The Political Economy of Private Sector-led Edtech Production and its Implication for Education Futures in Nigeria

Charles Falajiki

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Abstract

The COVID-19 pandemic and associated disruption of education has inspired an increased public discourse on the 'digital transformation' of education, and the potential of education technology to democratise access to education in Nigeria. On one hand, the federal and state governments are attempting to introduce new national digital education strategies and intervention programmes. On the other hand, is an increase in private sector led edtech investment and product development which has coincided with the increased use of educational technologies (edtech) and a growing market of education technology in the country. While there is also a growing body of literature investigating the politics of edtech and the rise of private edtech companies and investors, the majority of these studies are conducted outside the Sub-Saharan African region. This implies that the growing activities of private sector edtech companies and actors within Sub-Saharan African countries like Nigeria remain under-researched. To bridge this gap, this study investigates the political economy of private sector led edtech production in Nigeria and its implication on the imaginaries of education futures in the country.

Using a qualitative case study research design, the study examines the discursive constructions of edtech promoted by private edtech startups in Nigeria and the imaginaries of education futures embedded in such discourses. Through a purposeful sampling that locates the top performing edtech companies in Nigeria based on industry insight, this study engaged the founders of ten edtech companies in Nigeria as research participants. Qualitative data were collected through online semi-structured interviews and analysed using critical discourse analysis. The study identifies and discusses the 'technical fix' narrative about edtech and the 'neoliberal utopian blueprint' of education futures promoted by edtech startups, both of which were found to be consistent with emerging evidence in critical edtech research (Van Dermijnsbrugge & Chatelier, 2022). The study concludes by emphasising the need for the Nigerian education community – policymakers, administrators, teachers, academics as well as private actors – to engage in constructing alternative education futures that can challenge the neoliberal education agenda emerging from the burgeoning edtech industry in Nigeria.

Dedication

To my mother, your love and prayers make the difference.

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Chapter 1: Introduction

Background

Waves of enthusiasm for technological innovations that promise to revolutionise education have been around for several decades (Weller, 2020). Often promoted as a 'technical fix' to systemic and multifarious educational challenges, there is a broad presumption that the increased use of digital technology in education will progressively deliver broad lines of reorganisation and transformation of broken educational systems (Selwyn, 2022). From the filmstrip of the 1910s to educational radio of the 1930s, the instructional television of the 1960s, and more recent initiatives such as the One Laptop Per Child Initiative in parts of Latin America and Africa, technology solutionism has a long history in educational contexts (Selwyn, 2016).

Particularly across developing regions, e.g. in Sub-Saharan Africa where education challenges such as the number of out-of-school children population and learning poverty are mounting, the transnational ethos of education technology in these contexts has been of 'leapfrogging' - i.e. the implementation of advanced technologies that can support accelerated rates of economic development and social progress (Selwyn, 2013). Across these regions, education technology is usually promoted for the promise of achieving learning at scale, usually in line with the Sustainable Development Goals (SDG) which foreground the significance of equitable quality education for all (SDG 4) and highlights the importance of technology in achieving the SDGs (SDG 17.6-8), particularly in low- and middle-income countries (LMICs) (UNESCO, 2023; UN, 2015; World Bank, 2020). As Rodriguez-Segura (2022) observed, the promise of education technology to boost learning outcomes and address other educational challenges has primarily been the motivation for its incorporation into the educational systems in developing countries.

In Nigeria, one of the objectives of ICT adoption in the early 2000s, as described in the ICT policy 2001, was the focus on integrating ICT into mainstream education to "provide opportunities for educationally disadvantaged areas and to educationally leapfrog into the modern era" (FGN, 2001, p.1). More recently, the vision for the adoption of technology in education, as described in the national policy on ICT in education is based on the conception that "ICT is

paramount to the future of education and that successful contributions to meeting the Sustainable Development Goals (SDGs) are most likely to be made by ICT in Education" (FME, 2019, p.1). For these reasons, both the public and private sector, as well as international organisations and development partners have long been exploring means for the deployment of education technologies to improve the accessibility and quality of education in Nigeria, leading to a number of government, private and donor-funded initiatives (Anikweze' and Kanu, 2018). Early examples of these initiatives include the USAID funded COMPASS project that deployed Interactive Radio Instruction (IRI) intervention for teachers' training; the Federal Ministry of Education's School Net initiative which was intended to equip all schools in Nigeria with computers and communications technologies; and the MTN Nigeria Foundation (MTNF) Schools Connect project, designed to enable teachers and students in Nigerian public secondary schools to gain confidence and understanding of how ICT (Adomi and Kpangban, 2010; Okebukola, 2004; Yusuf et al., 2012).

While there have been appearances of technology in the Nigeria education system since the early 2000s, the effect of the Covid19 pandemic on school closure largely resulted into invigorated interest in the mobilisation of education technology. Federal and state governments, working alongside transnational and multilateral organisations have been exploring new means to integrate digital technologies into the Nigeria education system through the introduction of new national strategies and intervention programmes (Czerniewicz & Feldman, 2023). These efforts have led to the deployment of State-level initiatives such as the EdoBest initiative which was designed to transform enhance the quality of basic education provision in Edo State (World Bank, 2020); and national-level projects such as the Nigeria Learning Passport, a multi stakeholder partnership between the Federal and States Ministry of Education in Nigeria, UNICEF, and other partners including Microsoft, designed to close the learning poverty gap in Nigeria (UNICEF, 2024). UNICEF describes the Nigeria Learning platform as part of the "education cloud project for the provision of e-learning from basic to tertiary for all learners" (UNICEF, n.d.).

Furthermore, post-Covid19, there has been reported increase in the involvement of private sector actors in the production and distribution of education technology in Nigeria. Evidence suggests that private sector actors, particularly private edtech startups and private capital are

increasingly leading the way in introducing new education technologies into the Nigeria education system (Adediran et al., 2023). A key example of this wave of private sector led investment targeted at boosting edtech startups, as shown by the USD 15 million edtech accelerator programme set up by Co-Creation Hub (CcHub) to support 72 edtech startups in Nigeria and Kenya (TechCrunch, 2023). While private sector involvement in education technology development has been a known phenomenon for many years, particularly through the operation of public-private partnership, the accelerated growth in the involvement of private sector edtech companies and investors in the expansion of education technology is raising new questions about whose purposes are served by the link between education technology development and the space of education? What are the means through which it is accomplished? And how does it shape educational practices? As Selwyn & Facer (2013) advised, these questions are important because they draw attention to the political economy of education technology development, making it possible to analyse how "institutions of power and wealth are connected to educational practices, and to the functioning of marketplaces and the role of commerce and commercial actors in the educational technology field" (p.13).

By adopting such a political economy perspective, some studies have found that education futures are increasingly being shaped by financial power brokers such as edtech investors, venture capital, and edtech companies who are advancing specific education imaginaries through their investment in the Edtech industry (Cohen, 2022; Davies et al., 2022; Komljenovic et al., 2023). However, these quandaries have only entered the educational research agenda of education scholars in some regions in Europe and America. The increased activities of private sector actors in the circuit of production and distribution of education technology in regions across Sub-Saharan Africa and particularly in Nigeria remains under-researched. The implication of this research gap is that the rapid penetration of technologies into education systems in Nigeria has not been accompanied by a thorough scrutiny that investigates the emerging edtech landscape increasingly dominated by private actors.

Research Context

This study is situated in Nigeria, the most populous country in Africa and the fourth largest economy on the continent with a GDP of $252 billion. The study focuses on Nigeria because of the country's booming edtech market share which currently ranks second in Sub-Saharan Africa, and it's expected to reach $107.90 million by the close of 2024 (Nairametrics, 2024). Moreover, within the broader landscape of the edtech market in Africa, data shows that the Nigeria edtech industry has continued to grow since its peak during Covid-19 and it now makes up one third of the top 50 promising edtech startups in Africa, an indicator of the increasing strength of the market and capital flowing into edtech startups in the country (Holon IQ, 2023). This growth has been characterised by increased flow of investment coming from accelerator programmes, indigenous venture capital, international investors as well as bilateral corporations. For example, the largest investment in an African Edtech company was attracted by a Nigerian-based edtech company in 2021, closing at a $15 million Series-B investment (Nairametrics, 2024). These indicators suggest that the edtech landscape in Nigeria is fast growing and investigating the operation of the actors involved has become a timely necessity for research inquiry. Lastly, having spent over five years working as a development officer in a youth-led education-focused NGO in Nigeria, my experience and interests in education practice are relevant for the research context.

Aims and Objectives

Against this background, this study aims to investigate the political economy of private sector led edtech development in Nigeria and its implication for education futures. Specifically, the study aims to explore the discursive construction of edtech among private sector edtech actors and to locate imaginaries of education future(s) in Nigeria embedded in these constructions. To achieve this goal, the study mapped the landscape of private edtech startups in Nigeria and recruited ten private sector edtech startups to participate in the research study. The study adopted a qualitative research design and used semi-structured interviews for collecting the research data. All qualitative data were analysed using critical discourse analysis and the findings were used to answer the following research questions;

1. What are the discursive constructions used by private edtech startups to define the purpose of edtech?

2. How do private edtech startups sector configure and legitimise their role in edtech production in Nigeria?
3. What specific values and education future imaginaries are embedded in this discursive production?

Structure of Dissertation

Following this introduction is a review of literature in Chapter 2. The chapter examines the concept of political economy and discusses why a political economy perspective is used in this study. The next chapter in the dissertation, Chapter 3, outlines the research methodology. The chapter presents the research design, sampling strategy, data collection technique and the analytical approach adopted for data analysis. Each of the methodological choices were argued for and the chapter concludes with by highlighting issues related to ethics, reliability and trustworthiness. Chapter 4 highlights the analytical procedure of the research data and proceeds to present the research findings which were highlighted in themes in relation to the three research questions. Chapter 5 critically discuss the research findings, draws data-informed conclusions and suggestions for future research.

Chapter 2: Literature Review

Drawing from a wide range of scholarly literature, this chapter examines the concept of political economy, and how it's used in this study. It further explores the various ways in which edtech has been studied and then provided an overview of why a political economy perspective was chosen as a framework for investigating the current research phenomenon. Following a critical review of existing body of work, the chapter concludes by summarising the current debates and highlights the missing knowledge that this study aims to bridge.

2.1 What is Political Economy?

As a broad field of knowledge in the social sciences, political economy is captured in an ongoing contestation of meaning which is characterised by the different interpretations of the subject (Stilwell et al., 2022). Sometimes, political economy is used to describe an area of study that explores the interrelationship between economics and politics, and at other times it is conceptualised as a methodological approach (Weingast & Wittman, 2009). As an assembly of different schools of thought converging from different disciplines and yet without an ultimate consensus, the literature on political economy covers debates of economists, and political scientists working under broad traditions of Classical or Marxism political economy among others (Caporaso & Levine, 1992; Stilwell et al., 2022). Each of these paradigms have been examined at large in academic debates and continue to be refined as new ways of thinking about economics and politics emerge. For example, classical political economy scholars privilege the ideological projections of capitalism, free markets and emphasise the issues of production, distribution of goods and services, and the vision of the market economy, i.e., the capacity of markets to regulate themselves (Morgan, 2022; Stilwell et al., 2022). The classical political economy approach is, however, treated with scepticism and long-standing criticism with reasons associated with its oversimplification of the complex social and institutional factors as well as power dynamics that shape economic behaviours and outcomes. According to Tabb (1999), classical political economy "did not consider the relative autonomy of the sphere of social reproduction, but just saw the supply of labour as regulated solely by the wage mechanism" (p.74).

The Marxist tradition in political economy can be understood from the vantage points of labour, class struggle, and bargaining between labour and capital for exploitation or control of the economic surplus (Caporaso & Levine, 1992; Dunn, 2022). As Dunn (2022) observes, at the core of Marxism's is the "historical materialist view which posits the centrality of labour, class formation and contest, economic development and social change" (p.52). The Marxian approach to political economy questions the classical theory's understanding of the purpose of the market, arguing that "the market economy is not so much a mechanism for maximising the private welfare of individuals generally as it is a means of facilitating the capitalist's appropriation of surplus-value and accumulation of capital" (Caporaso & Levine, 1992, p.58). Regardless of the analytical departure of these two paradigms, the theorising of labour, wealth, the state, and the market as well as the conceptual discussion of politics and economics remain threaded across the literature on political economy. Contemporary work in political economy has, however, transcended beyond the debate over the markets and its dynamics.

For education scholars, political economy is usually concerned with the investigation of the relationship between education and the capitalist economy (Bowles & Gintis, 1976), the analysis of how allocation of educational resources reflects the economic structure in a particular context, and the power relations among various groups within that structure (Carnoy, 2024). Literature on political economy approaches in education also extends to examining the relationship between public expenditure on education as an economic decision and the complex political forces that shape and influence such decisions (Carnoy & Levin, 1985). This body of literature on the political economy of education also takes into consideration "how and why individuals take education, how educational value is created and distributed, and the relationship of education to political power" Carnoy, 2024, p.6). Some scholars argued that an understanding of the political economy of education is particularly significant for studying and disentangling the relationship between education, growth, and income distribution as well as for developing educational policies concerned with directing public financing and provision of education (Gradstein et al., 2005). One point of inquiry in the literature of political economy of education is in the realm of Higher Education which is usually considered as a separate field of scholarly debate based on its characteristics of complex financial decisions on the part of the State, Institutions, students, and

the market (Ginsburg, 2012; Macpherson et al., 2014; Robertson, 2010). Specifically, literature here explores how the State organises its financing and regulation of higher education and the political as well as economic decisions that influence those decisions. Several other studies have pursued to explain the rising interest of the private sector in participating in educational systems, with reference to the shifts in the global political economy (Ginsburg, 2012; Robertson & Verger, 2012). Other studies have taken the route of critical theory while applying political economy framework to the analysis of higher educational systems, usually to consider how hegemonic power contributes to policies and institutional changes in higher education (Robertson, 2010; Robertson & Dale, 2015).

While it is not the intention of this chapter to provide a comprehensive theoretical explanation or critique of political economy, this brief examination signals the contested nature of the subject and shows why it is important to establish how this study has conceptualised political economy. Recognizing that political economy can be conceived in different ways, I have chosen to conceptualise political economy as a framework that can be applied to the analysis of political behaviour within existing institutions of power and wealth. The conceptualisation of political economy in this study can be understood within the premise of how Mosco (2009) described the subject. As Mosco (2009) explained, political economy is "the study of the social relations, particularly the power relations, that mutually constitute production, distribution, and consumption of resources" (p.2). According to Mosco (2009), this formulation draws attention to how power and wealth are related and how are these in turn connected to cultural and social life?" (p.4). This framing has been used, for example, to study and describe the operations of large communication and technology enterprises and to address concerns about the use of power in such large enterprises (Murdock and Golding, 2016). This strand of political economy raises questions about the issues of distribution of power, and asks whose interests are served within economic and social structures (Wasko, Murdock and Sousa, 2011). Adopting this lens of political economy for this study will help to, as Hardy (2014) observes, examine how the political and economic organization of "media [edtech] industries affects the production and circulation of meaning, and connects to the distribution of symbolic and material resources that enable people to [adopt and update educational technology]" (p.186). It is important to emphasise here that the adoption of the political economy approach as an analytical framework for this study is not a deterministic claim that social realities

can or should be reduced to political economic logic (Selwyn, 2013). Instead, this study aims to foreground the principles of political economy as an important entry point for analysing social life, individuals, and institutions. From these viewpoints, what then, is the significance of a political economy approach to investigating the research phenomenon? What are the possible ways of thinking about education technology and why should education technology be studied from a political economy perspective?

2.2 Why a political economy approach to Education Technology?

Research on the mobilisation of technology in education has occupied a significant place in educational research and scholarly literature in the last forty years or more (Facer, 2011; Selwyn, 2013, 2016; Sutherland, 2014). However, although the phrase 'education technology' itself appears to have taken a centre stage in contemporary discourse about teaching and learning, literature is explicit about the lack of consistency in framing what education technology is and what it is not. This suggests that the configuration and construction of the purpose of education technology itself is largely contested in literature, and as Rushby & Surry (2016) observed, the field itself is a perfect example of this "pluralist interpretation" (p.4). Moreso, because the arrival of new technological innovation and subsequent adoption within education systems is often entangled with progress in the field of education technology, there is usually an attempt by scholars to describe educational technology in terms of the technology that has been adopted for educational purposes. As Oliver (2016) argued,

> the field seems to reinvent itself every few years, resulting in a proliferation of related terms: learning technology, educational technology, computer-based learning, computer-assisted learning, multimedia learning, communication and information technology, information and communication technology, e-Learning, online learning, blended learning, technology enhanced learning, and so on. (p.36)

This means that, when discussing education and technology, as this study aims to do, it might be difficult to make full sense of the diverse ways in which technologies are mobilised in education, and the consequences that come with such interrogation (Selwyn, 2022).

Literature on forms of knowledge production in education technology research has also been broadly categorised into three by Norm Friesen. Drawing from the Critical Theorist, Jurgen Habermas, Friesen contends that edtech research has the potential to generate instrumental, pragmatic, or emancipatory types of knowledge which he asserts are based on the "multi-epistemological" nature of human knowledge or human interests (Friesen, 2009, p.13). Whilst instrumental research is related to producing knowledge for the sake of efficiency, seeking to establish what works, pragmatic studies generate interpretive, user-oriented accounts asking, 'how does it work?', and are usually aimed at justifying whether technology has achieved a desired educational objective (Henry et al., 2019). The emancipatory form of knowledge on the other hand seeks to articulate the dynamics of social power, the "expression of a struggle between contradictory interests, influences and social groups" (Friesen, 2009; p.14). This epistemological multiplicity notwithstanding, literature suggests that research in the field of education technology, for many years, has produced specific understanding of the application of technology in education, privileging instrumental edtech research and usually associated with positivist assumptions, interests in finding what works, and investigating how people can learn with digital technology along with questions about effectiveness and efficiency (Selwyn, 2010).

Shifting way from the preponderance of instrumental edtech research, some scholars have argued for the need for the development of a critical perspective of educational technology in ways that "looks beyond the immediate context of learning gains or patterns of interaction to question the ways in which technology has been taken up in the first place" (Oliver, 2011, p.373). From this perspective, a growing body of literature is beginning to produce what Friesen referred to as an emancipatory form of edtech research. This literature draws on critical and social justice theories as well as socio-technical techniques to engage with edtech from a critical perspective. Although the meaning of 'critical' is itself contested (Macgilchrist, 2021), these critical studies are becoming mainstream, unmasking some of the complex and often hidden implications of technology within educational contexts elided by dominant positivist narratives. Scholarship in the critical tradition have studied how, for example, digital platforms affects pedagogical autonomy of institutions and teachers (Kerssens & van Dijck, 2023), data-driven educational software emerging from the combination of radical behaviourist theories and machine learning systems are shaping learner behaviour towards predefined aims (Knox et al., 2020), and the growing privatisation, assetization

and commodification of education as a result of the dominance of venture capital investment in edtech (Komljenovic et al., 2023).

Considering these quandaries in edtech literature, what does all this mean for the current study? Although instrumental/pragmatic forms of knowledge production remain relevant to the field of edtech research and practice, scholars argue that they often discount the broader social structure that accounts for how technologies are being used in education and thus call for a nuanced evaluation of education technology that goes beyond superficial engagement with edtech in practice (Henry et al., 2019, Oliver, 2011; Selwyn, 2012, 2022). While this call for alternative approaches carries significant implications for how research in the field is configured, there is a growing interest among scholars to unpick the situatedness of education technology within a broader context that accounts for the power relations as well as the economic and political influence shaping the field of edtech within global capitalism. This is arguably due to the increasing evidence that suggests that imaginaries and trajectories of edtech development are increasingly being shaped by private sector edtech companies, financial power brokers and VCs that construct the Edtech industry through their products and investments (Davies et al., 2022; Komljenovic, 2021; Komljenovic et al., 2023; Selwyn et al., 2020). Based on this body of research evidence, some literatures have argued that understanding the mechanism of education technology development should adopt a political economy approach that directs our attention toward the way "in which existing institutions of power and wealth are connected to educational practices, and to the functioning of marketplaces and the role of commerce and commercial actors in the educational technology field" (Selwyn & Facer, 2013, p13).

The political economy approach, as literature in section 2.1 above suggests, foregrounds the possibility of making explicit the rather implicit linkage between educational technology and the interests of capital and capitalism, and raises the questions about how education technology comes to be developed, and entities have the capacity to define its trajectories, and whose interests and values are ultimately served (Williamson et al., 2023). Previous work applying a political economy perceptive to education technology research have, for example, examined how EdTech corporations are trying to disrupt higher education, not necessarily for educational or social change but for profit (Mirrlees and Alvi, 2019). Also, within the context of higher education from a

political economy perspective, Richard Hall (2015) explored how the expansion of education technology platforms such as MOOCs are facilitating the shaping of the higher education sector into spaces for further capital accumulation, and profitability. Furthermore, other authors have analysed how the digital education platforms, although ostensibly considered as neutral administrative or instructional resources, are instead serving the role of powerful de facto policy actors "whose social, technical, and political-economic dimensions condition, direct, and even govern educational activities in the sites where they are embedded" (Nichols and Dixon-Román, 2024, p.313). Literature has also captured the political economy of platform learning, highlighting how platform learning is entangled with value extraction, exploitation of labour and a site for neoliberal future imaginary (Means, 2018). These studies demonstrate how education technologies are increasingly embodying a vision of radical transformation of education through technology and serving the ultimate interest of neoliberal logics that privileges privatisation, commodification, and value extraction over education and public good.

Thus, as Selwyn (2013) argued, a political economy perspective is therefore necessary to investigate "the vast expansion of the 'educational technology industry' with clear links to the integration of educational processes in the wider system of capitalism" (p.31). Within this vast education technology industry and within the broader system of education, however, are different actors steering, modifying, or even competing to achieve specific objectives. As literature suggest, the development and policy-making around education technology has always been (re)distributed across different actors (Ball and Junemann, 2012; Rowe, 2022; Verger et al., 2017). Together, these actors form what can be referred to as 'strategic clusters', (Porter, 1990; cited in Ball, 2019) i.e., a "geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions in particular fields that compete but also cooperate" (p.39). Captured within this network of actors in the education technology market are global multi-national corporations (e.g. Pearson, McKinsey, Microsoft, Google, Amazon etc.), global philanthropic foundations (e.g. Gates Foundation, Omidyar, etc.) as well as micro-, small-, and medium-sized edu-businesses (Ball, 2019). Emerging analysis have also defined new cluster of actors referred to as 'edtech brokers', "organizations that operate between the edtech industry, public schools, research centers and governments, guiding schools in the procurement and pedagogical use of edtech" (Ortegón et al., 2024, p.1). While each of these actors

indeed play a unique role in the design, procurement, and adoption of educational technologies, each requiring a critical examination of their roles and materiality, this study will focus only on examining the role of private sector actors, specifically private education technology startups in Nigeria. As developed in the introduction chapter and further argued in the last sub-section of this chapter, this study is focusing on private sector edtech startups in Nigeria because of their increasing dominance in the education technology landscape in Nigeria. Having attracted the attention and investment of international investors, the landscape of education technology development and adoption in Nigeria is increasingly being shaped by private sector edtech startups who are leading the way in introducing new education technologies into the country.

2.3 Public Good vs Private Interest: A Review of the Political Economy of Private Sector Edtech Provision [in Nigeria and Beyond]

Over the past decades, researchers have been investigating the provision and governing of education, with a major target of the debate being the role of the state and private actors in financing and driving policies for education development. Not least, this is due to the contestation about what counts as public or private sphere, and the debate of whether education is a public good or a private good (Levin, 1999; Starr, 1989). In this debate, Levin (1999) observes that education inherently serves both public and private interests. Levin describe this nature of education as

> It addresses public interests by preparing the young to assume adult roles in which they can undertake civic responsibilities; embrace a common set of values; participate in a democratic polity... At the same time, education must address the private interests of students and their families by providing a variety of forms of development that will enhance individual economic, social, cultural, and political benefits for the individual. (1999, p.125).

What this suggests is that the space of education is inherently a field of contestation where both public and private interests seek expression. On one hand, the implication of this extends to the realm of politics such that political actors – either governments or other entities with power – use their power to influence the direction of education and the values embedded in it. And on the

other hand, economic interests of government and private individuals also shapes how much should be invested in education and for what purpose.

Looking beyond the conceptualisation of education under public vs private debate, some scholars have argued that specific interactions of the private and public sector are necessary to resolve perennial and systemic problems in education systems, such as access, quality, and equity (King, 2009). Presented as an innovative mechanism, these scholars argue that public-private partnerships (PPPs) are required apparatus for delivering educational goals, crediting its potential to expand equitable access to schooling and for improving education outcomes, especially for marginalised groups (Patrinos et al., 2009). However, other bodies of work observe that the enactment of PPPs are part of a privatisation agenda that aims to render public education into the hands of private actors (Ball, 2009; Hatcher, 2006; Robertson & Verger, 2012) or put as the 'hidden privatisation' of public education (Ball & Youdell, 2007). According to Robertson & Verger (2012), the mechanism of public private partnerships in education is an outcome of "processes associated with neoliberal economic globalisation" (p.37), which organises education systems around the principles of free market and weakens central control by the government (Macpherson et al., 2014; Robertson & Verger, 2012). Ball & Youdell (2007) further proposed that the tendencies of privatisation can be understood as being of two key types: privatisation in public education, and privatisation of public education. According to them, privatisation in public education "involve the importing of ideas, techniques and practices from the private sector in order to make the public sector more like business and more business-like" while privatisation of public education "involve the opening up of public education services to private sector participation on a for-profit basis and using the private sector to design, manage or deliver aspects of public education" (Ball & Youdell, 2007, p.8-9). In present day debate, what has remained a growing concern in literature is the increasing involvement of the private sector at the heart of day-to-day business of education, either for infrastructure development, capacity building and development as well as investment in development of educational technologies (Ball, 2007, 2009; Macpherson et al., 2014; Selwyn, 2013).

Indeed, a significant body of literature has contributed to the growth of private sector involvement with the research and development of education technologies and their adoption

within and outside the school (Ball, 2007, 2009; Robertson & Dale, 2015; Selwyn, 2013, 2022; Selwyn & Facer, 2013). Not least, the production and distribution of digital technology hardware and software majorly fall under the control of technology companies. While their involvement in education technology development should be seen as commonplace due to the wide range of industry and commercial involvement in the development of most major technologies in recent years, some scholars argue that there is a new form of privatisation underway in education with the increasing private sector involvement with edtech affairs (Burch, 2009; Selwyn, 2011). It is argued that what is ostensibly a public concern under the affairs of the government is increasingly being invaded by private actors and there is a "fundamental re-design of the public sector [where] the state is increasingly re-positioned as the guarantor, not necessarily the provider . . . the state is very much a market-maker or broker" (Ball, 2007, p.13). From providing digital infrastructures and software, to the network of maintenance, training, and the provision of technical support, there has been a wide range of entry points for private sector edtech development (Ball, 2007; Selwyn, 2011). Moreso, literature suggests that underpinning the private sector engagement with the mobilisation of technologies in schools and within the broader system of education are the education technology policies driving strong relationships between the state and private actors (Selwyn, 2012). From this perspective, Selwyn (2012) suggests that educational technology policies can be said to be fulfilling at least three specific economic and political criteria; "the economics of education (i.e. the notion of technology contributing to the efficient logistics of educational provision); the economy and education (i.e. the notion of technology contributing to the profitability and commoditisation of education); and education and the economy (i.e. the notion of technology contributing to countries ' economic competitiveness and efficiency of labour and knowledge production)" (p.73). While previous studies have sought to establish the operations of private sector involvement in edtech development through state cooperation or public-private partnerships, more recent studies have been paying attention to the growing interest of private actors through the soft power of financial brokers and VCs and how they contribute to shaping the Edtech industry through their investment and in the process, advance particular imaginaries and declare their authority in education through narratives of expertise and measures of social impact (Davies et al., 2022; Komljenovic, 2021; Komljenovic et al., 2023; Regan & Khwaja, 2019; Sellar, 2017; Williamson et al., 2022, 2023). Some scholars have also contended that private sector

investment in edtech is particularly motivated by their interest to capture new users and market for their technology product of the future (Kerssens & van Dijck, 2023; Nichols et al., 2023).

Another dimension of private sector entrance into edtech production and adoption is through the guise of international aid and corporate philanthropy and this is particularly true for countries in sub-Saharan Africa such as Nigeria. According to Selwyn (2013), while the integration of digital technologies into the education systems in low-income and middle-income countries is driven partly by national government policy, the process is entwined with long-established international development efforts on the part of state, market, and international actors. Particularly across developing nations like Nigeria where edtech is being 'declared' for the promise of learning at scale along the narrative of 'education for all' (UNESCO, 2023; World Bank, 2020), the transnational ethos of edtech in these contexts has been of 'leapfrogging' - i.e. the implementation of advanced technologies that can support accelerated rates of economic development and social progress (Selwyn, 2013). This trend is accompanied by the ICT4D era that promoted the use of ICT to address development challenges in LMICs where information and communication technologies are seen as powerful tools to address entrenched educational inequalities. As Michelle Selinger, (2009) recounts, "ICTs can indeed hold the key to a step change towards improvement in the world ' s education systems. ICT is certainly not a panacea for education, but it is a powerful tool that when implemented appropriately can catalyse and accelerate education reform and development" (p.206).

One of the most celebrated and documented example in this category is the One Laptop Per Child (OLPC) initiative (Kozma et al., 2014). In the case of the OLPC initiative, the technological allure of the program and the drive to put low-cost computers in the hands of every child in low-income countries was considered as a means of achieving significant educational and social change in LMICs (Selwyn, 2013). The ideological narrative of leapfrogging, implemented through initiatives such as the OLPC program, remains at the heart of the agenda for promoting the use of education technologies to achieve education change across LMICs today. While these imaginaries are often implemented as part of government aid in LMICs, the lifecycle of such implementations have further extended to establish a continuous private sector involvement within the space of public education. As such, the EdTech industry across the sub-Saharan Africa region

has become increasingly driven by the private sector (Adediran et al., 2023; Rodriguez-Segura, 2022).

For example, while international aid indeed helped government across LMICs to deploy online and distance learning interventions to cushion the effect of education disruption caused by the Covid-19 pandemic, the aftermath of this interventions has helped to open and sustain opportunities for private edtech companies to push forward their edtech solutions and to gain considerable influence in the education sector (Patil, 2020). Not least, the introduction of new digital education strategies and intervention programmes across developing countries (e.g. UNICEF's Learning Passport initiatives already implemented in 12 Africa countries including in Nigeria) has helped to intensify private sector affairs in edtech provision. Many of the edtech investment by international organisations such as the UNICEF, World Bank or UNESCO and by philanthropic organisations such as the Gates Foundation has helped to catalyse private interest seeking profit from the deployment of edtech products in public education and the result of this has been the increased mobilisation of private sector led edtech solutions across these regions (Czerniewicz & Feldman, 2023; Hakimi et al., 2021; Lai et al., 2023).

The existing body of literature reviewed in this chapter have engaged with political economy perspective to investigate how the issue of power and wealth and the interest of private actors are entangled with the production and distribution of education technology. However, there is a notable lack of literature that has paid attention to this relationship within the Nigerian contexts. The implication of this research gap is that private interest in edtech production in Nigeria has not been accompanied by a thorough investigation of the specific corporate motivations driving these actors and the material interests these actors pursue within the education system. There appears to be a lack of understanding on the implication of private sector led edtech development on education practice in Nigeria and how this impact the imaginary of education future in the country. This gap in literature serves as the basis for further inquiry which this current study seeks to investigate. This study will thus focus on investigating the activities of private sector edtech companies who, as literature suggest, are vested in the reshaping of education with education technology and uses different means of power relation to shape vision of education technology

that they will benefit from. In this manner, the study will seek to answer the following research questions;

1. What are the discursive constructions used by private sector edtech actors to define the purpose of edtech?
2. How does the private sector configure and legitimise their role in edtech production in Nigeria?
3. What specific values and education future imaginaries are embedded in this discursive production?

Chapter 3: Methodology

3.1 Research Design

As Peter Freebody observes, the motivations for educational research may seek to test out theoretical ideas that inform practice, used to inform, advance, or obstruct policy and practice in education, or to advance methodology and analysis (Freebody, 2003). While these aims might be the motivation for conducting empirical education research, the process of conducting the research i.e., the research design and methodology, are often influenced by a research paradigm, a comprehensive worldview or way of thinking that "frames a research topic and influences the way that researchers think about the topic" (Hughes, 2010, p.35). Thus, as Mertens (2010) argued, a research paradigm can be said to be the philosophical base of research and connects with assumptions about the ontology – the nature of reality – and epistemology – the nature of knowledge and the relationship between the knower and that which would be known. As a result of this scholarly discourse about the philosophical foundations of a research paradigm, there has been the emergence of two distinct ways of knowing and investigation widely categorised into positivist and interpretive, or quantitative and qualitative traditions (Pring, 2015). On one hand, the positivist/quantitative tradition is characterised by realism, an assumption that there is a discoverable reality that exists independently of the researcher (Pring, 2000). On the other hand, the interpretive/qualitative tradition is characterised by relativism, an assumption that reality is subjective and differs from person to person (Guba & Lincoln, 1994). Some scholars have, however, argued that maintaining this binary and dichotomy between quantitative and qualitative research tradition is a 'false dualism' (Pring, 2015). Notwithstanding, empirical research design today still adopt either quantitative or qualitative methods and, in some cases, some researchers adopt both methods as in mixed research design.

This study adopts a qualitative research design to investigate the research phenomenon and answer the research questions. This methodological choice is based on the relevance of qualitative analysis, which has been demonstrated to be useful in developing a better understanding of the economic and political production of edtech (Selwyn, 2002). As Denzin & Lincoln (2011) argued, "qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible … [and] study things in their natural

settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them" (p. 3). As a way of reasoning and enquiry that follows interpretivism, a qualitative research design, as Freebody (2003) puts it, "is characterised by an understanding that contextual considerations should not be assumed to operate as distinctive 'variables' consistently or independently across a range of sites, somehow in isolation from one another" (p.49). In contrast to quantitative design that privileges determining cause and effect, predicting, or describing the distribution of attributes among a population, qualitative research is concerned with uncovering "the meaning of a phenomenon for those involved… [and] understanding how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their experiences" (Merriam & Tisdell, 2016, p.5-6). This is not to say that quantitative research design cannot produce a reasonable understanding of a research phenomenon, however, as described by Scott & Usher (1996), there is a limited opportunity for quantitative research to "deal with the intentions, beliefs, and propositional attitudes of social actors", whereas, qualitative research, strives for depth of understanding unattainable within the realm of quantification (p.92).

The choice of qualitative research design in this study draws on the observation of Merriam & Tisdell (2016) that proposes that qualitative study, for example, could be used to examine how social institutions and their production [as in the production of education technology within broader education system] is structured such that the interests of some actors and classes of society are preserved and perpetuated at the expense of others. Whereas quantitative studies can also produce understandings of power relations within social structures, I strongly argue that qualitative research is useful in developing a nuanced understanding of how social experiences are created and given meaning, "meanings that are not experimentally examined or measured (if measured at all)" (Denzin & Lincoln, 2013, p.17). From this perspective, my choice of qualitative research design and mode of inquiry is influenced by the motivation to interrogate the broader social, political, and economic relations in which private sector led education technology production happens, and the implication of such formation on education futures in Nigeria. This collective examination of the underlying socioeconomic, political, and power relations presents a unique opportunity but also the responsibility to embrace the context in which education technology is being produced. Because educational technology is produced out of technical but also social influences, a qualitative approach is important to focus attention on the social, political and

economic contexts where edtech are developed Selwyn (2002). Thus, for the purpose of this study, a qualitative approach provides the opportunity to address the economic and political construction of education technology that cannot be observed or measured thorough quantification techniques used in quantitative studies.

My research will adopt a case study method as a strategy for my qualitative inquiry. As described by Merriam & Tisdell (2016), a case study is an "in-depth description and analysis of a bounded system" (p.37). As Yin (2014) suggests, a case study is an "empirical inquiry that investigates a contemporary phenomenon (the case) within its real-life context, especially when the boundaries between phenomenon and context may not be clearly evident" (p.16). From this perspective, this study is incorporating the core tenet of case study as a methodological approach to investigate a set of private sector actors involved in edtech development in Nigeria. The target of social inquiry in this study, i.e., the case of intertest in this study is the Nigeria edtech industry (explained below). While case study methods may be applied in quantitative research design, this study adopts qualitative case study methods only.

Although case study method is often criticised for not being able to provide generalisation from a single case, the application of case study method in this study aims to operationalise what Stake (1995) described as 'naturalistic generalizations', i.e., conclusions that provide insights into a single case by reflecting on it peculiar details ana are embedded in the experience of the reader. To help the reader make these generalisations, I have, as Stake (1995) recommends, "provided adequate raw data prior to interpretation so that the reader can consider their own alternative interpretations" (p.87). In other words, I have written separate findings and discussions chapters. Lastly, in my discussion of the research findings, although I have attempted to preserve the multiple perspectives emerging from the research data, I acknowledge that other interpretations and assertions may exist other than those presented in the discussion section and this is while invoking naturalistic generalizations is relevant in this study.

3.2 The Case Study

The target of social inquiry in this study is the Nigeria edtech industry. The Nigeria edtech industry, as described in Chapter 2.2, represents a unique site of social and political interaction constituted by different actors. As argued earlier in Chapter 2, although there are several actors that can be mapped within the Nigeria edtech industry including edtech investors, startups and policymakers among others, the actors concerned within the aim of these study are edtech start-ups. Edtech startups in Nigeria represent a community, or closed relationships involved in the mobilization of edtech in Nigeria. For context, the Nigeria edtech landscape currently leads the Africa edtech market with a share of 34% Nigeria based edtech startups occupying the list of top 50 edtech companies in Sub-Saharan Africa (Holon IQ, 2023). With the presence of edtech ventures that have closed $15 million Series-B investment, the largest investment in an African Edtech company, the Nigeria edtech industry is projected to reach a value of $107.90 million by the close of 2024 (Nairametrics, 2024).

From this background, the Nigeria edtech industry can be reasoned to satisfy the conditions of a 'case' as described in the literature on qualitative research strategies. The industry and its network of actors represents a constituent population that can be studied as a 'bounded system' (Stake, 1995). In this study, I have focused on the Nigeria edtech landscape as my site of inquiry for two reasons. The first is the country's edtech market share which currently ranks first in the Sub-Sahara Africa region and the second is the potential to leverage existing relationships to get access to identified study participants. Rather than centring on a single edtech startup as a unique case, I have chosen to capture a broader base of the Nigeria edtech landscape as my case site. This broad scope enables me to map edtech start-ups that differ in their orientation towards edtech development, target different levels of education, and thus offer the potential to investigate the phenomenon of interest from different perspectives.

It is important to emphasise that although I see the whole network of actors involved in edtech production and distribution in Nigeria as a single case, I am exploring this case primarily through interviews with private sector edtech startups only. I arrived at this methodological decision on the basis of the gap I have identified in the literature and aim to explore through my research questions.

3.3 Data Collection

The data collection strategy used in this study is semi-structure interviews. This method of data collection is specifically adopted based on its relevance to the research phenomenon and the case study method. For one, gathering data with the use of interviews makes it possible to engage the multiple realities embedded in a studied case and provide a means for discovering the meanings and interpretations that individuals within the bounded case hold true (Stake, 1995). As Patton (2015) explains, “the purpose of interviewing, then, is to allow us to enter into the other person’s perspective” (p.426). Depending on the type of interview tactics, Stake (1995) argued that interviews provide qualitative researchers with a technique to aggregate “perceptions or knowledge over multiple respondents" (Stake, 1995, p.65). From these perspectives, my choice for using interviews as a technique for data gathering in this study is because of the advantage it serves as a systemic mode of inquiry that helps researchers to obtain a rich, in-depth experiential account of a case and its particularisation (Fontana & Frey, 2005). As Stake (1995) reasoned, each interviewee is expected to have had unique experiences and special stories to tell. In this sense, the applicability of interviews with multiple informants in my research gives me an opportunity to examine how the purpose of edtech is framed among private sector actors and to discuss what meanings, values and education future imaginaries are embedded in private sector led edtech production in Nigeria. With interviews, I am able to discover multiple views and realities related to my research phenomenon and have the opportunity to aggregate knowledge over multiple respondents. This will strengthen the reliability of my findings and inferences as I will be able to draw on multiple realities of my respondents to answer my research questions and make sense of the research phenomenon.

To draw my sample, I traced a list of top 50 edtech companies in Sub-Saharan Africa published by Holon IQ, a leading education market intelligence platform commonly used in the edtech industry (Komljenovic et al., 2023). From this list of 50 most promising edtech startups in Sub-Saharan Africa, I mapped out the Nigeria based edtech startups and included them in my list of potential research participants. I should emphasise that the Nigeria based edtech startups as used in this study is interpreted as edtech startups that are registered and incorporated in Nigeria. In total, there were 11 Nigeria based edtech startup in the surveyed list and out of these 11 startups,

ten of them were involved in my research whereas one of them declined to participate in the research.

3.4 The Interviews

As Fontana & Frey (1994) argued, different types of interviews are suitable for different situations and the type of interview selected should therefore reflect and be aligned with the purpose of the phenomenon under investigation. For this study, semi-structured was adopted because of its flexibility to adapt to the respondents particularity and situations. This approach to interviewing contrasts the highly structured interviews that are arguably standardised with little to no room for flexibilities. As Merriam & Tisdell (2016) argued, semi-structured interviews allow a researcher to "respond to the situation at hand, to the emerging worldview of the respondents, and to new ideas on the topic" (p.111). For my research, the application of semi-structured interviews allowed my respondents to express themselves based on their understanding, their terms, and values (Creswell, 2007). Considering the primary question driving this study, the interview questions were tailored to widely explore participants' interpretations and meanings associated with how the private sector is implicated in edtech production in Nigeria and how this impacts the imaginaries of education futures in the country.

All interviews were conducted online using Microsoft Teams platform which is the recommended video conferencing platform recommended by the University of Oxford research ethics committee. The research participants selected their preferred time and everyone that participated was briefed about the purpose of the research prior to being interviewed. The average time for the interview was 30 minutes. All interviews were audio recorded using Microsoft Teams built-in meeting recording function (details on this is in the section on ethics). I conducted a pilot interview as part of my research training in a coursework assessed in the Department of Education, University of Oxford. After the pilot, I repurpose the interview questions to focus more on asking questions that are directly related to my research questions[1].

[1] See interview schedule in Appendix A

3.5 Analysis

I have adopted a specific type of discourse analysis known as critical discourse analysis (CDA) for analysing and interpreting my research data. My choice for critical discourse analysis is based on the rationale for adopting an analytical approach that is "faithful to the phenomenon under investigation" (Atkinson & Delamont, 2005, p.824). Thus, at the centre of this decision is the concern to adopt an approach that can rightly deal with "transforming and interpreting qualitative data - in a rigorous and scholarly way - in order to capture the complexities of the social worlds [I] seek to explain" (Coffey and Atkinson, 1996, p.3). Although some scholars argued that [critical] discourse analysis is not a unified body method, or practice, and lacks a testable theory (Stubbs, 1997), the approach is argued to remain important for qualitative researchers, particularly to emphasise the "interrelationships between accounts and hierarchies, power and ideology" (Punch & Oancea, 2014, p.248). The approach to critical discourse analysis adopted in this study is based upon Fairclough's conception that discourse or language is an "irreducible part of social life, dialectically interconnected with other elements of social life, so that social analysis and research always has to take account of language" (Fairclough, 2003, p.2). From this perspective, critical discourse analysis is well suited for my research because it provides the analytical useful that can, for example, be used to trace discursive narrative as I have set out in my RQ1.

Also, the applicability of critical discourse analysis to my research is consistent with its potential to make explicit the "nonobvious ways in which language is involved in social relations of power and domination and in ideology" (Fairclough, 2001, p.229). In this sense, applying critical discourse analysis approach to my data analysis will enable me to critically examine and make explicit the implicit values embedded in the discursive constructions of edtech and the role of private sector actors in edtech development in Nigeria as I outlined in RQ2. Lastly, as Fairclough (2003) argued, discourses "not only represent the world as it is (or rather is seen to be), they are also projective, imaginaries, representing possible worlds which are different from the actual world" (p.124). Hence, the applicability of critical discourse analysis in this study provides the opportunity to investigate, for example, the education future imaginaries embedded in the discursive construction of edtech promoted by private sector edtech companies as I have set out in RQ3. Although CDA is more commonly used in textual analysis (Fairclough, 2003; 2010), I've chosen to use CDA to analyse my interview data because it allows me to investigate how private

edtech enterprises employ specific language and discourses to describe edtech and the educational futures they envision.

Conclusively, I acknowledge that some readers may question the 'objectivity' of discourse analysis as used in this study, particularly because it is perceived as being vulnerable to the biases and ‘subjectivity’ of the analyst (Fairclough, 2003). However, I would reiterate that one of my motivations for choosing this approach is the belief that discourse has social, political, and material consequences and effects, and that it is important to understand these consequences and effects if we are to raise significant questions about contemporary mobilisation of technology in education, and the transformation it brings about through it entanglement with private sector actors. Thus, my approach in this study can be categorised under the broad umbrella of critical edtech research that goes beyond asking normative questions such as how technology can transform education but rather raising critical questioning of edtech in social, economic, and political terms. A detailed description of how the research data is coded and categorised into themes will be presented in Chapter 4.

3.6 Establishing Validity, Credibility and Ethics

The subject of validity, reliability and ethics are important to any type of research regardless of the nature, either qualitative or quantitative, of the research. According to Firestone (1987), “the quantitative study must convince the reader that procedures have been followed faithfully because very little concrete description of what anyone does is provided. The qualitative study provides the reader with a depiction in enough detail to show that the author's conclusion "makes sense" (p.19). Because qualitative study is categorised as interpretive and that reality is multidirectional, not an objective phenomenon that can be measured as in quantitative research, the extent of its validity and credibility is often questioned (Merriam & Tisdell, 2016). More troubling is the fact that the community of qualitative tradition grapples with the terminology that can describe the ‘validity’ of a qualitative study and the extent to which the study can be ‘credible’. Different scholars have proposed different terminologies as well as strategies for producing research that its findings and conclusions rings true to readers, practitioners, and other researchers. For example, Lincoln & Guba (1985) used terms such as

credibility, authenticity, transferability, and confirmability; Eisner (1991) used the term credibility to describe how qualitative researchers feel confident about their observations, interpretations, and conclusions; while other researchers such as Wolcott (1990) proposed that qualitative researchers should strive to produce understanding rather than trying to convince. Without attempting to condense the literature and debate on model for establishing the validity and credibility of qualitative research which goes on until today, I have aligned my stance on this matter with the contributions of Creswell (2013) and Tracy (2010).

This choice is a purposeful fusion of the ideas and propositions from both authors that I find useful in conceptualising the criteria for validity and credibility in qualitative research. According to Creswell (2013), establishing validity in qualitative research is an "attempt to assess the 'accuracy' of the findings as best described by the researcher and the participants. This view suggests that any report of research is a representation by the author" (p. 249–250). Creswell (2013) suggests that validity or 'validation' is more about a process than verification. From this perspective, I interpret validity in this research as the extent to which my research findings are valid and the degree to which there is consistency in my findings. On the issue of credibility, Tracy (2010) argues that credibility refers to the "trustworthiness, verisimilitude, and plausibility of the research findings" (p.842). It is argued that credibility in qualitative can be achieved through practices including "thick description, triangulation or crystallization, and multivocality and partiality" (p.843). Hence, to establish the validity and credibility of my research, I have provided a rich and thick description of my qualitative data, preserving the voices of my research participants by using direct quotes from them (Creswell, 2013; Tracy, 2010). Holding into account my interpretation of reality as multiple and contested, I have chosen to use crystallisation as a practice of validity and credibility in my research as opposed to the practice of triangulation commonly used to foreground credibility in research that is more aligned towards deriving a 'single truth' or reality. My research is embedded within a context that is characterised by socially constructed meanings, and as such, my research can be considered valid and credible to the extent to which I open up the multiple 'truth', and deepened, complex, thoroughly partial, understanding of the topic"(Richardson, 2000, p.934). Thus, throughout my analysis and discussion, I have made intentional effort to engage crystallisation as a practice, bringing together multiple genres in my

research data to enrich findings and to demonstrate the inherent limitations of all knowledge" (Ellingson, 2009, p.15).

On the other hand, I have dealt with the issue of ethics in my research, regarding both collection of data and in my relationship to the participants. Before starting my research, I provided a detailed description of the study to all participants using adapted template participant information sheet recommended by the University of Oxford. I obtained informed consent before participation and oral consent for recording interviews. To ensure full anonymization of my research participants, I anonymised direct quote from all interviews using the combination of *Int.* and a unique identifier number (e.g., Int. 1). In my relationship to the participants during interviews, I ensured that I avoid extractive practice that only seeks for answers without paying attention and I ensured that all voices are heard (Blair & Collins-Gearing, 2017). Another significant aspect of ethical issues considered in my research is ensuring that all data were stored securely in alignment with the University guideline. My research was approved under by the University of Oxford's Central University Research Ethics Committee (CUREC)[2].

[2] See CUREC approval notification in Appendix B

Chapter 4 – Research Findings

This chapter only presents the findings of the current study but discusses the findings in relation to the literature in the next chapter. The chapter starts with a description of how the research data were categorised and coded and then proceeds to presentation of findings.

4.1 Analytical Strategy

In qualitative research, coding is a way of developing and refining interpretations of data, it "involves bringing together and analysing all the data bearing on major themes, ideas, concepts, interpretations, and propositions" (Taylor et al., 2015, p.172). Based on this understanding, coding is used in this study as a technique to make sense of the qualitative data and to categorise the presentation of the research findings as themes. The coding process followed six basic steps that include: (i) familiarisation with the data, (ii) generating initial codes, (iii) looking for themes, (iv) reviewing themes, and (v) naming and defining themes, before (vi) writing up the findings (Braun & Clarke, 2006). For the purpose of my analysis, I uploaded all qualitative interviews (N=10) onto the NVivo software where the coding was completed.

In discourse analysis, as a form of interpretive/qualitative research, the role and identity of a researcher becomes significantly relevant in the coding process, and the question here, as Taylor (2001) recounts, is "how far the researcher can be separated from the research" (p.16). As argued earlier in Chapter 3, I acknowledge my positionality as an edtech researcher motivated to pursue my research from a critical lens. This suggests that the coding process and sense making of the research data are filtered through my lens. However, this does not suggest that the coding process and by extension, the findings of this study are a product of my imagination or special interests. While my theoretical perspective is intertwined with the research, this does not equate that the findings discussed afterwards are more or less an accurate reflection of the studied phenomenon. As Richardson (1990) argues, "because all knowledge is partial and situated, it does not mean that there is no knowledge or that situated knowledge is bad" (p.27). To establish rigour and trustworthiness of the coding and analysis process, I foreground the ethos of critical self-reflection and reflective practice. As Blair & Collins-Gearing (2017) advised, rather than looking for an

answer, I immerse myself in 'paying attention' to the details, and the 'messiness' embodied in my research data. I engaged in reflective practice, acknowledging that, as Hokari (2000) notes, "the (Gurindji) art of knowing is not always the way of searching, but often the way of paying attention" (Hokari 2000, p. 2, quoted in Blair & Collins-Gearing, 2017). Basic to the coding process was a rigorous attempt to identify patterns in the 'rich' qualitative data and a commitment "to make the codes fit the data and not vice versa" (Taylor & Bogdan, 1998, p.152). Also, I made effort to look for both positive and negative incidents related to emerging themes. As Miles & Huberman (1994) writes,

> Any given finding usually has exceptions. The temptation is to smooth them over, ignore them, or explain them away. But the outlier is your friend. It not only tests the generality of the findings but also protects you against self-selecting biases and may help you build a better explanation (p.269).

Thus, after a rigorous coding process, several codes relevant to the research questions were identified and categorised as potential themes. Following a refinement of the initial codes and iterations of themes, recurring sets of themes were identified, contrasted and final themes were established. These themes are used to discuss the research findings that respond to the research questions:

1. What are the discursive constructions used by private edtech startups to define the purpose of edtech?
2. How do private edtech startups sector configure and legitimise their role in edtech production in Nigeria?
3. What specific values and education future imaginaries are embedded in this discursive production?

4.2 Findings

4.2.1 RQ1: What are the discursive constructions used by private edtech startups to define the purpose of edtech?

As I shall explain below, despite the differences in the edtech product developed by the ten edtech ventures (tutoring and online learning platform 50%; teacher development platform 10%; school management platform 20%; STEM education 20%), the discursive construction of edtech among the research participants is the same. Primarily, the discursive construction of edtech by the interviewees follows a pure instrumental perspective that sees education technologies as powerful tools that can 1) democratise and scale access to education; 2) achieve the needed digitization of education. However, as I shall present below, one of the interviewees had a different view of edtech.

Theme 1: Democratisation of access and scale

The discursive construction of edtech from the lens of scaling the democratisation of educational access was significantly promoted throughout the interviews. Education technologies were described as a ready-made solution to education inequality in terms of their potential to 'open up' access to education for every child everywhere. According to one of the interviewees, "education technology will actually change the education landscape in Africa. It will increase access; it will increase equity (Int. 3)." One other interviewee observed that "edtech is eventually going to democratise access to quality education for young Africans, irrespective of their background" (Int. 1). Based on the contextual reality of the Nigerian education system characterised by a high number of out-of-school children, and disparity between urban and rural education enrolment and attainment; education technologies were defined in terms of their potential to deliver better educational outcomes in terms of democratising access to education at scale.

Also imprinted into this narrative and definition of the purpose of edtech is the fact that educational technologies are instrumental artefacts and neutral tools that can bypass social and political relations that may otherwise hinder the democratisation of education at scale. For

example, one of the interviewees used the following narrative to justify the neutrality of edtech tool;

> Uh, prior to now, everyone has to go to a school and then you have to go to a location where you can actually access education. And even though you go to those locations where school is situated, you'll also need to know someone before you can actually get to a school of your choice because nepotism is the other of the day. So, when you now look at this in totality, you see that as long as there is a human procedure, a human process in the enrolment process, there's a tendency that the best student won't get access to the best school. And that's something that technology would break. If I release a platform for everyone to apply, I possibly will not be shutting out anybody from applying because everybody could go to an address and fill the form. If you score 30 and my cut off is 30, you will be chosen, whether you know somebody or not. So, I like to define edtech from the perspective that it is opening access and democratising access to education, that whether you are black or white, whether you are rich or poor, whether you are living in the city or in the remote, you have access to education. That's what technologies is first addressing. – Int. 4

From the above case, it can be argued that the interviewee considers edtech as having the potential to mitigate social and political process that influences educational practices and thereby opening up access to education. This emerging understanding of the purpose of edtech, as described by the interviewees, reflects a recurring belief in the potential of technology to deliver broad outcomes of positive and apolitical educational change at scale.

However, contrary to this assumption about the objectivity and neutrality of edtech, one of the interviews had a very different view of technology in which the purpose of edtech is described in a wider sense that accounts for social and political factors. In this case, the interviewee notes that “edtech essentially is more like the totality of technologies, human expertise, programmes, ideas and strategies, put together to make education somewhat accessible to so many people, breaking down the barriers of time, distance and space” (Int. 9). While this definition of the purpose of edtech still considers edtech being capable of delivering positive outcomes in terms opening up access to education, there is a somewhat different orientation that considers the invincible aspect of edtech such as policies, pedagogy and human expertise. As the interviewee recounts,

> Edtech is a complete suite of technology, technologies of expertise, of policies, of innovation, summed up together to enhance access as well as strengthen equity in education delivery and at the same time, equally enhance the quality of education programmes. The fusion of the right mix of education content, the right pedagogy, as well as the right devices to drive teaching and learning and improve learning outcomes is what we can describe as edtech. – Int. 8

Although this is a single case in the research data, it is useful to acknowledge that this view accommodates a broader description that accounts for the non-technical aspects of edtech. However, it is worth mentioning that although this interviewee contributes more nuances in defining the purpose of edtech, this perspective didn't reflect on their broader understanding of edtech which still promote an instrumental narrative.

Theme 2: Discourse of Digitisation

In the interviews, all the participants defined one other purpose of edtech along the narrative of digitisation. The interviewees opined that the application of education technology is the right mechanism towards achieving digitisation of education that will enhance the optimisation of educational processes. It was reasoned that education systems built around human supervision and the logic of schooling are unable and unreliable to produce data that can optimise educational processes. As one of the interviewees noted that, "there is a need to digitise our education system so that we can work better from the data perspective and the optimization of our processes" (Int. 4). Another interviewee observed that "education needs to be digitised and the founding principles that are necessary for a school system to run needs to be digitised first so we can produce data and optimise efficiency" (Int. 1).

One of the rational for promoting a digitisation discourse, as described by the interviewees, is that digitising education will significantly enable personalisation of learning and provide an integrated framework for monitoring educational activities from the standpoint of data interoperability. Some of the interviews argued that;

> The traditional model we have today, kids go to school and the outcome is always that many kids are left behind because the experience doesn't acknowledge their current status, doesn't acknowledge where they are, and it's not designed to provide the 100% support they need to move to meet them at their level and need. This is what edtech is solving.

> Digitising education and making it possible for kids to experience personalised learning. – Int. 5

> Because we're not also looking at it from an integrated perspective is why technology is not working in our space. We have applications in different platforms, managed by different platforms. Then connecting data together is going to be a bit of difficulty because anyone who is building a learning solution is not thinking of a standard way of exchanging data for whoever is doing assessment, or whoever is doing assessment solution is not working on a standard framework on whoever is going to managing results. So, because there is no integrated digital framework, then we will not be able to drive change within our education – Int. 2

From these assumptions, it can be drawn out that at the core of the digitization discourse promoted by the research participants is the drive for developing and harmonising digital education platforms that can promote interoperability and synchronisation of different edtech products to make education data mining more effective. While I shall return to this point later in the discussion section, it is important to note that folded into this sort of configurations are attempts to continue to deploy and normalise the application of data-intensive system in education system, facilitating the connection the education systems to the broader datafication of social life (Kitchin, 2014; Williamson, 2019).

4.2.2 RQ2: How do private edtech startups configure and legitimise their role in edtech production in Nigeria?

One of the concerns of the political economy perspective adopted in this study relates to investigating how the role and interest of private sector edtech firms are configured and legitimised in edtech development in Nigeria. As highlighted below, the findings here suggest that there are varied but consistent mechanisms through which private sector actors sought to configure and legitimise their role in the circuit of edtech development in Nigeria.

Theme 3: Private Sector as Investors and Market Architects

One of the dominant expressions of the role of the private sector in edtech development in Nigeria as described by the interviewees is in terms of capital investment and market creation. Threaded across the interviews is the configuration of the role of the private sector actors as big investors that crowd in the capital needed to expand the edtech market in Nigeria, particularly to make education technologies accessible to hard-to-reach communities. Some of the interviewees notes that;

> Education is taking a whole huge investment, it's a lot of investment. And to bridge that gap and make that investment drive, the private sector had to come in and play the role of the big job investor who will bring in the required funding to drive and deliver edtech for quality education. – Int. 7

> We all know that, of course, when it comes to resources, this is where the private sector plays a very, very key role. So, the private sector, you know, are ought to provide essential funding for edtech startups and initiatives. You know these investments can help drive research and development enabling the creation of cutting-edge educational technologies that ensure that these innovations can actually scale and reach a wider audience. – Int. 9

> The private sector is also going to help in expanding up market access, right? They're going to help to penetrate into communities where the government cannot reach. – Int. 6

In configuring the role of private sector actors as big investors, the interviewees significantly suggested that financing the infrastructural pieces that will drive edtech innovation is a typical example of edtech investment priory that falls predominantly under the domain of private sector actors. The interviewees frequently validate this configuration by referring to the role the private sector has played in building digital infrastructures that has led to increased adoption of digital services in Nigeria including in FinTech and within the context of wider telecommunication penetration in Nigeria. For instance, one of the interviewees explained;

> Something that the private sector does is that they build the infrastructure pieces that enable people to access technology and they do it at scale because they have access to a lot of investment to be able to do that. Look at fintech like, everybody can basically open an account on OPAY right now or MoneyPoints without visiting the bank, right? Why is that? Why are banking products accessible? It's because some private sector folks come into play. And so, I think for Edtech as well, the role of private sectors cannot be overemphasised. – Int. 7

Primarily, these narratives suggests that private sector edtech actors serve the role of economic actors that mobilise private capital to unlock market opportunities for educational technology adoption. This implies that market and economic principles are further entrenched in the decision pipeline of education technology development that can influence, for example, what time of education technology is developed and who can access such edtech tool. Indeed, this finding is consistent with the literature that suggests that the growth and direction of the edtech industry is powered by private financing as well as investments coming from the edtech investment sector (Davies et al., 2022; Komljenovic, 2021; Komljenovic et al., 2023).

Theme 4: Private Sector as Innovators

Another configuration of the role of the private sector, as discussed by the interviewees, is in relation to private sector edtech actors as innovators. At the core of this configuration of the role of private sector actors is the belief that edtech innovation is a primary responsibility of the private sector and that the government or the public sector should only be responsible for creating enabling conditions that will support private sector innovation to thrive. According to one of the interviewees, "the primary business of the government is not to do business" (Int. 10). From this perspective, private sector actors are considered as active innovators who have the capacity to rapidly innovate and build edtech products. According to the interviewees;

> The first role of the private sector is to drive innovation. The private sector is a little bit daring. Private sector is a little bit forward thinking, the private sector is a little bit adventurous when it comes to technological innovation. So, the private sector is supposed to develop based on first hand understanding of local problems and develop solutions that are tailored to solving those educational problems. – Int. 2

> First is actually in the area of innovation and development. You know, private companies drive innovation in Edtech and they should. Of course, the forward-thinking ones actually should drive innovation in edtech by developing new platforms, tools, and applications that enhance teaching and learning. – Int. 5

> I think the bulk of the work is in the private sector. The government should just focus on doing policies that are making it thrive and making it work. I don't think the CBN is the one that is in charge of making sure banks have ATM machines but they create certain policies and parameters. That's the job of the government. But the whole other thing is the job of the private sector. So, the government can just focus on doing its best, right? Doing

> a lot of research and then leaving the private sector to, you know, look at what they can dabble into. – Int. 8

In a similar dimension, private sector actors are also considered as policy innovators who should support the government in designing policies that supports and incentivise innovation. For example, one of the interviewees mentioned that private sector actors are "supposed to work closely with federal governments in the area of policy innovation". According to another interviewee, the rationality of private sector actors as policy innovators is for them to be able "to play a role in shaping the policies that will shape their activities" (Int. 10). From this perspective, private sector roles are being configured both in terms of how they contribute to promoting edtech innovation as well as how they contribute to the general climate of edtech development through policy shaping. This dual dimension of the role of private sector edtech actors as innovators is referred to in literature as 'policyneurs', the recognition of private sector actors with the interest and the possibility not only to do business but to contribute to policy by exerting political influence (Jobér, 2023).

Also, under this current analysis is an investigation of the mechanism through which private sector actors seek to legitimise their role in the production and distribution of edtech in Nigeria. As the qualitative data revealed, this legitimation process are pursued mainly through private sector's rhetoric of a needed partnership with the government, and presence of expertise within the private sector.

Theme 5: Legitimation through partnership

One of the approaches through which private sector actors seek to legitimise their role in the general climate of edtech development in Nigeria is through partnership with government ministries, departments and agencies (MDAs). Public-private partnerships (PPPs) are seen as the pathway through which private sector led edtech production can be scaled. Again, the role of the government in this process is primarily considered as administrative, creating an enabling environment for edtech to thrive. As one of the interviewees recounted,

> You know, let's look at the US, is the government doing anything? I think they are doing partnerships. If a district will be using a certain edtech, the district is not supposed to build that tool, right? The government is not supposed to build anything. The government can

> just enable, and then, they must partner with the right edtech companies. So, it's a partnership.
> –Int. 1

As the interviewees argued, public-private partnerships are the mechanism that will shape the future of edtech development in Nigeria and Africa at large. One of the interviewees concludes that "the future of education in Africa will also be shaped by stronger collaboration between governments, the private sector and nonprofit organisations because these partnerships will be crucial for scaling edtech solutions, funding initiatives and ensuring sustainable impacts" (Int. 5) These visions of PPPs are construed as being capable of providing ease of doing business for private sector edtech companies and the interviewees strongly advocated for it.

> There are several edtech solutions in Nigeria. But the question is, in all of this solution, how many of the solutions have the government, the public sector adopted into the system and then pushed in terms of scalability? We can just grow to the point where our marketing budget can take us to or the kind of reach we can take. But imagine some of the solutions being adopted into the public schools, and public parastatals. We believe that, if we are able to achieve synergy between the private and the public sector, edtech adoption will increase in Nigeria. – Int. 10

Aside from public-private partnerships, it was also discussed that private sector actors also often approach partnerships by direct engagement with schools and institutions. According to one of the interviewees, "when it comes to partnerships, private edtech companies often collaborate with schools, universities and other educational institutions to integrate technology into the curriculum so these partnerships can include providing software solutions, training teachers and offering technical support" (Int. 8).

Nonetheless, the interviewees echoed that the mechanism of partnership, either with the government or with schools is not always a guaranteed phenomenon. In some instances, the interviewees claimed that government bureaucracy often limits the implementation of PPPs, and government sometimes have priority for the type of edtech they want to adopt. This is particularly on the basis of alignment with curriculum and pedagogical preference or on the basis of lack of harmonisation of edtech products. For example, some of the interviewees explained;

> We had an edtech startup who said Oh well, you know, there are times when we've gone to the government and said, you know what, let's just have your students use our product for free. You don't have to pay anything and you know, even then, they are still not interested in it, they don't adopt it. And then the government in that state said, the fact that you guys are bringing something free doesn't mean that we will automatically take it. Your free can be rubbish, your free might not align to our curricula. Your free might not align with how we've desired for learning to happen in our schools. – Int. 6

> But how open is the government to public private partnerships to do all of these things right? We approached the government a couple of times, but some of the things we wanted to do every time just hit the wall. So, it's just really, really challenging to be able to, you know, to partner with the government to get some of these things done. – Int. 3

> Most times you go to pitch your edtech products to a particular school and they're like, OK, I love your products. I love these other people's products. I love that product as well. But do you want me to sign up on all the platforms? Why don't you guys come together? – Int. 6

On one hand, it can be drawn from these narratives that, as seen in the first quote above, private sector actors are also political actors using lobbying practice to pitch their edtech product to the government for adoption within public education. On the other hand, this insight suggests that the government also have a vision for edtech development in Nigeria and have the political influence to shape the forms of edtech that are mainstreamed into public education in Nigeria. The implication of this is that edtech development is continually a space for political constatation where actors on all sides, in this case, private and the government actors, leverage their political power to influence edtech development.

Theme 6: Legitimation through rhetoric of efficiency

Another mechanism through which private sector edtech actors seek to legitimise their role in the production and distribution of edtech is through the narrative of expertise and efficiency. The interviewees note that the government has limited capacity to innovate and lack the efficiency required to sustain innovation within the public sector. Furthermore, the participant argued that one reason why digital services under the domain of the government often fail and experience downtime is due to lack of strong digital infrastructure in government, and the lack expertise required to provide and manage digital services. According to the interviewees, the private sector is considered to have the expertise required to create innovative digital products and initiate

minimum product standards that will guarantee efficiency. Specifically, this rhetoric of standard initiation for improved efficiency was used to describe how the private sector set the pace in creating minimum viable products (MVPs) that can be deployed and tested to gather user feedback that will feed back into product development to the end that the particular product becomes efficient for it to produce return on investment. This narrative of efficiency was further explained by some of the interviewees as;

> Because over the years we have then learned that when the private sector is playing in a particular space or an industry, then that space becomes much more efficient because we would be much more, you know, focused on ensuring that the outcomes and the impact you know are measured and used to direct product development for efficiency. Because of course, the money that goes into building the solution and sustaining it has to be recouped so we that we play in the private sector, our job is to create much more efficiency and effectiveness in whatever thing we're doing. – Int. 4

Consequently, it appears that the rhetoric about efficiency more than been about the absence of expertise in the public sector is largely about the interest of the private sector to continue to create product that guarantee continuous usage of that product for private sector actors to recoup their investment. Because, as one of the interviewees claimed; "when it comes to the private sector, solutions are monetized, right. Most times it's monetized" (Int. 7), and hence if users are satisfied with a particular product, there are tendencies that they will continue to pay for such product, and this is what private sector actors referred to as efficiency.

4.2.3 RQ3: What specific values and education future imaginaries are embedded in this discursive production?

One of the components of critical discourse analysis is its concern with how discourses are used to promote certain values, construct specific forms of reality and shape the direction of imagined futures (Fairclough, 2003). In this respect, the last part of my analysis focused on identifying the specific values, and imaginaries of education future(s) that are embedded in the discursive construction of edtech among private sector edtech actors. Looking into the qualitative data, the imagined futures of education promoted by the private sector edtech companies interviewed appears to be entangled with the discursive construction of edtech promoted by these actors.

Theme 7: Education Without Borders

The first theme relates to the vision of decentralisation and education without borders. This is concerned with how technology will configure the space of education, making educational spaces not restricted to the limit of time and space and schooling no longer within the confines of physical structure. According to one of the interviewees, “learning will be such that even the school, the brick-and-mortar schools may not exist anymore” (Int. 10). This theme also relates to how education will become decentralised and learners will no longer be bound to a particular institution of learning because technology will give them the opportunity to learn from multiple institutions at the same time, and from anywhere. This imagined future of education is claimed to increase learners' agency and make access to education equitable for every learner. According to one of the interviewees, “in the future, a child is going to be studying 12 subjects from 12 different schools or different platforms, it's possible because you go to the one that gives you what you need to survive” (Int. 9).

Along this imaginary vision of decentralisation of education, it was also said that edtech will facilitate centralisation and alignment of curriculum and learning content. According to one of interviewees:

> There will also be centralisation in the sense that curriculum will become more aligned because the world is becoming a global and digital village. That means there's definitely centralization happening. What will happen is that education will become centralised, there'll be much more alignment in curriculum, much more alignment in standard testing and assessment. So, in as much as we're going to have those decentralisation happening with people in the mode of delivery of these programmes and everything, they'll also be centralisation happening in terms of content design, content delivery, assessment and testing. – Int. 4

As this decentralisation and centralisation takes place and as learners become autonomous concerning where and how they learn, it is said that teachers will also become ‘universal teachers’. According to one of the interviewees,

> We possibly will not be employing physical teachers. You'll be employing teachers who will also be working in different schools. So, no one will own or have ownership of his

> own staff. You're also possibly going to be seeing that change in the teaching, that teachers will be universal teachers. – Int. 3

This imaginary project of decentralisation and borderless education, as discussed by the interviewees, aligns with boarder attempts of edtech companies and their investor networks to continue to roll out edtech systems that will "de-link schools, teachers, and students from their local context in order to promote standardized curricular interventions" (Cohen, 2024, p. 276).

Theme 8: Economic Influence on Education

The second theme refers to how edtech and economic productivity and the workforce will come to influence education. According to the interviewees, corporate demand for certain skills as well as individual's desire to improve their economic productivity and job readiness is going to influence what people learn and how they learn. As one of the interviewees explains, "the skill needed in the workplace is also changing. And as a result of that, it's also going to affect education. And as it's going to affect, education is going to affect the mood of delivery. So Edtech will propel that" (Int. 8) Edtech is said to become subject to economic interests and desire for future work readiness. According to one of the interviewees,

> Any educational technology that does not translate into income transformation or does not lead to economic productivity might not thrive in the future of learning. If I'm using your tool, how does it lead to my own income transformation or a significant change in my life that will enable me to earn more and have more and have more wealth as an individual. – Int. 2

Similarly, the interviewees observed that the future of education will prioritise preparing talents for the workforce, more focus on STEM education and skills development that will prepare learners for jobs in the digital economy. According to an interviewees:

> I also see a lot of focus on STEM and digital skills. Especially, you know there will be an increase in STEM, Science, technology, engineering, mathematical education and digital skills. Because this will prepare students for careers in the rapidly evolving digital economy that will address the skills gap in the workforce in Africa, you know. I'm sure you know that during the next 10 to 20 years Africa is projected to double its population, which is going to be crazy, right? So, with all of this comes challenges as well that we need to be very much prepared for. – Int. 1

> I've always been an advocate for the fact that there has to be an alignment in between what school is focusing on and what the society locally and globally, the industrial landscape is asking for. For example, in Africa there is a skill gap on the continent. Different kinds of reports are speaking to various skills that the industrial landscape is asking for. And so, I think that this kind of thing should now form the essence of what Learning looks like in our school environments. – Int. 5

This imaginative alignment of edtech with education-work relationship and wider economic imperatives suggest that the technology-centric revolution of education is based on the interest of producing agile and employable workforce that will service the demands of today's growing digital economy. As Teräs et al (2020) recounts, businesspeople, computer enthusiasts and politicians have always considered computers and other digital devices a magic bullet that can discipline students as a skilful future workforce.

Theme 9: Imaginary of Increased Adoption of AI

The future of education in Nigeria is also discussed to be characterised by increased adoption of artificial intelligence (AI) and other emerging digital technologies. As one of the interviewees claimed, "the future of learning with EdTech really is going to be driven by the emerging technologies, right? I mean I think that's a popular thought already. AI will be everywhere; machine learning will be everywhere" (Int. 7). The research participants were particularly enthusiastic about how they have begun to integrate AI systems into their edtech products and to talk about how AI is going to shape the future of education in Nigeria and Africa at large. As one of the interviewee notes; "we are beginning to incorporate AI into the work that we do so we can just reach more people with less resources." Primarily, technologies are seen as stable artefacts and educators; teachers and learners, would have to adapt to learning to use them. According to one of the interviewees,

> The future of teaching and learning will change, but the future of teaching and learning cannot be without the use of these technologies. The more you try to cut people off of these technologies, the more they are endeared to it. So, we have to ensure that we plan for them and find a suitable way to apply them to the classroom. – Int. 5

It was argued that AI and other emerging technologies will alter educational practice and change the way teaching and learning is conducted. In the words of some of the interviewees,

> Learning will also be reconstructed by artificial intelligence, because you're not going to be learning too hard. You're going to possibly be learning how to unlearn and learn. So, because AI will do the job for you, and you just need to learn how AI will do this job for you. – Int. 3

> So, I think that from what we're seeing today, I mean with respect to the evolution of AI, generative artificial intelligence, I think what is going to happen is personalization is going to be a reality. I mean, it's going to be a high possibility. It will become a reality. Because the challenge we've had before now is that because of the level of technology that has been available, right, personalization has been somewhat difficult. But I think that AI is going to really drive that strongly and so that's going to become a great possibility and it's really going to be easy for kids to learn. So even in a place like Nigeria, you know, AI is going to really help us in dealing with the out of school numbers. – Int. 2

> The future of education in Africa will see a significant shift, you know, towards personalised learning. Adaptive learning technologies and data analytics will allow educators to tailor educational content to individual students' needs, helping each learn how to progress at their own pace according to their own abilities. – Int. 8

As the quotes above suggest, the interviewees reason that the application of these technologies will lead to better personalisation of learning as well as advancement in learning analytics that will help teachers to effectively tailor lessons and track learners progress. This is significant because this constructions of education future imaginary towards personalization and datafication are consistent with the discursive construction of edtech as the means to achieve personalisation and data-driven decision making analysed in theme 1 and 2. As they maintain these consistent rhetoric, both in their discursive construction of edtech and in their conception of education future imaginary that privileges edtech dominance, this evidence shares insight into how private sector edtech actors can leverage their political and economic power, as suggested in theme 3 & 5, to promote certain values of technology in education in Nigeria, both now, and in the future.

Chapter 5: Discussion and Conclusion

5.1 Discussion

In this section, using the identified themes as my vintage point, I critically discuss my research findings, addressing how the conceptualization and discursive construction of edtech among private sector edtech actors implicates the political economy of edtech production and imaginaries of education futures in Nigeria.

Critically, the conceptualization of the purpose of edtech by the interviewees, as analysed in RQ1 have two implications within the context of this study. First, the discursive constructions employed by the interviewees to define the purpose of edtech can be argued to follow the logic of 'technological fix' in education, an attempt to leverage technology to provide technical solutions to educational problems. This phenomenon is recalled by Evgeny Morozov (2013) as the solutionism ideology, i.e., "recasting all complex social situations either as neatly defined problems with definite, computable solutions or as transparent and self-evident processes that can be easily optimized—if only the right algorithms are in place" (p.11). For example, as the analysis in theme 1 and theme 2 above shows, the interviewees generally defined the purpose of edtech as being able to solve a particular education problem as in the case of democratisation of education access, or to provide a technical solution to harmonise educational processes as in the example of interoperability under the discourse of digitisation.

Indeed, the kind of edtech narrative expressed by the interviewees is certainly not unheard in literature. Waves of enthusiasm for technological innovations that promise to revolutionise education have been around for several decades and such historical accounts are almost inexhaustive (Weller, 2020). The history of education has always been characterised by an unwavering faith in the 'power' of technology and its promise of a technical fix to educational challenges even when those challenges are non-technological in nature (Robins & Webster, 1989). As Selwyn (2022) argued, there has always been a broad presumption that the increased use of digital technology in education will progressively deliver along broad lines of reorganisation and transformation, often serving as a response to 'fix' a broken system.

This technology solutionism beliefs are often pervasive and as the evidence in RQ1 suggest, they are visibly promoted in a complex web of political economy, not least from edtech entrepreneurs and their disciplines of market economics. This principle of market economics was expressed by the edtech entrepreneurs that are part of this study, particularly in how they relate scale to not just increasing access to education through technological adoption but also from a business sense that applies the principle of economies of scale. For instance, one the interviewees explained that; "what scale does, I mean, we all know economies of scale by the way, is that you're able to offer the same edtech product to many people with less cost and stress, and the product becomes cheaper (Int. 6). This evidence suggest that the 'technological fix' discourse promoted by the research participants are entangled with business thinking and the profitability that may arise from large-scale distribution of edtech products.

The second implication of the emerging evidence from RQ1 is that the discursive constructions of edtech promoted by the research participants seek to validate a rhetoric that advances digital transformation of education as an inherent social good. However, the danger of advancing these kinds of discursive constructions of edtech is that the vested interest of the "relevant social groups" (Pinch & Bijker, 2012) who stand to benefit the most from this arrangement becomes obscured. In essence, such construction hides the politics as well as the economics of the so-called needed digital transformation of education. Considering that private sector edtech companies currently maintain a leading position in the edtech landscape in Nigeria, as literature suggest, these actors have the tendency to benefit from and also shape the meanings attached to the adoption of edtech in Nigeria. As Pinch and Bijker (1984) note, "the sociocultural and political situation of a social group shapes its norms and values, which in turn influence the meaning given to an artifact" (p. 428). As such, the discursive constructions promoted by private sector edtech actors, who are relevant social groups, are undoubtedly capable of shaping the social imaginary of education technology development and adoption in Nigeria. This is particularly relevant in the context of how private sector edtech actors occupy the role of both political and economic actors (see theme 3 and 5 in Chapter 4) who are using economic tools such as capital investments and political lobbying to seek leverage in influencing the development and adoption of edtech in Nigeria based on their interests. This material arrangement risks empowering private edtech companies to begin to implicitly promote specific desired futures of education technology

while facilitating a broader deployment of private interests into educational processes and continue to render public education into “private-corporate walled gardens" (Kerssens & van Dijck, 2023, p.96).

From these two implications, it is important to note that the definition of the purpose of edtech must go beyond technological solutionist discursive constructions. Contrary to what proponents and private sector edtech actors would promote, any attempt to conceptualise the purpose of edtech must account for the social, economic and political decisions that goes into the development and distribution of education technologies.

One of the emerging findings in RQ2, i.e., the configuration of the role of the private sector as big investors and active innovators capable of building innovative edtech products and expanding the edtech market beyond the scale of what the government can do reveals a connection between edtech production and historical neo-liberal capitalism. For example, the ideology of free markets and reduced State intervention advocated by the research participants in the sense of relegating the function of the State to policy-making as highlighted in theme 4 & 5 is consistent with the neo-liberal capitalist ideology which promotes the private sector as fast-moving drivers of innovation and economic growth (Mazzucato, 2018b). Consequently, the configuration of the role of private sector actors in terms of capital investment and market expansion suggests that capital and economic logic of marketisation and business modelling will be intensified in the production and distribution of edtech and as such, edtech is inevitably subject to economic logic of the market and so is the marketisation of education in general. The implication of this association between edtech and the interest of capital and capitalism, as Ball (2007) argues, is that “education is re-articulated as a resource for the economy, that is as productive, as income-generating and as a commodity” (p.30).

Furthermore, the construction of the private sector's role as responsible for scaling edtech into new markets in order to reach marginalised learners as highlighted in theme 3 can be argued to be aligned with the business model of scalability, which promotes values that are not necessarily educational. Although scaling the reach of edtech may indeed expand educational access, the language of scalability used by private sector edtech actors cannot be disentangled from the

interests of edtech companies who seeks “constant expansion into new markets and generate prospective value from the ‘network effects’ of accelerating user numbers” (Komljenovic et al., 2023, p.7).

Also, as the emerging findings under themes 5 & 6 suggest, the mechanisms through which private interests are pursued to be legitimised remain consistent with the protocol of public-private partnerships (PPPs) as seen in the literature. Although some scholars argue that PPPs are important for boosting education service delivery, particularly in contexts like Nigeria where public education is underfunded (Patrinos et al., 2009), PPPs are particularly vulnerable to spreading the ethos of neoliberal capitalism and accelerating the mechanism of the hidden privatisation of education (Ball & Youdell, 2007; Burch, 2009). As the findings in theme 5 suggests, a key aspiration of private edtech companies pursuing of PPPs is that government adoption of their edtech protect will lead to rapid growth and large-scale adoption of their products, which would ultimately deliver high returns on investment.

In light of the evidence emerging from RQ2, it remains critical to continue to challenge the assertions that the role of the government should be restricted to regulation and creating an enabling environment for private sector edtech innovation to thrive. As innovation economists would argue, the function of the state is not only about market fixing or regulating innovation but to actively lead the direction of innovation through strategic investments and mission-driven innovation policies (Mazzucato, 2018a). Indeed, it is positive to find that the Nigeria government also has a vision of what they want the adoption education technology should look like in the country. Notwithstanding, considering the increasing influence of private sector actors as they take up economic and political roles (as highlighted in theme 3 & 5), it will be worth investigating to what extent these private actors influence government agency.

As the analysis in RQ3 revealed, the vision of borderless education (theme 7) appears to be one of the desired futures of education among the research participants, especially an edtech supported education future. Notably, this evidence is consistent with existing attempts by marketers of online education that seek to promote policies and practices that will “push for placeless, apolitical schooling practices that undermine the ability of place-based school” (Cohen,

2024, p.276). At the core of the projections of the research participants, e.g., the estimation that learners in the future will have the opportunity to study 12 subjects from 12 different [virtual] schools or different platforms, are two implicit agendas. One is the implicit promotion of the individualisation of learning or learnification, as Biesta puts it, i.e., the replacement the language of education with the language of learning (Biesta, 2009). Central to the learnification agenda, as evident in the claims made by the interviewees, is the "underlying assumption that learners come to education with a clear understanding of what their needs are" (Biesta 2005, 59). In this way, as Biesta (2005) argued, the predefined needs of learners become a serviceable commodity that educational providers would have to supply, aligning public education to the rise of neo-liberal logic of market demand and supply. The other agenda implicit in the borderless education rhetoric, evident in the interviewees' imaginary of virtual schooling, is the inherent promotion of platfomisation of education, i.e., the transformation of educational content, activities and processes to become part of a (corporate) platform ecosystem, including its economies, infrastructures and technical architectures (Kerssens & van Dijck, 2023). One of the danger of this is that it risk delivering public education into mainstream platform economy and it socio-technical apparatus that facilitates the transformation of public service delivery into commercialized platforms & site of monetization.

One other piece of evidence emerging from the analysis of RQ3 is how the imaginaries of education futures discussed by the interviewees are strongly linked to economic imperatives and the global political economy of the labour market, as revealed under theme 8. Similar to the framing of education as delivering both public and private value, highlighted in the literature review chapter, the interviewees envision that external circumstances such as the demand for certain skills in the labour market and individual economic priorities will play a role in shaping what people learn and how edtech will support them to achieve such learning objectives. A dominant trend in this imaginary of education futures, as discussed by the interviewees, is the linkage between education and the burgeoning digital economy and the skills it demands, particularly in the area of STEM and digital skills. While it will be misleading to not consider how future learners will thrive in the evolving digital economy, the imaginary discourse presented by the interviewees risks attributing a causal relationship to the digital economy market demands and individual education priorities. As quoted under theme 8 where one of the interviewees recounts

that the change in workplace skills demand will affect education, the implication of this that, education will become a pipeline for servicing the global digital economy and it capitalism system while other function of education that relates to socialisation and subjectification might become subjugated (Biesta, 2009). Moreover, individual learners agency is more vulnerable to be subjected to the demand of the labour market and its economic logics.

Lastly, as the analysis in RQ3 suggests, the imaginary construction of education futures presented in the findings of this study is deeply entangled with the philosophy of technological determinism, a belief that "social progress is driven by technological innovation, which in turn follows an "inevitable" course" (Smith, 1994, p.38). These imaginaries, for example the almost absolute faith that AI and emerging technologies will automatically lead to positive transformation of teaching and learning (theme 9), projects a nearly utopian future of education, that fails to consider the evolving relationship between technology and society which is increasingly becoming intertwined with global capitalism and the influence of big tech corporations (Couldry & Mejias, 2019; Srnicek, 2017; Zuboff, 2019). As literature suggests, edtech and digital education more broadly has been "proven to extend and entrench the privatisation of public education, corporate control over key educational processes, and the exacerbation of oppressive conditions of individualisation, standardisation and surveillance" (Selwyn, 2023, p.2). Thus, the imaginary of education futures, as revealed in the findings, can be argued to be deeply connected with 'neoliberal utopian blueprint' that manifest in form of increased privatisation of public education, individualisation of learning and (re)structuring of education spaces into site of profit extraction (Van Dermijnsbrugge & Chatelier, 2022, p.12), and calls for critical research such as this that work to imagine otherwise.

5.2. Conclusion

As discussed in the introduction and literature review chapter, a growing body of theoretical and empirical studies have continued to investigate the burgeoning edtech landscape and the increasing activities of private sector actors within the circuit of production and distribution of edtech, and their shaping of education futures. Nonetheless, the majority of these studies are carried out in Europe, America, and Asia while the increasing engagement of private sector actors in the development of edtech in other regions like Sub-Sharan Africa remain largely under researched. Based on this evident gap in literature, this study set out to investigate the involvement of private sector edtech actors in the development of edtech in Nigeria and its implications on the imaginary of education futures from a political economy perspective. A political economy perspective was particularly adopted for this study because it provides a conceptual framework that can be used to investigate the social, economic and political nuances that contribute to the development and adoption of education technologies which are largely missing in other approaches that have been used to research edtech, for example, from a pure instrumental perspective (Selwyn and Facer, 2013).

Political economy as used in this study pays attention to how EdTech is connected with the interests of private edtech companies that act as economic and political actors who own, finance, produce, distribute and marketize education technologies. As Mirrlees & Alvi (2020) contends, "EdTech is not an island but part and product of society; it is shaped by and shapes the capitalist mode of production (the economic sphere), the State and civil society (the political sphere) and culture (the sphere of discourses, ideas and meanings)" (p.14). As such, the political economy framework as used in this study connects educational technology to larger economic, political and cultural-ideological social structures. By taking a critical approach that goes beyond edtech hype and normative questions of how technology can transform education, the study raises and tries to answer socially, economically and politically relevant questions.

Even though the meaning and the purpose of EdTech is complex and multifaceted, findings from the study have revealed that Edtech is primarily framed as a tool for transformation and reconfiguring education among the interviewed private edtech actors. Analogous to what Langdon Winner describes as mythinformation, i.e., "the almost religious conviction that a widespread

adoption of computers and communications systems and broad access to electronic information will automatically produce a better world for humanity" (Winner, 1984, p.585), the purpose of edtech as the research participants argue, construct edtech as an inherently good and neutral tool that can be used to deliver significant educational change. However, as I have argued in the discussion section above, EdTech means much more than a combination of hardware and software. Not least, all technological systems are part and product of a techno-social "system" that relies upon many other tools and people to function (Hughes, 2004). Defining the purpose of edtech must consider the complex web of social, economic and political factors that influence edtech development, considering what values are embedded into its design and who stands to benefit from such development. The implication of this, particularly for this study is that edtech is revealed as a site of political and economic contestation where different actors seek to establish their interests and values which inevitably contributes to the shaping of public education.

One other conclusion from this study is a call for the reconfiguration of the role of the private sector and the relationship these actors have with the government and educational institutions in the context of edtech development in Nigeria. As the analysis of the research question two have shown, private sector edtech actors are largely seeking to configure and legitimise their role as big investors and market enablers, promoting discourse of expertise and effectiveness. This kind of configuration risks putting a limitation on the ability of the government to direct edtech development for public good and ultimately put private sector actors at the centre of edtech development. In an era in which EdTech has been incorporated into the circuits of capital and capitalism, governments must act with agency to repurpose edtech for public good and strategically advance mission-driven approaches that will put educational values at the core of edtech development.

At the same time, as private edtech firms are promoting certain discursive construction of edtech, particularly those that configures edtech as the solution to the myriad problems facing the Nigeria education system, there is a need for the education community to develop critical understanding of the development and adoption of educational technologies. The pervasive ethos of constructing edtech as a tool to leapfrog educational development obfuscates social and economic structures that must be put in place for edtech to support learners, teachers and the

education community at large. As private sector EdTech actors and their products continue to make inroads into public education, promoting certain discursive construction of edtech that aligns with the education futures they envision – one that is entangled with the global neo-liberal capitalism – it is critical for the education community to question the interests and values promoted by these actors and seek to understand how edtech can be reconfigured to fit the social, economic, and political context in which it will be used. In addition to this, the neoliberal utopian blueprint for a better education imprinted in EdTech by private sector edtech actors needs to be reimagined. As Winner (2009) contends, it is always important to ask, "why is it always digital technology that is so heavily emphasized these days rather than other pedagogical approaches and other material resources?" (p.589). While it is not useful to think about the future of education without technology, it is important that we do not fall into the trap of continuous amnesia that fails to acknowledge how edtech has been in a cycle of hope and eventual disappointment because they fail to deliver their promised transformation (Selwyn, 2013). From this perspective, critical approaches must be embraced when we think about the future of education and how technology will play a role in shaping and be shaped by that future. This is particularly important to counter the extractive principle of edtech entrepreneurs and tech companies that seek to turn educational spaces into spaces for capital accumulation. The education community must strive to imagine alternatives.

Recognising the structural position of private sector edtech companies as 'economic and political actors' has shown in this study but also consistent with literature (Komljenovic et al., 2023), it is plausible to argue that these entities may have a significant influence in shaping the imaginary futures of education in Nigeria, particularly in the context of how edtech will play a role in shaping this future. This is particularly relevant in the sense that edtech and digital education in general is mostly present in public discussion of where education is headed (Bayne, 2023). Thus, future work could develop the findings presented in RQ3 of this study and investigate to what extent is the economic and political power of private sector actors shaping the design and process of education on the ground. I suggest this kind of work will benefit from ethnographic inquiry that is situated within the day-to-day discourse, practices and material arrangements of private sector edtech companies in Nigeria. Also, while this study through the analysis of qualitative data, particularly in RQ2 has established that the Nigeria government remain an important actor that

have a desired vision of edtech, the study has not gone further to study how much of private sector influence contribute to the shaping government edtech vison. As such, it will be significant for future work to investigate this area of research, providing empirical insights into how the political influence of private sector actors impact the political will of the government using a specific case study or other research design that is contextually relevant.

While the above recommendations for future research should be encouraged, it is important to emphasise that this study has provided meaningful empirical contributions that can aid the understanding of the role and activities of private sector edtech companies in the production and distribution of education technology in Nigeria. In the case of Nigeria where evidence of this type remains nascent, the empirical contributions from this study has shown that at the core of technological fix narrative about education technologies are capitalist ideologies that creates tension between the public mission of education and for-profit motives of edtech companies and private capital. The over-riding message from this study is not that we do away with education technologies or private-sector led edtech production, but that there is an increasing need for critical innovation in education technology development to address contemporary issues in education such as the neoliberal techno-utopianism of education futures (Bayne, 2023).

APPENDIX A: INTERVIEW SCHEDULE

Introduction

Hello, my name is [redacted] and I am a master student in Education (Digital and Social Change) at the University of Oxford. I am currently working on my dissertation and I am interested in investigating the political economy of private sector edtech companies and its implications for education futures in Nigeria. Thank you once again for your time and giving consent to be part of this research. You have being invited to take part in this research on the basis of your work as the founder of an edtech startup in Nigeria. This interview will last for about 30-45 minutes in a single day. You will not be contacted again else I need further information and if you consent to be recontacted. I will ask you couple of questions, about 5 of them, but I may also ask follow-up questions based on the flow of our conversation. Please don't hesitate to ask me any questions at any point during the interview. Before we begin, do you have any question?

(Answer any question raised by the interviewee)

Now, would you mind if I turn on the audio recording before we start the interview? (Await oral consent)

Indicative Interview Questions

1. It is interesting to see how different actors within the edtech industry define the purpose of edtech, how would you define the purpose of edtech? This could be specific to your edtech venture or more broadly

2. What do you think is/are the role of the private edtech companies in edtech development in Nigeria?

3. It is fascinating to see how your edtech venture is evolving, can you describe your motivation for designing the edtech product you are currently working on?

4. Looking at the edtech landscape in Nigeria, start-ups tend to have different prioritise for the types of edtech they design. For example, some startups focus on teacher centred edtech and some focus on student centred edtech among others. In your opinion and based on the realities of education in Nigeria, do you think there are specific forms of edtech that should be prioritised?

5. Based on your understanding and the vision you have for edtech, how would you describe the future of education, particularly in terms of how technology will be involved in that future?

APPENDIX B: CUREC APPROVAL

Tuesday, August 6, 2024 at 13:40:46 British Summer Time

Subject: CUREC Application EDUC_[redacted]
Date: Friday, 8 March 2024 at 21:34:15 Greenwich Mean Time
From: Faidra Faitaki
To: [redacted]
CC:
Attachments: EDUC_[redacted]

[redacted]

Thank you for your CUREC application EDUC_[redacted], which I have now reviewed and I am happy to approve. You will find the approval letter attached.

Please add the ethics reference on the public-facing documents, and remember to delete any advisory text (e.g., the first paragraph on the PIS document).

Best of luck with your research,
Faidra

Dr Faidra Faitaki, AFHEA
/ˈfɛðɹa faɪˈtaːki/ | she/her/hers
Departmental Lecturer in Applied Linguistics
Department of Education, University of Oxford
15 Norham Gardens, Oxford, OX2 6PY
Meeting Booking Link | Twitter | ResearchGate
CreATE Group | ELLMEnet

References

Abilmazhinova, O. S., Janbubekova, M. Z., Belenko, O. G., Abisheva, S. S., & Kassymova, G. K. (2021). Development of creative abilities of students using art technologies in the higher education. Ilkogretim Online, 20(1).

Adediran, A., Adedeji, A., Nwosu, E., Nwugo, E., & Nnamani, G. (2023). Ed-Tech landscape and challenges in Sub-Saharan Africa. Southern Voice.

Adomi, E.E. and Kpangban, E. (2010), "Application of ICTs in Nigerian secondary schools", Library Philosophy and Practice, pp. 1-8, available at: http://citeseerx.ist.psu.edu/viewdoc/download? doi510.1.1.600.663&rep5rep1&type5pdf (accessed 20 May 2020).

Anikweze, C. M., & Kanu, A. C. (2018). Information and communication technology (ICT) and 21st century education in Nigeria.

Arkorful, V., & Abaidoo, N. (2015). The role of e-learning, advantages and disadvantages of its adoption in higher education. International journal of instructional technology and distance learning, 12(1), 29-42.

Atkinson, P., & Delamont, S. (2005). Analytic perspectives. In N. K. Denzin & Y. Lincoln (Eds.), The SAGE Handbook of Qualitative Research (3rd ed.). SAGE.

Ball, S. J. (2007). Education Plc: Understanding private sector participation in public sector education. Routledge.

Ball, S. J. (2009). Privatising education, privatising education policy, privatising educational research: Network governance and the 'competition state.' Journal of Education Policy, 24(1), 83–99. https://doi.org/10.1080/02680930802419474

Ball, S. J., & Youdell, D. (2007). Hidden Privatisation in Public Education , Education International 5th World Congress Preliminary Report, University of London.

Barbrook, R., & Cameron, A. (1996). The Californian ideology. Science as Culture, 6(1), 44–72. https://doi.org/10.1080/09505439609526455

Bassey, M. (1999). Case study research in educational settings. Open University Press.

Bayne, S. (2023). Digital education utopia. Learning, Media and Technology, 1–16. https://doi.org/10.1080/17439884.2023.2262382

Bender, D. M., & Vredevoogd, J. D. (2006). Using online education technologies to support studio instruction. Journal of Educational Technology & Society, 9(4), 114-122.

Biesta, G. (2009). Good education in an age of measurement: On the need to reconnect with the question of purpose in education. Educational Assessment, Evaluation and Accountability (formerly: Journal of Personnel Evaluation in Education), 21, 33-46.

Biesta, Gert. 2005. "Against Learning. Reclaiming a Language for Education in an age of Learning." Nordisk Pedagogik 25 (1): 54–66.

Blair, N., & Collins-Gearing, B. (2017). Reflective Practice: Ancient Wisdom and Practice—Australian Indigenous Reflections in Teacher Education Through Shared Storying. In R. Brandenburg, K. Glasswell, M. Jones, & J. Ryan (Eds.), Reflective Theory and Practice in Teacher Education (Vol. 17, pp. 63–83). Springer Singapore. https://doi.org/10.1007/978-981-10-3431-2_4

Bowles, S., & Gintis, H. (1976). Schooling in capitalist America: Educational reform and the contradictions of economic life. Routledge & Kegan Paul.

Bozalek, V., Ng'ambi, D., & Gachago, D. (2013). Transforming teaching with emerging technologies: Implications for higher education institutions. South African Journal of

Higher Education, 27(2), 419-436.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Brem, A., Viardot, E., & Nylund, P. A. (2021). Implications of the coronavirus (COVID-19) outbreak for innovation: Which technologies will improve our lives? Technological forecasting and social change, 163, 120451.

Buckingham, D. (2003). Media Education: Literacy, Learning and Contemporary Culture. Polity Press.

Burch, P. (2009). Hidden markets the new education privatization. Routledge.

Camilleri, M. A., & Camilleri, A. C. (2022). The acceptance of learning management systems and video conferencing technologies: Lessons learned from COVID-19. Technology, Knowledge and Learning, 27(4), 1311-1333.

Caporaso, J. A., & Levine, D. P. (1992). Theories of Political Economy (1st ed.). Cambridge University Press. https://doi.org/10.1017/CBO9780511840197

Carnoy, M. (2024). The Political Economy of Education. Cambridge University Press.

Carnoy, M., & Levin, H. (1985). Schooling and work in the democratic state. Stanford University Press.

Coffey, A., & Atkinson, P. (1996). Making sense of qualitative data: Complementary research strategies. SAGE.

Cohen, D. (2022). Any Time, Any Place, Any Way, Any Pace: Markets, EdTech, and the spaces of schooling. Environment and Planning A: Economy and Space, 0308518X2210847. https://doi.org/10.1177/0308518X221084708

Collis, B., & Jung, I. (2004). Uses of information and communication technologies in teacher

education. In Teacher education through open and distance learning (pp. 171-192). Routledge.

Couldry, N., & Mejias, U. A. (2019). Data Colonialism: Rethinking Big Data's Relation to the Contemporary Subject. Television & New Media, 20(4), 336–349. https://doi.org/10.1177/1527476418796632

Creswell, J. W. (2013). Qualitative inquiry & research design: Choosing among five approaches (3rd ed.). SAGE Publications Ltd.

Czerniewicz, L., & Feldman, J. (2023). 'Technology is not created by the sky': Datafication and educator unease. Learning, Media and Technology, 1–14.https://doi.org/10.1080/17439884.2023.2206137

Davies, H., Eynon, R., Komljenovic, J., & Williamson, B. (2022). Investigating the financial power brokers behind EdTech. Education Data Futures: Critical, Regulatory and Practical Reflections. https://educationdatafutures.digitalfuturescommission.org.uk/about

Denzin, N. k, & Lincoln, Y. (2011). Introduction: The discipline and practice of qualitative research. In The Sage handbook of qualitative research (4th ed.). SAGE.

Dunn, B. (2022). The Marxist tradition in political economy. In F. Stilwell, D. Primrose, & T. Thornton (Eds.), Handbook of Alternative Theories of Political Economy (pp. 51–65). Edward Elgar Publishing. https://doi.org/10.4337/9781789909067.00010

Ellul, J. (1964). The technological society. Vintage Books.

Facer, K. (2011). Learning Futures: Education, Technology and Social Change. Taylor & Francis Group.

Fairclough, N. (2001). Language and power (2nd ed.). Longman.

Fairclough, N. (2003). Analysing discourse: Textual analysis for social research. Routledge.

Fairclough, N. (2010). Critical discourse analysis: the critical study of language (2nd ed.). Longman.

Federal Ministry of Education (2019). National Policy on Information and Communication technologies (ICT) in Education

Federal Republic of Nigeria (2001). Nigeria National policy for Information Technology (IT)

Feenberg, A. (2002). Transforming Technology: A Critical Theory Revisited.

Firestone, W. A. (1987). Meaning in Method: The Rhetoric of Quantitative and Qualitative Research. Educational Researcher, 16(7), 16–21.

Fontana, A., & Frey, J. (2005). The Interview. In N. K. Denzin & Y. Lincoln (Eds.), The Sage handbook of qualitative research. SAGE.

Fraser, S., & Robinson, C. (2004). Paradigms and Philosophy. In S. Fraser, V. Lewis, S. Ding, M. Kellett, & C. Robinson (Eds.), Doing Research with Children and Young People. SAGE Publications Ltd.

Freebody, P. (2003). Qualitative research in education interaction and practice. SAGE.

Friesen, N. (2009). Re-Thinking e-Learning Research: Foundations, Methods, and Practices. Peter Lang.

Ginsburg, M. (2012). Public Private Partnerships, Neoliberal Globalization and Democratization. In S. L. Robertson, K. Mundy, A. Verger, & F. Menashy (Eds.), Public Private Partnerships in Education. Edward Elgar Publishing. https://doi.org/10.4337/9780857930699.00011

Gradstein, M., Justman, M., & Meier, V. (2005). The political economy of education: Implications for growth and inequality. MIT Press.

Guba, E., & Lincoln, Y. (1994). The SAGE Handbook of Qualitative Research (D. Norman & Y.

Lincoln, Eds.). SAGE Publications Ltd.

Hakimi, L., Eynon, R., & Murphy, V. A. (2021). The Ethics of Using Digital Trace Data in Education: A Thematic Review of the Research Landscape.

Hamilton, E., & Friesen, N. (2013). Online Education: A Science and Technology Studies Perspective / Éducation en ligne: Perspective des études en science et technologie. Canadian Journal of Learning and Technology / La Revue Canadienne de l'apprentissage et de La Technologie, 39(2). https://doi.org/10.21432/T2001C

Hatcher, R. (2006). Privatization and sponsorship: The re-agenting of the school system in England 1. Journal of Education Policy, 21(5), 599–619. https://doi.org/10.1080/02680930600866199

Henry, J. V., Oliver, M., & Winters, N. (2019). Global-local divides and ontological politics: Feminist STS perspectives on mobile learning for community health workers in Kenya. Learning, Media and Technology, 44(3), 235–251. https://doi.org/10.1080/17439884.2019.1628047

Hoffmann, A. L., Proferes, N., & Zimmer, M. (2018). "Making the world more open and connected": Mark Zuckerberg and the discursive construction of Facebook and its users. New Media & Society, 20(1), 199–218. https://doi.org/10.1177/1461444816660784

Hughes, P. (2010). Paradigms, methods and knowledge. In S. Rolfe & I. Siraj-Blatchford (Eds.), Doing Early Childhood Research (2nd ed., p. 400). Routledge.

Hughes, T. (2004). Human-built world: How to think about technology and culture. University of Chicago Press.

Javaid, M., Haleem, A., Singh, R. P., Haq, M. I. U., Raina, A., & Suman, R. (2020). Industry 5.0: Potential applications in COVID-19. Journal of Industrial Integration and Management,

5(04), 507-530.

Jevsikova, T., Stupurienė, G., Stumbrienė, D., Juškevičienė, A., & Dagienė, V. (2021). Acceptance of distance learning technologies by teachers: Determining factors and emergency state influence. Informatica, 32(3), 517-542.

Kerssens, N., & van Dijck, J. (2023). How platformisation affects pedagogical autonomy in primary schools. In B. Williamson, J. Komljenovic, & K. N. Gulson (Eds.), World Yearbook of Education 2024. Taylor & Francis Group.

Kerssens, N., & van Dijck, J. (2023). How platformisation affects pedagogical autonomy in primary schools. In B. Williamson, J. Komljenovic, & K. N. Gulson (Eds.), World Yearbook of Education 2024. Taylor & Francis Group.

King, E. (2009). Foreword. In H. Patrinos, F. Barrera-Osorio, & J. Guaqueta (Eds.), The Role and Impact of Public Private Partnerships in Education. World Bank Group.

Kitchin, R. (2014).The data revolution: Big data, open data, data infrastructures andtheir consequences. London: Sage.

Knox, J., Ben, W., & Sian, B. (2020). Machine behaviourism: Future visions of ‘learnification’ and ‘datafication’ across humans and digital technologies.

Komljenovic, J. (2021). The rise of education rentiers: Digital platforms, digital data and rents. Learning, Media and Technology, 46(3), 320–332. https://doi.org/10.1080/17439884.2021.1891422

Komljenovic, J., Williamson, B., Eynon, R., & Davies, H. C. (2023). When public policy ‘fails’ and venture capital ‘saves’ education: Edtech investors as economic and political actors. Globalisation, Societies and Education, 1–16. https://doi.org/10.1080/14767724.2023.2272134

Kozma, R., Surya Vota, W., & Spector, M. (2014). ICT in Developing Countries: Policies, Implementation, and Impact. In D. Merrill, J. Elen, & M. J. Bishop (Eds.), Handbook of Research on Educational Communications and Technology. Springer. https://doi.org/10.1007/978-1-4614-3185-5_72

Kudratilloev, N. A., & Akhmedov, B. A. (2021). Application of communication-cluster technologies in pedagogical institutions: interactive methods of processing graphic data. Scientific Progress, 1(5), 191-198.

Lai, S. S., Andelsman, V., & Flensburg, S. (2023). Datafied school life: The hidden commodification of digital learning. Learning, Media and Technology, 1–17. https://doi.org/10.1080/17439884.2023.2219063

Levin, H. (1999). The public-private nexus in education. American Behavioral Scientist, 43(1), 124–137. https://doi.org/10.1177/0002764299043001008

Lincoln, Y., & Guba, E. (1985). Naturalistic inquiry. SAGE.

Macgilchrist, F. (2021). What is 'critical' in critical studies of edtech? Three responses. Learning, Media and Technology, 46(3), 243–249. https://doi.org/10.1080/17439884.2021.1958843

Macpherson, I., Robertson, S. L., & Walford, G. (2014). An Introducation to Privatisation, Education, and social justice. In I. Macpherson, S. L. Robertson, & G. Walford (Eds.), Education, privatisation and social justice: Case studies from Africa, South Asia and South East Asia. Symposium Books.

Major, H., & Savin-Baden, M. (2012). An Introduction to Qualitative Research Synthesis Managing the Information Explosion in Social Science Research. Taylor & Francis Group.

Mazzucato, M. (2018a). Mission-oriented innovation policy. UCL Institute for innovation and public purpose working paper, 1

Mazzucato, M. (2018b). The entrepreneurial state: Debunking public vs private sector myths. Penguin Books.

Merriam, S., & Tisdell, E. (2016). Qualitative research: A guide to design and implementation (Fourth). Jossey-Bass.

Mertens, M. D. (2010). Transformative Mixed Methods Research. Qualitative Inquiry, 16(6), 469–474. https://doi.org/10.1177/1077800410364612

Miles, M., & Huberman, A. M. (1994). Qualitative data analysis: An expanded sourcebook (2nd ed.). SAGE.

Mirrlees, T., & Alvi, S. (2020). EdTech Inc. : Selling, automating and globalizing higher education in the digital age. Routledge.

Morgan, J. (2022). Classical political economy and its ongoing relevance. In F. Stilwell, D. Primrose, & T. Thornton (Eds.), Handbook of Alternative Theories of Political Economy (pp. 33–50). Edward Elgar Publishing. https://doi.org/10.4337/9781789909067.00009

Morozov, E. (2013). To save everything, click here: Technology, solutionism and the urge to fix problems that don’t exist. ALLEN LANE.

Mosco, V. (2009). The political economy of communication (Second). SAGE Publications Ltd.

Nichols, T. P., & Dixon-Román, E. (2024). Platform Governance and Education Policy: Power and Politics in Emerging Edtech Ecologies. Educational Evaluation and Policy Analysis, 46(2), 309-328. https://doi.org/10.3102/01623737231202469

Nichols, T. P., LeBlanc, J., & Garcia, A. (2023). After digital literacy: Media pedagogies for platform ecologies. In B. Williamson, J. Komljenovic, & K. N. Gulson (Eds.), World

Yearbook of Education 2024. Taylor & Francis Group.

Okebukola, P. (2004). E-learning in varsities, others underway, NUC boss lists strategies. The Guardian (12 October): 35, 39.

Oliver, M. (2011). Technological determinism in educational technology research: Some alternative ways of thinking about the relationship between learning and technology: Educational technology and determinism. Journal of Computer Assisted Learning, 27(5), 373–384. https://doi.org/10.1111/j.1365-2729.2011.00406.x

Oliver, M. (2016). What is Technology? In The wiley handbook of learning technology. John Wiley & Sons, Incorporated.

Oliver, P. (2010). Understanding the Research Process. SAGE Publications Ltd. https://doi.org/10.4135/9781446279373

Patrinos, H., Barrera-Osorio, F., & Guaqueta, J. (Eds.). (2009). The Role and Impact of Public Private Partnerships in Education. World Bank Group.

Patrinos, H., Barrera-Osorio, F., & Guaqueta, J. (Eds.). (2009). The Role and Impact of Public Private Partnerships in Education. World Bank Group.

Patton, Q. (1985). Quality in qualitative research: Methodological principles and recent developments, Invited address to Division J of the American Educational Research Association, Chicago, Il.

Patton, Q. (2015). Qualitative research & evaluation methods (4th ed.). SAGE.

Pinch, T. J., & Bijker, W. E. (2012). The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other.

Pring, R. (2000). The 'False Dualism' of Educational Research. Journal of Philosophy of Education, 34(2), 247–260. https://doi.org/10.1111/1467-9752.00171

Pring, R. (2015). Philosophy of Educational Research. Bloomsbury Academic. http://doi.org/10.5040/9781474228596

Punch, K., & Oancea, A. (2014). Introduction to research methods in education (2nd ed.). SAGE.

Regan, P. M., & Khwaja, E. T. (2019). Mapping the political economy of education technology: A networks perspective. Policy Futures in Education, 17(8), 1000–1023. https://doi.org/10.1177/1478210318819495

Richardson, L. (1990). Writing strategies: Reaching diverse audiences. SAGE.

Robertson, S. L. (2010). Market Multilateralism, the World Bank Group, 1 and the Asymmetries of Globalizing Higher Education Toward a Critical Political Economy Analysis. In R. M. Bassett & A. Maldonado-Maldonado (Eds.), International Organizations and Higher Education Policy: Thinking Globally, Acting Locally? (0 ed.). Routledge. https://doi.org/10.4324/9780203876664

Robertson, S. L., & Dale, R. (2015). Towards a 'critical cultural political economy' account of the globalising of education. Globalisation, Societies and Education, 13(1), 149–170. https://doi.org/10.1080/14767724.2014.967502

Robertson, S. L., & Verger, A. (2012). Governing Education through Public Private Partnerships. In S. L. Robertson, K. Mundy, A. Verger, & F. Menashy (Eds.), Public Private Partnerships in Education. Edward Elgar Publishing. https://doi.org/10.4337/9780857930699.00009

Robins, K., & Webster, F. (1989). The Technical Fix: Education, Computers and Industry. Macmillan.

Rodriguez-Segura, D. (2022). Ed-tech in developing countries: A review of the evidence. The World Bank Research Observer, 37(2), 171-203. https://doi.org/10.1093/wbro/lkab011

Rodriguez-Segura, D. (2022). EdTech in Developing Countries: A Review of the Evidence. The World Bank Research Observer, 37(2), 171–203. https://doi.org/10.1093/wbro/lkab011

Rushby, N., & Surry, D. W. (2016). Mapping the Field and Terminology. In N. Rushby & D. W. Surry (Eds.), The Wiley Handbook of Learning Technology (1st ed., pp. 1–14). Wiley. https://doi.org/10.1002/9781118736494.ch1

Sandars, J., & Schroter, S. (2007). Web 2.0 technologies for undergraduate and postgraduate medical education: an online survey. Postgraduate medical journal, 83(986), 759-762.

Schelly, C., Anzalone, G., Wijnen, B., & Pearce, J. M. (2015). Open-source 3-D printing technologies for education: Bringing additive manufacturing to the classroom. Journal of Visual Languages & Computing, 28, 226-237.

Scott, D., & Usher, R. (Eds.). (1996). Understanding educational research. Routledge.

Selinger, M. (2009). ICT in education: Catalyst for development. In T. Unwin (Ed.), ICT4D: Information and communication technology for development. Cambridge University Press.

Sellar, S. (2017). Making network markets in education: The development of data infrastructure in Australian schooling. Globalisation, Societies and Education, 15(3), 341–351. https://doi.org/10.1080/14767724.2017.1330137

Selwyn, N. (2002). Telling tales on technology: Qualitative studies of technology and education. Ashgate.

Selwyn, N. (2011). Schools and Scholing in the Digital Age. Routledge.

Selwyn, N. (2012). Making sense of young people, education and digital technology: The role of sociological theory. Oxford Review of Education, 38(1), 81–96. https://doi.org/10.1080/03054985.2011.577949

Selwyn, N. (2013). EDUCATION IN A DITIAL WORLD: Global Perspective on Technology and Education. Taylor & Francis Group.

Selwyn, N. (2016). Digital Technology and Educational Change. In Is Technology Good for Education? Polity Press.

Selwyn, N. (2022). Education and technology: Key issues and debates (Third edition). Bloomsbury Academic.

Selwyn, N. (2023). Digital degrowth: Toward radically sustainable education technology. Learning, Media and Technology, 49(2), 186–199. https://doi.org/10.1080/17439884.2022.2159978

Selwyn, N., & Facer, K. (2013). Introduction: The Need for a Politics of Education and Technology. In N. Selwyn & K. Facer (Eds.), The Politics of Education and Technology (pp. 1–17). Palgrave Macmillan US. https://doi.org/10.1057/9781137031983_1

Selwyn, N., Hillman, T., Eynon, R., Ferreira, G., Knox, J., Macgilchrist, F., & Sancho-Gil, J. M. (2020). What's next for Ed-Tech? Critical hopes and concerns for the 2020s. Learning, Media and Technology, 45(1), 1–6. https://doi.org/10.1080/17439884.2020.1694945

Sharp, J. (2009). Success with your Education Research Project. Exeter: Learning Matters Ltd.

Skiba, D. J., Connors, H. R., & Jeffries, P. R. (2008). Information technologies and the transformation of nursing education. Nursing Outlook, 56(5), 225-230.

Smith, M. (1994). Does technology drive history? The dilemma of technological determinism (M. Smith & L. Marx, Eds.). MIT Press.

Srnicek, N. (2017). Platform capitalism. Polity Press.

Stake, R. (1995). The art of case study research. SAGE.

Starr, P. (1989). 1. The Meaning of Privatization. In S. B. Kamerman & A. J. Kahn (Eds.),

Privatization and the Welfare State (pp. 15–48). Princeton University Press. https://doi.org/10.1515/9781400860135.15

Stiegler, B. (2010). For a new critique of political economy. Policy Press.

Stilwell, F., Primrose, D., & B. Thornton, T. (2022). Introduction to the Handbook of Alternative Theories of Political Economy. In F. Stilwell, D. Primrose, & T. Thornton (Eds.), Handbook of Alternative Theories of Political Economy (pp. 2–15). Edward Elgar Publishing. https://doi.org/10.4337/9781789909067.00006

Stone, A., Briggs, J., & Smith, C. (2002, August). SMS and interactivity-some results from the field, and its implications on effective uses of mobile technologies in education. In Proceedings. IEEE International Workshop on Wireless and Mobile Technologies in Education (pp. 147-151). IEEE

Stubbs, M. (1997). Whorf's children: Critical comments on critical discourse analysis. In A. Ryan & A. Wray (Eds.), Evolving models of language (pp. 100–116). Multilingual Matters.

Sutherland, R. (2014). Education and Social Justice in a Digital Age. Policy Press.

Tabb, W. (1999). Reconstructing political economy: The great divide in economic thought. Routledge. Routledge. https://doi.org/10.4324/9780203049310

Taylor, S. (2001). Locating and Conducting Discourse Analytic Research. In M. Wetherell, S. Taylor, & S. Yates, Discourse as data: A guide for analysis. SAGE in association with The Open University.

Taylor, S., Bogdan, R., & DeVault, M. (2015). Introduction to Qualitative Research Methods: A Guidebook and Resource (4th ed.). John Wiley & Sons, Incorporated.

TechCrunch. (2023). Co-Creation Hub's ed-tech accelerator puts $15m towards African startups.

https://techcrunch.com/2023/02/17/co-creation-hubs-ed-tech-acceleratorputs 15m-towards-african-startups/

UNESCO. (2023). Technology-enabled Open Schools for All. UNESCO

UNESCO. (2023). Technology-enabled Open Schools for All. UNESCO. https://www.unesco.org/en/digital-education/teoss

UNICEF. (n.d.). Global Learning Passport! Retrieved April 7, 2024, from https://global.learningpassport.unicef.org/

United Nations. (2015). Transforming our world: the 2030 Agenda for Sustainable Development. https://sdgs.un.org/publications/transforming-our-world-2030agenda-sustainable-development-17981

Van Dermijnsbrugge, E., & Chatelier, S. (2022). Utopia as method: A response to education in crisis? Asia Pacific Journal of Education, 42(sup1), 6–19. https://doi.org/10.1080/02188791.2022.2031870

Watty, K., McKay, J., & Ngo, L. (2016). Innovators or inhibitors? Accounting faculty resistance to new educational technologies in higher education. Journal of Accounting Education, 36, 1-15.

Weingast, B. R., & Wittman, D. A. (2009). The Reach of Political Economy. In D. A. Wittman & B. R. Weingast (Eds.), The Oxford Handbook of Political Economy (1st ed., pp. 3–26). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199548477.003.0001

Weller, M. (2020). 25 Years of Ed Tech. Athabasca University Press. https://doi.org/10.15215/aupress/9781771993050.01

Williamson, B. (2019). Datafication of education: a critical approach to emerging analytics technologies and practices. In Rethinking pedagogy for a digital age (pp. 212-226). Routledge.

Williamson, B., Eynon, R., Knox, J., & Davies, H. (2023). Critical perspectives on AI in education: Political economy, discrimination, commercialization, governance and ethics. In B. Du Boulay, A. Mitrovic, & K. Yacef (Eds.), Handbook of Artificial Intelligence in Education (pp. 553–570). Edward Elgar Publishing. https://doi.org/10.4337/9781800375413.00037

Williamson, B., Gulson, K. N., Perrotta, C., & Witzenberger, K. (2022). Amazon and the New Global Connective Architectures of Education Governance. Harvard Educational Review, 92(2), 231–256. https://doi.org/10.17763/1943-5045-92.2.231

Winner, L. (2009). Information Technology and Educational Amnesia. Policy Futures in Education, 7(6), 587–591. https://doi.org/10.2304/pfie.2009.7.6.587

Wolcott, Harry. F. (1990). On seeking-and-rejecting-validity in qualitative research. In E. W. Eisner & A. Peshkin (Eds.), Qualitative inquiry in education: The continuing debate (pp. 121–152). Teachers College Press.

World Bank. (2020). Edo Basic Education Sector And Skills Transformation Operation. Technical Assessment

World Bank. (2020). Reimagining Human Connections: Technology and Innovation in Education at the World Bank. World Bank.

Yin, R., K. (2014). Case study research: Design and methods (5th ed.). SAGE.

Yusuf, A., Ajidagba, U. A., Yusuf, H. T., Amali, I. O. O., Bello, M., & Oniye, M. I. (2012). How do teachers approach innovations: upper basic school teacher's attitude towards schools

connet and multi-choice resource centres in Ilorin, Nigeria. European Scientific Journal, 8(8), 51-60.

Zuboff, S. (2019). The age of surveillance capitalism: The fight for a human future at the new frontier of power (First trade paperback edition). Public Affairs.