Shaping Minds, Shaping Machines: The Quiet Revolution of AI in UNESCO's Educational Dream

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Abstract:

Artificial intelligence (AI) has increasingly become an essential and imminent component of educational governance and policy formulation with internationally influential organizations such as UNESCO who play a pivotal role in shaping the global discourse on its integration. This thesis critically examines the way that UNESCO's educational guidelines of AI in education construct sociotechnical imaginaries of the future of the educational system by specifically focusing on how these imaginaries envision critical pedagogy and critical thought, human agency, and datafication. This study employed the concept of sociotechnical imaginaries proposed by Sheila Jasanoff (2015) and deconstructed them through Bacchi's problematizations approach revealing implicitly embedded underlying assumptions of AI's role in the future of education. The findings exposed three dominant imaginaries around the main themes of this research, namely, AI as a tool for critical pedagogy and critical thought, AI as a mediator of human agency, and AI as a data-driven governance tool. The presented imaginaries portray AI as an inevitable and transformative force within the educational system while also acknowledging persistent tensions with regard to automation, teacher autonomy, and algorithmic decision making. As UNESCO's policy guidelines frame AI as a beneficial mechanism for fostering inclusivity and personalized learning there is a determined conception that its effectiveness is contingent upon digital access, infrastructure, and governance design which still remain unevenly distributed throughout the global educational domain. Through the critical investigation of these imaginaries, this thesis underlined the way AI is framed as a technological solution to existing systemic challenges which oversighted structural inequalities and ethical considerations. This research contributed to the growing understanding and discourse on AI and the future of education by offering a nuanced critique of the manner in which policy frameworks shape expectations. Ultimately, this thesis highlights the necessity for a more context-sensitive and critical approach to the policy formulation of AI in education. One which is capable of addressing the complex socio-political realities which essentially define the global educational system without being blinded by the deterministic vision of technological progress.

Table of Contents:

Chapter 1) Introduction……...…… 3

Chapter 2) Theoretical Background…….7

2.1) The Evolution of Social Imaginaries……7

2.2) Sociotechnical Imaginaries and Artificial Intelligence……..10

2.3) Problematizations……...……15

Chapter 3) Methodology……...……..16

3.1) Research Approach…….16

3.2) Document Selection……17

3.3) Analytical Framework……19

3.4) Analytical Process…….…….19

Chapter 4) Results……...…….…..21

4.1) AI as a Tool for Critical pedagogy and Critical Thought…….……..21

4.2) Human Agency in an AI-Augmented Environment……..…….23

4.3) Datafication and AI as a Data-Driven Tool……26

Chapter 5) Discussion……29

5.1) A Tension Between Empowerment and Instrumentality……29

5.2) Human Agency and AI: Co-Creation or Automation…….……32

5.3) Datafication: The Promise and Perils of AI-Driven Governance……...…….35

5.4) Limitations……..38

Chapter 6) Conclusion……...39

References…….…….40

Tables List:

1) *Table consisting of the UNESCO selected documents*

Chapter 1: Introduction

Throughout recent years, we have experienced a rapid acceleration of computer and information processing techniques, enabling the advancement and application of Artificial Intelligence (AI) within society and daily life. AI is increasingly perceived as a transformative force in education, shaping pedagogical practices, administrative processes, and policy frameworks worldwide. AI-driven technologies such as adaptive learning systems, automated assessments, and intelligent tutoring systems offer personalized instruction and instant feedback. Some advocates highlight AI's potential to enhance efficiency, improve accessibility, and bridge educational disparities, while others warn of growing issues related to surveillance, data privacy, algorithmic bias, and the dehumanization of education (Williamson, 2017; Jarke & Breiter, 2019; Anagnostopoulos et al., 2013; Selwyn, 2015; Livingstone & Sefton-Green, 2016). Despite the expanding literature on AI's influence in education, much existing research emphasizes the technological affordances of AI tools and ethical considerations regarding their implementation. There is significantly less focus on the broader sociotechnical imaginaries shaping how AI is envisioned in education policy. Jasanoff and Kim (2015) define sociotechnical imaginaries as collectively held visions of desirable technological futures that influence policy decisions and governance structures. These imaginaries frame AI as an inevitable technological advancement and a necessary intervention in the face of systemic educational challenges (Mamlok, 2024). Understanding these imaginaries is vital, as they shape how AI is problematized, the proposed solutions, and the values embedded in educational policy. This research addresses these questions by analyzing UNESCO's AI in education policy guidelines to explore how AI is portrayed as a transformative force in education and how these imaginaries influence critical pedagogy, human agency, and datafication.

UNESCO is an agency of the United Nations established in 1945 which promotes peace and sustainable development through education, science, culture, and communication. It advances global initiatives aligned with the United Nations' Sustainable Development Goals, particularly SDG 4, which focuses on universal access to quality education (UNESC, 2019). UNESCO sets international standards, fosters innovation, and promotes inclusivity and equity, positioning it as a key player in shaping policies on emerging technologies like AI in education. UNESCO AI in

education frameworks articulate an aspirational vision for integrating AI to address challenges such as inclusion, equity, and the evolving needs of learners in the digital age. The adoption of AI in education has not only altered educational systems but has reshaped knowledge dissemination, cognition, and learning processes. While UNESCO emphasizes AI's potential to enhance access, improve learning outcomes, and foster innovative teaching, its policies raise critical questions about AI's impact on the complex dynamics of education. Like most policy discourses, these guidelines are shaped by assumptions about society's relationship with technology and reflect socio-technical imaginaries.

Considering AI's increasing role in global education policy, this thesis seeks to answer the following research question:

How do the UNESCO AI in education guidelines construct socio-technical imaginaries of the future of education, and how do these imaginaries address critical pedagogy and critical thinking, human agency, and datafication?

Despite the influence of UNESCO on AI in education policy, there is a lack of systematic research analyzing the sociotechnical imaginaries embedded within its documents. Policy frameworks construct visions of the future, contributing to the normalization of AI as an integral aspect of educational transformation (Selwyn, 2021). UNESCO's sociotechnical imaginaries shape AI's governance, its role in fostering equity, and its broader educational implications. This research employs Bacchi's (2009) problematization approach to examine how UNESCO frames AI as a solution to educational challenges. Problematization refers to how certain issues are constructed as problems in need of technological solutions. AI is frequently positioned as a response to inefficiencies in education, offering solutions such as automated grading, intelligent content recommendations, and predictive analytics. However, such framing risks depoliticizing systemic inequalities by shifting attention away from structural issues like funding disparities, teacher shortages, and curriculum development. This study interrogates these problematizations to assess how AI is embedded in policy discourse and the assumptions underlying these framings.

To address this research gap, this study critically analyzes the UNESCO AI in education guidelines in three areas: critical pedagogy, human agency, and datafication. Critical pedagogy and critical thinking is the foundation of Freire and Giroux's work (2021), critical pedagogy emphasizes fostering critical thinking and reflexivity in education. AI is often framed as a tool to enhance learning efficiency, but limited attention is given to whether it encourages deeper inquiry or reinforces standardized learning models. In accordance with human agency, AI is frequently presented as augmenting human decision-making, but concerns persist about automation diminishing teacher autonomy and reducing students to passive recipients of algorithmically curated content (Williamson, Bayne, & Shay 2020). This study examines how UNESCO's documents conceptualize human agency in relation to AI, questioning whether they reinforce or challenge technological determinism. Datafication and AI-driven analytics are increasingly used to monitor student performance, inform policy decisions, and shape curricula. However, this raises concerns about surveillance, algorithmic bias, and the commodification of student data. Drawing on research on datafication in education (Selwyn, 2021), this study examines how the UNESCO guidelines address data governance and what this reveals about their broader socio-technical imaginaries.

Thesis structure:

- ➢ *Chapter 2*: The theoretical background and literature will discuss sociotechnical imaginaries, contemporary research of AI in education and the concept of problematizations.
- ➢ Chapter 3: Methodology will present the abductive document analysis, document selection, and analytical framework.
- ➢ Chapter 4: The results are structured around three sociotechnical imaginaries: AI as a tool for critical pedagogy, AI and human agency, and AI as a mechanism of datafication.
- ➢ Chapter 5: The Discussion highlights key tensions, contradictions, and implications for sociotechnical imaginaries
- ➢ Chapter 6: The conclusion will summarize contributions, policy implications, and directions for future research.

By critically analyzing the UNESCO AI in education guidelines through a socio-technical lens, this research deepens the understanding of how AI is framed as a governance tool in global education policy. It critically examines whether these imaginaries align with broader concerns about equity, ethics, and human-centered learning, offering insights into the future trajectories of AI in education.

Chapter 2: Theoretical Background

Sociotechnical imaginaries shape discourse on AI in education by influencing how technologies are envisioned and governed. They provide a framework for understanding AI's role in teaching, learning, decision-making, and institutional practices, making them essential in analyzing how policies shape educational priorities. Within this context, the UNESCO guidelines on AI in education outline an AI-driven transformation, emphasizing ethical considerations, governance frameworks, and pedagogical shifts. However, these guidelines also reflect underlying socio-political assumptions about AI's role in shaping the future of education.

This chapter will firstly introduce the evolution of sociotechnical imaginaries and the transition from social to sociotechnical imaginaries, illustrating how technological advancements reshape collective visions of the future, enabling a more critical engagement with the UNESCO guidelines. Secondly, the alliance of sociotechnical imaginaries and AI will be discussed by delving into existing research in the domains of datafication, critical pedagogy and human agency. Ultimately, Bacchi's problematizations concept is introduced as a theoretical lens for deconstructing and interpreting sociotechnical imaginaries.

The Evolution of Sociotechnical Imaginaries

Imaginaries are firmly rooted within interpretive social theory as a notion referring to the collective beliefs about how society functions (Jasanoff and Kim, 2015). The genesis of the concept of imaginaries can be discovered within interpretive sociology in relation to Emile Durkheim's "collective representations, portraying how social imaginaries are intrinsically engraved within our culture while highlight how they are embedded in rituals, symbols, and institutional practices, shaping cultural articulations of reality (Pickering, 2000). Cornelius Castoriadis developed this idea, arguing that imaginaries are intrinsically creative and transformative. Dissonant from theorists who perceived social structures as static, he advocated that societies actively create and recreate their own meaning, collective visions, and institutions

through imagination (Castoriadis, 1987). His strive in *The Imaginary Institution of Society*, was to challenge the idea that the imaginary is, in fact, different from the *real*, and to portray that social reality is radically created and not a reproduction of existing norms (1987). Equivalently, social imaginaries assume a vision of society as creative and constantly self-creating (1987). The theoretical concept of social imaginaries can be accepted as the framework for comprehending social reality in its numerous forms. The emergence of this field paved a potential qualitative path in which cultural, social, and political phenomena could be understood, systematically perceived, and problematized (Adams et al. 2015). This idea illustrates that imaginaries are powerful agents in shaping the world and especially relevant in studying the way in which emerging technologies and policies construct modern socio-technical imaginaries.

Benedict Anderson and Charles Taylor further developed this concept. Anderson contributed to the development of social imaginaries with his *Imagined Communities* which expressed the divide between ethnography and political science with the interpretation of a nation as " an imagined political community…and imagined as both inherently limited and sovereign" (Anderson, 2006). His work emphasizes that nationalism is a creative construct of the minds which may never meet each other in reality but are even so connected through the shared practices of narrating, recollecting, and forgetting (Jasanoff, 2015). His contribution was vital as it illustrated the ways that specific groups of people have constructed an imagined community through shared narratives, standard practices, and institutions illustrate social imaginaries as a phenomenon that shaped collective identities.

Taylor progressed the concept of social imaginaries to describe the essence of narratives that are deeply embedded in everyday practices, stories, and people's sense of legitimacy (Taylor, 2002). He defined social imaginaries as "the incorporation of a sense of normality in the expectations which we suppose from one another - a common understanding that allows us to exercise collective practices which compose our social life" and carries a sense of how we all fit together in exercising these practices (2002). Furthermore, he asserts that it is prosperous to observe social imaginaries as "backgrounds" that allow social life to function and flourish instead of theoretical and ideological depictions (2002). They are the essence of society's own understanding of solidarity, cosmogony, myths, and narratives, and ultimately the projected trajectory for the future of life. Taylor (2002, p. 106). Castoriadis, Anderson, and Taylor

converge on the idea that imagination is a vital element that constitutes society. Sheila Jasanoff's concept of sociotechnical imaginaries builds on their work by asserting that societies construct shared narratives of the present and imagined futures. However, sociotechnical imaginaries specifically focus on the technological development and its implications on the active exercise of state power, allocated funds, and the prioritization of development pathways.

An essential transition to the technological outlook was developed by George Marcus and his colleagues, who introduced the concept of *technoscientific imaginaries*. This concept was mainly centered around the imaginaries of scientists and their contemporary positions, therefore limiting the research scope to individualistic accounts of future possibilities. Unlike sociotechnical imaginaries, who "investigate how through the imaginative work of varied social actors, science and technology become enmeshed in…producing diverse visions of the collective good" (Jasanoff and Kim 2015). Another vital contribution which helped formulate the sociotechnical imaginaries was Yaron Ezrahi's (2012) *Descent of Icarus* and *Imagined Democracies* which emphasizes that democracies are in need of *necessary fictions* and that these fictions are rigorously connected with technologies. Ezrahi (2012) states that "technologies… operate as performative scripts that combine values and interests, materialising and making tangible the invisible components of social imaginaries.". Jasanoff (2004) highlights *co-production* as a framework linking science and culture, illustrating how scientific progress evolves alongside social discourses, practices, and institutions.

Consequently, Jasonoff (2015) illustrated that imaginaries are intrinsically entrenched within our cultural, social, and political realms and reflect the way in which we understand our social reality and attempt to foresee potential future trajectories. The vast development of educational technologies in an attempt to incorporate innovative educational tools are tightly bonded to the way in which social actors such as scientists, policy-makers, technology entrepreneurs, and non-government organizations imagine and prioritize various prospects that strive for the improvement of the common good. This theoretical framework will be adopted and will serve as a cornerstone for this research. Jasanoff defines this concept as the collective imaginary effort: Socio-technical Imaginaries are defined as:

“collectively held and performed visions of desirable futures and they are also “animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology (Jasanoff, 2015, p19).

Sociotechnical Imaginaries and Artificial Intelligence

Before surrendering to the prevailing euphoria surrounding the increasing influence of Artificial Intelligence in education, it is crucial to examine not only its potential benefits and challenges but also how it impacts creativity, critical thinking, and agency, rather than reducing education to a technocratic apparatus driven by instrumental reasoning (Mamlok, 2024). In response, Means (2018), offers that the while the rhetoric of digital education unfolds within the vicinity of desired models of education in the 21st century including critical thinking, imagination, and creativity, the practices of these digital solutions will produce a myopic vision of knowledge and learning as static abstractions isolated from the complex social context and the deeper forms of ethical development. The pronounced shift in incorporating artificial intelligence tools into the educational system reflects how socio-technical imaginaries have transformed into algorithmic imaginaries which act to obscure power relations, economic interests, and structural conditions while shaping the datafication and stratification of life and the conceivable influence on human behavior and social interaction (2018).

The drastically evolving permeation of digital technology and AI in education has established the nature of how educational imaginaries have become a lucrative model of transnational corporations. The increasing power of datafication, particularly through data availability and algorithms, has introduced new ways to numerically capture, measure, and interpret social life (Jarke & Breiter, 2019). Education is among the most affected domains, as datafication not only reshapes the educational process but also influences how future generations construct reality through data. The collecting data at all levels of education, from teaching and learning to management, significantly shaping decision-making and policy formation. The push for measurable accountability, large-scale international assessments, and performance benchmarking reflects a broader trend of "governance by numbers" (Piattoeva & Boden, 2020). With the rise of big data, data science, and AI technologies like machine learning and neural networks, new

forms of quantitative knowledge production and decision-making are emerging (Ruppert, 2018). Governments increasingly rely on digital services to collect detailed population data, including controversial facial recognition for identification (Crawford & Paglen, 2019). While datafication enhances educational development and accountability, it raises concerns about surveillance, privacy, power dynamics, and inequality (Anagnostopoulos et al., 2013; Selwyn, 2015; Livingstone & Sefton-Green, 2016; Lupton & Williamson, 2017). This reliance on data aligns with dataism, a mindset linked to neoliberalization, where competition and performance metrics mirror market dynamics. Beer (2016) describes this era as driven by a neoliberal system of "metric power," which determines value, shapes future outcomes, legitimizes actions, and influences decision-making under the disguise of objectivity.

As enthusiasm for big data and AI grows, learning analytics and adaptive learning platforms are increasingly integrated into education (Williamson, 2017). However, this risks reducing complex educational experiences to simplified metrics, prioritizing what is measurable over what is meaningful. This issue relates to how reality is mediated and how social imaginaries shape our understanding of the world (Manlok, 2024). The concept of datafication is essential for analyzing UNESCO's sociotechnical imaginaries of AI in education, revealing how data influences what is valued, legitimized, and made visible.

AI's promise to transform education and to equip students for a changing world is deeply interwoven with sociotechnical imaginaries (Mamlok, 2024). Various scholars have explored this connection, showing how educational imaginaries create governance structures between technology and education. Rahm (2023) argues that education plays a central role in adjusting citizens to computerization by promoting digital literacy and producing a fully quantified citizen. The quantification of education is part of a broader critique of its instrumentalization and commodification, often framed through business models of accountability and standardization. These models prioritize skill development for competitive labor markets while neglecting democracy's humanistic goals (Mamlok, 2021; Williamson, 2013). Socio-technical imaginaries have thus become embedded in an industry driven by economic incentives, with techno-managerial imaginaries shaping AI's role in education as a tool for efficiency, automation, and individualized learning (Rahm, 2023). This instrumental approach aligns with digital Taylorism, which translates "knowledge work into working knowledge" but undermines

creativity and autonomy (Ashton et al., 2010, p.846). Technology is constructed through shared understandings of its purpose and imagined future applications. Sartori and Bocca (2022) emphasize that while discussions on AI in education focus on technological and ethical concerns, the social dimensions of AI's role remain overlooked. Imaginaries are crucial because they shape how technologies are perceived and accepted in society. Sociotechnical imaginaries offer a theoretical foundation that integrates subjective agency with structural implications of technological systems, policies, and political cultures (Sheila, 2015). They help analyze how imaginaries frame alternative futures, connect past and future, enable or constrain actions, and shape dominant ways of thinking (2015). However, imaginaries are rarely homogeneous and multiple imaginaries can coexist and are interpreted differently by various actors. Rahm and Rahm-Skageby (2023) describe this as "competing visions of the future," highlighting contrasting conceptualizations of technological change in education and society.

Critical pedagogy is a philosophical and pedagogical paradigm developed by Paolo Freire, which aims to confront the established educational techniques by empowering students to recognize, critically assess and challenge existing social structures of society (Freire, 2021). The concept accentuates the development of students' ability to engage in reflective, independent thinking, challenge established power structures, and question societal norms (2021). Westheimer (2009) warns that effective democratic citizenship requires critical thinking about social assumptions, which conflicts with current trends in education. Freire and Shor (1987), however, argue that the fundamental flaw in current educational institutions lies within the abstraction of student's ideas derived from experienced realities, preventing them from challenging ideas. Moreover, Luke (2010) notes that when knowledge is unquestioned, students turn to authoritative sources for understanding. Furthermore, Cho (2010) highlights that critical pedagogy focuses on the relationship between knowledge and power, rejecting the idea of objective, neutral knowledge, and aiming to create alternative, counter-hegemonic forms of knowledge. AI heightens these concerns as automated systems could reinforce existing power structures and limit students' ability to engage with knowledge critically, further complicating the development of independent thinking. In response to the growing technological domination in education, critical digital pedagogy incorporates these principles into the digital realm and explores the way that technological development can be adopted to promote social justice, empower learners and to foster critical consciousness (Selwyn, 2014). The promotion of equity and challenging power

structures is vital to critical digital pedagogy. The approach disputes the notion that technology is neutral and recognizes the encapsulated values and its potential to reinforce existing power structures (2014). It upholds the idea that both educators and students must critically engage with digital technologies by questioning underlying assumptions and exploring the potential of transformative learning. This involves the critical assessment of issues such as access to technological tools, digital literacy, and the equitable representation of diverse voices of digital technologies. Digital literacy and critical thinking are essential components to critical digital pedagogy in times of the abundance of information and misinformation.

Duman and Akdemir (2021) argue that AI enhances research skills by automating repetitive tasks, allowing cognitive effort to focus on higher-order skills like data interpretation and hypothesis generation. AI's impact on critical thinking extends beyond efficiency, offering platforms for exploring and analyzing theories. Mathisen et al. (2019) highlight AI's potential to empirically evaluate frameworks, reinforcing questioning as key to critical thought. Similarly, Spectoy and Maa (2019) and Halpern and Dunn (2021) advocate AI's role in fostering skeptical inquiry and challenging self-reproducing norms. While much research emphasizes AI's positive influence on critical thinking, concerns remain. One major issue is AI's potential to create "echo chambers," limiting exposure to diverse sources and perspectives. Sasahara et al. (2019) warn that algorithmic biases may inadvertently narrow analytic outcomes, reducing opportunities for critical analysis. Additionally, concerns about reliability and ethical conduct necessitate skepticism, as flawed AI settings can generate misleading results (Ryan, 2020). Further research suggests over-reliance on AI may weaken critical thinking, a phenomenon known as "cognitive offloading" (Marzuki et al., 2023). This study will examine how technologies align or conflict with values of empowerment, critical inquiry, and social transformation in equitable and inclusive education. Critical pedagogy interrogates the pedagogical assumptions in UNESCO's socio-technical imaginaries, questioning whether AI-enhanced education prioritizes learners' critical consciousness or merely emphasizes efficiency, standardization, and measurable outcomes.

Human agency serves as a counterpoint to the potentially deterministic tendencies of AI-driven educational imaginaries. Research suggests that constant interaction with AI systems may reduce individuals' sense of control (Berberian et al., 2012), therefore diminish human agency. Agency

is crucial not only for individual empowerment but also for the collective ability to influence and co-create educational technologies. The relationship between agency and structure is central to various theoretical frameworks. While some view agency as independent, others emphasize its interdependence with the structures that influence educational experiences (Adie et al., 2018). This perspective aligns with the idea that student agency is rooted in their capacity to regulate and control their own learning processes (Code, 2020), aligning with Winnie's definition of agency as the capacity to exercise choice "in reference to preference" (Winnie, 2006, p.8). The expansion of educational technology and the growing accumulation of learner data have enabled new AI applications in education (Gasevic, Siemens, & Sadiq, 2023). AI is designed to assist learning through personalized experiences, adaptive instruction, intelligent tutoring, and automated content creation (du Boulay, Mitrovic, & Yacef, 2023; Hwang et al., 2020). Research suggests AI can foster agency by developing effective learner models, personalized nudges, and recommendation systems (Abdi et al., 2021; Afzaal et al., 2021; Bodily & Verbert, 2017). However, concerns remain that automating learning may undermine student agency, violate social boundaries, enforce constant surveillance, and diminish essential skills needed for ethical conduct and authenticity in education (Celik et al., 2022; Darvishi et al., 2022; Fyfe, 2022; Molenaar, 2022; Seo et al., 2021).

For teachers, it is necessary to recognize and develop their co-creative role in shaping education (Mouta et al., 2024). This includes fostering "intelligent professionalism," ensuring teachers actively engage in the processes educational institutions aim to develop (Thompson, 2021). Such engagement requires a commitment to change (Kukulska-Hulme et al., 2020) and collaboration with families and communities in learning (European Union, 2018). As public figures, educators must participate in policy discussions to elevate their professional standing (Thompson, 2021). This approach fosters shared epistemic agency among teachers (Damsa, 2014), while encouraging ethical considerations in AI's role in education. It also advances relational and collective teacher agency by creating structural conditions that promote interdependence, viewing agency as an evolving process shaped by personal abilities and environmental factors (2014).

After having illustrated the fundamental concept of sociotechnical imaginaries and their roles in shaping the collective visions of society and technology, it becomes evident that these

imaginaries are far from isolated abstraction. They are deeply embedded in the cultural, social and political spheres of society. Sociotechnical imaginaries incorporate a relatively broad framework in the exploration of the relationship between society and technology and sometimes in absence of analytical tools which support the depiction of the subtle ways in which governance, critical thought, and human agency unfold. Therefore, this research will deconstruct the imaginaries within UNESCO's policy guidelines by investigating the problematizations expressed in them.

Problematizations

The concept of problematization was developed by Bacchi (2009) who proposed a method for policy analysis using the "What's the problem represented to be" approach. This approach attempts to reveal the underlying assumptions embedded in policies which are concealed as solutions to proposed problems. Bacchi (2009), further highlights that it is vital to comprehend that policies are not necessarily a response to the problem, but the creation of problems. This method involves perceiving imaginaries and problematizations are interrelated and using the expressed problems as means to deconstruct the imaginaries in play. It is advocated that sociotechnical imaginaries are reliant on problem-solution formulations, hence they compliment each other by addressing what problems are represented and what imagined futures are highlighted throughout the narratives. The presentation of problems in policy guidelines usually entails a corresponding "fix" (Rahm and Rahm-Skageby, 2023). Consequently, identifying problematizations encompasses the need to understand what fixes are proposed or what ideas have been presented as facts to uncover the assumptions of policy actors. The modern practice of policy problematization is defined as the "conception of technology intertwined with notions about what specific knowledge is required in the present or the future (Rahm, 2019).

Chapter 3: Methodology

Research Approach:

This research employs a qualitative approach - abductive document analysis to examine UNESCO's AI in education guidelines and frameworks. Investigating the documents through a qualitative perspective is particularly relevant for exploring the sociotechnical imaginaries, since it allows for a comprehensive and thorough exploration of the underlying meanings. The abductive approach facilitates an iterative analytical process, enabling flexibility in exploration. By shifting between theoretical perspectives and the empirical data, this process helps reveal the underlying assumptions and values shaping UNESCO's portrayal of AI and the future of education. Abduction involves a creative inferential process which produces new hypotheses or theories based on surprising evidence (Tavory and Timmermans, 2014). As mentioned, this research approach is neither data-driven nor hypothesis oriented. Instead it conducts a parallel engagement with both empirical data and the extant theoretical understanding (Atkinson et al., 2003; Rinehart, 2021). Its fundamental objective is to discover the most logical solution and valuable explanation for phenomena (Coffey and Atkinson, 1996; Hurley et al., 2021)

The decision to employ the abductive approach is essential to the research question: *How do the UNESCO AI in education guidelines construct socio-technical imaginaries of the future of education, and how do these imaginaries address critical pedagogy and critical thinking, human agency, and datafication?* This analysis allows active interpretation of UNESCO's policies, facilitating an exploration of how AI is envisioned rather than merely describing the discourse. Moreover, the abductive approach provides stability in the identification of various tension, contradiction, and implicitly presented ideological vision across the documents, allowing a nuanced and critical investigation of UNESCO's policies.

Document Selection:

This study relies on primary data, consisting of UNESCO documents related to AI in education published between 2021 and 2024. The selection criteria ensured the document's fundamental relevance to the AI policy recommendation in education.

The following concepts defined the essential criterias for the document selection. Firstly, the *relevance* was substantial as the documents needed to explicitly address AI policies, their educational application, and governance frameworks. Secondly, the *time frame* must be respected and the documents had to be published between 2021 and 2024 to ensure the most contemporary outlook, policy formulation, and applications of AI in education. After which the *authority* must be intact, ensuring that they are published directly by UNESCO which provides trustworthiness since it is an influential international policy-making organization. Following was the Diversity of focus apparent within the document as they needed to portray a combination of broad policy frameworks while also incorporating specific guidelines to ensure thorough examination. Ultimately, they needed to express a *thematic consistency* where The document explicitly addresses at least one of the three core themes of the research - Critical pedagogy, human agency, and datafication.

The selected documents are presented in table 1, with details on their title, publication year, and relevant pages used.

Table: 1

Document Name	***Year of Publication***	***Relevant Pages***	***Focus Area***
UNESCO Guidance for Generative AI in Education and Research	*2023*	(7-38)	Human Agency and Datafication

AI and Education: Guidance for Policymakers	*2021*	(5-37)	Human Agency, Datafication, and critical pedagogy
State of the Education Report for India, 2022: Artificial Intelligence in Education	*2022*	(15-99)	Datafication
Student Competencies for AI in Education: A Curriculum Framework	*2024*	(12-77)	Human Agency and Critical Pedagogy
Teacher Competencies for AI in Education: A Curriculum Framework	*2024*	(13- 51)	Human Agency, Critical Pedagogy
Recommendation on the Ethics of Artificial Intelligence	*2021*	(13-42)	Human Agency, Critical pedagogy, and Datafication
Artificial Intelligence in Education: Challenges and Opportunities for Sustainable Development	*2019*	(7-34)	Datafication, Human Agency

Analytical Framework:

This analysis is structured around two core theoretical frameworks: Jasanoff's (2015) concept of socio-technical imaginaries and Bacchi's (2009) problematization approach which complement each other in the deconstruction of UNESCO's framing of AI in education. These frameworks help assess how AI is envisioned, legitimized and translated into educational policies, with a specific focus on critical pedagogy, human agency, and datafication.

Sociotechnical Imaginaries (Jasanoff, 2015) provides an overarching theoretical framework which would provide the frame and foundational perspective. This framework was used to analyze how AI is envisioned as a driver of future education, exploring the values, norms, and underlying assumptions. The problematization approach (Bacchi, 2009) was adopted as a complimentary frame to sociotechnical imaginaries. It advocates the interrogation of how UNESCO defines educational challenges and proposes AI as a solution, revealing implicit assumptions about technology, governance, and pedagogical priorities.

Analytical Process:

This research was conducted manually, without external software. While software can enhance the precision in coding and categorization, the manual approach encourages a more nuanced and context sensitive reading of the policy documents. Engaging directly with the materials ensures a deep, interpretive depiction of the complexities of UNESCO's policies, avoiding algorithmic confinements that could mask essential meaning.

Firstly, *familiarization* with the document was essential - the documents were thoroughly read multiple times in order to gain a general perspective and understanding of the text while noting down and highlighting elements which would potentially be meaningful in the research.

Consequently, *Coding and Thematic Analysis* was conducted. The documents were manually coded to specifically identify persistent and recurring themes related to the AI's role in education. The thematic categories were then established based on the three foundational

concepts of the research: critical pedagogy, human agency, and datafication. Afterwhich, sub-themes were developed across the categories which resulted in the cultivation of subcategories such as AI as a governance tool, AI and skill development, and AI's influence on educational equity

Following, *Intertextual Analysis* allowed the establishment of connections between different documents with the purpose of examining the way the discourse on AI in education evolved. Afterwhich, highlighting numerous contradictions and tensions (such as competing vision) in the UNESCO documents provided deeper insights as to the way AI is portrayed both as a democratizing tool and simultaneously formulated as a force which exacerbates existing inequalities

Ultimately, *Critical Discourse Analysis* allowed the research to closely examine the language and manner of framing policies related to AI in education with the purpose to uncover underlying assumptions and ideological visions embedded within the policies Particular attention was assigned to the way AI is framed as a technological solution, or a *fix*, to systemic educational challenges presented across the documents.

Chapter 4: Results

AI as a Tool for Critical Pedagogy and Critical Thought

The Unesco documents collectively construct a shared sociotechnical imaginary which portrays AI as an inevitable wave and a transformative force ambitiously striving to promote efficiency, personalization, inclusivity, and innovative learning opportunities which will revolutionize the future of education. Simultaneously, a critical pedagogical perspective emerges within some of the documents which highlights the necessity of fostering critical thinking skills and ethical awareness in both students and educators. UNESCO *(2024) Student Competencies for AI in Education: A Curriculum Framework* , essentially posits that students should be supported in understanding the way AI tools will shape societal norms and allow them to delve into decision-making to uncover power dynamics that come into play. The framework declares:

"The aim is to prepare students with the values, knowledge and skills necessary to critically examine the proportionality of AI from an ethical perspective. This includes examining and understanding its impact on human agency, social inclusion and equity" (UNESCO, 2024, p.14).

UNESCO *(2023) AI and Education: Guidance for Policymakers* similarly reinforces this idea, advocating for a policy that will "provide basic AI education to all citizens, educating them on thinking critically and responsibly about their choices, rights and privileges in the context of AI and its impact on their day-to-day lives" (p. 36). One way in which this vision is operationalized is through dialogue-based tutoring systems (DBTS). The document informs that DBTS "adopt a Socratic approach to tutoring, probing with AI-generated questions rather than providing instruction" with the aim to "encourage students to co-create explanations to reach an in-depth understanding of the topic rather than the shallow understanding" *(2023) AI and Education: Guidance for Policymakers*. Ultimately, framing AI as a tool which can cultivate a deeper understanding and engagement than simple automating instructions.

Another recurring vision across multiple documents is AI's potential to expand educational opportunities and to foster inclusivity by personalizing learning experiences for diverse learning

styles and linguistic backgrounds. For example, the UNESCO (2022) State of the Education Report for India frames AI tools like Automated Assessment (AA) and Intelligent Tutoring Systems (ITS) as solutions to challenges such as high student-to-teacher ratios and shortages of qualified educators (UNESCO, 2022, p.31). Similarly, UNESCO's AI and Education: Guidance for Policymakers (2021) states AI aims "to provide every learner, wherever they are in the world, with access to high-quality, personalized, and ubiquitous lifelong learning." (p.15). The document also recognizes AI's "potential… to facilitate new approaches to assessment, such as AI-enabled adaptive and continuous assessment…" (UNESCO, 2021, p.15).

ITS is highlighted as a promising tool for learning, using machine learning and knowledge tracing to "automatically adjust the level of difficulty and provide guidance according to individual student strengths and weaknesses …to ensure that the student is able to learn the topic efficiently" (UNESCO, 2021, p.15). However, UNESCO also warns of its limitations, noting their "instructionist knowledge transmission approach…which personalizes pathways prescribed by content, rather than promoting human agency and personal ambitions" (p.15), potentially restricting creativity. Additionally, AI "amplifies hidden features of its initial data and effectively reinforces its underlying assumptions" (UNESCO, 2021, p.27). UNESCO highlights AI's appeal to major technology companies, reaching "the highest value of investment" (p.15), subtly framing AI as an unavoidable reality requiring adaptation. These competing visions underscore a contradiction in AI discourse, portraying it as both an empowering tool and a potential constraint on human creativity.

UNESCO also stresses teachers' transformative role in realizing a critical pedagogical approach. Its Competency Framework for Teachers advocates a human-centered mindset, emphasizing the values and critical attitudes educators must cultivate: "Teachers are encouraged to nurture critical methodologies to evaluate the benefits and risks of AI, while ensuring human agency and human accountability, and understanding AI's societal impact and implications for citizenship in the era of AI" (UNESCO, 2024, p.23).

Beyond being facilitators of AI, teachers should serve as ethical and critical guides. The framework argues their role should extend beyond acquiring technical AI skills to preparing students to critically examine AI's ethical implications (UNESCO, 2024, p.26). However,

concerns persist about teachers' readiness to engage critically with AI, particularly in regions lacking training and infrastructure (UNESCO, 2024, p.26), raising questions about global disparities in AI adoption and the need for comprehensive competency-building initiatives.

The documents largely frame AI as a solution to pedagogical challenges, reflecting an underlying assumption of technological determinism. Positioning AI as a fix for educational deficiencies risks depoliticizing broader issues, diverting attention from socio-economic disparities and systemic inequalities. By presenting AI as a universally beneficial tool needing only policy adjustments for equitable distribution, UNESCO implicitly portrays AI as neutral, despite its potential to reinforce existing power structures.

Human Agency in an AI-Augmented Educational Environment

While AI has the power to support and enhance the methods of teaching and learning, the documents highlight that it should not be given the opportunity to overshadow or replace human control or judgment. As stated in UNESCO *(2023) Guidance for Generative AI in Education and Research:*

"As GenAI becomes increasingly sophisticated, a key danger is its potential to undermine human agency. As more individuals use GenAI to support their writing or other creative activities, they might unintentionally come to rely upon it." (UNESCO, 2023, p.24).

In response to this risk, UNESCO highlights the importance of the participatory approach in the integration of AI in education. UNESCO prioritizes participatory and active learning approaches which highlight the importance of collaboration and the engagement with the community. Additionally, a number of perspectives are proposed, including to "inform learners about the types of data that GenAI may collect from them, how these data are used", "prevent the use of GenAI where it would deprive learners of opportunities to develop cognitive abilities and social skills", and "ensure sufficient social interaction and appropriate exposure to creative output produced by humans and prevent learners becoming addicted to or dependent on GenAI" (UNESCO, 2023, p.25). This can also be observed in UNESCO *(2023) Guidance for Generative*

AI in Education and Research, which states that AI should not be introduced using a top-down approach, rather, it should be co-created by educators, students, and researchers to effectively evaluate long-term impacts of diverse uses (p.29). This participatory approach underlines the significance of the indispensable interrelatedness through which the use of AI can be reflective of local values and considerately implemented. The document argues that both teachers and students are to have a voice in the shaping of the AI tools which will be integrated into the educational environments. This envisions a sense of agency and ownership over the technologies (UNESCO, 2023).

A tension occurs within the documents as AI is simultaneously framed as a tool assisting teachers and as a disruptive mechanism potentially dehumanizing education. UNESCO *(2021) AI and Education: Guidance for Policymakers* underlines that the application of AI in education can also be criticized for being both intrusive - requiring the "continual monitoring of students' actions, gestures and emotions", and de-humanizing since "AI requires students to fit into prescriptive methods of teaching, with minimized interaction…and automized continent, which reduces human agency" (p.21). However, the same document recognizes the compelling potential of AI tools to support and assist teachers through the automation of various administrative tasks, providing real-time feedback on student progress, and being able to identify at-risk students (2021, p,18). The competing visions presented in documents frames AI as a necessary developer to human agency and assumes that education challenges are founded on inefficiencies that can be remedied by technological advancements. This imagination risks overshadowing alternative human centered reforms such as smaller classes, increased structural investments or developed teacher training which could address challenges without technological interventions. Through the emphasis of AI's potential to support decision making, UNESCO subtly reinforces a instrumentalist perception of AI in which algorithmic assistance is assumed to be advantageous to human judgement rather than fundamentally restructuring it.

Ultimately, the UNESCO (2021) *Recommendation on the ethics of Artificial Intelligence* states that "It may be the case that sometimes humans would choose to rely on AI systems for reasons of efficacy, but the decision to cede control in limited contexts remains that of humans, as humans can resort to AI systems in decision-making and acting, but an AI system can never

replace ultimate human responsibility and accountability" (p.8-9). Consequently, while AI can optimize the educational system, its implementation should be regulated and restricted to protect human autonomy and decision making.

All documents agree that while AI's impact on education remains uncertain, the education system is essential in preparing future citizens for an AI-enabled world. This vision, often introduced at the beginning of the documents, situates the present within the 4th Industrial Revolution, characterized by increasing technological intensity across all spheres of life. UNESCO (2022) describes AI as bringing "waves of change into the design, delivery, and continuous improvement of learning methods" (p.62). Similarly, UNESCO (2019) highlights its role in "altering every aspect of our social interactions. In education, AI has begun producing new teaching and learning solutions" (UNESCO, 2019, p.4).

While UNESCO upholds human agency, some documents depict students primarily as the future workforce, necessitating specific educational advancements. UNESCO (2019) states: "Education plays a critical role in efforts to make future workforces AI-ready. …It also means rethinking the content and methods used to deliver instruction at all levels of education" (p.18). Similarly, UNESCO (2022) stresses the importance of AI education in higher learning "to meet the needs of present and future job markets" (p.25). However, a competing vision challenges this market-driven approach. While UNESCO (2021) acknowledges the necessity of AI-related skills, it argues that AI adoption in education should be guided by long-term needs rather than market demands (p.14). Yet, another UNESCO (2021) policy recommendation contradicts this, calling for curriculum changes to ensure education remains relevant to evolving economies, labor markets, and societies (p.36).

As education is positioned as a driver of the 4th Industrial Revolution, it is essential to consider the broader implications of AI adoption in schools. The neoliberal framing of these narratives raises questions about economic motivations shaping these imaginaries. The focus on skills development appears more aligned with producing a new generation of corporate workers in a digital society rather than leveraging technology for purely pedagogical or didactical gains.

Datafication and AI as a Data-Driven Governance Tool

"The more data is available, the better" (UNESCO, 2022, p.63)

Most of UNESCO's documents portray AI as a powerful tool for data-driven decision-making, addressing equity issues and enhancing learning through analytics, real-time monitoring, and predictive tracking. The UNESCO (2022) *State of the Education Report for India*, which was the most optimistic, emphasizes big data's growing role in education, stating that "teachers have always used data to give feedback and guidance," and that the shift to digital data is beneficial as "more and more data about performance of students" becomes available (p.63). This document advocates AI-driven analytics and data mining as solutions to educational challenges, highlighting predictive analytics as a key tool for enhancing learning and revealing essential insights into learning dynamics. UNESCO (2022) describes these systems as not only providing feedback but also offering "predictive analysis of how students' performances may develop in the future" (p.64), though it cautions that their effectiveness relies on sufficient historical data to identify patterns and trends.

In contrast, UNESCO (2021) *AI and Education: Guidance for Policymakers* warns of risks associated with AI deployment, particularly regarding data ownership, consent, and privacy: "Widespread deployment of AI technologies can bring multiple risks such as those centered on data ownership, consent, and privacy" (p.20). It highlights concerns over algorithmic biases and the concentration of AI data and expertise in the hands of "a small number of international technology and military superpowers" (p.20). The collection and analysis of student data, or "dataveillance," raises privacy concerns, especially regarding potential misuse by third parties (p.20).

Another recurring theme across the documents is AI's role in democratizing education by improving global access to resources. The UNESCO (2022) *State of the Education Report for India* asserts that "AI has begun making inroads into the Indian educational landscape, thus bridging the socio-economic and gender divide…of education" (p.62). Similarly, UNESCO (2019) highlights AI's potential in ensuring equitable access: "AI technologies are used to ensure equitable and inclusive access to education. It provides marginalized people and communities,

people with disabilities, refugees, those out of schools, and those living in isolated communities with access to appropriate learning opportunities" (p.12). AI is envisioned as instrumental in reducing educational disparities.

However, concerns arise about AI's potential to exacerbate inequalities. UNESCO (2019) warns that while AI offers opportunities, it may also "deepen the existing inequalities and divides as the marginalized and disadvantaged population are more likely to be excluded from AI education. The result is a new kind of digital divide: a divide in the use of data‐based knowledge to inform intelligent decision‐making" (p.28). UNESCO'(2021) *AI and Education: Guidance for Policymakers* further underscores that this divide is "exacerbated by the increasing concentration of power and profitability in a small number of international technology superpowers" (p.21). Without effective policy intervention, AI may "inevitably magnify rather than ameliorate existing learning inequalities" (p.21). Across all documents, there is consensus that unregulated AI implementation in education, without ethical consideration of local contexts, risks worsening inequities.

Beyond policy regulation, Guidance for Generative AI in Education and Research (2023) asserts that the ultimate objective and potential of AI will not be reached if the inclusive accessibility is not ensured. The document states that "GenAI tools will not help address the fundamental challenges in education or the achievement of SDG 4 commitments unless such tools are made inclusively accessible… and if they do not by design advance equity, linguistic diversities and cultural pluralism" (p.24). This vision, positions AI as an essential solution to educational challenges, forasmuch as worldwide accessibility is guaranteed.

UNESCO warns that the uneven dissemination of AI may deprive populations of its full benefits, emphasizing inclusivity and appropriate policy formulation. While AI is promoted as a force for equity, the documents also highlight concerns about unintended consequences. UNESCO (2023) warns that AI's integration risks over-reliance, reinforcing biases and systemic inequalities. AI, trained on existing data, may embed societal prejudices, creating unintended consequences. The growing importance of data access further exacerbates disparities, leading to "*data poverty*" (p.14). Meanwhile, AI's rapid expansion in advanced nations concentrates "AI wealth" in the Global North, embedding northern values into algorithms, rendering AI-generated data

unsuitable for disadvantaged societies (p.14).

This raises concerns about excluding data-poor regions and subjecting them to long-term risks of digital colonization. However, UNESCO notes that AI technologies remain corporate intellectual property, shielded from academic review and external regulation (2023, p.14). The organization consistently highlights the ethical use of AI, stressing the need for careful governance to prevent pre-existing power imbalances from persisting in education. Ultimately, UNESCO asserts that "AI is not biased in itself. Instead, if its data are biased or analysed with inappropriate algorithms, the original and perhaps unidentified biases can become more noticeable and have a greater impact. Making the biases noticeable is probably helpful, because it can lead to corrections" (UNESCO, 2021, p.25).

Across all documents, UNESCO constructs sociotechnical imaginaries a future where data-driven governance transforms education for equity and inclusion. However, achieving these goals requires a critical ethical understanding of AI's possibilities and limitations. UNESCO also implicitly frames AI as neutral and universally applicable, problematizing data rather than its fundamental use. While AI holds transformative potential, its implementation demands careful ethical and contextual considerations to prevent reinforcing existing inequalities.

Chapter 5: Discussion

A Tension Between Empowerment and Instrumentality

Unesco's policy document envisions AI as a tool for developing critical pedagogy by improving critical thinking skills and empowering learners through inclusive education. Unesco's documents collectively highlight AI's promising role in democratization education by providing personalized learning experiences and administering dialogue based tutoring systems which facilitate the engagement of students and increase their active inquiry. This aspiration aligns with the Frerian notion of education as empowerment equipping learners with the understanding and awareness to critically engage with knowledge instead of passively consuming it (Freire, 1970). For instance, dialogue-based tutoring systems are framed as a tool which conducts Socratic questioning aimed to encourage students to co-construct knowledge and not to be absorbents of pre-determined knowledge (UNESCO, 2023). This reflects the aspiration of aligning AI with the critical pedagogy by fostering intellectual autonomy and reflexivity.

Nevertheless, besides the profoundly opportunistic aspirations presented, AI is frequently framed as a solution to perceived educational inefficiencies. This sociotechnical imaginary reflects a type of technological determinism which frames AI as an inevitable and necessary mechanism to address educational challenges. This conceals broader structural inequalities by implying that AI alone can democratize education. This concern is reflected in Westheimer's (2009) critique of the educational system, which prioritized compliance and efficiency over democratic engagement and questioning of assumptions. In UNESCO's imagination, AI has the potential to bridge this gap by tailoring specific content to learners' unique backgrounds and fostering engagement. This circumstance inspires questions whether AI, while holding great potential in creating more accessible learning experiences, can truly enhance critical pedagogy or would it risk amplifying an instrumentalist approach to knowledge consumption. Similarly, as Freire and Shor (1987) argue, the fundamental flaw of education is that students' ideas are abstracted from their lived realities which prevents them from challenging dominant ideologies. While UNESCO's discourse implies that AI can create more inclusive and engaged learning experiences, it does not

account for the way AI systems may embed biases that reinforce existing hierarchies (Sasahara et al., 2019).

UNESCO underlines AI' capability to provide personalized learning and specifically so, in linguistically diverse and marginalized communities. For example, Automated Assessment and intelligent-tutoring systems are framed as solutions to teacher shortages and overcrowded classrooms (UNESCO, 2022). AI's potential is expressed through its ability to provide individually tailored pathways and provide real-time feedback to support unique needs throughout linguistically diverse settings and to nurture student's development in marginalized backgrounds by conquering traditional barriers of knowledge acquisition. This framing aligns with the foundation of critical digital pedagogy which highlights the need for technological tools to empower learners by challenging the dominant knowledge structures, consequently fostering social justice (Selwyn, 2014).

However, AI-driven personalization possesses its challenges. UNESCO (2021), acknowledges that ITS tools generally depend on instructionist models which essentially personalized pathways based on predefined material rather than enhancing learner agency. This reflects the concern of existing literature suggesting that AI tools can unintentionally reinforce standardized models of learning instead of encouraging deep inquiry. As Luke (2010) underlines, when knowledge is left unquestioned, students will increasingly rely on authoritative sources and discourage independent critique. This notion raises the question if AI-enhanced personalization essentially develops critical thought or if it merely refines content delivery with pre-established curricular frameworks.

Furthermore, while AI is framed as a facilitator of critical thought, its substantial dependency on data-driven analytics invites more risk of narrowing student's exposure to diverse perspectives. AI models which learn through the analysis of past performances to predict and optimize learning can inherently amplify patterns existing in the initial data (UNESCO, 2021). This mirrors the concern inspired by Rahm and Rahm-Skageby (2023), who argued that the adoption of AI in education involves a problem-solution approach which influences the way in which knowledge is presented and accessed. Therefore, the optimization of the learning process based

on past performance can reinforce pre-existing biases and guide students towards a pathway of predetermined knowledge instead of empowering them to critically engage with the structural issues and existing inequalities. Moreover, personalization creates a paradox because as AI-based learning models promise inclusivity, they are also risking the exposure of dominant epistemologies by filtering educational material through algorithms that prioritize efficiency over deep inquiry (Cho, 2010). UNESCO's discourse does not completely engage with this challenge and therefore leaves the potential of AI to expand rather than to constrain intellectual horizons unaddressed.

Ultimately, UNESCO presents a sociotechnical imaginary where AI is framed as a tool having ability to foster inquiry-based learning, enhance ethical reflection, and promote student engagement. However, competing visions emerge, as the AI-driven personalization is critiqued for the reinforcement of standardized learning pathways instead of developing intellectual autonomy. While AI is represented as a mechanism which can improve critical thinking, the risk of its overdependence on algorithmic analysis and predictive modeling arises which align with concerns of cognitive offloading (Marzuki et al., 2023) and algorithmic bias (Sasahara et al., 2019). As follows, UNESCO's sociotechnical imaginaries essentially reflect both the aspirations and limitations of AI in education. While creating a vision of the enhanced learning opportunities, UNESCO simultaneously acknowledges the unresolved tensions between technological optimism and the pedagogical complexity. This discussion underscores the need for a more reflexive engagement with AI in education. Instead of succumbing to the presumption that AI benefits are universally accessible, it is vital that future policy frameworks critically interrogate how AI interacts with structural inequalities and pedagogical values. Through the explicit integration of critical pedagogy into AI governance, educational institutions can transition from discourse about technological determinism towards a more nuanced, equitable and transformative image of the future of education with AI.

Human Agency and AI: CO-Creation or Automation?

UNESCO's documents persistently present AI as a mediator of human agency advocating participatory approaches in education. UNESCO portrays AI as an enabler of a more engaged experience by recommending that AI tools should be collectively and actively constructed by students and educators (UNESCO, 2023). However, competing visions across the documents complicates this narrative. While AI is framed as enhancing human agency, it was simultaneously escorted with cautionary notes of the counteractive effect that it might essentially reproduce. These concerns are associated with the depersonalization of education through the introduction of the AI driven automation tools such as the intelligent tutoring systems and administrative decision-making appliances. The duality is consistent with the existing research which highlights that AI has both the potential to enhance personalized learning and promote the passive consumption of algorithmically created content which could minimize their self regulation (Code, 2020) and potentially diminish individuals' sense of control over the learning process (Berberian et al., 2012). The findings of this research substantiate these concerns by demonstrating how UNESCO fluctuates the framings of AI between empowerment and adaptation instead of portraying an absolute enhancement of agency.

A more nuanced interpretation suggests that UNESCO's vision of AI's role in fostering adaptation rather than empowerment. Instead of assuming that automation inherently develops human agency, UNESCO implies that both educators and students must learn to adapt to AI-driven changes with the purpose to maintain their agency within a radically shifting and technologically induced society. It can be observed in the *State of the Education Report for India* (2022) which frames AI as potentially beneficial in tackling the high student-to-teacher ratio and enabling teachers to focus on inspiring critical thinking and socio-emotional support. This framing, nevertheless, subtly implies that AI is essentially a necessary tool to compensate for the teacher shortages. It is therefore represented as a technological fix to the contemporary issues while no alternative visions or questions are presented which could question the structural paradigm with respect for inadequate investment in teacher training and recruitment which are also the generators of the elevated workload of teachers. This aligns with the broader critiques of

techno-solutionism in education policy in which structural problems are framed as a technological challenge instead of a political imposition.

Competency Framework for Teachers (UNESCO, 2024), highlights the inescapable need for educators to develop AI Literacy. In this way, the responsibility is gently shifted onto the teachers to adapt to technological transformations instead of critically considering whether these transformations will meaningfully align with the most adequate pedagogical practices. The emphasis on the need to develop AI literacy is persistently accompanied with a sense of inevitability of AI's integration. This fundamentally inspires a techno-solutionist perspective where teachers are pre-conditionally tied to navigating AI-enhanced environments instead of critically assessing whether AI should be integrated in the first place. This illustrates how the role of the teachers could be reduced to passive respondents instead of active decision-makers. This sociotechnical imaginary reflects a perfect example of the problematization within policy discourse. Instead of questioning the structural conditions which lead to a perceived problem, policies frequently frame problems in a sense that it necessitates a specific type of intervention. In this case, AI is the necessary response to the systemic educational challenges and will inevitably pertain in our society. The findings affirms Kukulska-Hulme et al. 's (2020) argument that educators should engage in policymaking to retain professional autonomy, further reinforcing the importance of relational and collective teacher agency (Damsa, 2014). Additionally, Unesco's imaginary assumes a universal baseline of digital literacy, however, successful implementation requires technological proficiency which is not equally distributed. This inspires further ambiguities with respect to the creation of digital hierarchies which benefit some students who are able to extract the benefits from AI enhanced learning while drastically excluding others due to the infrastructural limitations.

This sociotechnical imaginary can also be recognized in UNESCO's portrayal of AI as a tool which would beneficially prepare students for the future labor market. *Artificial Intelligence in Education: Challenges and Opportunities for Sustainable Development* (2019) underlines that AI-readiness is an essential and unavoidable skill for tomorrow's workforce. Similarly, UNESCO (2022) states that "education plays an essential role in making the future workforces AI-ready" (p.18), reinforcing a vision where education serves economic incentives rather than fostering

independent thought. These findings support Willimason's (2019) argument that commercial interests could prioritize a particular set of skills and competencies required in the future workforce over holistically intellectual development. This vision implicitly reinforces a neo-liberal tendency which assumes students are mere workers in a society and neglects their autonomous character. The idea that students need to be trained to effectively collaborate with AI implies a form of adaptation where human agency is conditioned by technological developments. By framing AI-readiness as a prerequisite, UNESCO assumes a future in which technology will dictate educational priorities. The essential question, nevertheless, still remains: does AI truly empower learners, or does it impose a new form of algorithmic dependence?

These imaginaries align with the broader theoretical discussions on human agency and its inevitable association with technological structures. As the Council of Europe (2022) and Berberian et al. (2012) underline, AI may diminish an individual's sense of control of the learning process. Moreover, Code's conception of self-regulated learning also aligns with UNESCO's positioning of human agency, however, the findings expose that this form of agency is often contingent on AI-driven interventions. This nuance extends the existing research by illustrating how UNESCO's guidelines do not fully interrogate the question of whether AI truly enhances or diminishes epistemic agency. The discourse, instead, remains entrenched in the assumption that AI's integration is both necessary and inevitable.

Ultimately, UNESCO constructs sociotechnical imaginaries of AI in education by blending narratives of participatory engagement and adaptive necessities. The presented imaginaries highlight human agency and collaboration, however, they eventually align with technological inevitability by framing AI as a necessary adaptation rather than an optional feature. Moreover, this framing of AI provides minimal room for alternative outlooks, human-centred reforms which prioritize teacher autonomy and pedagogical integrity.

Datafication: The Promise and Perils of AI-Driven Governance

UNESCO's documents consistently portray AI as a tool for data-driven governance, advocating its capability to advance educational equity through predictive analytics, real-time monitoring of progress, and big data. AI is framed as a mechanism for addressing educational disparities by identifying learning gaps and generating informed interventions. However, this imaginary aligns with existing research concerns regarding the implication of educational datafication.

UNESCO frequently frames persistent inequalities as an issue of insufficient educational data rather than border socio-economic disparities. Consequently, AI is portrayed as a technological fix for improving educational gaps by generating precise analytics on student's learning behaviors. This perspective informs policies which advocate large-scale data collection, predictive learning analytics, and automated assessments. The oversimplification of the underlying systemic challenges is overshadowed by the vision that data driven personalization can remedy educational disparities. UNESCO does not explicitly provide an alternative view, for instance, in relation to inadequate funding, lack of professionally qualified teachers, or deeply embedded social stratification.

Mamlok (2024), cautioned the need to examine how AI in education impacts agency, critical thinking, and creativity before reducing education to a technocratic process driven by instrumental reasoning. By illustrating the framing of AI as an equitable intervention, these findings align with Means (2018) argument that digital education is often linked to 21st century learning ideals, however, in practice it risks producing a myopic vision of knowledge isolated from social and ethical contexts. This critique portrays how UNESCO's framing of AI in education is embedded in a technocratic rationality which privileges efficiency over structural critiques of educational disparities

Jarke and Breiter's (2019) advocated that datafication reshapes education by transforming learning into quantifiable metrics which influence how reality is constructed through data. UNESCO's framing echoes this notion that educational inequalities derive from insufficient data instead of broader socio-economic disparities. The prominence of personalization tools and

predictive assessment also align with the concept of governance by numbers (Piattoeva and Boden, 2020), as decision-making is increasingly dependent on quantifiable indicators, reinforcing a requirement for metric-based accountability. UNESCO's framing of AI also expands on Williamson' (2017) critique noting that learning analytics and adaptive learning platforms can risk reducing educational experiences in metrics, rather than meaningful experiences. As an illustration, *AI and Education: Guidance for Policymakers* (2021) highlights the benefits of AI-driven real-time learning analytics, allowing educators to monitor the student's continuous progress. The *State of the Education Report for India* (2022) further emphasizes AI potential to provide predictive assessments of students progress and generate insights on their future development. As AI is represented as an equitable intervention this simultaneously encourages the normalization of an educational system in which students are surveilled with algorithm predictions dictating learning trajectories. This also reveals the assumption that previous data can truly and holistically encapsulate students learning potential and ambitious desires.

UNESCO frames AI as a tool for bridging educational divides, which carries an underlying assumption that the fundamental barrier to education is the inefficiency of reliable data instead of structural challenges. The *Artificial Intelligence in Education: Challenges and Opportunities for Sustainable Development* (2019) elaborates on this, by portraying AI adaptive learning systems as a solution for reaching marginalized students. However, this fix fails to address deeper societal issues which contribute to digital exclusion. This paves way for a paradox, where AI is framed as an inclusive tool while requiring access to resources that many disadvantaged communities lack. *Guidance for Generative AI in Education and Research* (UNESCO, 2023) acknowledges that AI's benefits can only be realized if equitable access is ensured. Without policies ensuring universal digital infrastructure AI's role in education could deepen the 'digital divide'. Through the portrayal of AI as a mechanism of developing educational inclusion without adequately addressing disparities in the digital infrastructure, UNESCO implicitly frames technological accessibility as the crucial factor in effectively developing educational equity and that the power of AI in addressing equity can only be achieved through global policy formulation. This reflects Rupperts (2018) argument that the growing reliance on big data and AI would introduce new forms of quantitative knowledge production which could reinforce existing inequalities. This was

also highlighted by Crawford and Palgen (2019) who further highlighted the privacy and surveillance risks which are evidently portrayed in UNESCO's portrayal of real-time monitoring as an equitable educational intervention. Once again, this framing proposes AI as a solution to the digital divide and directs the attention to the accessibility rather than questioning AI fundamental impact.

Another essential aspect of UNESCO's imaginary is the reliance on private actors to develop AI educational technologies. This raises concerns underlined by Anagnostopoulos et al. (2013) and Selwyn (2015) regarding data ownership, algorithmic bias, and the commercialization of education. Beer's (2018) concept of metric power is particularly relevant, as it illustrates how neoliberal reasoning shapes educational priorities by market-driven incentives. *Guidance for Generative AI in Education and Research* (2023) cautions of the increasing concentration of AI expertise and data collection which are fueling powerful actors. Nevertheless, UNESCO maintains that AI-driven governance can be made equitable through adequate regulation. As AI is increasingly embedded in educational decision-making, concerns about the commodification of student data intensifies, provoking the risk of reinforcing existing data exploitation patterns. While UNESCO recognizes the importance of ethical governance, its policies remain vague regarding data ownership and student consent. This reflects a technocratic rationality framing governance as an issue of AI policy optimization rather than the fundamental critique of AI-driven data governance and its implications for educational equity.

Ultimately, this discussion revealed how UNESCO AI in education policy guidelines construct sociotechnical imaginaries which frame AI as an inevitable and transformative force throughout the domain of critical pedagogy, human agency, and digital governance. While these imaginaries envision AI as a solution to educational inequalities and systemic challenges they are oftentimes engraved with unexplored assumptions about the technological neutrality, accessibility, and efficiency. The findings of this research substantiate Mamlok's (2024) argument that the predominant discourse on AI in education overpasses issues related to human agency, ethical governance, and social stratification. The dependency on AI as a solution to digital divides also reflects Jasanoff's (2015) critique that sociotechnical imaginaries will shape the dominant way of

thinking while also constraining the perspective of alternative futures. Moreover, when considering the competing vision (Rahm and Rahm-Skageby 2023) of AI in education, the findings illustrate how UNESCO's imaginary may obscure diverging visions that challenge the idea that AI can be a universal solution. By the investigation of these framings through the problematization approach this research highlights the need for a more nuanced and critical understanding of AI in education which accounts for the infrastructural disparities, algorithmic biases, and the ever evolving and essential role of human agency in the future of this inevitable AI mediated society.

Limitations:

While this approach was valuable in providing insights, several limitations must be acknowledged. Although the selected documents reflect UNESCO's fundamental policy recommendations, they may not completely capture the broader institutional and political influences shaping AI in education governance. Future research could benefit from examining policy implementation, local adaptation, or stakeholder responses to provide a more comprehensive perspective. Furthermore, while the manual document analysis allowed a nuance interpretation of the policy framings, it inherently introduces subjectivity. The abductive approach encourages reflexivity and flexibility in the identification of themes, but it remains conditioned to the researcher's perspective. Employing large-scale discourse analysis or triangulation findings with interviews could remedy the interpretive limitations. Moreover, this research focused on policy discourse, lacking an assessment of AI tools' implementation in education in practice. This could be mitigated by empirically investigating how these imaginaries occur in reality. Finally, this research exclusively examined imaginaries constructed within UNESCO documents, without enveloping alternative perspectives from stakeholders. By providing distinctive visions a more holistic understanding of how UNESCO's imaginaries shape dominant narratives could be produced. Despite these limitations, the research provides an essential foundation in the understanding of UNESCO's role in shaping educational imaginaries while underlying key areas in need for future exploration and policy critique.

Chapter 6: Conclusion

In conclusion, this thesis critically investigates how UNESCO's AI in education guidelines collectively construct sociotechnical imaginaries and how these imaginaries address critical pedagogy, human agency, and datafication. The findings reveal that UNESCO positions AI as an opportunity and a necessity shaping the imaginary that AI is an inevitable force in education and requires adaptation. Regarding critical pedagogy, UNESCO presents AI as a tool which enhances critical thinking and creativity by emancipating educators from administrative burdens. Nevertheless, this perspective remains hostage to the techno-solutionist reasoning presuming AI to be essential in bridging educational disparities without adequately addressing structural inequalities. Consequently, critical pedagogy is dependent on the perceived functional benefits of AI rather than being framed as a guide interrogation of AI in education. With respect to human agency, UNESCO constructs AI as an enabler and a challenge. UNESCO encourages participatory approaches where students and educators co-construct learning environments with AI. Concurrently, AI literacy is framed as a necessity, shifting the responsibility onto the teachers rather than questioning AI's integration in education. This subtly implies the inevitability of AI as an integral feature in education and which risks reducing teachers into passive recipients. The imaginary of datafication represents data as a crucial element in achieving educational equity, framing AI tools such as predictive analytics and real-time monitoring as solutions to the educational disparities. However, this vision risks transforming education into quantifiable metrics, fostering surveillance practices and adopting commercial interests while neglecting socio-economic inequalities. The assumptions that data-driven governance can solve disparities reflects the technocratic rationality which priorities efficiency over structural reforms. Ultimately, UNESCO's policy guidelines construct an imaginary where AI is framed as both an inevitable and necessary mechanism while providing limited opportunities for alternative vision of the future. While UNESCO acknowledges ethical concerns, it primarily aligns AI with technological determinism, accentuating adaptation over agency, efficiency over critical pedagogy, and data-driven governance over structural transformation. Future research could expand on these discoveries by conducting comparative studies with other influential organizations such as the OECD, which also influence global policy formation. Empirical studies could further demonstrate how these imaginaries translate into local policy

implementations, providing deeper insights into real-world consequences of AI driven educational governance. This thesis contributed to contemporary discourse critically engaging with AI sociotechnical imaginaries in education, revealing their underlying assumptions, inspiring further consideration in AI policy formulation within the broader ethical, pedagogical and socio-political spheres of society.

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