged students but also prepares them for active participation in a globalized society.

Studies Du-Plooy and Zilindile (2014); Muller (2014); Maniram (2018); Armstrong (2019); Omar et al. (2019); Maina and Maringe (2020); Madondo (2020); and Venter (2020), indicate that participants affirmed that personalized learning, global collaboration, holistic learning and skills development, and inclusivity and global education has play a critical role in transforming students as a result of utilizing digital technologies for education. Moreover, Fagan (2020) used Archer morphogenetic theory to explore the transformational changes of students when ICT pedagogical resources are used. In the study, it was discovered that students' changes in learning, critical thinking capability, and immediate accessibility as an inherent affordance of ICT pedagogical resources for epistemological access.

This implies that digital technologies have a transformative impact on underprivileged students at University of Nigeria, Nsukka, particularly in personalized learning. This approach allows flexibility in learning styles, individual pacing, and exploration of diverse subject areas, marking a profound shift in educational paradigms. Additionally, global collaboration and connectivity break down geographical barriers, providing opportunities for students to engage on a global scale. Holistic learning and skills development, facilitated by digital technologies, signify a departure from traditional methods, offering immersive experiences and practical skills. Inclusive and global education, driven by digital platforms, contributes to transformative changes by ensuring accessibility, broadening the educational journey, and preparing students for active participation in a globalized society. These findings align with the research objective of this study emphasizing the transformative potential of digital technologies in education.

Considering the Archer Morphogenetic Theory as a guiding theory in this study, the second concept of the theory "cultural/structural interaction" has explained the students' interaction at University of Nigeria, Nsukka, which aligned with the finding of this study as shown in **Figure 1.**

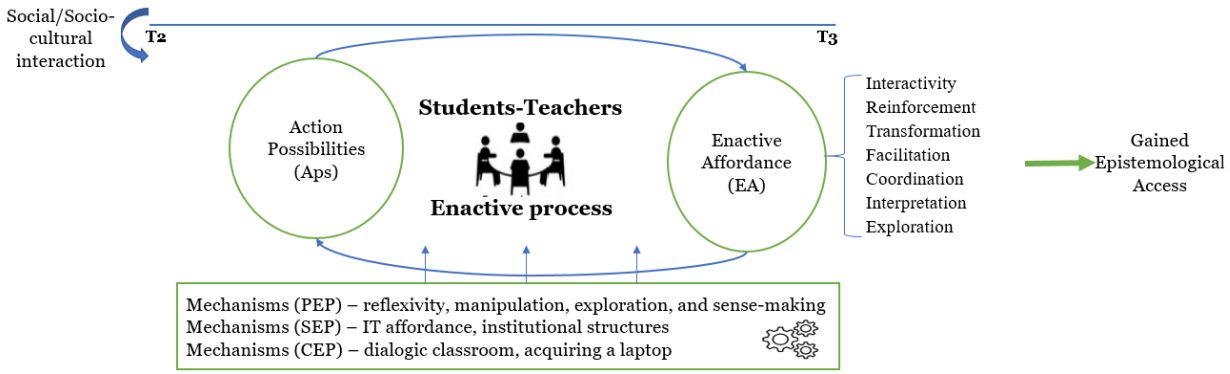

Figure 1: Socio-cultural interaction

When the affordances of digital technologies are fed into time period T2 – T3, it can now be analyzed through students-teacher interaction in a dialogic form (i.e., interacting with Canvas, OpenErp, as learning management systems) in the university as a Learning Contexts. During the interaction, the mechanisms triggering or catalyzing the interaction process, when it comes to people emergent properties (PEP), are reflexivity, manipulation, exploration, and sense-making. For the structural emergent properties (SEP), it comprises of IT affordances, institution, political, and legal structures that trigger the interaction process. While the cultural system of the University of Nigeria, Nsukka are the cultural emergent properties (CEP) that trigger the interaction between students-teachers, which is dialogic interaction and acquiring a laptop, over the time period T2 – T3 as the second concept of the theory (i.e., structural/cultural interaction) described as dialogic activities. As students-teachers involve in constant interaction with digital technologies at time period T2 – T3, while user enactment of affordance processes is going on, epistemological access can be gained.

The theory described the presence of both cultural and structural systems of students that come to higher educational institutions and are at T1 – T2, which later imping to T2 – T3 as indicated in **Figure 1**. The time period T2 – T3, refers to the second period of the cycle. During this time, users (i.e., students and teachers) interact with artefactual structures and institutional structures through the interplay of certain mechanisms that trigger and catalyze the interaction. The use of morphogenetic theory here entails evaluating this interplay across time (Archer, 1995). T3 - T4 is the final stage of a morphogenetic cycle. At this moment, users of the digital technologies may have been transformed (i.e., morphogenesis) into the extent to which change has occurred, or whether no change has occurred (i.e., morphostasis), in which T4 then becomes T1 for the next cycle. Morphogenetic theory is a theory of change or transformation. It explains how an individual transforms from one stage to another. Meanwhile, there is a completely new human being after undergoing the process of the Archer morphogenetic theory.

This theory (Archer Morphogenetic Theory) was used in this study because it provide a theoretical foundation for understanding the complex interplay between technological

changes, social structures, and students within the context of higher educational institutions. Been a transformational theory of change, it is used because of it is potential in looking at underprivileged students with their prior beliefs and assumptions, and facilitates changes from students' previous culture to educated human being.

Structural Conditions that Constrained Underprivileged Students from Gaining Epistemological Access at the University of Nigeria, Nsukka (UNN)

This study found that underprivileged students of the University of Nigeria, Nsukka were constrained in some ways. These ways include; barriers to technology adoption and integration, digital inequality and infrastructural challenges, and equitable education, which in this study settings identified as constraints to epistemological access.

The study delves into the intricate challenges faced by underprivileged students in gaining epistemological access at University of Nigeria, Nsukka, revealing three distinct themes. Firstly, the theme of "barriers to technology adoption and integration" highlights the array of structural conditions impeding students, including lack of how to use the technology, difficulties, technical challenges, insufficient training, lack of support, and inadequate digital literacy. These challenges collectively hinder the seamless incorporation of technology into the educational process, emphasizing the need for targeted interventions to bridge the digital divide and enhance the technological literacy of underprivileged students.

Secondly, the theme of "digital inequality and infrastructure challenges" sheds light on the disparities in access to digital resources and the limitations posed by insufficient technological infrastructure. The subthemes encompass limited access to well-equipped digital laboratories, insufficient bandwidth, outdated infrastructure, insufficient funds, and aging computers. These structural constraints posed formidable barriers to underprivileged students in achieving epistemological access, highlighting the necessity for strategic investments in digital resources and technological infrastructure to ensure an equitable learning environment.

Lastly, the theme of "Equitable education" reveals the broader disparities in educational opportunities, with the subtheme focusing on "disparities between learners." This structural condition further contributes to the hindrance faced by underprivileged students in gaining epistemological access. Addressing these systemic equitable education is crucial to fostering a more inclusive and equitable academic environment at University of Nigeria, Nsukka.

This study is similar to a study conducted by Joshi et al. (2020) where it was narrated that lack of training and support for teachers and students, digital inequality and infrastructural challenges hinders the attainment of epistemological access in higher educational institutions. Stein et al. (2015)*;* and Strunk et al. (2018) further narrates that lack of leadership in schools, digital inequality and infrastructural challenges, and lack of

technology integration constrain epistemological access to especially students from low background communities.

This implies that underprivileged students at University of Nigeria, Nsukka were constrained from gaining epistemological access. Some of the structural conditions like obstacles to technology adoption and integration, digital inequality, infrastructural challenges, and educational disparities, as impediment to their epistemological access.

While, the first and the last concepts of the theory "cultural/structural conditioning and cultural/structural elaboration" is not in line with the study findings. This is because, the first and second concepts of the Archer morphogenetic theory have explained the experiences and interactivity of underprivileged students at University of Nigeria, Nsukka. This implies that underprivileged students at University of Nigeria have come from the low income community, with poor background in which they were all conditioned after registering at the University. But, since the study have not explore the students' experiences after graduation, the researcher is not in the position to understand whether the underprivileged students at University of Nigeria, Nsukka are successfully transformed to something else or not. As such, only one concept of the theory was able to affirm its alignment with the study's objectives.

Conclusion and Recommendations

Based on the findings of this study, the study highlights the transformative potential and structural barriers of digital technologies in promoting equitable access to quality education and preparing underprivileged students for success in a rapidly changing world. It is therefore, recommended that the University should implement educational strategies that capitalize on the identified transformational changes associated with underprivileged students' interaction with digital technologies. Foster personalized learning experiences, encourage global collaboration and connectivity, integrate holistic learning and skills development, and promote inclusivity and global education. This may involve the development of tailored programs, mentorship opportunities, and collaborative projects that leverage digital technologies. Targeted initiatives to address structural barriers hindering underprivileged students' epistemological access should be developed. This includes addressing barriers to technology adoption and integration, mitigating digital inequality and infrastructural challenges, and implementing measures to reduce equitable education. Ensure that these initiatives are designed to uplift underprivileged students and promote equitable access to educational resources.

References

Ali, A. (2023). Exploring the Transformative Potential of Technology in Overcoming Educational Disparities. *International Journal of Multidisciplinary Sciences and Arts, 2*(1).

Anazia, I. U. (2021). Closing the school attendance gap in rural communities in Nigeria: School leadership and multi-actor approach in community engagement. *International modern perspectives on Academia and Community Today*(1).

Archer, M. S. (1995). *Realist social theory: The morphogenetic approach*. Cambridge university press.

Armstrong, M. (2019). Learning to learn: A critical realist exploration into the home established learning practices of a marginalised community in Port Elizabeth. *Unpublished Doctoral Thesis, Rhodes University*.

Ausín, V., Abella, V., Delgado, V., & Hortigüela, D. (2016). Aprendizaje basado en proyectos a través de las TIC: Una experiencia de innovación docente desde las aulas universitarias. *Formación universitaria*, *9*(3), 31-38.

Bandara, W., Furtmueller, E., Gorbacheva, E., Miskon, S., & Beekhuyzen, J. (2015). Achieving rigor in literature reviews: Insights from qualitative data analysis and tool-support. *Communications of the Association for Information Systems*, *37*(1), 8.

Behari-Leak, K. (2015). *Conditions enabling or constraining the exercise of agency among new academics in higher education, conducive to the social inclusion of students* Rhodes University].

Bergdahl, N., & Nouri, J. (2021). Covid-19 and crisis-prompted distance education in Sweden. Technology, Knowledge and Learning, 26 (3), 443-459. In.

Berger, A. A. (2017). *Video games: A popular culture phenomenon*. Routledge.

Brown, J. C. (2017). A metasynthesis of the complementarity of culturally responsive and inquiry-based science education in K-12 settings: Implications for advancing equitable science teaching and learning. *Journal of Research in Science Teaching*, *54*(9), 1143-1173.

Bubou, G., & Job, G. (2021). Benefits, Challenges and Prospects of Integrating E-Learning into Nigerian Tertiary Institutions: A Mini Review. *International Journal of Education and Development using Information and Communication Technology*, *17*(3), 6-18.

Carnevale, A. P., & Smith, N. (2018). Balancing work and learning: Implications for low-income students.

Carvalho, R. N., Monteiro, C. E. F., & Martins, M. N. P. (2022). Challenges for university teacher education in Brazil posed by the Alpha Generation. *Research in Education and Learning Innovation Archives*(28), 61-76.

Cecez-Kecmanovic, D., Davison, R. M., Fernandez, W., Finnegan, P., Pan, S. L., & Sarker, S. (2020). *Advancing Qualitative IS Research Methodologies: Expanding Horizons and Seeking New Paths* (Vol. 21). https://aisel.aisnet.org/jais/vol21/iss1/1

Coleman, J. (2015). Introduction: Digital technologies in the lives of young people. In *Digital Technologies in the Lives of Young People* (pp. 1-8). Routledge.

Creswell, J. W. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.

Du-Plooy, L., & Zilindile, M. (2014). Problematising the concept epistemological access with regard to foundation phase education towards quality schooling. *South African Journal of Childhood Education*, *4*(1), 187-201.

Fagan, D. (2020). *Using ICTs as a pedagogical resource to facilitate epistemological access in science with teacher education students* UWC].

Fojtik, R. (2014). Mobile Technologies Education. *Procedia-social and behavioral sciences*, *143*, 342-346.

Gamede, T. (2006). *The biography of" access" as an expression of human rights in South African education policies* University of Pretoria].

Gerlach, J., & Cenfetelli, R. T. (2020). Constant Checking Is Not Addiction: A Grounded Theory of IT-Mediated State-Tracking. *Management Information Systems Quarterly*, *44*(4), 1704-1732. https://aisel.aisnet.org/misq/vol44/iss4/10

Grainger, R., Liu, Q., & Geertshuis, S. (2021). Learning technologies: A medium for the transformation of medical education? *Medical education*, *55*(1), 23-29.

Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the Role of Digital Technologies in Education: A review. *Sustainable Operations and Computers*.

Harland, T., & Wald, N. (2018). Curriculum, teaching and powerful knowledge. *Higher Education*, *76*(4), 615-628.

Henderson, M., Selwyn, N., & Aston, R. (2017). What works and why? Student perceptions of 'useful'digital technology in university teaching and learning. *Studies in higher education*, *42*(8), 1567-1579.

Ignatyeva, I. (2015). The trend of technologisation of modern education (the use of humanitarian technologies). *Procedia-social and behavioral sciences*, *214*, 606-613.

Igwe, D. O. (2014). Inclusive Education and Criminality: A Challenge to the National Open University of Nigeria. *Economic and Cultural Aspects of Selected Global Problems*, 219.

Joshi, O., Chapagain, B., Kharel, G., Poudyal, N. C., Murray, B. D., & Mehmood, S. R. (2020). Benefits and challenges of online instruction in agriculture and natural resource education. *Interactive Learning Environments*, 1-12.

Kharas, H., & Zhang, C. (2014). New Agenda, New Narrative. *The SAIS Review of International Affairs*, *34*(2), 25-35.

Lacka, E., & Wong, T. C. (2021). Examining the impact of digital technologies on students' higher education outcomes: the case of the virtual learning environment and social media. *Studies in higher education*, *46*(8), 1621-1634.

Leuwol, F. S., Prayitno, M. A., Taryana, T., Suprihartini, Y., & Al Haddar, G. (2023). Inclusive Education Perspectives: Montessori and Vygotsky's Approaches to Creating a Supportive Learning Environment For All Children. *Indonesian Journal of Education (INJOE)*, *3*(2), 247-256.

Lewis, C. C., Fretwell, C. E., Ryan, J., & Parham, J. B. (2013). Faculty use of established and emerging technologies in higher education: A unified theory of acceptance and use of technology perspective. *International Journal of Higher Education*, *2*(2), 22-34.

Luckett, K. (2019). A critical self-reflection on theorising education development as 'epistemological access' to 'powerful knowledge'. *Alternation*, *26*(2), 36-61.

Madondo, N. E. (2020). On Locating the Experiences of Second Year Science Students from Rural Areas in Higher Education in the Field of Science: Teaching science by drawing on students' lived rural experiences. *Unpublished PhD diss., Rhodes University, Grahamstown*.

Maina, G. E., & Maringe, F. (2020). Epistemological Access in Disadvantaged Schools: A Case Study of Flood-Prone Rural Schools in Western Kenya. In *Inclusion as Social Justice* (pp. 14-35). Brill Sense.

Major, L., Warwick, P., Rasmussen, I., Ludvigsen, S., & Cook, V. (2018). Classroom dialogue and digital technologies: A scoping review. *Education and Information Technologies*, *23*(5), 1995-2028.

Maniram, R. (2018). *Epistemological access and authentic learning practice: a case study in hospitality financial management*

Mistri, G. U. (2016). *A social realist analysis of participation in academic professional development for the integration of digital technologies in higher education* Rhodes University].

Morrow, W. E. (2009). Bounds of democracy: Epistemological access in higher education.

Muller, J. (2014). Every picture tells a story: Epistemological access and knowledge. *Education as change*, *18*(2), 255-269.

Myers, L. P. (2019). A social realist account of constraints and enablements navigated by South African students during the four year professional accounting programme at Rhodes University, South Africa.

Nwokedi, G. I. (2023). Digital resources in an academic hybrid library: assessment of usage pattern among history and international studies postgraduates in a Nigerian University. *Library Philosophy and Practice*, I-27.

Ofoegbu, O. T., Asogwa, U. D., & Ogbonna, C. S. (2021). Open educational resources (OERs) and courseware development in dual-mode universities in Nigeria. *Educational Technology Research and Development*, *69*(3), 1811-1833.

Ogunode, N. J., Adanna, C. M., & Ayoko, V. O. (2022). Out of School Children in Nigeria: Causes, Social Implications and Way Forward.

Okhuysen, G., & Bonardi, J.-P. (2011). The challenges of building theory by combining lenses. In (Vol. 36, pp. 6-11): Academy of Management Briarcliff Manor, NY.

Okonkwo, U. U., Eze, V., Ukaogo, V., Okoye-Ugwu, S., & Orabueze, F. (2021). Gender disparities in witchcraft beliefs: A challenge to Nigerian and African historiography. *Journal of International Women's Studies*, *22*(1), 446-464.

Olofsson, A. D., Fransson, G., & Lindberg, J. O. (2020). A study of the use of digital technology and its conditions with a view to understanding what 'adequate digital competence'may mean in a national policy initiative. *Educational studies*, *46*(6), 727-743.

Omar, I., Asif, M., & Madad, A. (2019). Epistemological Access to Technological Blended with Pedagogy as a Congruent Compnent for Students' Achievement. *Iqbal Review*, *60*(2), 69.

Ongito, O. J. (2012). *Transformative Learning within the Online Learning Environment: The Impact of Learners' Gender, Epistemological and Self-Efficacy Beliefs on Generation of Knowledge in Online Discussion Forums*. Ohio University.

Ononiwu, C. G., Brown, I., & Carlsson, S. (2018). Theory choice in critical realist information systems research. UKAIS,

Pachler, N., Bachmair, B., & Cook, J. (2013). A sociocultural ecological frame for mobile learning. *Handbook of mobile learning*, 35-46.

Pendlebury, S. (2009). Meaningful access to basic education.

Qureshi, M. I., Khan, N., Raza, H., Imran, A., & Ismail, F. (2021). Digital technologies in education 4.0. Does it enhance the effectiveness of learning?

Sailer, M., Murböck, J., & Fischer, F. (2021). Digital learning in schools: What does it take beyond digital technology? *Teaching and teacher education*, *103*, 103346.

Stein, M.-K., Newell, S., Wagner, E. L., & Galliers, R. D. (2015). Coping with Information Technology: Mixed Emotions, Vacillation, and Nonconforming Use Patterns. *Management Information Systems Quarterly*, *39*(2), 367-392. https://aisel.aisnet.org/misq/vol39/iss2/7

Strunk, K. O., Cowen, J. M., Goldhaber, D., Marianno, B. D., Kilbride, T., & Theobald, R. (2018). It is in the contract: How the policies set in teachers' unions' collective bargaining agreements vary across states and districts. *Educational Policy*, *32*(2), 280-312.

Varea, V., Gonzalez-Calvo, G., & García-Monge, A. (2022). Exploring the changes of physical education in the age of Covid-19. *Physical Education and Sport Pedagogy*, *27*(1), 32-42.

Venter, A. (2020). The provision of epistemological access for successful student learning at university: Towards a readiness model for business, commerce and management sciences learners in the further education and training phase.

Willey, M. (2007). Learning to teach in South Africa.