A DESKTOP ANALYSIS OF SUSTAINABLE ARTIFICIAL INTELLIGENCE POLICIES AND PRACTICES AT HIGHER EDUCATION INSTITUTIONS IN SOUTH AFRICA

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DECLARATION:

In accordance with Rule G5.6.3, I hereby declare that the above-mentioned treatise/dissertation/thesis is my own work and that I have not previously submitted it to another University or for another qualification

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ABSTRACT

Artificial Intelligence (AI) has rapidly surged in popularity. AI is now used in nearly every sector. There is a need to address the use of AI particularly in the education sector. The integration of AI tools among students and educators has created varied reactions. Students and lecturers are now able to focus on complex and creative tasks and AI tools perform mundane and routine tasks. However, this also raises concerns about diminishing critical thinking skills and compromising academic integrity. To address this, higher education institutions must create clear policies and guidelines that promote the responsible use of AI tools and provide methods for acknowledging their use, helping to prevent plagiarism and academic misconduct. The purpose of this study is to perform a desktop analysis to identify the most effective and sustainable artificial intelligence policies and practices that higher education institutions in South Africa can implement to preserve academic integrity in the long term. The universities consulted include UNISA, the University of Pretoria, the University of Johannesburg, the University of Witwatersrand, and Rhodes University. This study has undergone qualitative research, using the interpretivism approach and descriptive research. The research strategy employed is documentary analysis. The findings illustrate how higher education institutions can implement sustainable AI policies and practices to preserve academic integrity in the long term.

KEYWORDS: Artificial Intelligence (AI), education sector, higher education institutions, academic integrity, sustainability, policies, and practices.

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1.1 INTRODUCTION

The purpose of this study is to provide a desktop analysis of sustainable AI policies and practices at higher education institutions in South Africa. The emergence of artificial intelligence (AI) has had a major impact on many sectors. AI can affect global productivity, equality and inclusion, and environmental outcomes, to name a few (Vinuesa, Azizpour, Leite, Balaam, Dignum, Domisch, Fellander, Langhans, Tegmark & Nerini, 2020: 1). AI has grown in popularity worldwide. AI applications are being used in various sectors including marketing, banking, finance, agriculture, healthcare, security, transport, and chatbots. Within urban services such as the management of transport systems of cities, the running of restaurants and shops, maintaining infrastructure, overseeing traffic control, air quality monitoring, waste management, and energy efficiency, AI applications have become increasingly integrated in the playing of these roles (Yigitcanlar & Cugurullo, 2020: 1). AI has created uncertainty about what is to come in the future, as its adoption is only going to increase (Yigitcanlar & Cugurullo, 2020: 1). This needs to be supported by robust regulatory guidance and supervision to ensure the sustainable development of AI-based technologies. Failure to do so could pose the risk of inadequacies in transparency, safety, and ethical standards (Vinuesa et al., 2020: 1).

AI technologies have particularly grown in education. It has been applied to resources, allowing teachers to have time and freedom to provide understanding and drive performance (Tanveer, Hassan & Bhaumik, 2020: 1). IT technologies and their applications are a significant advancement in education. Researchers have demonstrated that learning is a social exercise involving collaboration and interaction. In education, AI technologies can be categorised into three central areas: personal tutors, collaborative learning, and virtual reality. Intelligent virtual reality can engage and guide students in an interactive learning environment. In this setting, AI systems can perform the roles of teachers, facilitators, and more within remote virtual classrooms. AI can also be used in assessment where there is a substantial amount of student data. AI has the potential to revolutionise education. To stay current with the advancements of the modern world, educational institutions must embrace AI technologies for teaching and learning purposes. By customising AI solutions to their specific needs and objectives, these organisations can effectively integrate AI into their educational frameworks (Ahmad, Rahmat, Mubarik, Alam, & Hyder, 2021: 5-6).

ChatGPT, Automation of Administration Tasks, Smart Content, and Intelligent Tutoring System (ITS) are examples of some AI technologies used in education. Automation of Administration Tasks is applied to the handling of repetitive administrative tasks such as grading and assessing exams. Smart Content summarises textbooks as helpful tools for exam preparation, such as practical tests. ITS operates on the principle of self-tutoring, supported by the presence of a human guide and facilitator (Tahiru, 2021: 3). However, AI technologies like ChatGPT and the ones mentioned above, and their use in academia, especially in higher education, raise concerns about academic integrity, plagiarism, and critical thinking skills. As much as ChatGPT can leverage education, it can also pose challenges like the ones identified above. In light of this, clear policies, guidelines, and frameworks are required to effectively and sustainably integrate ChatGPT and other AI technologies in higher education (Michel-Villarreal, Vilalta-Perdomo, Salinas-Navarro, Thierry-Aguilera & Gerardou, 2023: 1).

The five selected higher education institutions that will be analysed are the University of South Africa (UNISA), the University of Pretoria, the University of Johannesburg, the University of Witwatersrand, and Rhodes University. This chapter begins with a problem statement followed by the research objectives, including the primary, secondary, and methodological objectives. Definitions of key concepts will be provided. The chapter concludes with the significance of the study along with the structure of the study to follow.

1.2 PROBLEM STATEMENT

The growing popularity of AI technologies has created different reactions amongst higher education institutions (Tarisayi, 2023). AI has been utilised in educational institutions in varying ways, including automating administrative processes and tasks, developing curriculum and content, supporting instruction, and student learning. AI has improved efficiency in administrative tasks, such as reviewing students' work, grading, and providing feedback on assignments (Chen, Chen, & Lin, 2020: 75269-75270).

Incorporating AI sustainably into higher education institutions poses a challenge, as it requires upholding academic integrity while effectively addressing plagiarism and copyright issues (Michel-Villarreal et al., 2023: 1). In light of the growing interest in AI, it is appropriate to examine recent AI research in education, offering educators an updated understanding of the field as a preparation for potential developments (Zhai, Chu, Chai, Jong, Istenic, Spector, Liu, Yuan, & Li, 2021: 1). Studies have found a lack of clarity regarding the use of AI tools in academic policies, which increases the risk of academic dishonesty.

Higher education institutions need to update and clearly communicate their academic integrity policies to address the use of AI tools and provide clear instructions to ensure students understand the consequences of violations. Effective governance, training, and clear academic policies are essential to mitigate the challenges and risks associated with its use (Michel-Villarreal et al., 2023: 11-12). The prevalent use of AI technologies among students in higher education institutions cannot be stopped. This highlights the necessity for research on the strategies that higher education institutions can implement to effectively manage AI's integration.

The main research question of this study is: *What are the most effective and sustainable artificial intelligence policies and practices that higher education institutions in SA can implement to preserve academic integrity in the long term?*

1.3 RESEARCH OBJECTIVES

1.3.1 PRIMARY RESEARCH OBJECTIVE

To conduct a desktop analysis of sustainable artificial intelligence policies and practices at higher education institutions in South Africa.

1.3.2 SECONDARY RESEARCH OBJECTIVES

To achieve the primary objective, two secondary objectives (SO) have been formulated:

SO^1: To identify five higher education institutions in SA regarding their sustainable AI policies and practices.

SO^2: To conduct a desktop analysis regarding sustainable AI policies and practices in higher education institutions in SA.

SO^3: To determine best AI practices in the education sector of SA.

1.3.3. METHODOLOGICAL RESEARCH OBJECTIVES

To achieve the above-mentioned primary and secondary objectives, the methodological objectives (MO) are:

MO^1: To conduct a literature review regarding the nature of sustainable AI policies and practices in higher education.

MO^2: To identify the research methodology that is most suitable in addressing the specified research problems and objectives of the study.

MO^3: To collect qualitative data through a desktop or documentary analysis amongst five higher education institutions in SA regarding sustainable AI policies and practices.

MO^4: To analyse the qualitative data obtained from the desktop study.

MO^5: To draw conclusions and make recommendations to stakeholders in the higher education sector regarding sustainable AI policies and practices.

1.4 DEFINITIONS OF KEY CONCEPTS

1.4.1 ARTIFICIAL INTELLIGENCE (AI)

Artificial intelligence (AI) is a sector of computer science dedicated to developing software that is skilled at completing tasks that would otherwise necessitate human intelligence. AI algorithms are specifically designed to manage tasks such as learning, perception, problem-solving, language understanding, and logical reasoning (Saleh, 2019). The AI landscape encompasses a diverse array of technologies, such as machine learning, natural language processing, computer vision, and more. These advanced technologies allow computer systems to comprehend human language, learn from data, and generate forecasts (Kanande, 2022).

1.4.2 AI PRACTICES AND POLICIES

AI governance involves the active management of best practices that include policies, standardised procedures and controls over data and infrastructure, to foster an ethical and controlled AI ecosystem. By adopting effective AI governance practices, organisations can closely monitor and regulate training data, algorithms, and model infrastructure, from initial development, training and retraining, and deployment. This approach ensures a more streamlined AI operation while also ensuring compliance with relevant regulations governing data privacy and AI ethics (Hiter, 2023).

1.4.3 SUSTAINABILITY

There are three forms of sustainability, namely natural, social, and economic sustainability. Natural sustainability refers to the maximum sustainable long-term use of natural resources for raw materials and energy. It also includes the ability to manage waste effectively and utilise or protect living organisms. Social sustainability focuses on the inherent stability of a social organisation and its elements. It addresses the minimum requirements for system resilience against fluctuations, as well as individual rights, limitations, and duties for sustainability. It outlines the essential factors and driving forces necessary for society to remain stable while

honouring individual integrity. Economic integrity pertains to maintaining economic systems in absolute value terms, based on principles of mass balance and economic feedback (Sverdrup & Svensson, 2002: 21-22).

1.4.4 HIGHER EDUCATION

Higher education encompasses various educational programmes provided by higher education institutions, typically resulting in a named degree, diploma, or certificate upon completion. These institutions include universities and colleges, as well as professional schools that offer training in fields such as law, theology, medicine, business, music, and art. Additionally, higher education includes teacher-training colleges, junior colleges, and technology institutes. Most higher education institutions require the completion of secondary education as a basic entry requirement, with the typical entry age being around 18 years (The Editors of Encyclopedia Britannica, 2016).

1.5 SIGNIFICANCE OF THE RESEARCH

It is anticipated that the findings of this research could provide other higher education institutions in South Africa with appropriate guidelines to implement sustainable AI policies and practices. This is a relatively new field of research, and the findings of this study could contribute to the body of knowledge regarding AI with specific reference to the education sector. This study could also provide future researchers with a framework to follow when conducting research in AI in the education sector.

1.6 STRUCTURE OF THE STUDY TO FOLLOW

Chapter One serves as an introduction and background to the study, presenting the problem statement and the research objectives. This is followed by the clarification of key concepts and a discussion of the significance of the research. This chapter concludes with a summary.

Chapter Two offers a literature review that provides an introduction and then a historical overview of AI, and a brief overview of AI in the education sector, as well as the nature of AI where the stakeholder theory is discussed. Following this, the nature of AI is discussed under the following topics: key components of AI, goals of AI, types of AI, the steps in creating an AI policy, benefits of AI, risks or challenges of AI, the interface between AI and human intelligence, the link between AI and sustainability, and current trends in AI. This chapter concludes with a summary.

Chapter Three starts with an introduction and then discusses, in-depth, the research design and methodology adopted in this study. Following this, the research population and sampling are discussed, with convenience sampling being the chosen method. Subsequently, this chapter elaborates on the primary and secondary data collection methods employed. A discussion on the techniques of data analysis is provided, with thematic analysis being utilised in this study. Finally, ethical considerations are addressed. This chapter concludes with a summary.

Chapter Four first presents an introduction and then the study's empirical findings and interpretation of the data. This chapter concludes with a summary.

Chapter Five provides a summary of the contents of the previous chapters. It begins with an introduction and then utilises the literature review and empirical findings to draw conclusions and make recommendations. Additionally, it examines the research objectives in relation to the findings. This chapter concludes with a summary.

The following chapter, Chapter Two, presents a literature review that provides a historical overview of AI, explores AI in the education sector, discusses theories related to AI, and examines various aspects of the nature of AI.

2 LITERATURE REVIEW

2.1 INTRODUCTION

The previous chapter provided a detailed introduction and background to the study. It outlined the problem statement, highlighting the key research question. The primary research objective, along with the secondary and methodological research objectives was also presented. Key concepts were defined, and a discussion on the significance of the research followed this. The chapter concluded with the structure of the study to follow.

In this chapter, a literature review is provided, and a historical overview of AI will be presented. Following this, a brief overview of AI in the education sector will be discussed. Theories related to AI, such as the stakeholder theory will be analysed. Following this, the nature of AI will be discussed where key components of AI, goals of AI, types of AI, benefits of AI, risks or challenges of AI, the interface between AI and human intelligence, the link between AI and sustainability, and current trends in AI, will be discussed in depth. The above encompasses the theoretical framework.

2.2 HISTORICAL OVERVIEW OF AI

Historical timelines of research in the field of Artificial Intelligence (AI) express a sixty-year journey marked by periods known as "AI winters", which are periods of disillusionment with the technology, and significant breakthroughs. There have been many significant events, policies, and breakthroughs in the subject of AI (Tobin, Jayabalasingham, Huggett & de Kleijn, 2020: 291).

The origins of AI map back to the 1940s, specifically in 1942, when Isaac Asimov, the American Science Fiction writer, published his short story, Runaround. The story featured a robot created by engineers, Gregory Powell and Mike Donavan. At the same time English Mathematician, Alan Turing, developed *The Bombe*, a machine designed to break the Enigma code used by the German military in World War Two. This machine, considered the first functioning electro-mechanical computer, marked a significant technological breakthrough. In 1950, Turing published his influential article, “Computing Machinery and Intelligence”, in which he outlined how to create intelligent machines and he proposed a test for evaluating their intelligence. The Turing Test has since become a benchmark for identifying intelligence in artificial systems: if a human interacts with both another human and a machine and is unable to tell them apart, the machine is considered to be intelligent (Haenlein & Kaplan, 2019: 2-3).

The term "Artificial Intelligence" was officially introduced around six years later, in 1956, when Marvin Minsky and John McCarthy, a computer scientist from Stanford, organised the Dartmouth Summer Research Project on Artificial Intelligence (DSRPAI). This event, held at Dartmouth College in New Hampshire and lasting about eight weeks, brought together notable participants, including Nathaniel Rochester, the developer of IBM's first commercial scientific computer, the IBM 701, and Claude Shannon, the mathematician who pioneered information theory. The aim of DSRPAI was to bring together researchers from different disciplines to establish a new field of research focused on creating machines that could replicate human intelligence (Haenlein & Kaplan, 2019: 3).

'Ai Summer' began with nearly two decades of success in the field of AI. 'AI Summer' is the term given to the success stories of AI in the early days of its development. Between 1964 and 1966, Joseph Weizenbaum, developed the renowned ELIZA computer programme. ELIZA was a natural language processing application developed to mimic human conversation and was one of the earliest programs to attempt to pass the Turing Test. Substantial funding was allocated to AI research which led to additional projects (Haenlein & Kaplan, 2019: 3).

However, in 1973, the U.S. Congress started to heavily criticise the substantial expenditure on AI research. James Lighthill, a British mathematician, challenged the optimistic perspectives presented by AI researchers. The British government halted its support for AI research, except at three universities (Edinburgh, Sussex, and Essex). Following this example, the U.S. government also withdrew funding. This marked the start of 'AI Winter' (Haenlein & Kaplan, 2019: 3-4).

Discussions on statistical methods for attaining true AI date back to the 1940s. Canadian psychologist, Donald Hebb, formulated a learning theory called Hebbian Learning, which imitates the functioning of neurons in the human brain. This theory paved the way for creation of research into Artificial Neural Networks. In 1969, Marvin Minsky and Seymour Papert interrupted this line of work by demonstrating that computers lacked the processing power needed to perform the tasks required by artificial neural networks (Haenlein & Kaplan, 2019: 4).

Artificial neural networks came back in the form of Deep Learning in 2015, when Google's AlphaGo programme defeated the world champion in the board game, Go. Deep Learning is a particular type of artificial neural network. Go is a game that is similar to chess but is more complex. It was believed that computers would never surpass humans in this game. Today,

artificial neural networks and Deep Learning form the foundation of most applications categorised under AI. They underpin technologies such as image recognition employed by Facebook, and speech recognition algorithms powering smart speakers and self-driving cars. This harvesting of the benefits from past statistical advancements is the period of 'AI Fall', which we are currently experiencing (Haenlein & Kaplan, 2019: 4).

2.3 BRIEF OVERVIEW OF AI IN THE EDUCATION SECTOR

Many perceive AI as an integral driver of the fourth industrial revolution, with the potential to trigger the fourth industrial revolution in education. Educators are tasked with assessing current AI capabilities and investigating ways to optimise learning. Similar to how television and computers were proclaimed to be transformative in education, they have been shown to primarily enhance access to information without making substantial changes to core education practices. In light of the growing interest in AI, it is appropriate to examine recent AI research in education, offering educators an updated perspective of the field as a preparation for forthcoming changes (Zhai et al, 2021: 1).

AI has been utilised in educational institutions in numerous ways, such as automating administrative processes and tasks, developing curriculum and content, enhancing instructional methods, and enriching students' learning experiences. AI has enhanced efficiency in administrative functions, including reviewing students' work, grading, and offering feedback on assignments. Additionally, AI has been integrated into curriculum and content development, and instructions leveraging technologies, such as virtual reality, online platforms, robotics, video conferencing, audiovisual materials, and 3-D technology, all contributing to improved learning experiences for students (Chen et al., 2020: 75269-75270).

Teachers demonstrate increased effectiveness and efficiency, and students benefit from more personalised and richer educational experiences. The integration of AI in education offers a chance to overcome physical limitations posed by national and international borders, as learning resources are accessible online via the Internet and the World Wide Web. Learners can engage with content from anywhere in the world. Additionally, utilising AI tools such as language translation tools, enables learners to study best according to their individual abilities (Chen et al., 2020: 75269-75270).

2.4 THEORIES RELATED TO AI

2.4.1 THE STAKEHOLDER THEORY

Stakeholder theory's core management principle emphasises that effectively managing relationships with a firm's stakeholders is the primary responsibility of managers and is crucial for value creation. Stakeholder theory proposes that organisations that prioritise the well-being of a diverse range of stakeholders, such as customers, suppliers, employees, and communities, will operate more efficiently and generate more value. This value can be reinvested to support the organisation's growth and sustainability, while also benefiting the stakeholders who contributed to its creation (Phillips, Barney, Freeman & Harrison, 2019).

The rapid development and widespread use of AI technologies have brought to light a range of ethical concerns and challenges related to privacy, bias, transparency, accountability, and their effects on jobs and society. AI systems may reflect bias and discrimination if they are trained on biased datasets or developed without accounting for the ethical consequences of their decisions. Algorithmic decision-making in areas such as hiring, lending, and criminal justice can reinforce social inequalities and existing biases. Furthermore, the lack of transparency and accountability in AI algorithms can result in unintended outcomes and ethical dilemmas for both organisations and society at large. Stakeholder theory is especially pertinent to AI ethics, as it emphasises the importance of considering the interests and concerns of all stakeholders affected by AI systems (Ademola, 2024: 2).

A stakeholder-centred approach to AI ethics enables organisations to promote transparency, inclusivity, and accountability in their decision-making processes. Engaging stakeholders can help identify ethical risks, reduce bias and discrimination, promote fairness and equity in AI systems, and strengthen trust with the larger community. Ultimately, applying stakeholder theory in AI governance can foster more ethical, responsible, and sustainable AI practices that benefit individuals, organisations, and society at large (Ademola, 2024: 3).

2.4.2 THE LEARNING THEORY

Many frameworks have been created for learning theory for many different disciplines, including educational psychology, biology, and computer science. One reason for the number of learning theories is that each model explains only a portion of the overall story, resulting in many overlapping and conflicting perspectives. In the age of AI, there are many reasons why learning theories need to be rethought. No single description of a theory fully explains learning.

This limitation requires openness to new ideas and theories that can provide additional insight. With advances in computational models, such as AI, one can now explore learning in ways that were previously unattainable. It is therefore important to remain receptive to new, more comprehensive ideas that can unify and advance the field of learning science (Gibson, Kovanovic, Ifenthaler, Dexter & Feng, 2023: 1126-1127).

2.5 THE NATURE OF AI

Under the nature of AI, key components of AI, goals of AI, types of AI, benefits of AI, risks or challenges of AI, the interface between AI and human intelligence, the link between AI and sustainability, and current trends in AI, will be discussed.

2.5.1 KEY COMPONENTS OF AI

2.5.1.1 Decision-making

AI applications can replicate the expertise and decision-making capabilities of a human. AI can reduce the time humans take to make decisions and enhance the accuracy of decisions being made. AI is able to process a substantial amount of data at a speed that humans cannot (Vrontis, Christofi, Pereira, Tarba, Makrides & Trichina, 2021: 1250).

2.5.1.2 Learning and Deep Learning

Research areas involving AI applications in the workplace involve, among other fields, machine learning and deep learning, and can be implemented in industries globally. Within organisations, machine learning can help process knowledge derived from interactions, analyse variability across these interactions, and clarify unclear patterns using data from frontline employees and customer engagements. AI applications enhance learning opportunities by providing users with a high level of interactivity (Vrontis et al., 2021: 1248-1249).

2.5.1.3 Robotics

Robotics involves creating machines capable of replicating human movements and mimicking human behaviour. The discussion on advancement in robotic technologies emphasises their impact on work and employment. On the other hand, there is significant optimism about the learning and training opportunities they can provide for businesses and individuals within

organisations. Research in robotic technologies can be categorised into job replacement, human-robot collaboration, and learning opportunities. Robotics can assist employees of an organisation by providing opportunities for more technical roles that are enabled by robotic technologies. While robotics can increase precision and reduce errors if applied properly, human expertise remains essential. Robotic technologies can take over repetitive and routine tasks done by humans, offering them the opportunity to better utilise their skills (Vrontis et al., 2021: 1251-1252).

2.5.2 GOALS OF AI

When people refer to democratising a technology, they usually mean making it more accessible and user-friendly for a broad audience. The same concept has been applied to the democratisation of AI. The primary goal of democratising AI use is to ensure that the benefits of AI are shared by many. Benefits include entertainment, health and well-being applications, and productivity improvement. These benefits can also be transferred into financial gain for those who incorporate AI technologies into their areas of work (Seger, Ovadya, Siddarth, Garfinkel & Dafoe, 2023: 2).

Another motivation for democratising AI tools is to obtain feedback for better and safer AI. Developers can collect data on how their products are being utilised or misused across a greater variety of contexts than what would be possible through internal testing. The feedback then aids in improving model performance and helps prevent any forms of misuse that may arise (Seger et al., 2023: 2).

AI and its increasingly wider influence on various sectors necessitate an assessment of its impact on the accomplishment of the Sustainable Development Goals (SDGs). AI can facilitate progress on 134 targets (79%) across all SDGs, primarily by driving technological improvements that may help overcome current limitations. SDGs can be split into three categories of sustainable development, namely society, economy, and environment (Vinuesa et al., 2020: 1).

Sixty-seven targets (82%) within the societal group stand to gain from AI technologies. For instance, AI may support all targets in SDG one on no poverty, SDG four on quality education, SDG six on clean water and sanitation, SDG seven on affordable and clean energy, and SDG eleven on sustainable cities by enhancing the provision of food, health, water, and energy services (Vinuesa et al., 2020: 2).

AI could also positively influence the achievement of many SDGs within the economy group. AI provides benefits for 42 targets (70%) with the SDGs. AI technologies have had a positive impact by increasing productivity, and increased innovation and infrastructure (Vinuesa et al., 2020: 3-4). The final group of SDGs, related to the environment, is analysed. This group includes SDGS 13, 14, and 15, which focus on climate action, life below water, and life on land. AI can serve as an enabler within 25 targets (93%) in this group. Benefits from AI in this area stem from its ability to analyse large-scale interconnected databases, facilitating collaborative efforts to preserve the environment. For SDF 13 on climate action, AI advancements support the understanding of climate change and modelling its potential impacts. Additionally, AI supports the development of low-carbon energy systems, enhancing the integration of renewable energy and energy efficiency, which are all crucial for addressing climate change. AI can also help improve ecosystem health. To prevent and significantly reduce marine pollution, AI can help with its algorithms that automatically identify oil spills (Vinuesa et al., 2020: 4).

2.5.3 TYPES OF AI

According to Strelkova (2017), AI can be categorised into three levels: ANI, AGI, and ASI:

- **ANI (Artificial Narrow Intelligence)** is the initial level, specialising in a single domain. For example, an AI technology might be capable of defeating the world chess champion, but that is its sole capability.
- **AGI (Artificial General Intelligence)** is AI that achieves and surpasses human-level intelligence, demonstrating the capacity to reason, plan, solve problems, think abstractly, understand complex ideas, learn quickly, and gain knowledge from experience.
- **ASI (Artificial Super Intelligence)** refers to an intellect that is vastly superior to the most exceptional human brain in nearly all areas, including scientific creativity, general wisdom, and social skills.

Four types of intelligence are also discussed (Khakurel, Penzenstadler, Porras, Knutas & Zhang, 2018: 3):

- **Mechanics:** Involves minimal learning or adaptation, such as touchscreen kiosks.
- **Analytical:** Systematically learns and adapts using data, such as an in-car intelligent system that replaces diagnostic tasks of technicians.

- **Intuitive:** Intuitively learns and adapts based on understanding, such as robot reporters processing data from sports games to produce news articles.
- **Empathetic:** Learns and adapts empathetically through experience, such as Chatbots interacting with customers and learning from these interactions.

There is also the concept of strong and weak AI. Weak AI involves replicating or duplicating specific functions without achieving genuine intelligence. In contrast, strong AI embodies actual intelligence rather than just imitating it. In essence, weak AI simulates or imitates, while strong AI possesses intelligence. In terms of decision-making, weak AI is the simulation of decision-making and strong AI involves decision-making based on intelligence (Martinez, 2019: 1027-1028).

2.5.4 BENEFITS OF AI

According to Khanzode and Sarode (2020: 34), the following are the primary benefits of AI:

- Faster task completion compared to human capabilities
- Simplification and ease in handling stressful and complex tasks
- Completion of difficult tasks within shorter time frames
- Ability to perform multiple functions simultaneously
- Higher success rates in accomplishing objectives
- Less errors and defects during task execution
- Enhanced efficiency within short time periods
- Capacity to compute long-term and intricate scenarios.
- Exploration and discovery of unexplored territories, such as outer space.

The integration of AI tools, such as ChatGPT in higher education institutions presents many benefits for key stakeholders, including students, teaching staff, and researchers. ChatGPT can provide individualised feedback which promotes self-directed learning. AI tools provide improved accessibility. They offer round-the-clock support, and this is valuable for distance learners and international students in different time zones. AI tools enhance language skills by simulating conversations, correcting language errors, and offering vocabulary and grammar assistance. The interactive nature of the majority of AI tools enhances innovative learning experiences. AI tools are also great for assisting instructors. They can handle routine queries and guide on common questions which enables one to focus on higher-level tasks (Michel-Villarreal et al., 2023: 9-10).

2.5.5 RISKS OR CHALLENGES OF AI

AI technologies can pose the risk of performance and uncertainty. Deploying an AI technology that lacks sufficient accuracy in decision-making poses a significant risk. For example, consider a model tasked with predicting the price a customer would be willing to pay for a service. If predictions are excessively high, the business risks losing customers, whilst predictions that are too low could result in revenue loss. Despite considerable effort spent improving model accuracy during development using known test data, ensuring accuracy on data received by the model after deployment remains challenging. For example, when predicting the creditworthiness of loan applicants, it's impractical to test all possible applicants. This raises concerns about the model's performance when it sees an applicant with characteristics that differ significantly from those in its original training data (Piorkowski, Hind & Richards, 2023).

AI technologies can pose the risk of fairness. While machine learning inherently involves a form of statistical discrimination, it becomes problematic when it consistently gives certain privileged groups an advantage over disadvantaged groups. For instance, it may be reasonable to favour credit decisions for applicants with higher salaries, but biasing decisions based on ethnicity is unacceptable. Biases in training data, stemming from prejudiced labels or inadequate sampling, lead to models with unwanted biases. Systematically disadvantaging one group can have legal, societal, and litigious consequences. Thus, evaluating the risk of such bias is crucial for organisations to prevent significant harm (Piorkowski et al., 2023).

AI technologies can pose the risk of privacy concerns. Numerous privacy regulations require organisations to adhere to specific privacy principles when handling personal information. This relevance extends to machine learning due to findings indicating that a malicious third party, even without direct access to the training data, can infer sensitive, personal information about individuals whose data was used to train the model. Therefore, it is essential to identify and safeguard AI models that may contain or risk leaking personal data (Piorkowski et al., 2023).

AI technologies can pose the risk of adversarial robustness. Apart from the risks associated with exposing private information, attacks can also pose a threat by manipulating the output of an AI system in ways that benefit the attacker. For example, model theft becomes feasible if attackers can obtain output labels for chosen inputs. If a model is not resilient, a malicious actor can exploit its inputs to change the results (Piorkowski et al., 2023).

ChatGPT highlights the risk of students using the model to generate plagiarised content or cheat on assignments. This is of high concern in higher education institutions. The novelty of ChatGPT intensifies these threats due to unclear academic policies and low probability of detection. Studies have found a lack of clarity regarding the use of AI tools in academic policies, which increases the risk of academic dishonesty. Higher education institutions need to update and clearly communicate their academic integrity policies to address the use of AI tools and provide clear instructions to ensure students understand the consequences of violations (Michel-Villarreal et al., 2023: 11-12).

AI can also pose many significant challenges. According to Khanzode and Sarode (2020: 34), there are several significant challenges of AI in everyday life:

- Occasionally, programs may execute actions contrary to the intended command, leading to mismatches.
- There could be displacement of human jobs because of AI integration.
- The increase in unemployment is heightened by AI implementation.
- AI systems lack the human touch and intuition.
- The younger generation may become complacent and less motivated due to the convenience provided by AI.
- Implementation and maintenance of AI systems require large investments of money and time.
- The increased integration of AI into various aspects of society creates an over-reliance on technology.

2.5.6 THE INTERFACE BETWEEN AI AND HUMAN INTELLIGENCE

The collaboration between humans and machines, specifically AI technologies, enables humans to focus on more creative endeavours, while machines handle routine and mundane tasks. Machines rely on humans for decision-making that involves heuristics essential for evaluating outcomes. Humans also depend on machines for decisions requiring complex analytical approaches. In this manner, humans and machines contribute to quantitative and qualitative analyses, respectively. When making organisational decisions in ambiguous situations, humans take a comprehensive strategic view to assess the outcomes of the decisions. Although AI serves as a cognitive technology, humans alone possess the capability for sense-making and contextual understanding required for specific decisions. This collaboration allows AI to refine its expertise through more exposure of data, while humans develop an

understanding of cognitive thinking and their utility in decision-making. The synergy between humans and machines provides rapid data collection through AI and provides intuitive insights through humans. An example would be using AI's predictive analytics combined with human expert reviews to evaluate investment opportunities (Pathak, Pal, Shrivastava & Ora, 2019: 25).

2.5.7 THE LINK BETWEEN AI AND SUSTAINABILITY

The World Commission on Environment and Development, in the Brundtland Report, defined the forward-looking concept of ecological sustainability as "meeting today's needs without compromising the ability of future generations to meet their needs". This approach is important but challenging, as the needs of future generations are difficult to determine and define. Environmental sustainability broadly aims to protect the earth long-term, encompassing resource management, environmental protection, wildlife preservation, habitat restoration, and the conservation of natural resources (Falk & Wynsberghe, 2023).

AI has the potential to accelerate global efforts aimed at protecting the environment and conserving resources by identifying various factors like energy emissions and reductions, CO2 absorption, sustainable transportation networks, deforestation monitoring, weather prediction, accident forecasting, and optimising supply chain management (Kar, Choudhary & Singh, 2022). Vinuesa et al. (2020) examined how AI could facilitate and hinder the achievement of some of the 17 goals and 169 targets outlined in the 2020 Agenda for Sustainable Development.

AI's role in sustainable development affects various sectors. For example, AI is affecting global energy industries, environmental outcomes, productivity, and societal factors. The integration of AI into numerous aspects of sustainability has led to practical solutions for these issues. Rapid advancements in AI fields such as mechanics and parallelisation of processors, sensors, algorithms, and software, foster growth in diverse AI applications. These advancements enable environmental scanning, knowledge scanning, monitoring, and the development of adaptive goals. In manufacturing industries, AI provides detailed monitoring and control and offers a comprehensive view of equipment performance and health (Kar et al., 2022).

For the social dimension, AI can present advantages and risks. There is the potential to enhance communal bonds by assisting in various supportive roles, such as fostering network growth in streamlining administrative tasks, and aiding in household, nursing, and educational duties. However, there are varying opinions on AI's capacity for these functions. The question is then raised: Can AI learn like humans, considering that these skills necessitate a certain degree of

socio-cultural materiality? While some maintain that AI lacks the capacity for subtle learning due to its reliance on rigid algorithms, others argue that it could potentially contribute to tasks such as classroom instruction. Yet, ethical concerns need to be considered, such as safeguarding children's privacy, defining the responsibilities between teachers and AI, and the potential negative impact of AI (Khakurel et al., 2018: 10).

2.5.8 CURRENT TRENDS IN AI

2.5.8.1 Intelligent Tutoring System (ITS)

Intelligent Tutoring Systems (ITS) is currently being used to support and enhance traditional school curriculums. These ITS systems are designed using knowledge-based domain information. These technologies integrated with the educational domain facilitate more tailored, complex, and interactive learning methods, such as learning by teaching or through games (Yousuf & Wahid, 2021). ITS functions as a tutor by answering routine questions about assignments or tests while also identifying gaps in students' learning. Essentially, the instructor or teacher evaluates a sample of student responses and the ITS generates a computer model based on the inferred rules from the instructor's or teacher's grading decisions. This model is then used to grade other students' assignments or tests (Chassignol, Khoroshavin, Klimova & Bilyatdinova, 2018).

2.5.8.2 Personalised Learning

The flipped classroom model aligns well with adaptive and personalised learning concepts. The flipped classroom model explains a model where teaching methods are inverted or "flipped". Students engaged with instructional content outside of the classroom, through pre-recorded lectures, readings, and other materials, often accessed online. Personalised learning, which provides unique e-learning content tailored to each student's needs, helps develop quality content for individual requirements. This has proven to be effective in supporting students during their studies and reduces exam failures (Yousuf & Wahid, 2021).

2.5.8.3 Recommendation Systems in Education

Learning Management Systems (LMS) gather and store student assessment data, providing reports and basic analytics to academic managers to improve program quality and operational efficiency. The incorporation of AI technologies with LMS has become increasingly feasible due to the advancement in AI tool design and accessibility. To enhance the quality of learning, numerous AI and data mining algorithms can suggest remedial actions in educational settings. To motivate learners to engage in e-learning, a customised web content recommendation

system has been proposed which provides personal content suggestions (Yousuf & Wahid, 2021).

2.5.8.4 Natural Language Processing (NLP)

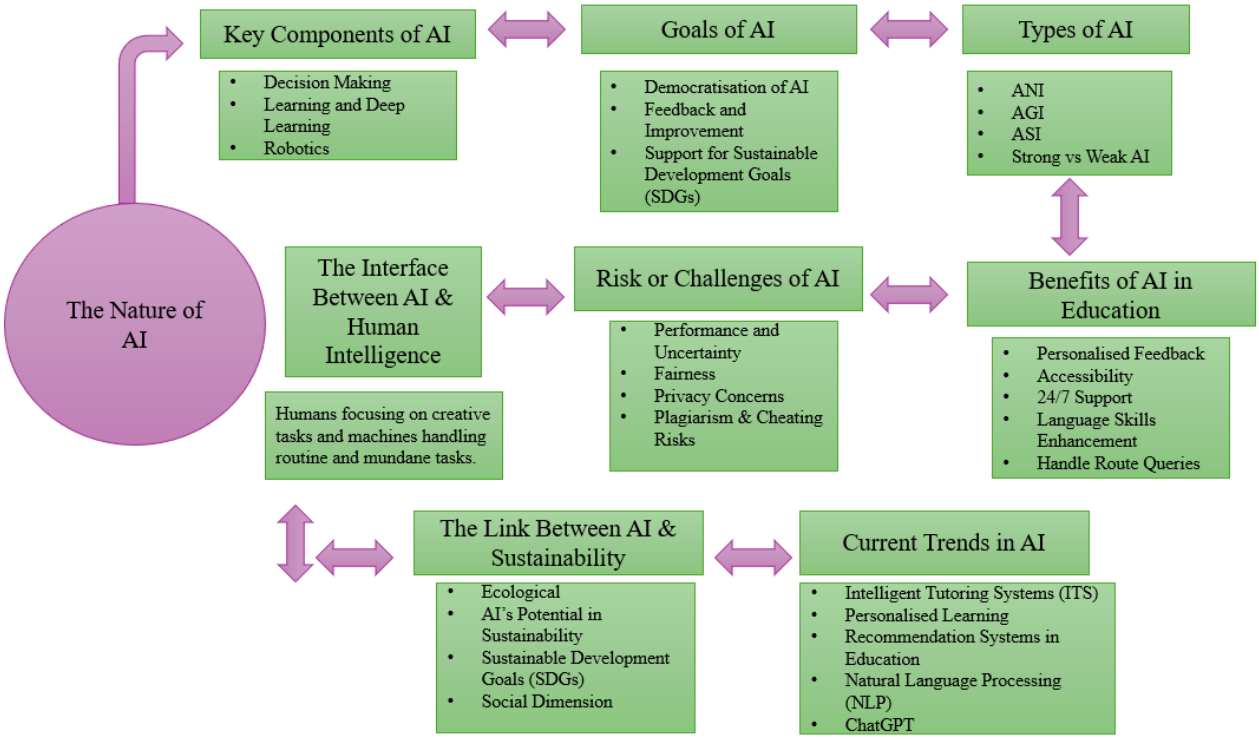
Natural Language Processing (NLP) tools leverage AI capabilities to evaluate and comprehend students' written or spoken language, offering valuable analysis and helpful feedback. NLP tools empower educators to enhance support for students struggling with reading by providing them with improved ways of expressing themselves. These tools can identify grammar, syntax, and vocabulary comprehension issues that students are having and deliver tailored instructions to assist them in their learning journey (Sharma, 2023). Examples of these tools include MonkeyLearn, Natural Language Toolkit, and Grammarly.

2.5.8.5 ChatGPT

Educators are employing AI chatbots such as ChatGPT to improve their instructional strategies and offer students more personalised support. These chatbots act as virtual assistants, able to answer questions, provide explanations, and engage in meaningful conversations with students. Concerns among some educators about the potential for AI chatbots to provide false information and encourage plagiarism have limited the integration of it in the classroom. However, as advancements continue and new models are introduced, perceptions will gradually shift, and policies will be introduced to manage this integration (Sharma, 2023).

Figure 2.1 provides an overview of the nature of AI discussed in the literature review above. The nature of AI consists of the key components of AI, goals of AI, types of AI, benefits of AI in education, risks or challenges of AI, the interface between AI and human intelligence, the link between AI and sustainability, and the current trends in AI.

Figure 2.1: An overview of the nature of AI.



Source: (Researcher's own construct).

The figure above provides a summary of the key points discussed in the section on the nature of AI.

2.6 SUMMARY

In this chapter, a comprehensive literature review was provided. It began with a historical overview of AI, followed by a brief overview of AI in the education sector. Theories related to AI, such as stakeholder theory, were described, and the nature of AI was thoroughly discussed, including key components like decision-making, learning and deep learning, and robotics. The goals of AI were explored, particularly the democratisation of AI technologies and their impact on achieving the Sustainable Development Goals (SDGs). Various types of intelligence, including ANI, AGI, and ASI, were explained along with concepts of strong and weak AI.

A detailed step-by-step analysis of creating an AI policy was presented. The benefits of AI for higher education stakeholders were highlighted, such as providing individualised feedback for learners, improving accessibility, enhancing language skills, assisting instructors, and handling routine queries. The risks and challenges of AI, including performance and uncertainty, fairness, privacy concerns, adversarial robustness, and the potential for generating plagiarised content or cheating on assessments, were discussed.

The chapter also delved into the interface between AI and human intelligence, emphasising the collaboration between humans and machines. This partnership allows humans to focus on more creative tasks while machines manage routine ones. The connection between sustainability and AI was then explored, showing AI's potential to enhance global efforts to protect the environment and conserve resources. AI's impact on global energy industries, environmental outcomes, productivity, and societal factors was discussed. Finally, current trends in AI were reviewed, including Intelligent Tutoring Systems (ITS), personalised learning, recommendation systems in education, Natural Language Processing (NLP), and ChatGPT.

Chapter Three outlines the research methodology and design that is employed in this study. It examines the selected research paradigm, research approach, methodological framework, research strategy, research population and sampling methods, as well as data collection, data analysis procedures, and ethical considerations.

3 RESEARCH METHODOLOGY AND DESIGN

3.1 INTRODUCTION

Chapter Two offered a comprehensive literature review, covering the historical overview of AI, along with a brief overview of AI in the education sector. The theories related to AI were discussed, and various aspects of the nature of AI were examined.

Chapter Three of this study will outline the methodology and research design that was used. Research methodology is a systematic and scientific process used to gather, analyse, and interpret quantitative or qualitative data, aimed at addressing research questions or testing hypotheses. It is a procedure by which researchers organise their study to achieve their objectives using selected research tools. This includes key elements such as research design, data collection strategies, data analysis techniques, and the overall framework guiding the research (Sreekumar, 2023). Research methodology can be categorised into three types: quantitative, qualitative, and mixed method. Quantitative research methodology focuses on measuring and analysing numerical data. It tests cause-and-effect relationships between variables, makes predictions, and generalises findings to broader populations. Qualitative research methodology explores people's opinions, behaviours, and experiences by collecting and analysing textual data. It involves fewer participants and can be more time intensive. This method is commonly used in exploratory research where the issue being studied is not well-defined. The mixed-method research methodology combines both quantitative and qualitative approaches within the same study. This allows researchers to cross-check results, determine if results from both approaches align and clarify unexpected outcomes from one method by referencing the other (Sreekumar, 2023).

A research design serves as a blueprint for guiding the research process, laying out the steps from the research purpose or questions to the outcomes. It is a detailed plan used to gather and analyse data to enhance the understanding of a particular topic. It consists of three primary stages: developing a research question, collecting relevant data to answer the question, and presenting a conclusion based on the findings (Abutabenjeh, & Jaradat, 2018: 238).

The research paradigm and approach, population and sampling, data collection, data analysis, ethical considerations, and a summary will follow.

3.2 RESEARCH PARADIGM

A research paradigm is described as a fundamental framework or perspective that guides the researcher. It can be described as a "philosophy" instead of a "paradigm" as can be the researcher's perspective or assumptions that guide their research. It reflects the researcher's philosophical orientation or perspective, influencing what should be studied, the methods used for studying it, and how the results are interpreted (Ugwu, Ekere & Onoh, 2021: 117).

The following table describes the different types of research paradigms.

Table 3.1: Types of research paradigms.

Positivism	Positivism is used for quantitative research. It expresses a scientific approach to the world. It centres on the researcher focusing on observable events within society, leading to generalisations.
Realism	Realism believes that a "real" world exists to discover, even though our understanding of it may be imperfect. It asserts the existence of an objective reality that is independent of an individual's perception of reality and emphasises the importance of causality.
Critical Theory	Critical theory emphasises social realities shaped by historically rooted structures. Critical theory researchers seek to analyse and transform social, political, cultural, economic, ethnic, and gender-based values.
Interpretivism	Interpretivism asserts that truth is defined by specific belief systems in particular contexts. Similar to critical theory, interpretivism investigates the ideologies and values that shape findings, suggesting that reality consists of "multiple realities" held by individuals. Researching this constructed reality relies on interactions between interviewer and respondent, which means it is necessary for the researcher to be a "passionate participant" in their fieldwork.

Source: (Yong, Md Husin, Kamarudin, 2021: 5859).

This study has undergone qualitative research with the paradigm or philosophy chosen as the interpretivism approach. Interpretivism encompasses approaches that highlight the meaningful aspects of individual characters and participation in both social and cultural contexts. This research method acknowledges that individuals' perceptions of reality are socially constructed by human actors, thus distinctively rejecting the methods of natural science. It is rooted in philosophical traditions of hermeneutics and phenomenology. Interpretivists seek to uncover the meanings and intentions behind people's actions, such as behaviour and interactions with society and culture. Interpretivist researchers seek to determine the presence and absence of causal relationships, as well as examine the specific ways in which they manifest and the context in which they occur (Chowdhury, 2014: 433). Interpretivism is suited for this study as it aligns with the objectives of the qualitative research, which aim to conduct a thorough

desktop analysis of sustainable AI practices and policies at higher education institutions in South Africa and determine the most effective AI practices within South Africa's education sector.

3.3 RESEARCH APPROACH

There are three approaches to research: descriptive, exploratory, and explanatory. Exploratory research is designed to investigate new or poorly defined areas that have not been studied before. This type of research seeks to identify patterns, uncover, describe, or gain an understanding of an issue, perform preliminary analysis, and establish groundwork for future research. It does not aim to provide conclusive results (Haile, 2023). Explanatory research aims to answer "why" questions. In this approach, the researcher is trying to determine the causes and effects associated with the phenomenon being examined (Sheppard, 2020).

The purpose of this study is descriptive research. Accurate information and conclusions about the data gathered and analysed are provided regarding the five higher education institutions' AI policies and practices. The aim of descriptive research is to describe a phenomenon and its attributes. This type of research primarily focuses on the "what" aspect rather than "how" or "why" something has happened (Nassaji, 2015: 129). In this study, AI policies and practices will be outlined, thus making the purpose of this study descriptive.

An inductive approach is given to the theory development. Induction involves moving from the particular to the general, such as by conducting empirical observations on a phenomenon and forming concepts and theories from them (Woiceshyn & Daellenbach, 2018). An inductive approach is beneficial for this study as it allows for the researcher to begin with specific observations such as conducting a desktop analysis and examining AI practices in South African education and then develop insight based on the empirical observation.

3.4 METHODOLOGICAL CHOICE

There are three types of methodological choices: mono-method, multi-method, and mixed method. A mono method involves focusing on either quantitative or qualitative data collection. Mixed methods combine both quantitative and qualitative methods to achieve various objectives and offset the limitations of using a single method. A multi-method approach uses both quantitative and qualitative methods, with one method being the primary approach and the other method being the supplementary approach (Melnikovas, 2018: 39).

The methodological choice is a mono method. A single data collection technique is used which is desk research/documentary analysis. A monomethod study utilises a single type of method, either quantitative or qualitative. In quantitative research, data is presented numerically and analysed using quantitative data analysis techniques. Qualitative research involves information in a primarily textual form and is analysed using qualitative data analysis techniques (Azorín & Cameron, 2010: 96).

3.5 RESEARCH STRATEGY

The research strategy employed is archival/documentary analysis. This method is a systematic process for reviewing and evaluating documents, including both printed and digital materials. It involves analysing and interpreting data to derive meaning, improve understanding, and develop empirical knowledge (Bowen, 2009: 27). A documentary analysis is suited to this study as information is examined and interpreted to enhance understanding and meaning of sustainable AI practices and policies amongst higher education institutions in South Africa.

According to Pandis (2014: 127), a cross-sectional study is an observational research method in which the exposure and the outcome are assessed simultaneously for each study participant. This study is cross-sectional as it aims to gather information on AI policies and practices among higher education institutions in South Africa at a single point in time, allowing the researcher to gain a comprehensive understanding of the research.

The technique and procedures used for the data collection and analysis of this study are qualitative documents in the form of publicly available AI policies and practices of higher education institutions in South Africa to be found on websites and other available secondary data sources.

Next, the research population and sampling methods will be discussed, followed by a discussion of the data collection methods. Subsequently, the data analysis techniques will be reviewed. Ethical considerations will then be addressed, and finally, the chapter will conclude with a summary.

3.6 RESEARCH POPULATION AND SAMPLING

The population of a study refers to the specific segment of the target population that is accessible for the research. The study sample is the group selected from the study population (Banerjee & Chaudhury, 2010). Probability sampling involves drawing samples from a population using random selection, ensuring that each population element has a known or determinable chance of being chosen. In contrast, nonprobability sampling uses non-random

methods in the selection of sample elements. The inclusion probabilities are unknown and potentially zero for some elements of the population (Wiśniowski, Sakshaug, Perez Ruiz, Blom, 2020).

The population for this study is all higher education institutions in South Africa engaging in AI and have publicly available policies and practices on the internet (World Wide Web), annual and sustainability reports, or any other material resources. This study employs convenience sampling. Convenience sampling is a method in which individuals meeting the study criteria are identified through any available means. This method helps researchers achieve the desired number of participants (Emerson, 2015: 166). Convenience sampling is a non-probability sampling technique often used in qualitative research. This method entails choosing participants who are readily accessible within a particular location, a database, an internet site, or a customer membership list (Stratton, 2021: 373). In this study, the sample is five higher education institutions engaging in AI that have AI policies and practices, and information regarding these universities is available on their websites and in other published secondary data sources.

3.7 DATA COLLECTION

The data collection strategy will take two forms, namely secondary and primary research. Primary research is information that the researcher gathers firsthand, whilst secondary research is information gathered from secondary research, such as existing literature. The researcher doesn't directly compile secondary research, and it may include published or unpublished work based on primary or secondary sources (Rabianski, 2003: 43). Primary data is factual and original information, while secondary data involves the analysis and interpretation of primary data. Primary data sources include surveys, observations, experiments, questionnaires, and personal interviews. Secondary data collection sources include government publications, websites, books, journals, articles, and internal records (Ajayi, 2017: 1-2).

In this study, secondary research is obtained through books, journals, internet sources, and higher education institutions' websites. Analysing five higher education institutions' AI policies and practices is considered to be both primary and secondary research.

3.8 DATA ANALYSIS

The process of data analysis involves several stages, including examining, categorising, and tabulating or reorganising the evidence, to fulfil the initial objectives of the study. The analysis should be guided by the purpose of the study (Rabiee, 2004: 657). Data analysis involves

converting raw data into insightful and comprehensible information that can be understood qualitatively or quantitatively. Data analysis encompasses comparing the outcomes of different treatments across multiple groups and making decisions regarding the research objectives. Regardless of whether the data is qualitative or quantitative, the analysis may be to describe and summarise the data, identify relationships between variables, compare variables, identify the difference between variables, and predict outcomes (Dawit, 2020: 2).

In this study, data analysis involves extracting relevant information from various identified sources during the data collection phase to construct a comprehensive literature review regarding AI. To collect the primary data, the researcher will utilise documentary and thematic analysis to facilitate the examination of AI policies and practices of higher education institutions in SA.

Thematic analysis provides systematic and accessible methods for deriving codes and themes from qualitative data. Codes represent the smallest units of analysis that highlight significant aspects of the data relevant to the research question. These codes serve as the foundation for developing themes, underpinned by a central organising concept – a core idea. Themes serve as a structure for arranging and presenting the researcher's analytical insights. The aim of thematic analysis is not just to summarise the data content but also to identify and interpret key features in relation to the research question (Clarke & Braun, 2017). In this study, the researcher aims to identify common trends or themes, or simply report on the approaches taken by selected higher education institutions in implementing AI policies and practices.

3.9 ETHICAL CONSIDERATIONS

Ethical considerations in research encompass a framework of principles that inform the researcher's research design and methodology. These principles consist of voluntary participation, informed consent, anonymity, confidentiality, the risk of harm, and communication of results (Scribbr, 2023). In this study, no human participants were involved, therefore no ethical clearance concerning individuals was required. The information presented in this study is conveyed professionally, ensuring that it does not cause harm or damage to authors or companies. All information gathered from secondary sources is appropriately referenced, ensuring that the researcher avoids plagiarism and respects the original work of others. The data collected in this study was responsibly sourced from reliable and credible sources, including academic journals, articles, books, internet sources, and the websites of companies and higher education institutions. This study adheres to the ethical standards

outlined by Nelson Mandela University (NMU), as seen by the completion and signature of the ethical clearance form (Form E). Additionally, a Turnitin report will also be provided to verify that plagiarism has not occurred in the study.

3.10 SUMMARY

Chapter Three thoroughly delved into the research methodology and design, providing detailed insights. Furthermore, the research population and sampling were discussed, with convenience sampling being the chosen method. Subsequently, this chapter elaborated on the primary and secondary data collection methods employed. A discussion on the techniques of data analysis was provided, with thematic analysis being utilised in this study. Finally, ethical considerations were addressed. Chapter Four will present the study's empirical findings and interpretation of the data.

4 FINDINGS AND INTERPRETATION OF DATA

4.1 INTRODUCTION

In Chapter Three the research methodology and design were discussed, emphasising thematic analysis as the method of data analysis for this study. Thematic analysis offers systematic and accessible methods for deriving codes and themes from qualitative data. Themes act as a framework for arranging and presenting the researcher's analytical findings. The aim of thematic analysis is not just to summarise the content of the data but also to identify and interpret essential features in relation to the research question (Clarke & Braun, 2017). In this study, the researcher aims to identify common trends or themes, or simply report on the approaches taken by selected higher education institutions in implementing AI policies and practices.

This chapter presents the empirical findings of this study. Data is collected from documents produced by the five higher education institutions under analysis. The focus is primarily on documents based on their AI policies and guidelines created for students and lecturers. Additionally, information from their official websites and self-authored articles by the institutions are analysed. This chapter begins with a demographic analysis of the five selected higher education institutions in South Africa. It then provides a thorough analysis of each of the five higher education institutions' AI policies and practices. Common themes are identified amongst all the institutions. Additionally, an in-depth analysis of several topics discussed in Chapter Two is conducted, focusing on the goals of AI, the benefits of AI, and the risks or challenges of AI. This chapter concludes with a summary.

4.2 DEMOGRAPHIC PROFILE OF FIVE SELECTED HIGHER EDUCATION INSTITUTIONS IN SOUTH AFRICA

Table 4.1 provides a demographic profile of the five selected higher education institutions in South Africa.

Table 4.1 Demographic profile of five selected higher education institutions in South Africa.

	Number of Students	Number of Employees	Faculties Offered	Establishment Date (Year)
UNISA	+ 370 000	7 000	Accounting Sciences; Economic & Management Sciences; Human Sciences; Science, Engineering, & Technology; Agriculture & Environmental Sciences; Education; Law	1873
University of Pretoria	+- 53 911	2 932	Humanities; Education; Economic & Management Sciences; Natural & Agricultural Sciences; Health Sciences; Veterinary Science; Theology & Religion; Law; Engineering, Built Environment & Information Technology	1908
University of Johannesburg (UJ)	+ 50 000	1 276	Business & Economics; Art, Design, & Architecture; Education; Engineering & the Built Environment; Health Sciences; Humanities; Law; Science	2005
University of Witwatersrand (Wits)	+- 41 000	+- 1 257	Science; Health Sciences; Humanities; Engineering & the Built Environment; Commerce, Law, & Management	1922
Rhodes University	Between 8 700 to 9 300	+- 1 600	Commerce; Education; Humanities; Law; Pharmacy; Science	1904

Source: (UNISA, 2024a; University of Pretoria, 2024; University of Johannesburg, 2024; University of Witwatersrand, 2023b; Rhodes University, 2024c).

Based on Table 4.1, UNISA has the most students, likely because of the university's online learning model. The oldest university is UNISA and the youngest is the University of Johannesburg. The University of Pretoria offers the greatest number of faculties. In the context of AI policies and practices, it is worth noting that all five higher education institutions began addressing and formulating AI-related policies and practices in 2023. However, more concrete AI policies and guidelines were formulated in 2024. Rhodes University, the University of Pretoria, and the University of Johannesburg have made remarkable progress, creating multiple

guides on the use of AI in learning, teaching, assessment, and education of AI and AI tools. In contrast, the University of Witwatersrand and UNISA have defined their approach to AI but have not yet created comprehensive guidelines and practices.

4.3 FINDINGS REGARDING AI POLICIES AND PRACTICES AT UNISA

In an article written for UNISA, Rapley (2023) states that UNISA's Professor of the Department of Curriculum and Instructional Studies believes AI in teaching and assessment is either banned, invigilated, or embraced. It is noted that the role of lecturers has become extremely challenging because of the decisions required regarding assessments. Lecturers would have to decide when AI is permitted and when it is not, providing clear reasons for their choices.

UNISA is currently drafting AI policies and guidelines to define the responsible use of AI at the university. However, in the meantime when using AI, it is crucial to remain transparent, accountable, and honest. It is of great importance to disclose when AI has been used to produce assessments (Rapley, 2024).

UNISA adopts a balanced and fair approach to the students' use of AI tools, such as ChatGPT. In accordance with the principles outlined in the Policy on Academic Integrity, the responsible and ethical utilisation of AI tools is encouraged (UNISA, 2024b). Acknowledging the potential advantages and risks associated with AI in education, UNISA is implementing measures to prevent the misuse or unethical application of AI. According to UNISA (2024b), these include:

- Completing the guidelines and Policy on Artificial Intelligence
- Launching a mandatory course on academic integrity in 2025 which will equip students with the necessary skills to uphold principles of academic integrity, such as honesty, fairness, and accountability, along with the responsible and ethical usage of generative AI tools.
- Finalising a comprehensive university position statement on the use of AI in teaching, learning, research, and engaged scholarship. This is soon to be approved.

It is found that UNISA encourages the responsible and ethical use of AI while remaining aware of the challenges that it presents, such as the use of it in assessments. UNISA has yet to fully develop comprehensive AI policies and guidelines, it is their goal to do so. In the meantime, students must remain transparent, accountable, and honest, and disclose any use of AI. This approach aligns with the stakeholder theory outlined by Ademola (2024: 3), which suggests

that applying stakeholder theory to AI governance can foster ethical, responsible, and sustainable AI practices that benefit all stakeholders.

The importance of UNISA creating a comprehensive AI policy is further supported by Zhai et al. (2021: 1), who emphasise that because of the rapid interest in AI, it is important to examine its effect on education, as well as offer educators a deeper understanding of AI to prepare them for potential changes. Considering that UNISA predominantly uses an online learning model, AI tools present the advantage of overcoming physical barriers like national and international borders. This aligns with the benefits of AI described by Chen et al. (2020: 75269-75270), where AI tools, such as language translation tools, make it possible for learners to learn according to their own abilities.

4.4 FINDINGS REGARDING AI POLICIES AND PRACTICES AT UNIVERSITY OF PRETORIA

The University of Pretoria believes that generative AI is a valuable resource that can greatly enhance students' learning experiences. However, it is essential to understand the inherent risks associated with its use. Large Language Models (LLMs) don't truly understand the meaning of the text they process, instead, they produce text by recognising patterns and relationships in their training data. Therefore, generative AI should be utilised as a tool to assist learning, rather than serving as a substitute for human creativity and critical thinking. One of the limitations of generative AI is its restricted ability to fully understand context. This can lead to incorrect and irrelevant answers. Therefore, it is important to carefully assess the output and use it alongside other educational resources, and never to replace the practice of critical human reflection and learning (University of Pretoria, 2023b).

The University of Pretoria has established some general principles and guidelines for students when using generative AI tools like ChatGPT (University of Pretoria, 2023b):

- **Understand AI capabilities and limitations:** Fully grasp and understand the strengths and weaknesses of generative AI to use it constructively for learning.
- **Use as a supplementary tool:** Use generative AI as a tool to broaden knowledge, enhance critical thinking, and stimulate creativity, rather than relying on it as a replacement for thorough research and academic rigour.
- **Cite sources properly:** Ensure correct citation and attribution when incorporating information from generative AI into academic work to avoid plagiarism.

- **Fact-check and verify the information:** Confirm the accuracy of AI-generated information against reliable sources, as AI may not always produce the most accurate or up-to-date data.
- **Consider ethical implications:** Be mindful of potential biases within AI and take steps to address them. Use AI responsibly to prevent the generation of harmful, offensive, or misleading content.
- **Ensure data privacy and confidentiality:** When utilising generative AI in the education setting, it is crucial to avoid including personal or confidential information in the AI's training data, as it may accidentally replicate or expose sensitive information. It is best to always use anonymised, non-identifiable data for training purposes. It is important to adhere to privacy regulations and to protect the individuals involved.

To acknowledge the use of AI, the University of Pretoria introduced a declaration statement for referencing in assignments and assessments (University of Pretoria, 2023b).

The University of Pretoria has made huge progress in addressing the use of AI among its students. While acknowledging the potential risks of AI, the university also sees it as a valuable tool to enhance learning. It encourages the careful use of LLM's in conjunction with critical human reflection and learning. This reflects the interface between human intelligence and AI, as Pathak et al. (2019: 25), noted that AI serves as a cognitive technology, but humans alone possess sense-making and contextual decision-making.

Furthermore, the University of Pretoria understands the inherent need of addressing AI in education as seen by its comprehensive principles and guidelines for students using generative AI tools. This approach is supported by Zhai et al. (2021: 1), who highlight the importance of examining AI research in education to offer educators a deeper understanding of AI to prepare for the inevitable changes it will bring.

Table 4.2 provides examples of the possible use of generative AI and how it can be used to enhance learning, boost student productivity, and provide personalised 24/7 tutor support.

Table 4.2: Examples of the possible uses of generative AI.

Use generative AI to enhance learning	Summarise and theme information.
	Provide an overview of complex, lengthy concepts.
	Get alternative phrasing for difficult-to-express ideas.
	Get feedback on written work.

	Generate outlines for writing assignments.
Boosting student productivity with generative AI	Edit a CV, write a cover letter, and prepare for an interview.
	Proofread written work and check for grammar, punctuation, and spelling errors.
	Create an Excel formula to automate calculations.
	Data analysis and identifying themes when dealing with large data sets.
	Create PowerPoint slides for presentations.
Providing personalised 24/7 tutor support via generative AI	Explain and teach a topic like a tutor.
	Summarise long or complex readings to make it easier to understand and retain critical concepts.
	Ask generative AI for examples.
	Assist with homework.
	Give study tips or ideas to improve marks or time management tips.

Source: (University of Pretoria, 2023a).

The examples of how generative AI can be used among students in Table 4.2, further demonstrate the University of Pretoria's support for students using AI tools to enhance learning. By providing students with these examples, they are better equipped to use AI tools responsibly and in accordance with the University's principles and guidelines.

Table 4.3 provides examples of how generative AI tools, such as ChatGPT, can be used to improve teaching and learning among the University of Pretoria's staff and students.

Table 4.3: Examples of how ChatGPT can be used to improve teaching and learning by lecturers.

Enhance students' critical thinking abilities	Instruct students on the principles of critical thinking appropriate to the relevant NQF level of the module.
	Requiring students to submit a ChatGPT-generated version of the assignment, complete with the prompts used, alongside their reflection/critique of the ChatGPT version based on the provided module material and their own final assignment in track changes.
	Use ChatGPT to generate questions that challenge assumptions.
	Encourage students to reflect on their understanding of the topic through the use of ChatGPT.
	Prepare a mind map for assignments or have students explain their thought processes.
To improve teaching	Create lesson plans.
	Develop a worksheet.
	Improve students' understanding.
	Write lesson outcomes.
	Identify major ideas of a module, unit or lesson.

Enhance planning activities related to teaching and learning	Proofread written work and check for grammar, punctuation, and spelling errors. Summarise and theme information. Solve mathematical equations and explain the steps. Create guidelines.
	Translate written work into different languages.
Assessment related purposes	Create quizzes and assessments.
	Grade an essay based on the marking rubric.
	Automated short-answer marking.
	Generate a summary of the problem areas of the assessment.
	Language proficiency assessment.

Source: (University of Pretoria, 2023a).

Table 4.3 highlights how the University of Pretoria provides ways for its lecturers to use AI tools to better assist them in their teaching and preparation of coursework. Lecturers can focus on more complex tasks and allow ChatGPT to simplify their workload by creating lesson plans, quizzes, proofreading, and generating mind maps and ideas, enabling students to better engage with and understand the course material. This aligns with the benefits of AI tools described by Michel-Villarreal et al. (2023: 9-10), which emphasises that AI tools can assist instructors by handling routine queries which enables them to focus on higher-level tasks.

4.5 FINDINGS REGARDING AI POLICIES AND PRACTICES AT UNIVERSITY OF JOHANNESBURG

The University of Johannesburg (UJ) believes that generative AI tools should be used to complement learning, teaching, and research. Their approach is to be responsible, informed, transparent, and ethical (University of Johannesburg, 2023b):

- **Be responsible:** Use generative AI to help you and enhance your skills. Don't use it to complete assignments. Don't rely on generative AI but rather use it to inspire, brainstorm, and plan.
- **Be informed:** Understand how the generative AI tool is developed, how it performs, and what risks or limitations it presents. Monitor for updates as well as reports on bugs or data leaks. Stay up to date on the ethical issues relating to AI tools.
- **Be transparent:** Clearly specify which AI tools were used and how you used them.
- **Be ethical:** Reference and cite the AI tools you used. Do not claim AI work as your own as this is academic misconduct.

The University of Johannesburg welcomes the use of AI tools among lecturers and students but not without caution. Their approach to the use of generative AI closely aligns with Ademola's (2024: 3) description of the stakeholder theory in AI governance. The University promotes the responsible, informed, transparent, and ethical use of AI, reflecting Ademola's (2024: 3) perspective that the stakeholder theory in AI governance should foster ethical, responsible, and sustainable AI practices that benefit all stakeholders.

Table 4.4 provides examples, as outlined by the University of Johannesburg, of how generative AI can be used in teaching and learning.

Table 4.4: Examples of how generative AI can be used in teaching and learning.

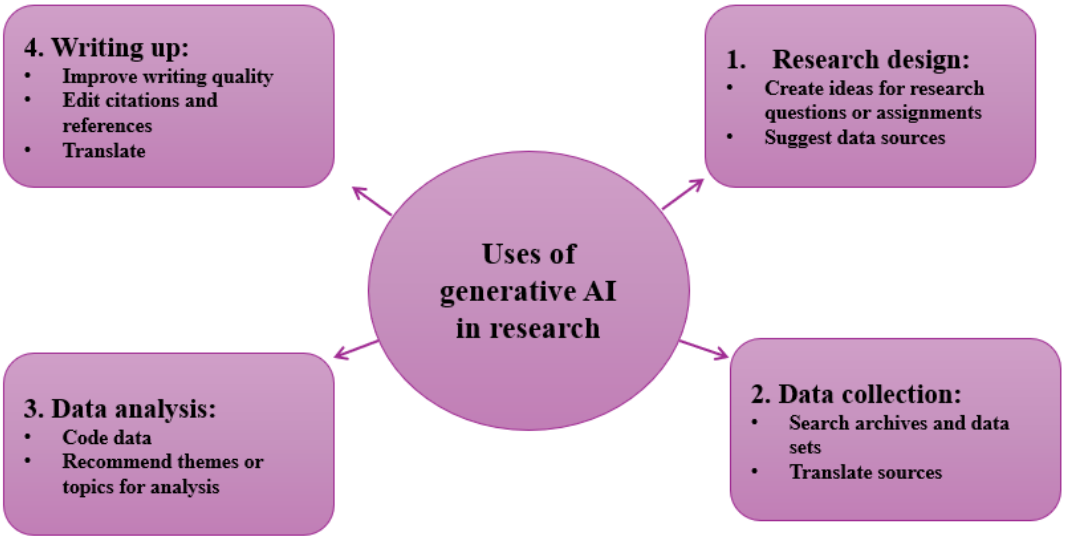
ROLE	DESCRIPTION
Possibility engine	AI generates different ways of conveying an idea.
Personal tutor	AI tools can provide personalised feedback to students and lecturers based on the information provided.
Co-designer	AI can assist in the design process assessments and assignments.
Study buddy	AI tools can help students prepare for tasks and provide ways to study material.
Guide on the side	Lecturers can use AI tools to create content for classes as well as provide support on how to support students in learning specific concepts.

Source: (University of Johannesburg, 2023a).

Table 4.4 illustrates how generative AI tools can complement learning and teaching, aligning with the University of Johannesburg's belief on how generative AI tools should be used.

Figure 4.1 outlines how generative AI can be used in the research process, in assisting one in the research design, data collection, data analysis, and the writing up of the research.

Figure 4.1: Uses of generative AI in research.



Source: (University of Johannesburg, 2023a).

Figure 4.1 highlights how the University of Johannesburg encourages the use of generative AI in research from assisting one in research design, data collection, data analysis, and the writing up of the report. It thus shows that generative AI can aid in generating ideas for research design, searching data sets in data collection, recommending themes for data analysis, and improving the quality of the written report.

4.6 FINDINGS REGARDING AI POLICIES AND PRACTICES AT UNIVERSITY OF THE WITWATERSRAND

The University of the Witwatersrand (Wits) understands that they will never be able to prevent the use of AI tools; thus they need to design assessments innovatively and imaginatively. The University of Witwatersrand takes advantage of AI tools to remove or reduce the less intellectually demanding tasks and focus on higher-order thinking skills. They want to promote academic integrity across their whole institution and for their students to show commitment to their learning. The lecturers need to clearly communicate to the students how to maintain academic integrity and how and when they can utilise AI tools (University of the Witwatersrand, 2023a).

In a report published by Wits Business School by Rirhandu (2023) titled "*South Africa set to gain societal benefits through AI*," the potential impact of AI across four sectors, healthcare, education, financial inclusion, and agriculture, is discussed. Within the education sector, AI can provide access to quality education. AI-powered tutors can enhance learners' access to

resources by making sense of their questions and navigating complex knowledge databases to find relevant information.

In an article published by the University of the Witwatersrand (2023c) titled "*How do we use Artificial Intelligence in Higher Education for good?*" the Senior Deputy Vice-Chancellor expressed: "I commend this very progressive workshop; I hope that we are not debating whether our students should or should not access large language platforms or the like. I would like to think that as a university with the edge, we are embracing artificial intelligence platforms and using them as tools to enhance teaching and learning for good, across all disciplines." She also added that the difficulty arises in monitoring the use of AI tools for teaching and learning purposes, particularly in determining what should be allowed and what should be prohibited. AI tools must be utilised responsibly to promote the public good, eliminate bias and prejudice, enhance transparency and accountability, and comply with the Protection to Access to Information Act while protecting data privacy. The workshop highlighted the importance of implementing AI responsibly and ethically in higher education, recognising its potential to transform learning while stressing the need for informed decision-making and inclusive practices in the AI era (University of the Witwatersrand, 2023c).

It appears that the University of Witwatersrand embraces AI and wants to utilise it to provide quality education. The university encourages the use of it to reduce the less intellectually demanding tasks, allowing students to focus on more complex, critical thinking tasks. However, the university highlights that the difficulty arises in deciding when the usage of AI is permitted and when it is not, and how one can maintain academic integrity when using it. Without a formal guideline in place, the university believes students should use AI tools responsibly and ethically, being mindful of the public good, privacy, and the elimination of bias and prejudice, whilst ensuring transparency and accountability.

The University of Witwatersrand aims to use AI sustainably as can be seen in promoting the public good in the social dimension. The university's concern for addressing bias and prejudice is supported by Piorkowski et al. (2023), who highlight the need for organisations to evaluate the potential risks of bias in AI tools to prevent significant harm. Additionally, the University understands that AI tools can retain personal information, which is a privacy concern. The university's approach to using AI for less intellectually demanding tasks, allowing one to focus on more complex tasks, is supported by Michel-Villarreal et al. (2023: 9-10), who highlight that AI tools can handle routine queries which enable one to focus on higher-level tasks.

4.7 FINDINGS REGARDING AI POLICIES AND PRACTICES AT RHODES UNIVERSITY

Rhodes University shares the same approach to using generative AI tools in teaching and learning as the University of Johannesburg. The 'RITE' approach includes: Be responsible, be informed, be transparent, and be ethical. Table 4.5 summarises the main elements of adhering to the 'RITE' approach.

Table 4.5: The RITE approach in using generative AI.

RITE	ELEMENTS
Be Responsible	Use generative AI to brainstorm ideas or to make sense of content. It is used to improve thinking and knowledge.
Be Informed	Understand who makes the generative AI tool and for what purpose. Understand the terms of use and the data and privacy concerns.
Be Transparent	Acknowledge the use of generative AI tools.
Be Ethical	Provide students with a framework to acknowledge the use of AI (could be through the means of citation).

Source: (Rhodes University, 2024a).

Table 4.5 outlines how Rhodes University students can adhere to the 'RITE' approach when using generative AI. Students must use generative AI responsibly, meaning it must be used as a supplementary tool to enhance learning. Being informed refers to being aware of the information inputted into AI tools, ensuring that privacy is respected. Being transparent is to acknowledge the use of AI tools and act ethically, such as through a declaration.

Rhodes University has provided its students with the following guidelines for using AI (Rhodes University, 2024a):

- **Understand the basics:** Understand the important concepts of AI to make informed decisions about its utilisation.
- **Academic integrity:** Acknowledge the use of AI tools and do not plagiarise.
- **Supplement learning:** Use AI for research, data analysis, and complicated problem-solving. It is a tool to enhance your learning and not replace it.
- **Critical thinking:** Cross-check AI-generated results with reliable sources.
- **Privacy awareness:** Review AI platforms privacy policies and be weary when sharing personal information.
- **Bias awareness:** AI platforms can carry biases from their input data. Be vigilant of potential bias in AI-generated content.

- **Credible sources:** Use reputable AI tools and resources. Review feedback and recommendations before adopting new platforms.
- **Learn and experiment:** Experiment and learn about how AI tools work. This can enhance your skills.
- **Stay updated:** Keep current with the latest developments and trends in the AI field.
- **Ethical AI use:** Consider how AI can impact the broader society and aim to use it responsibly.

Rhodes University has the same examples as the University of Johannesburg in Table 4.4 of how generative AI tools, like ChatGPT, can be used in teaching and learning. ChatGPT can take the role of possibility engine, personal tutor, co-designer, study buddy, and guide on the side (Rhodes University, 2024a).

To uphold academic integrity, Rhodes University stipulates whether the course or assignment students are undertaking permits the use of AI. When AI is allowed, students must acknowledge its use by referencing or generating an AI-generated output as indicated by the lecturer. Students should minimise using ChatGPT to edit their work, as Turnitin might detect AI usage. Additionally, students should keep a copy of the AI-generated outputs when brainstorming ideas as lecturers may want to see it and students could need it to refer to. Before signing, students must understand the plagiarism or AI declaration to know what is expected of them (Rhodes University, 2024b).

It appears that Rhodes University has established comprehensive guidelines for students on the responsible use of generative AI in teaching and learning. The university highlights the importance of considering how AI impacts the broader society, aligning with Khakurel et al. (2018: 10), who note that AI has the potential to enhance communal bonds by assisting in various supportive roles, such as fostering network growth.

Rhodes University provides clarity to their students on responsible AI usage, supported by Michel-Villarreal et al. (2023: 11-12), who emphasise that higher education institutions need to clearly communicate AI usage policies to students to ensure they understand the consequences of violations. Additionally, the university addresses concerns regarding privacy and bias. Piorkowski et al. (2023) express the importance of identifying AI models that may contain and potentially leak personal data and support bias, both of which can cause significant harm. Furthermore, Piorkowski et al. (2023) discuss the risk of performance and uncertainty in

AI tools. The aligns with Rhodes University encouraging students to use credible AI tools and review recommendations and feedback before adopting new platforms.

4.8 OVERALL COMPARISONS REGARDING AI POLICIES AND PRACTICES BETWEEN SELECTED UNIVERSITIES

Following a thematic analysis of the five higher education institutions and their AI policies and practices, the following common themes became apparent:

- **Ethical and responsible use of AI:** All five higher education institutions believe that AI should be embraced. They don't ban the use of AI but believe in its careful and responsible use. AI tools should be used to enhance learning and not to replace it, nor replace critical thinking. The universities understand the potential benefits of AI as well as the potential threats it poses. All institutions believe that students need to disclose when AI has been used to produce assessments. There is a huge emphasis on transparency, accountability, and honesty. As highlighted by Sharma (2023), educators are concerned about the potential for AI tools to generate false information and promote plagiarism. However, as AI technology advances and new models are introduced, perceptions will gradually evolve, and policies will be introduced to manage this integration.
- **Education on AI's capabilities and limitations:** All five of the universities aim to educate staff and students on AI's capabilities and limitations. UNISA is drafting AI policies and guidelines to define the responsible use of AI at the university. They have also introduced a mandatory course on academic integrity in 2025. The University of Pretoria has established general principles and guidelines for students when using generative AI tools like ChatGPT. They have also provided students with a list of ways in which generative AI tools can enhance student learning, boost productivity, and provide personalised 24/7 tutor support. The University of Johannesburg's approach to AI is the 'RITE' approach, to be responsible, informed, transparent, and ethical. They have also provided students and staff with a list of ways in which generative AI tools can be used in teaching and learning. The University of Witwatersrand believes that AI tools must be utilised responsibly to promote the public good, eliminate bias and prejudice, enhance transparency and accountability, and by complying with the Protection to Access to Information Act while protecting data privacy. Their staff attended a workshop that highlighted the importance of responsible and ethical AI

implementation in higher education. Rhodes University also follows the 'RITE' approach and has guidelines when using generative AI tools in teaching and learning. Michel-Villarreal et al. (2023: 11-12) support the creation of academic integrity policies and clear instructions to ensure students use AI tools responsibly and understand the consequences of their misuse.

- **Academic integrity, critical thinking, and plagiarism prevention:** All institutions place great importance on maintaining academic integrity when using AI tools. It is also mandatory for students to acknowledge the use of AI in assessments. All institutions believe that AI tools should be used to complement learning and be used responsibly. It should be used as a supplementary tool that enhances learning. Critical thinking skills should not be replaced. Michel-Villarreal et al. (2023: 9-10) emphasise the ability of AI tools to enhance innovative learning allowing individuals to focus on higher-level tasks while delegating routine tasks to AI.

4.9 GOALS OF AI

One of the goals of AI is productivity improvement. All five higher education institutions believe that AI tools should be used to enhance learning. The University of Pretoria and Rhodes University believe that AI should be used as a supplementary tool to broaden knowledge and enhance learning. The University of Pretoria believes generative AI can boost student productivity. Examples of this are proofreading written work, data analysis, editing, and identifying themes with large data sets. The University of Johannesburg believes generative AI can be used as a study buddy by helping students prepare for tasks and providing them with ways to study material. The University of Witwatersrand takes advantage of AI tools to remove or reduce the less intellectually demanding tasks and focus on higher-order thinking skills. Seger et al. (2023: 2) emphasise that a key goal of AI is to democratise its access, ensuring that the benefits received from it, such as improved productivity, can be enjoyed by all.

4.10 BENEFITS OF AI

The University of Pretoria has identified several benefits of using generative AI, including enhancing learning, boosting student productivity, and providing personalised 24/7 tutor support. Table 4.2 illustrates examples of how generative AI can provide support aligned with these benefits. These advantages are also linked to those outlined by Michel-Villarreal et al. (2023: 9-10), such as using round-the-clock support which is valuable for distance learners and

international students in different time zones. Additionally, generative AI enhances language skills by simulating conversations, correcting language errors, and offering vocabulary and grammar assistance.

The University of Johannesburg highlights the benefits of generative AI in teaching and learning in Table 4.4, describing its potential roles as a possibility engine, personal tutor, co-designer, study buddy, and guide on the side. This is also linked to the advantages outlined by Michel-Villarreal et al. (2023: 9-10), where ChatGPT provides individualised feedback that promotes self-directed learning. The interactive nature of the majority of AI tools enhances innovative learning experiences. Rhodes University highlights the same benefits of generative AI as the University of Johannesburg.

The University of the Witwatersrand takes advantage of AI tools to remove or reduce the less intellectually demanding tasks, allowing a greater focus on higher-order thinking skills. This aligns with the advantages outlined by Michel-Villarreal et al. (2023: 9-10), where generative AI tools can handle routine queries and address common questions, enabling one to focus on higher-level tasks. The University of Witwatersrand also outlined that AI can provide access to quality education and AI-powered tutors can enhance learners' access to resources by making sense of their questions and navigating complex knowledge databases to find relevant information. This aligns with the benefits of AI described by Khanzode and Sarode (2020: 34), where AI simplifies the handling of stressful and complex tasks and completes difficult tasks within a shorter time frame.

4.11 RISKS OR CHALLENGES OF AI

UNISA's Professor of the Department of Curriculum and Instructional noted that the role of lecturers has become extremely more challenging because of the decisions required regarding assessments. Lecturers would have to decide when AI is permitted and when it is not, providing clear reasons for their choices. Acknowledging the potential benefits and risks of AI in education, UNISA is implementing measures to guide students against the misuse or unethical use of AI.

The University of Pretoria acknowledges the inherent risks of using generative AI. Large Language Models (LLMs) don't truly understand the meaning of the text they generate, instead, they generate text by recognising patterns and relationships between words on their training data. As a result, generative AI should be viewed as a supplementary tool and not act as a replacement for human creativity and critical thinking. Generative AI has the restricted ability

to fully understand context. This can lead to inaccurate and irrelevant answers. Therefore, it is important to carefully evaluate the output and use it alongside other educational resources, and never to replace the practice of critical human reflection and learning (University of Pretoria, 2023b). This is consistent with the findings of Piorkowski et.al (2023), who discuss the risks associated with AI technologies and their impact on performance and uncertainty.

The University of Johannesburg (2023a) has provided several ways to reduce the risks of academic misconduct related to generative AI when designing assessments:

- Increase the amount of assessed work in class.
- Create assessments with practical components.
- Require students to use the most recent resources available.
- Require students to submit rough notes alongside their final submissions.
- Ensure that the assessments measure the student's ability to construct arguments, analysis information, and present evidence.
- Encourage students reflect on their thought processes and writing strategies through written feedback forms.

The goal of assessment is for students to demonstrate their learning. The rise of generative AI has shown that traditional assessment methods can be bypassed using these tools. This raises concerns about plagiarism and academic dishonesty and undermines the core objective of achieving meaningful learning (University of Johannesburg, 2023a).

To maintain academic integrity when using generative AI lectures must clearly communicate whether and how students must use generative AI in their course and for which assignments. Students must remain transparent by signing a declaration confirming that their work is their own. If they have used a generative AI tool, they must specify what tool was used, how it was used, and where it was utilised (University of Johannesburg, 2023a). This is consistent with the findings of Michel-Villarreal et al. (2023: 11-12), who discuss the risks associated with AI technologies, specifically ChatGPT, and how higher education institutions need to communicate their academic integrity policies to address the use of AI tools and provide clear instructions to ensure students understand the consequences of violations.

The University of Witwatersrand acknowledges the difficulty that arises in monitoring the use of AI tools for teaching and learning purposes, particularly in determining what should be permitted and what should not. AI tools must be utilised responsibly to promote the public good, eliminate bias and prejudice, enhance transparency and accountability, and by complying

with the Protection to Access to Information Act while protecting data privacy. This is consistent with the findings of Piorkowski et al. (2023), who discuss the risk of AI technologies posing privacy concerns. Malicious third parties can infer sensitive, personal information about the people whose data was used to train the model.

Rhodes University has created responsible and ethical ways of using generative AI tools. However, when using generative AI tools like ChatGPT, it is important to be aware of the following (Rhodes University, 2024a):

- **Database inaccuracies:** ChatGPT can create responses that seem to be factually reliable and convincing but, in reality, the software does not understand the content and cannot distinguish between right or wrong information. Therefore, one needs to evaluate and verify the information generated. This aligns with Piorkowski et al. (2023), who emphasise the difficulty of ensuring the accuracy of the data received by the AI tool.
- **Bias:** AI technologies are trained from internet data which can make the responses biased. It is important to critically evaluate the responses it produces for potential biases. This aligns with Piorkowski et al. (2023), who highlight the potential bias in the training date of AI tools, making it essential for organisations to evaluate the risk of this to prevent harm.
- **Reliance and use of generative AI:** Over-reliance on ChatGPT and other AI technologies may result in the underdevelopment of critical thinking skills. This aligns with Khanzode and Sarode (2020: 34), who highlight that the growing integration of AI into various aspects of society creates an over-reliance on technology.
- **Privacy and ethical use:** One needs to be aware of how information is used by AI technologies. The data inputted into the AI tool is added to the training data and database of that tool. This aligns with Piorkowski et al. (2023), who bring attention to the risk that malicious third parties can infer sensitive, personal information about individuals whose data was used to train the AI tool. It is therefore important to identify and protect AI tools that can potentially leak personal information.

4.12 SUMMARY

Chapter Four presents the empirical findings of this study. The results provided are derived from documents produced by the five higher education institutions being analysed. Information from their official websites and self-authored articles by the institutions was analysed. Each

higher education institution's AI policies and practices were discussed in detail, with common themes identified amongst all the institutions. A further analysis was conducted in relation to several topics discussed in Chapter Two. The topics discussed were the goals of AI, the benefits of AI, and the risks or challenges of AI. Chapter Five will discuss the conclusions and recommendations.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

In Chapter Four findings and interpretation of the data were discussed. This study aimed to provide a desktop analysis of sustainable artificial intelligence policies and practices among five higher education institutions in South Africa. Chapter Five aims to provide conclusions and recommendations for policymakers at higher education institutions regarding the use of generative AI tools. This chapter provides an overview of the study. Following this, a discussion of the findings will be presented and then recommendations will be formulated. This chapter will address the study's contributions and limitations, offering suggestions for further research. Lastly, a conclusion will be provided.

5.2 OVERVIEW OF THE STUDY

Chapter One introduced the study, detailing the background and providing a description of the problem statement. The primary, secondary, and methodological objectives followed this. The primary objective of this study was to conduct a desktop analysis of sustainable artificial intelligence policies and practices at higher education institutions in South Africa. Key concepts were defined, and the significance of the research was presented. The chapter concluded with a structure of the study to follow.

Chapter Two provided a comprehensive literature review of the study. It began with an introduction, followed by a historical overview of AI, and a brief discussion of AI in the education sector. Theories related to AI such as the stakeholder theory and learning theory were explored. The chapter then examined various aspects of AI, including its key components, goals, types, benefits, risks or challenges, the interface between AI and human intelligence, the link between AI and sustainability, and lastly, the current trends in AI. The chapter concluded with a summary.

Chapter Three examined the research methodology and design of the study. It began with an introduction and then outlined the chosen research paradigm, which was interpretivism. The chapter discussed the selected research approach, highlighting the use of descriptive research. The methodological choice, research strategy, and research population and sampling were presented. Following this, it described the data collection techniques and data analysis methods. Ethical considerations of the study were highlighted, and the chapter concluded with a summary.

Chapter Four analysed the empirical findings of the study. The chapter began with an introduction, followed by a demographic analysis of the five selected higher education institutions in South Africa. AI policies and practices were then discussed for each institution, making overall comparisons and identifying common themes. Additionally, a further analysis was conducted in relation to several topics discussed in Chapter Two. The topics discussed were the goals of AI, the benefits of AI, and the risks or challenges of AI. The chapter concluded with a summary.

5.3 THE ACHIEVEMENT OF PRIMARY, SECONDARY, AND METHODOLOGICAL OBJECTIVES

The achievement of the research objectives is summarised in Table 5.1 below, indicating in which chapters they were achieved.

Table 5.1: Research objectives achieved.

Objectives	**Chapter(s)**
Primary Objective:	**Achieved**
To conduct a desktop analysis of sustainable artificial intelligence policies and practices at higher education institutions in South Africa.	Chapters 1-5
Secondary Objectives:	**Achieved**
To identify five higher education institutions in SA regarding their sustainable AI policies and practices.	Chapters 3-4
To conduct a desktop analysis regarding sustainable AI policies and practices in higher education institutions in SA.	Chapters 3-4
To determine best AI practices in the education sector of SA.	Chapter 5
Methodological Objectives:	**Achieved**
To conduct a literature review regarding the nature of sustainable AI policies and practices in higher education.	Chapter 2
To identify the research methodology that is most suitable in addressing the specified research problems and objectives of the study.	Chapter 3
To collect qualitative data through a desktop or documentary analysis amongst five higher education institutions in SA regarding sustainable AI policies and practices	Chapters 3-4
To analyse the qualitative data obtained from the desktop study.	Chapter 4
To draw conclusions and make recommendations to stakeholders in the higher education sector regarding sustainable AI policies and practices.	Chapter 5

Source: (Researcher's own construct).

5.4 CONCLUSIONS AND RECOMMENDATIONS

The following section will discuss the conclusions and recommendations of the study, focusing on sustainable AI policies and practices in the five selected higher education institutions, the

goals of AI, the benefits of AI, and the risks or challenges of AI. Additionally, this section will explain how the research question and objectives of the study were satisfied.

5.4.1. SUSTAINABLE AI POLICIES AND PRACTICES IN HIGHER EDUCATION INSTITUTIONS

The main research question of this study is: *What are the most effective and sustainable artificial intelligence policies and practices that higher education institutions in SA can implement to preserve academic integrity in the long term?* This study aimed to explore sustainable AI policies and practices at higher education institutions in South Africa, supported by a comprehensive literature review that provided an overview of AI in the education sector, theories related to AI, and the nature of AI.

It was found that all five higher education institutions embrace AI, but they remain cautious in their approach to its implementation. Studies have found a lack of clarity surrounding the use of AI tools in academic policies, heightening the risk of academic dishonesty. Effective governance, training, and well-defined academic policies are crucial to addressing the challenges and risks associated with its use (Michel-Villarreal et al., 2023: 11-12). All five higher education institutions promote the ethical and responsible use of AI. A huge emphasis is placed on transparency, accountability, and honesty. They aim to educate their staff and students on AI's capabilities and limitations. Rhodes University, the University of Pretoria, and the University of Johannesburg have created multiple guidelines on the use of AI in learning, teaching, assessment, and education of AI and AI tools. In contrast, the University of Witwatersrand and UNISA have defined their approach to AI but have not created comprehensive guidelines and practices yet.

Furthermore, academic integrity, critical thinking, and plagiarism prevention are of great importance to all five higher education institutions when using AI tools. It is mandatory for students to acknowledge the use of AI, employing it as a supplementary tool that enhances learning and doesn't replace critical thinking skills.

The following recommendations are offered to assist higher education institutions in establishing effective and sustainable AI policies and practices, thereby achieving the third secondary objective of this study: to determine the best AI practices in the education sector of SA.

- *Establish comprehensive AI guidelines:* All five higher education institutions should create detailed guidelines on how to use AI ethically and responsibly. The guidelines

should consist of but not be limited to data privacy and confidentiality, AI's capabilities and limitations, ethical implications, academic integrity, bias awareness, and the use of AI as a supplementary tool. While Rhodes University, the University of Pretoria, and the University of Johannesburg have created multiple guidelines, the University of Pretoria and UNISA have yet to do so. Therefore, it is essential that all higher education institutions implement a clear AI policy that is integrated into their institutional policies. It is also important to regularly review these policies to keep up to date with the latest developments in AI.

- *Continuous assessment of AI tools:* All five higher education institutions should regularly assess and review the AI tools they utilise. It is important to review AI tools before adopting them. Higher education institutions must seek feedback on the credibility of the AI tools to ensure the tool doesn't contain malicious software or leak personal information. Keeping up with the current trends in AI is also beneficial to these institutions as it enables them to better monitor the usage and implement necessary safeguards.
- *Implement regular AI workshops and training programmes:* AI workshops and training progammes would be highly beneficial for both students and staff in familiarising themselves with AI tools. This will help staff and students gain a better understanding of the tools, including their capabilities and limitations, and learn how to use them responsibly and ethically. This is important to avoid academic integrity violations, and to use it as a supplementary tool to enhance learning.

5.4.2 THE GOALS OF AI

It was found that one of the main goals of AI is productivity improvement. AI tools can be used as supplementary tools to enhance learning and be used as a study buddy. Recommendations of how all five higher education institutions can incorporate AI to increase student productivity and enhance learning are:

- *Encourage the use of Chatbots:* Chatbots like ChatGPT are virtual assistants that provide personalised support. They can provide explanations, answer questions, and engage in conversation. Chatbots enhance learning by providing individualised feedback and increase productivity by streamlining routine tasks, allowing one to focus on more complex tasks. AI communication assistants, like Grammarly, can also help individuals to improve their productivity by assisting them in their writing processes and generating new ideas.

- *Leverage AI tools to enhance curriculum frameworks:* Educators can enhance student learning by using AI tools to establish more creative curriculum frameworks. These tools can generate curriculum frameworks based on different learning styles, and the time required to make them is significantly reduced compared to doing it manually, thereby increasing productivity.

5.4.3 THE BENEFITS OF AI

It was found that the benefits of AI include enhanced learning, improved student productivity, and personalised 24/7 tutor support. The benefits of AI in teaching and learning are its roles as possibility engine, personal tutor, co-designer, study buddy, and guide on the side. Additionally, AI tools can remove the less intellectually challenging tasks, allowing one to focus on higher-order thinking tasks. AI can provide quality education by increasing learners' access to resources. The following recommendations are offered to assist higher education institutions to reduce the less intellectually challenging tasks, enhance the quality of education, and improve the effectiveness of teaching and learning:

- *Leverage AI to automate administrative tasks:* Educators are able to focus on more complex tasks by allowing AI to handle administrative tasks such as scheduling, grading quizzes, managing student records, designing specific assessments, and analysing student data.
- *Incorporate Intelligent Tutoring Systems (ITS):* Intelligent Tutoring Systems (ITS) act as virtual tutors by answering routine questions about assessments while also identifying gaps in students' learning. They are designed using knowledge-based domain information, offering more interactive learning experiences, such as learning through games (Yousuf & Wahid, 2021). The instructor evaluates a sample of student responses, allowing the ITS to generate a computer model based on the inferred rules derived from the instructor's grading decisions. This model is then used to grade other student's assessments (Chassignol et al. 2018). Thus, this improves the effectiveness of teaching and learning.
- *Improved accessibility:* AI tools can significantly improve the quality of education because of its immediate accessibility. Students can utilise these tools to explain concepts, answer questions, offer additional reading, and provide examples. AI also provides access to resources that may otherwise be difficult to obtain, enhancing the learning experience.

5.4.4 THE RISKS OR CHALLENGES OF AI

The study identified several risks or challenges of AI, including academic dishonesty and plagiarism, database inaccuracies, bias, over-reliance on AI, and concerns regarding privacy and ethical usage. The following recommendations are provided to higher education institutions to help combat the risks or challenges associated with AI usage:

- *Declaration of generative AI usage:* It should be mandatory for students to sign a declaration confirming the use of generative AI in their work. Additionally, they must be made aware of the consequences of dishonesty or plagiarism.
- *Validate AI outputs:* Many AI tools have database inaccuracies, and the responses created might seem reliable or correct but could be incorrect. It is important for students to verify AI-generated information using reliable sources. This process enhances students' critical thinking skills encouraging them to cross-check information. The risk of bias is another concern, as AI tools are trained from internet data, which can result in biased responses. Therefore, it is crucial to validate the responses AI generates to ensure accuracy and fairness.
- *Regulation of AI tools:* Higher education institutions must clearly communicate when the use of AI is permitted and when it is not. If there is no regulation of these tools, students may misuse them, leading to an over-reliance on them. As a result, this will reduce the development of critical thinking skills.
- *Data protection measures*: Higher education institutions should implement thorough data protection measures to safeguard students' personal information when using AI tools. Students must be made aware of privacy concerns and be educated on how to use AI ethically, ensuring compliance with privacy regulations, such as the Protection to Access to Information Act.

5.4.5 IMPLICATIONS OF AI IMPLEMENTATION IN HIGHER EDUCATION

The implications of AI implementation in higher education are summarised in Table 5.2.

Table 5.2: Overall implications of AI implementation in higher education institutions.

No	Higher education institutions in South Africa should realise that:
1	AI in teaching and assessment is often banned, invigilated, or embraced and the role of lecturers has become extremely more challenging because of the decisions required regarding the use of AI in assessments.
2	Generative AI could be used as a tool to assist teaching and learning and not act as a replacement for human creativity and critical thinking.

3	AI usage has ethical implications, and one must be aware of the potential biases within AI and how to mitigate them as it should be used responsibly and avoid the creation of harmful, offensive, or misleading content.
4	The aim of AI usage should be to enhance students' critical thinking, and how to be responsible, informed, transparent, and ethical.
5	They will never be able to prevent the use of AI tools, thus they need to use AI innovatively and imaginatively, remove or reduce less intellectually demanding tasks, and focus on higher-order thinking skills.
6	AI impacts the broader society and has the potential to enhance communal bonds by assisting in various supportive roles, such as fostering network growth.
7	AI should be used as a supplementary tool to broaden knowledge, enhance learning, and boost student productivity.
8	Generative AI is a valuable tool that can greatly enhance students' learning experiences in the classroom.
9	Drafting AI policies and guidelines to define the responsible use of AI in education is crucial to remain transparent, accountable, and honest to all stakeholders.
10	It is important to carefully assess the output and use of AI alongside other educational resources, and never use it to replace the practice of critical human reflection and learning.
11	When introducing the usage of AI in teaching, learning, and assessments, a declaration statement for AI usage should be provided to users.
12	The usage of generative AI in research could assist researchers in the whole research process from research design, data collection, data analysis, and the writing up of the final report.
13	AI tools must be utilised responsibly to promote the public good, eliminate bias and prejudice, enhance transparency and accountability, and comply with the Protection to Access to Information Act while protecting data privacy.
14	There are concerns regarding the use of AI tools to generate false information and possibly promote plagiarism, but as AI technology advances and new models are introduced, perceptions could gradually evolve, and policies could be introduced to manage its integration.

Source: (Researcher's own construct).

5.5 CONTRIBUTIONS OF THE STUDY

The purpose of this study is to provide a desktop analysis of sustainable AI policies and practices at higher education institutions in South Africa. The research findings can provide higher education institutions with appropriate guidelines to implement sustainable AI policies and practices. The emergence of AI in the education sector has grown rapidly and is a relatively new field of research. The research findings can contribute to the body of knowledge regarding AI with specific reference to the education sector. Additionally, it can provide future researchers with a framework to follow when conducting research in the education sector.

5.6 LIMITATIONS OF THE STUDY AND SUGGESTIONS OF FURTHER RESEARCH

This study has made a meaningful contribution to the existing body of literature regarding sustainable AI policies and practices in the education sector. However, there are several limitations that should be considered. Firstly, this study specifically focused on the education sector, meaning the results of the study cannot be generalised to other sectors. Secondly, the study was limited to South African higher education institutions, so further research would need to be conducted to review AI policies and practices in higher education institutions in other geographical locations. Thirdly, there is a limitation in the scope and depth of the data collected, as the University of Witwatersrand and UNISA do not have comprehensive AI guidelines and practices in place yet. While Rhodes University, the University of Pretoria, and the University of Johannesburg have created multiple guides on the use of AI in learning, teaching, assessment, and education of AI and AI tools, none have established policies as part of their academic integrity policies. Lastly, the current AI policies and practices for these institutions may change and evolve, thus ongoing research is important to keep pace with these developments, specifically in the education sector.

5.7 CONCLUSION

This chapter provided conclusions and recommendations regarding sustainable AI policies and practices in higher education institutions, the goals of AI, the benefits of AI, and the risks or challenges of AI. This study has achieved its primary objective of providing a desktop analysis of sustainable AI policies and practices at higher education institutions in South Africa. The results and recommendations are beneficial as they highlight the importance of higher education institutions in implementing sustainable and comprehensive AI policies and guidelines. The recommendations on creating sustainable AI policies and practices, enhancing AI's goals and benefits, and mitigating its risks or challenges are essential for promoting the responsible long-term use of AI.

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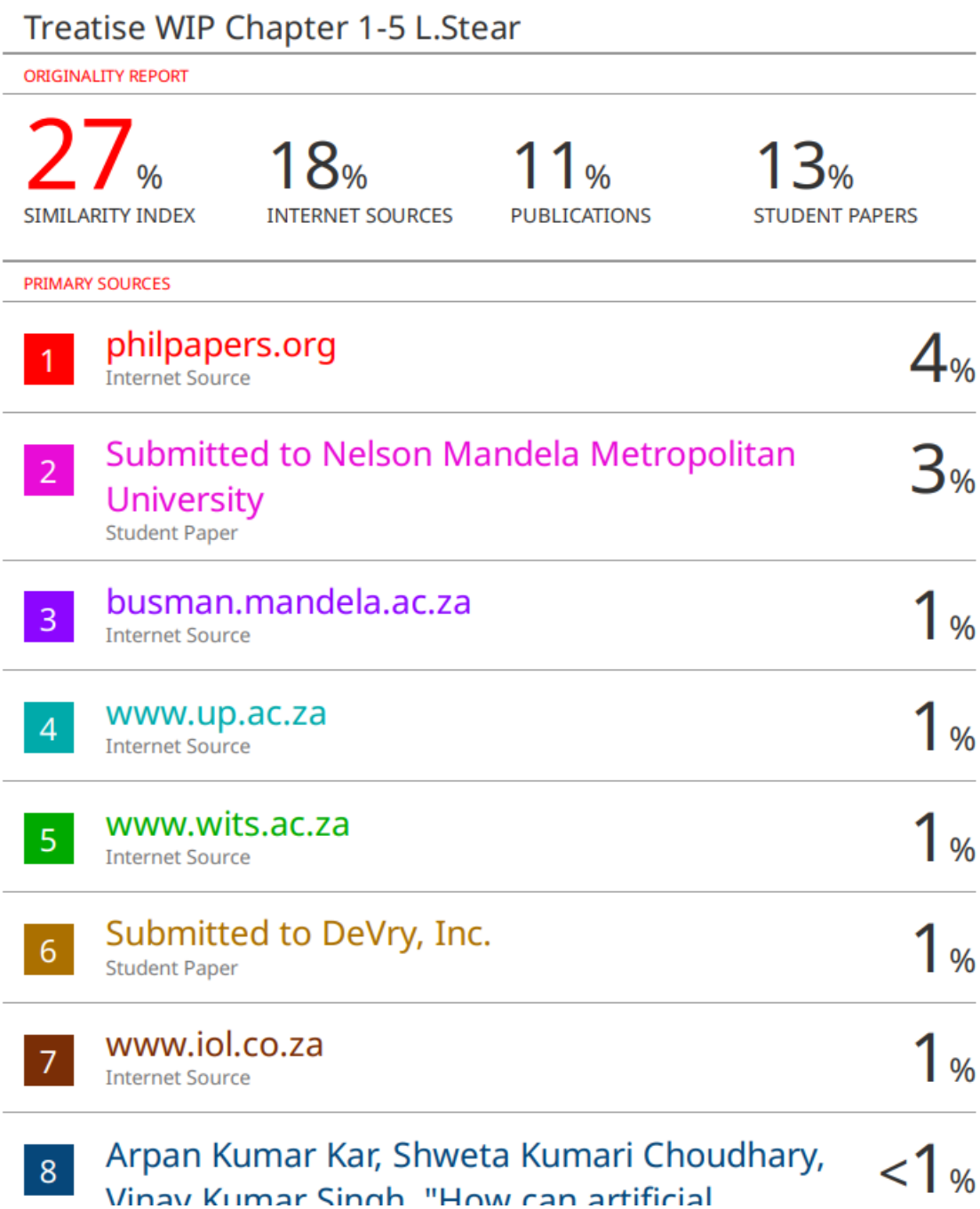
APPENDIX 1: TURNITIN REPORT



Treatise WIP Chapter 1-5 L.Stear

ORIGINALITY REPORT

27%	18%	11%	13%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	philpapers.org Internet Source	4%
2	Submitted to Nelson Mandela Metropolitan University Student Paper	3%
3	busman.mandela.ac.za Internet Source	1%
4	www.up.ac.za Internet Source	1%
5	www.wits.ac.za Internet Source	1%
6	Submitted to DeVry, Inc. Student Paper	1%
7	www.iol.co.za Internet Source	1%
8	Arpan Kumar Kar, Shweta Kumari Choudhary, Vinay Kumar Singh, "How can artificial	<1%

APPENDIX 2: ETHICS FORM

NELSON MANDELA
UNIVERSITY

FACULTY OF BUSINESS AND ECONOMIC SCIENCES
DEPARTMENT OF BUSINESS MANAGEMENT

ETHICAL CONSIDERATION FOR HONOURS TREATISE

INSTRUCTIONS

- Should be completed by study leader and student.
- Must be signed off by the student, study leader and HoD.
- Submit completed form to Ms Kim Alexander.
- Please ensure that a summary of the research methodology section of the treatise is attached to this form *(Complete Annexure A)*.
- ***Please note that by following this ethics route, the study will NOT be allocated an ethics clearance number.***

SECTION A – STUDENT ACKNOWLEDGMENT

- The student acknowledges that their research project is for academic qualification purposes only. As such, the research report or any sections thereof ***may not be published.***

- The student also acknowledges that their research project ***will be a desktop study*** and will ***make use of publicly available documents or secondary data***. No human subjects will be involved in the study as primary sources of data.

Secondary data, in this instance, refers to data that was collected and processed by someone else for some other purpose but is now being used by the researcher for another reason (Tripathy, 2013). Research utilising secondary data that both exists and has been collected in a public, academic database, for example Google Scholar, is considered desktop research, and generally does not require full ethical approval (Creswell & Poth 2017).

SECTION B – STUDENT AND RESEARCH PROJECT DETAILS

Student name & surname	**LC Stear**
Student number	**223185701**
Title of treatise	**A desktop analysis of sustainable artificial intelligence policies and practices at higher education institutions in South Africa**
Qualification	**Business Management Honours**
Department	**Business Management**
Study leader	**Prof EE Smith**

SECTION C – ETHICS CRITERIA

	(Please tick the appropriate block)	YES	NO
1.	Is there any risk of harm, embarrassment of offence, however slight or temporary, to the participant, third parties or to the communities at large?		✓
2.	Is the study based on a research population defined as 'vulnerable' in terms of age, physical characteristics and/or disease status?		✓
2.1	Are subjects/participants/respondents of your study:		
2.1.1	Children under the age of 18?		✓
2.1.2	NMU staff?		✓
2.1.3	NMU students?		✓
2.1.4	The elderly/persons over the age of 60?		✓
2.1.5	A sample from an institution (e.g. hospital/school)?		✓
2.1.6	Handicapped (e.g. mentally or physically)?		✓
3.	Does the data that will be collected require consent of an institutional authority for this study? (An institutional authority refers to an organisation that is established by government to protect vulnerable people)		✓
3.1	Are you intending to access participant data from an existing, stored repository (e.g. school, institutional or university records)?		✓
4.	Will the participant's privacy, anonymity or confidentiality be compromised?		✓
4.1	Are you administering a questionnaire/survey that:		
4.1.1	Collects sensitive/identifiable data from participants?		✓
4.1.2	Does not guarantee the anonymity of the participant?		✓
4.1.3	Does not guarantee the confidentiality of the participant and the data?		✓
4.1.4	Will offer an incentive to respondents to participate, i.e. a lucky draw or any other prize?		✓
4.1.5	Will create doubt whether sample control measures are in place?		✓
5.	Do you wish to publish any research output (i.e. article) from this study?		✓

*Please note that if **ANY** of the questions above have been answered in the affirmative **(YES)** the student will need to complete the full ethics clearance form (MEOS REC-H application) and submit it with the relevant documentation to the Faculty RECH (Ethics) committee.*

The student hereby certifies that he/she has given his/her research careful ethical consideration and full ethics approval is not required.

SECTION D – INFORMATION TO BE INCLUDED INTO THE RESEARCH REPORT

(The section below should be edited and aligned to the specifics of the study)

1. ETHICAL CONSIDERATIONS

This study will follow the ethical research considerations that apply to all research in the social sciences, which are defined as moral rules and professional codes of conduct to the collection, analysis, reporting, and publication of information about research subjects (Pietilä, Nurmi, Halkoabo & Kyngäs, 2020:49). The research will, at all times, adhere to the following ethical considerations:

1.1 Informed Consent

Where data is freely available on the Internet, books or other public forum, permission for further use and analysis is implied, however, the ownership of the original data must be acknowledged (Tripathy, 2013).

1.2 Anonymity and Confidentiality

To ensure privacy and to protect individuals or institutions within the secondary data, a privacy plan or protocol will be in place to protect the confidentiality of the users. This may include removing identifiable information, securely storing the data and removing any sensitive information prior to distribution of the outcome of the study (where needed).

1.3 Action and Competence of Researchers

The study will be undertaken in an ethically correct manner. Under no circumstances would the researcher in this study make judgments about data, falsify data or plagiarise.

1.4 Respect of Intellectual Property

Intellectual property is the creation arising from intellectual activity, and this study will acknowledge and reference all ideas and sources used in the study.

1.5 Beneficence

The study topic being researched is for degree purposes only and will not be published.

1.6 Non-Maleficence

Non-maleficence makes sure that what is being done is not harmful and that harm is not done by omitting care or treatment. This study will make sure that no harm will come to anyone connected to the study. This body of work and the documents consulted will also adhere to the Protection of Personal Information Act (PoPIA). POPIA governs the collection, processing and sharing of personally identifiable information (PII).

1.7 Applying for ethical consideration

The researcher will apply for ethical consideration from the ***Department of Business Management*** (Nelson Mandela University) to have the right to research within the intended domain. The research

process, in particular data collection, may only be conducted once ethical clearance has been granted, i.e., the ethics form has been signed by the student, the study leader and the Head of Department.

SECTION E – SIGNATURES AND DATES

STUDENT	19/04/2024 DATE
STUDY LEADER	22/04/2-24 DATE
HEAD OF DEPARTMENT	2024/04/29 DATE

APPENDIX 3: AI USAGE DECLARATION

ANNEXURE X: GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN WRITING PROCESS – USAGE DECLARATION

According to Nelson Mandela University's Institutional Position Statement on the use of Generative Artificial Intelligence (D_71_24_(2024-02-07), the following are considered recommended uses and unacceptable uses of AI by students and staff.

Recommended uses:

- Search engine
- Enhancing understanding
- Gaining insights
- Gathering information
- Clarifying concepts
- Critically evaluating information

Unacceptable uses:

- Copy and paste generated intellectual work.
- Claiming a generated product (text, image, creation) as your own.
- Generating information for assessments, projects, and assignments, unless this is explicitly instructed by the academic, who has provided clear guidelines in the form of permissions and prohibitions as to the appropriate use thereof as part of an assessment designed around the use of AI.
- Used for unfair advantage – when you are determined to deceive and do not use something in an appropriate manner.
- Making use of AI and not appropriately referencing the sources represented in the generated text, image and/or other product.
- Makes use of AI and does not ensure that the sources represented in the generated text, image and/or other product are accurate and represent the actual work of existing sources.

- Generating information via AI that may or may not represent the intellectual work of another person, people or AI and thereafter making further use of AI to disguise this information and then present it as one's own.
- When you do not follow permissions and prohibitions provided in assessment guidelines.
- When you are not transparent about its use, do not reference and acknowledge your sources.

Student declaration:

During the undertaking of preparing and writing this mini treatise,

I Leigh Cavanagh Stear_____,with student number

_223185701_____, declare that *I have not used AI in an unacceptable manner as described by Nelson Mandela University's Institutional Position Statement on the use of Generative Artificial Intelligence*.

I further declare that *I have used* Grammarly and ChatGPT *in order to* correct some of my grammar and punctuation, create ideas, structure my thoughts, and provide synonyms for some of my words.

I *also acknowledge* that I am ultimately responsible and accountable for the contents of this mini treatise.

SIGNATURE STUDENT: 

DATE: 30/09/2024

*[**NOTE**:* Students must declare in their mini treatise the use of AI and AI-assisted technologies in the process of writing their treatise by completing this declaration statement. This statement must be included as an Appendix/Annexure in their mini treatise. AI and AI-assisted technologies do not include basic tools for checking grammar, spelling, references etc. Should AI and AI-assisted technologies not have been used in the process of writing, *not applicable (N/A)* can be entered where the NAME of the AI and the REASON used is requested. Using AI and AI-assisted technologies in their mini treatise without completing this declaration amounts to academic dishonesty. Students should note that the use of AI is detected by Turnitin and in addition to this declaration a Turnitin report is required as an Appendix/Annexure to their mini treatise