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THE SWOT ANALYSIS OF ARTIFICIAL INTELLIGENCE IN HIGHER EDUCATION

M.Sc. THESIS

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Approval

We certify that we have read the thesis submitted by …… titled "**……. (in bold)**" and that in our combined opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Educational Sciences.

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Declaration

I hereby declare that all information, documents, analysis and results in this thesis have been collected and presented according to the academic rules and ethical guidelines of Institute of Graduate Studies, Near East University. I also declare that as required by these rules and conduct, I have fully cited and referenced information and data that are not original to this study.

Abasifreke Aniedi David

10/December/2023

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Abasifreke Aniedi David

Abstract

The Swot Analysis of Artificial Intelligence in Higher Education

David, Abasifreke Aniedi
MA, Department of Computer Information Systems
December, 2023, 58 pages

Artificial intelligence (AI) refers to the development of computer systems with the ability to perform tasks normally requiring human intelligence, such as visual perception, decision-making and speech recognition. It is the science of creating machines that can think like humans and function smarter. AI technology can process large amount of data in ways unlike humans, with the goal of recognizing patterns, making decisions and judging like humans. This systematic literature review dives into the impact of AI in higher education. It identifies and analysis the strengths, weaknesses, opportunities and threats that AI consists of within the education system. The main aim of the study is to perform a SWOT analysis that will increase awareness of AI technology in education, investigate current research and make recommendations on future developments and advances of artificial intelligence in higher education. Findings suggest that there are significant benefits for stakeholders in higher education and also challenges and opportunities to be considered by institutions. Hopefully, the results of this study will benefit future researchers who seek to gain further knowledge and insight into the field of artificial intelligence in higher education and make ascertained progress towards the definitive establishment of AI technology in the system.

Key Words: artificial intelligence, AI, higher education, tertiary education, student, student perspective

Abstract

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Yapay zeka (AI), görsel algı, karar verme ve konuşma tanıma gibi normalde insan zekası gerektiren görevleri yerine getirme yeteneğine sahip bilgisayar sistemlerinin geliştirilmesini ifade eder. İnsanlar gibi düşünebilen ve daha akıllı çalışabilen makineler yaratma bilimidir. Yapay zeka teknolojisi, kalıpları tanımak, kararlar vermek ve insanlar gibi yargılamak amacıyla büyük miktarda veriyi insanlardan farklı olarak işleyebilir. Bu sistematik literatür taraması yapay zekanın yüksek öğretimdeki etkisini derinlemesine inceliyor. Yapay zekanın eğitim sistemi içerisinde oluşturduğu güçlü yönleri, zayıf yönleri, fırsatları ve tehditleri belirler ve analiz eder. Çalışmanın temel amacı, eğitimde yapay zeka teknolojisi farkındalığını artıracak bir SWOT analizi yapmak, mevcut araştırmaları incelemek ve yapay zekanın yükseköğretimde gelecekteki gelişmeleri ve ilerlemeleri konusunda önerilerde bulunmaktır. Bulgular, yükseköğretimdeki paydaşlar için önemli faydaların yanı sıra kurumların dikkate alması gereken zorluklar ve fırsatlar olduğunu göstermektedir. Umarız bu çalışmanın sonuçları, yüksek öğrenimde yapay zeka alanına ilişkin daha fazla bilgi ve içgörü kazanmaya çalışan ve yapay zeka teknolojisinin sistemde kesin olarak kurulmasına yönelik kesin ilerleme kaydeden gelecekteki araştırmacılara fayda sağlayacaktır.

Key Words: yapay zeka, AI, Yüksek öğretim, yüksek öğretim, öğrenci, öğrenci bakış açısı

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List of Abbreviations

AI:	Artificial Intelligence
AIED:	Artificial Intelligence in Education
SWOT:	Strength, weakness, opportunity, threat
IOT:	Internet of Things
NLP:	Natural Language Processing
ML:	Machine learning
SLR:	Systematic literature review
PRISMA:	Preferred Reporting Items for Systematic Reviews and Meta- Analysis
S/N:	Serial Number
HEIs:	Higher education institutions
USP:	University of the South Pacific
ICT:	Information communication and technology
4ir:	Fourth Industrial Revolution
MOOCs:	Massive Open Online Courses
ITS:	Intelligent tutoring systems
LMS:	Learning Management System
AES:	Automated Essay Scoring
CBT:	Computer-based test
VR:	Virtual Reality
AR:	Augmented Reality

CHAPTER I
INTRODUCTION

1.1 Background

The reality checks for several schools and higher education institutions have been to produce and provide high quality learning outcomes with relevant competencies appropriate for students and the system overall. Therefore, developing new learning styles and methods such as learning by doing, problem solving, interactive classes and transferable knowledge have become eminent over the last decade around the world (Bucea-Manea-tonis et al., 2022). The rise in the need for greater education has produced diverse growth and opportunities for institutions to expand and improve on a wider scale. Certain factors that contribute to oriented educational goals have been identified and treated with all seriousness to ensure the quality and development of education received by students are a success. Learning environments have a significant influence over the aspect of learning and teaching due to embodying a direct relationship with training. A better learning environment would help to provide much better compelling understanding and assertive outcomes in students learning compared to just a regular normal classroom structure. Having a more efficient learning environment also creates higher levels of concentration and supports the behavior and emotions of students and instructors alike (Zafari et al., 2022). The application of digital learning techniques and technologies into the educational system are hooked on some basic conditions such as possessing a solid hardware and software infrastructure and also having power connections and an internet network so that the students can make quality use of artificial intelligence tools online (Sertić et al., 2023). Meeting this conditions sets the basis for students to be able to approach and foster their level of AI literacy while learning as the system continues to promote the idea and initiative for AI advancement in education (Laupichler et al., 2022). In view of the ethical implications for integrating AI into higher education, governing bodies of nations advocate for solid policies to be implemented for the key responsibility of proper management of AI technologies within the educational system and learning environment and these policies would serve as a framework and standard for right and wrong, acceptable and not acceptable (Chan, 2023).

The use of artificial intelligence (AI) has quickly increased with a concomitant spread of AI tools and technologies being available to instructors and students in higher education (Crompton & Burke, 2023). During its time AI has achieved great success in several sectors including robotics, speech and facial recognition, healthcare, finance (Emmert-Streib et al.,

2020). After many years of research and publications, and in light of some recent advances within artificial intelligence in education (AIED), AIED has sparked promising potentials to play key roles in various aspects of the educational system (Tan et al., 2022). The use of AI in key areas of education like student learning, teaching, assessment, administration is crucial as technologies have been introduced into these key domains to contribute greatly towards the system and enhance stakeholder's experiences (Chiu et al., 2023). However, some concerns have also been raised and doubts about how machines will eventually come up to the level of human intellectual abilities, what could possibly be the outcome of these advancements, what will change in society and in the system, what are the jobs that AI puts in huge risk and many more. These questions are of fundamental interest to unambiguously get concerned about the present and future of artificial intelligence in higher education (Buttazzo, 2023). The systematic literature review aims to discuss the strengths, weaknesses, opportunities and threats of artificial intelligence in higher education.

1.2 Problem statement

The shift in trends and patterns of learning has triggered and woken humanity to the reality of the digital age in higher education (Sushama et al., 2022). Most studies have demonstrated the effect of AI in education with the application of the technology inside and outside of classrooms buzzing with excitement from the promises spelt out. Indefinitely, there are also severe ethical challenges and worries which educators are afraid of encountering with this powerful tool (Pinto, 2023). The term artificial intelligence (AI) has become a force to reckon with in the industry of education over the past few years. Artificial intelligence is amongst the group of emerging tools with great potentials and advancements in educational technology. However, with the recent developments of AI tools such as ChatGPT, QuillBot, CopyMatic in higher education sector, there is ongoing discussions about the clarity of advantages and disadvantages of AI tools (Sibanda et al., 2023). Academic policy board members recognize the evolution happening in the education system and the experience with flourishing AI, how the system is changing with the accomplishments of the artificial intelligence technology sphere, they recommend this is a better and more innovative approach to learning and teaching in higher education (Tilak, 2020). Reading through several studies available on open access to gain foresight of different authors perspectives and concept, a recurrent concern all these many researchers provoked is the reliability, validity and sustainability of artificial intelligence technology within the higher education systems for current and future stakeholders (Aldosari, 2020).

1.3 Purpose of the study

The aim of this study is to explore broad range of studies and research from several databases relating to the subject area; artificial intelligence in higher education and to to prepare a SWOT analysis discussing the strengths, weaknesses, opportunities and threats that have been identified with AI in education.

1.4 Significance of the study

The measure to which technology has affected digital education in the last decade makes this study particularly an interesting analysis to systemically review past research articles about the strengths, weaknesses, opportunities and threats of AI in higher education.

1.5 Overview of the study

This study is a systematic literature review that examines the strengths, weaknesses, opportunities, and threats of artificial intelligence in higher education. The author conducted a thorough search of popular scientific databases and used a predetermined procedure to select high-quality research articles. The study includes a demographic distribution of papers by research method and country. The findings of this study can serve as a guide for higher educational institutions, organizations, educators, learners, and learners' guardians to make informed decisions in embracing and implementing artificial intelligence into the higher education system. The study also outlines some limitations, such as the selection of articles only in the English language and the exclusion of non-peer-reviewed articles.

1.6 Limitations of the study

Some of the limitations to be recognized within this study are the availability of comprehensive and reliable data during research, which can impact the outcome of the quality of the study and accuracy. AI in education often involves handling sensitive information of students therefore ensuring data privacy, consent and ethical use of AI algorithms might restrict access to certain data. Digital systems can inherit biases from the data they are trained on and this might lead to unequal treatment or representation which would affect the fairness of the educational setting. AI technology rapidly evokes and is continuously developing so therefore existing research and current findings might become outdated quickly in the near future and finally, research on AI in higher education often spans various disciplines such as computer science, education, psychology and ethics. Bridging these diverse areas while maintaining depth and accuracy can be challenging.

CHAPTER II

LITERATURE REVIEW

2.1 Theoretical Framework

2.1.1 Artificial Intelligence

Artificial intelligence generally is associated with technology and computers (Chen et al., 2020). While a huge number of the general population express genuine interest and are galvanizing about this powerful technology, some others raise eyebrows to serious concerns and doubts on how this affects and impacts the society for all. There has already been tremendous growth and progress with the rate which artificial intelligence is currently at, reaching and surpassing the capabilities of human beings in several fields cutting across language translation, music composition, detecting of objects, performing medical diagnoses, software programming and much more (Buttazzo, 2023). Artificial intelligence (AI) is a tool that cuts across multiple disciplines including the Internet of Things (IOT), governance, education system, e-learning and focuses on specific objectified goals with the aim to improve human speed in productivity on certain areas as well as provide inquisitive solutions to problems that there could be (Tyukin et al., 2018). However, other views on the use of AI tools and technology as a huge threat because it could devalue certain skills that are traditionally taught in schools such as writing (Steele, 2023). Academic discipline is weakened to a large degree with the level of academic malpractices that begins from high school into university and tertiary education, eventually having irreversible effects on the code of ethics within a work environment (Sweeney, 2023). In this study, a SWOT analysis is conducted to identify and determine what are the strengths, weakness, opportunities and threats of AI in higher education.

2.1.2 Artificial Intelligence tools for Higher Education

Artificial intelligence tools constantly support education in multiple ways and mediums, such as providing resources and materials, providing learning opportunities of a lifetime and fostering a culture of knowledge building and learning. The skills that these tools provide are essential and critical to possess especially in the 21st century of today (Kenchakkanavar, 2023). Table 1 shows some artificial intelligence tools and brief description about each of them.

Table 1.

Artificial Intelligence tools

AI Application	Website	Description
ChatGPT	https://chat.openai.com	ChatGPT is an artificial intelligence (AI) chatbot that uses natural language processing to create humanlike conversational dialogue.
OpenRead	https://www.openread.academy/	OpenRead is an AI-powered research tool that digitizes papers and turns them into an interactive format. It uses AI technology to Summarize content & Answer questions.
Chatsonic	https://writesonic.com/chat	ChatSonic is an AI-powered chatbot platform that uses natural language processing (NLP) technology to simulate human speech. ChatSonic can be used to integrate with Google Search to create content with the latest information
Gradescope	https://www.gradescope.com/	Gradescope is a grading application that uses artificial intelligence (AI) to help instructors grade student work. Gradescope's AI features automatically group similar answers together, eliminating redundancies and enabling higher quality, more consistent feedback.
Tutor.AI	https://www.tutorai.me/	A computer-based learning system that uses artificial intelligence to provide humanlike lessons without a human teacher. An advanced English-speaking tutor powered by artificial intelligence.
Brainly	https://brainly.com/	Brainly.com is a popular online learning platform and community where students and educators can ask and answer academic questions. It serves as a peer-to-peer learning and collaboration platform, allowing students to seek help with homework, assignments, and various academic topics.
OpenAI	https://openai.com/	OpenAI is a private research laboratory that develops artificial intelligence (AI) to benefit humanity. The company was founded in 2015 by Elon Musk, Sam Altman, and others. OpenAI's headquarters are in San Francisco.
Knowji	https://www.knowji.com/	Knowji is an education technology company that offers vocabulary learning apps. Knowji's apps combine

		scientifically proven methodologies with entertaining content. They use research-based audio-visual tools to help language learners.
Otter.ai	https://otter.ai/	Otter.ai is speech-to-text transcription software that uses artificial intelligence and machine learning. It's available as a phone or computer app. Otter.ai can be used for Lectures, Meetings, Brainstorming, Transcribing previously recorded multimedia, Automatically capturing and summarizing conversations from meetings.
Trinka	https://www.trinka.ai/	Trinka is an AI-powered writing assistant that checks for grammar, spelling, style, and consistency errors. It also suggests tone and style enhancements. Trinka is designed for academic and technical writing.
Copyscape	https://www.copyscape.com/	Copyscape is a popular online plagiarism detection and content protection service used by website owners, content creators, and educators to identify instances of copied or duplicated content online.
Quillbot	https://quillbot.com/	Quillbot is an online AI-powered writing assistant that helps users generate highquality content by paraphrasing and enhancing their writing. Quillbot provides users with an intuitive and user-friendly interface, allowing them to input their text easily and receive suggestions for improvement.
Grammarly	https://www.grammarly.com/	Grammarly is an online writing tool that offers grammar, spell-checking, and suggestions for improving clarity, style, and tone. It uses artificial intelligence and natural language processing algorithms to analyze text and provide real-time feedback.
EvidenceHunt	https://evidencehunt.com/	EvidenceHunt is an AI-powered search engine that helps users to find clinical evidence quickly and effectively. It answers clinical questions with citations to published papers.
Elink.io	https://elink.io/	Elink.io is an online content management system that helps users save, bundle, and create content from web links. It can

		be used to create: Email newsletters, Web pages, Social sharing.
Typeset.io	https://typeset.io/	Typeset.io is a web-authoring platform for researchers to create, collaborate, and publish their research. It allows authors to write and submit manuscripts directly to journals.
ChatPDF	https://www.chatpdf.com	ChatPDF is a PDF document that contains research on chatbots and their effectiveness in customer service. The main points of this research include an analysis of various studies and experiments conducted to assess the effectiveness of chatbots in customer service.
Consensus	https://consensus.app/	Consensus.app is a search engine that uses artificial intelligence (AI) to find evidence-based answers to queries. It uses language models to find answers in peer-reviewed literature
Lateral	https://www.lateral.io/	Lateral.io is a web application that helps researchers, academics, and students read, organize, find, and share research in one place. It's an AI-powered app that can help researchers save the time and improve efficiency by organizing and analyzing research papers, locating and searching sources quickly, accelerate research projects.
Elicit	https://elicit.org/	Elicit.org is an AI research assistant that uses machine learning to assist with research tasks. It can help with tasks such as Finding papers, Extracting key claims, Summarizing, Brainstorming ideas, Analyzing research papers and Synthesizing findings.
Jenni AI	https://jenni.ai	Jenni.ai is a website platform that offers an AI-powered research assistant. Users can input their research or sections from papers or reviews and receive a paragraph explaining the main points of the input. The platform aims to provide quick and accurate summaries to help users understand the key takeaways from their research materials.
Scholarlcy	https://www.scholarcy.com	Scholarcy is a website that aims to help researchers summarize and understand scientific papers more easily. It

		uses artificial intelligence to analyze and extract key information from research articles, allowing users to quickly access the main points and crucial details without having to read the entire paper.
SciSpace	https://scispace.com	Scispace is a website that provides users with various tools and resources for scientific research. The main features of Scispace include a data sharing platform, data management tools, and collaboration capabilities.
PaperPal	https://paperpal.com	PaperPal is a platform that simplifies the research process for academic papers. It provides real-time collaboration, citation management, and document organization. PaperPal offers a plagiarism checker to ensure the originality of the work.
Research Rabbit	https://www.researchrabbit.ai/	Research Rabbit is an artificial intelligence (AI) tool that helps researchers and postgraduate students find research and authors related to their topic area. It's a free online tool that's similar to Spotify.
Scite.ai	https://scite.ai/	Scite.ai is an AI-powered platform designed to assist researchers, academics, and scientists in the field of academic publishing and research. The platform offers a unique approach to evaluating and understanding research articles by providing context and transparency regarding the citations and references within scientific papers
HyperWrite	https://hyperwriteai.com/	HyperWrite AI is an AI-powered writing assistant that uses machine learning and artificial intelligence to help with the writing process. HyperWrite AI can help to write 10 times faster, Beat writer's block and create compelling speeches.
Semantic Scholar	https://www.semanticscholar.org/	Semantic Scholar is a free, AI-powered search engine for academic publications. It was developed at the Allen Institute for AI and released in November 2015. Semantic Scholar uses natural language processing to provide summaries for scholarly papers. It indexes over 200 million academic papers.

Fireflies	https://www.fireflies.ai	This AI intuitive meeting assistant records and transcribes meetings, calls, audio files, and perform HR duties swiftly.

2.1.3 Higher Education

Higher education institutions are the core learning institutions which are mainly the undergraduate and postgraduate level of studies; these institutions are moving away from traditional structures to a more digital approach and environment (Gürkut et al., 2023). The transformation of higher education has been significant in the past decade as it has gone through series of advancements and developments of deep learning techniques and large datasets, emerging through technologies such as Natural Language Processing (NLP), Machine Learning (ML) and chatbots like ChatGPT (Fuchs & Aguilos, 2023). Higher education institutions continually provide a definition for the level and scope to which artificial intelligence technology can be actively utilized by students and educators by carefully assessing potential impacts, benefits, and risk of this technology and models could be developed to support the implementation and maximize the educational experience for all students (Wang et al., 2023). In higher education, AI can be used for many purposes ranging from assessment and evaluation generation to developing questions of high valuable affordance as test and also as an intelligent tutoring system (Crompton & Burke, 2023). Education is a crucial aspect of development to any society of people and it continues to evolve with new methods, contents, concepts, and models over time. In recent times it has been increasingly prevalent to benefit from the implementation of artificial intelligence (AI) technology into the system to address certain educational challenges and provide opportunities and solutions that could be leveraged upon to achieve the ultimate goals of all higher and tertiary education institutions which is to improve their students' performance and provide an enhanced educational quality (Zafari et al., 2022). An analysis done on some selected sources shows that AI has indeed been applied to educational institutions in diverse ways from the administrative processes and tasks to the curriculum and content development taught in classrooms, and student learning process (Chen et al., 2020).

2.2 Related Research

The implementation of a well-designed and functioning education system is a major pillar of growth to any nation and therefore embracing artificial intelligence is an important step to

working on improving the numerous concerns which many have regarding technologies for the education sector (Tilak, 2020). Aldosari (2020) explained that artificial intelligence is a set of computational techniques which receives inspiration from the way humans make use of their nervous system and their body to feel, learn and act. This technology is beneficial for both students and teachers as it aids in the learning and teaching process within the educational environment. Students can obtain a more personalized learning with online feedback systems created for a 24/7 service provision (Konecki et al., 2023). Sushama et al. (2022) states that in order to get the lost out of artificial intelligence and personalized learning, one must study through the data generated by the technology and make use of it in offering students valid and accurate feedbacks. Figure 1 is a use case diagram for an AI based remote learning system which shows some examples of activities that can be done remotely with the help of artificial intelligence integrated into personalized system.

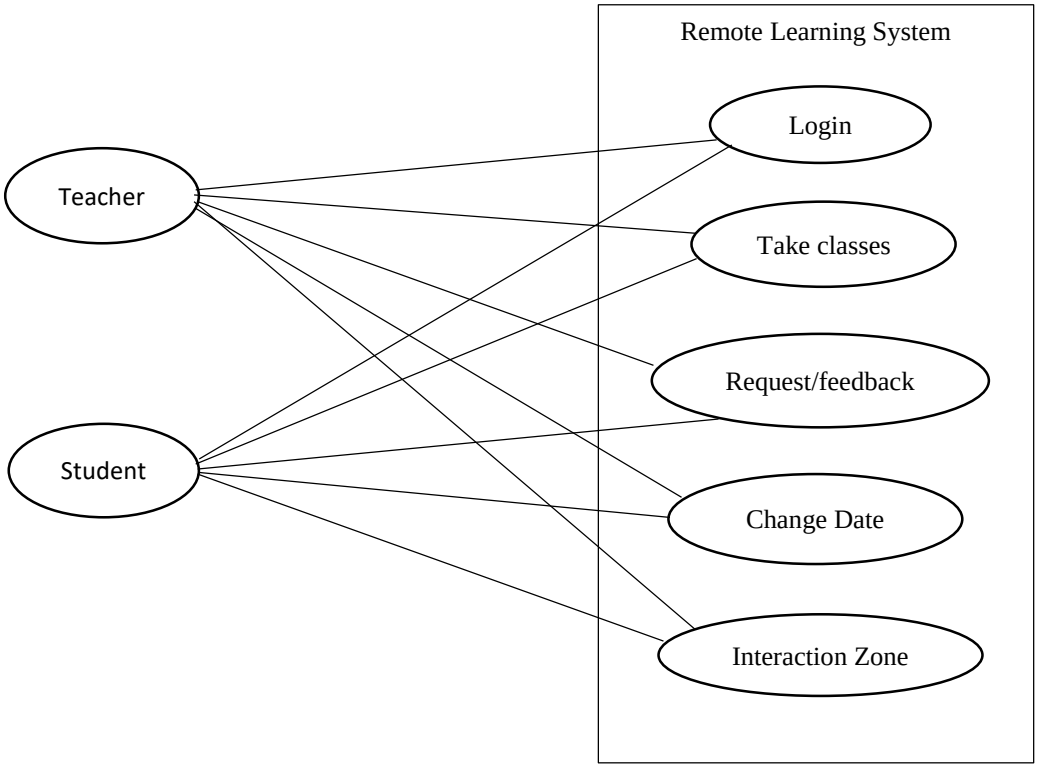


Figure 1. Use case diagram for AI based remote learning system

Artificial intelligence has a number of fields under the disciple, some of which are natural language processing, machine learning and much more. Natural language processing (NLP) is the technique whereby computer systems are able to understand, produce, and learn human language with ease. This computational technique is found to be used across the context of education many times in things like the supporting of the development of students social, language and working skills (Humble & Mozelius, 2022). Some of the foreseeable effects of

the employment of AI technology into higher education is set to bring drastic changes to how certain functions can be carried out in certain countries, functions including but not limited to administrative, research, teaching and learning functions. The implementation of these AI tools can potentially raise and improve student's motivation and involvement in their classrooms and learning environment (Alordiah 2023). The AI language learning tools engage with the AI algorithms to effectively give a great learning experience, reducing learning time and introducing learners to various useful applications (Bilad et al., 2023). Generative AI in education have some incredible roles that the model proposes in education and are categorized into several categories such as teacher/tutor, student/tutee, learning peer/partner, domain expert, administrator, and learning tool (Hwang & Chen, 2023). Figure 2 previews the roles of generative AI in education.

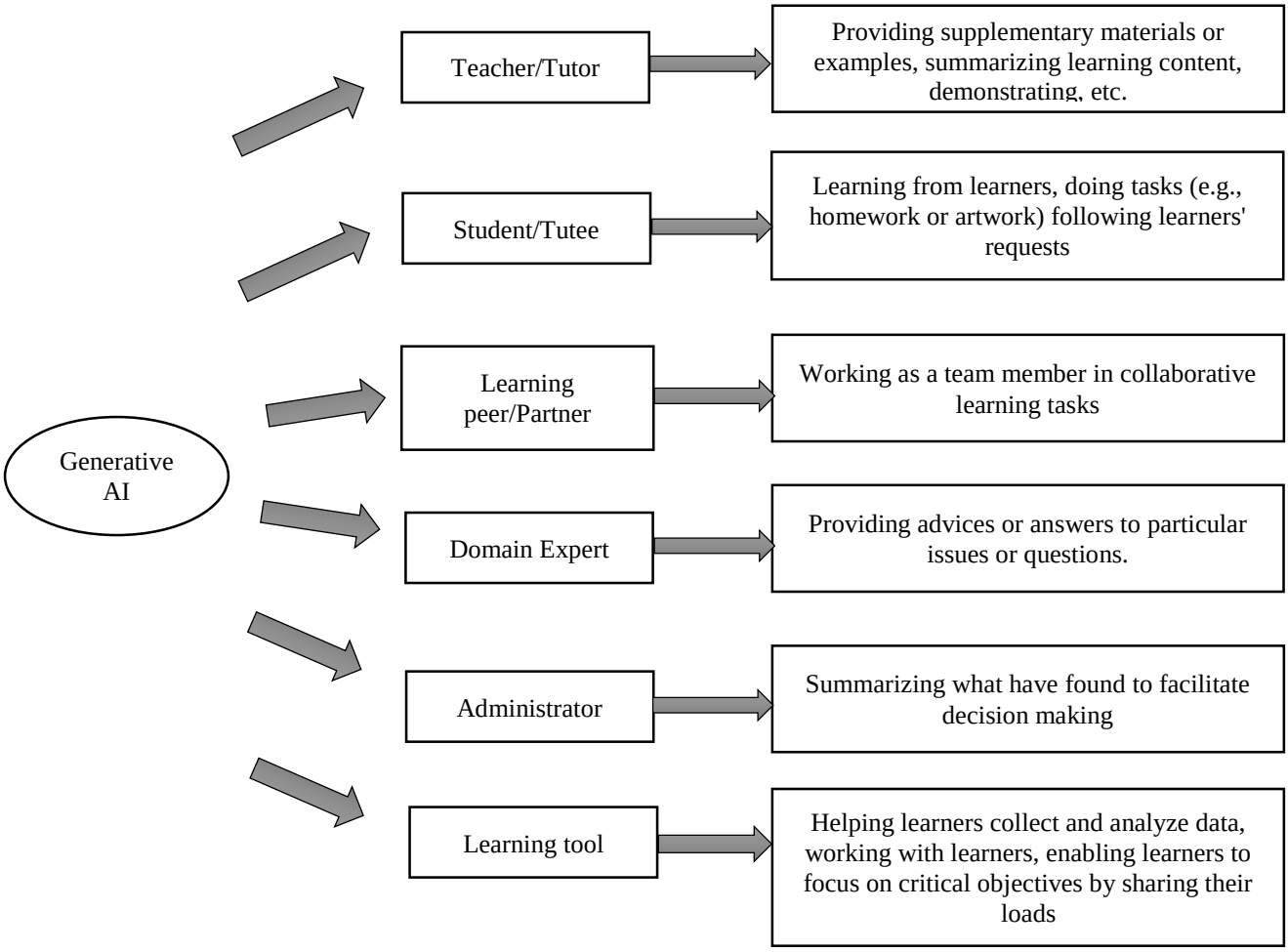


Figure 2. Roles of generative AI in education

The rise of artificial intelligence in higher education accounts for numerous applications and tools such as predictive modelling, assistive technology like chatbots, intelligent analytics, image analytics such as the facial recognition, personalization and AI software tools and

algorithms. These applications and tools has also been widely seen to increase service needs for students and the managements within colleges and universities (Geryk, 2023). Pacheco-Mendoza et al. (2023) states that utilizing technologies in the education system can increase interactive learning experiences, allow quicker and simpler access for having educational resources, facilitate great relations amongst students and teachers and therefore improves the level of academic performance. One of the goals of AIEd since the early days of discovery and innovation has been narrowed towards learners as human beings with feelings and aspirations as well as knowledge and skills. Thereafter, understanding the nature of learners provoked their motivation which would enable their mindset and academic feelings to respond towards innovative learning environments (du Boulay, 2022). Despite the plentiful benefits of using artificial intelligence especially in higher education, there are some major concerns and controversies that cannot be overlooked either. Undoubtedly, the application of AI in educational setting is termed "enabling personalized learning" (Hwang & Chen, 2023). Some of the ways by which AI tools can be applied and used in educational measurement and assessment include personalized learning. Intelligent tutoring systems (ITS), automated grading, predictive analytics, natural language processing, intelligent content, virtual assistants, automated transcription and translation, learning management systems (LMS), automated essay scoring (AES), learning analytics tools, computer-based testing (CBT) platforms, gamification tools, virtual reality (VR) and augmented reality (AR), formative assessment tools, online polling tools, interactive whiteboards, video conferencing tools, digital portfolios, data visualization tools, social media platforms, plagiarism detection, classroom response systems, digital assessment tools. These tools motivate students, increase learning interest and interaction, reduce anxiety in students, predict student's future outcomes and academic performances (Owan et al., 2023). As artificial intelligence continually advances and changes over time in the field of education and research, there are still great opportunities to develop teaching, learning, administration and student experiences and therefore students can independently progress through the system while receiving full support and help where required (Kenchakkanavar, 2023). The adoption of AI into education is set to become really explosive within the coming decade with a global expenditure point expected to climb over $6 billion. Majority of this growth will be coming from countries such as China and the United States which currently is responsible for about 50% of global AI education spending (Llić et al., 2021). Tilak. (2020) states why educators are to become willingly ready to adopt artificial intelligence as one solution for the educational system and this is because of the great benefits that this technology would provide to the stakeholders such as creating

expert systems which can exhibit intelligent behaviour, learn quickly, demonstrate, explain and advice users. The efficiency of adaptive educational systems can prove the capability of AI in being able to assist students learning in many ways beyond just maximizing learning experiences but also utilized within e-learning platforms and models (Dimitriadou & Lanitis, 2023). The future of utilizing adaptive learning technology in collaboration with artificial intelligence is really going to create a unique combination of exciting and effective methods for instructors to be able to provide their services to their students at various level of knowledge and understanding (Daugherty et al., 2022). As a result of such combination, the advancement of the education sector and higher education in specific is likely to be exceptional and significant progress will be achieved and sustained throughout the system (Sibanda et al., 2023). Denecke. (2023) conducted a survey by asking participants to provide relevant competent factors for why they would likely factors benefit from having AI integrated into the system and their selected responses includes; exposure on data literacy, advanced technical skills, critical thinking, domain expertise, communication skills, collaboration, problem solving, and continuous learning.

CHAPTER III
Methodology

3.1 Research Design

To extensively examine and analyse the straight, weakness, opportunity and threat of artificial intelligence in higher education, the researcher chose to perform a systematic literature review of already existing studies in the aforementioned field. A systematic literature review (SLR) is a secondary research that makes use of a predetermined procedure to seek, assess and analyze all data pertaining to an investigation. Most articles included timely studies and made use of experimental designs and evaluation done manually based on records from previous years' search.

3.2 Search Strategy

In the course of this study, the author adapted the systematic literature review approach to carefully design a plan for all stages. This review was conducted in November 2023 and across different popular scientific databases namely; IEEE, Science Direct, Scopus, and Web of Science. These four databases were identified for the research as they are easily understood when making a search entry. They offer gruesome variety of information within articles giving the author an opportunity to filter out the search criteria accordingly. Along the search process, the following terms were included ("artificial intelligence" OR "AI" AND "higher education" OR "tertiary education" AND "student" OR "student perspective"). The entire search observed a time range from 2013 to 2023 and included rare journal articles published only in English language. This search has been conducted based on ideal and relevant publications with concomitant to artificial intelligence and higher education.

3.3 Inclusion and Exclusion Criteria

In this study, an inclusion and exclusion approach was adapted and applied to help filter out the records. It is necessary to establish specific criteria for including and excluding research during the selection process as that ultimately impacts the overall quality of the literature review. Table 2 provides a summary of the utilized criteria to determine which studies should be included and which should not be included based on the results of the search process. The excluded articles were articles written in different languages from the English language, they were not free to download and they were not journals.

Table 2.

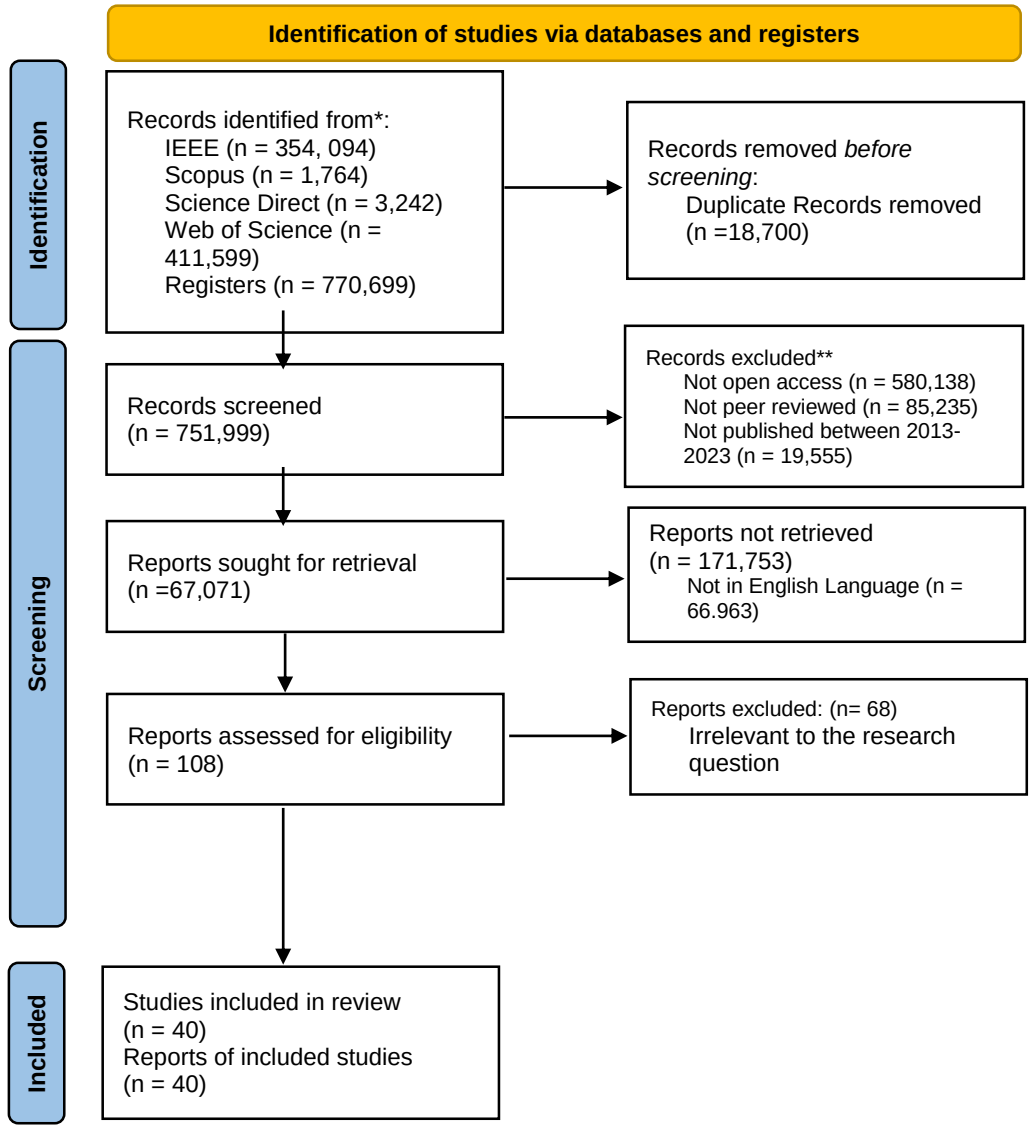
Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
• Available within the 4 databases • Articles published only in English • Full text accessible online (open access) • Articles published in the last decade (2013-2023) • Peer-reviewed journal articles	• Duplicates between the databases • Articles published in languages other than English • Full text not accessible (Not open access) • Articles published before the last decade • Not peer-reviewed journal articles

3.4 Selection Process

From the first database search through to the final review process, inclusion and exclusion criteria, the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) guidelines has represented the entire selection process. At the initial screening stage, no articles were removed. The titles, abstract, and conclusion section of each papers were assessed whereby the author made a decision of whether or not to include certain articles which although made use of a systematic literature review application, did not necessarily relate to the research topic. After the search was conducted within the past decade and eliminating duplicate studies, a total of 770,699 articles were retrieved across all 4 databases namely (IEEE, Web of Science, Scopus, Science Direct). Based on the criteria listed, the author was able to get the following numbers from their first search in each database: Web of Science (n = 411,599), IEEE (n = 354,094), Scopus (n = 1,764), Science Direct (n = 3,242). After screening out articles that were not peer-reviewed journal articles, weren't open access, weren't published in the English language, were not published between 2013 to 2023, and screening the titles, abstract and conclusion, the author was left with 108 articles. These 108 articles weren't through rigorous full text assessment and thereby after was filtered down to 40 studies to include in this systematic literature review.

Figure 3.
PRISMA flow diagram of the systematic literature review



3.5 Quality Assessment

In this systematic literature review, the author oversaw the planned review methods to ensure that the included papers were of high quality. This study was conducted and developed meticulously following appropriate guidelines on the foundation of careful time and resource management. Every single criteria and procedure for the selection process was followed keeping a watch on the measure of the aim of the study. Automated tool like Mendeley was used to assure the accuracy in removing duplicates, full-text assessment, sorting out citations and references, as well as keeping track of the quality of sorted articles included at the final stage of the systematic literature review.

3.6 Data Extraction

During the stage of extracting data which is the final phase in the PRISMA study, the systematic literature review considered a total of 40 articles below indicates all crucial contents which were used to extract data from the articles.

Table 3.

Data extraction table

Data Item	**Description**
S/N	Serial number for all studies included
Reference	Reference for all studies included
Aim of Research	The aim of all included studies
Strength	Advantages found in the studies related to the analysis
Weakness	Drawbacks found in the studies related to the analysis
Opportunity	Potential examples for future expectations found in the studies related to the analysis
Threat	Challenges found in the studies related to the analysis
Recommendation	Recommendations by the researchers included in the studies

3.7 SWOT Analysis

The SWOT analysis was created by Albert Humphrey in the 1960s and has been a major technique used by many philosophers, researchers, and scholars to analyse the strengths, weaknesses, opportunities and threats and also identify areas for growth and improvement before implementing significant changes (Pinto, 2023). This systematic review is conducted with the application of SWOT analysis to be able to investigate the integration of artificial intelligence into higher education system. This analysis helps to identify and name the SWOT without necessarily interfering with the aspect of individual factors or potential impact or desired outcomes. The purpose of the SWOT analysis for this study is to reveal the positive effects of AI that work together to make huge impact in the education system and potential issues that need to be recognized and addressed accordingly for a common goal of achieving

success in implementing artificial intelligence into higher education. The analysis has four separate sections which includes Strengths, weaknesses, opportunities, threats. The relevant information for investigation of artificial intelligence in higher education with the application of the SWOT analysis are listed below.

Strength	**Weaknesses**
Numerous research has shown the benefits and advantages of utilizing and implementing artificial intelligence technology into higher education (Denecke et al., 2023). This study seek to identify those factors and present them accordingly.	The narrative of AI in higher education is painted to be a brilliant concept and should be well received into the system. However, upon further study there are certain issues that get discovered and require attention to them for resolute purposes (Chassignol et al., 2018).
Opportunities	**Threats**
Within the vast complexity of the AI technology and education system, there are several opportunities lined up that both external and internal participants are likely to gain from with proper knowledge, implementation and decision-making (Geryk, 2023).	Some students and teachers have doubts about what would happen if AI goes wrong or fails the system and therefore becomes a threat to their privacy and safety (Du Boulay, 2022).

CHAPTER IV

Findings and Results

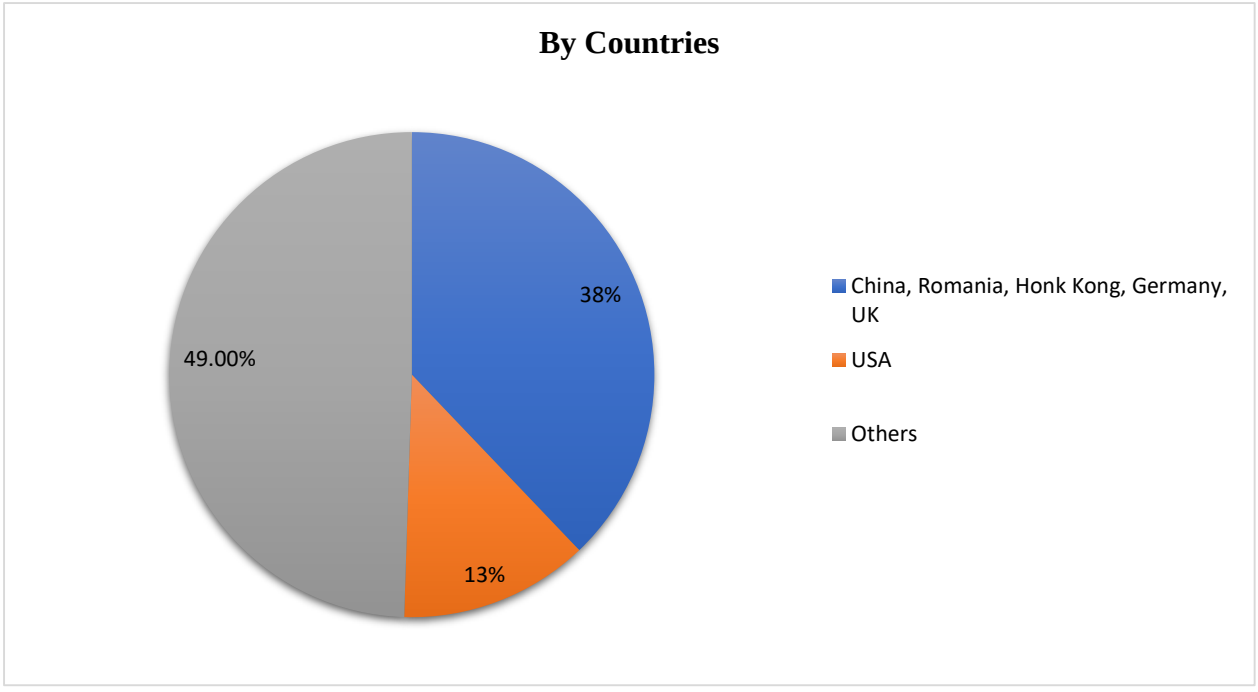
4.1 Demographic distribution of studies

- **By Countries**

This systematic literature review contains a complete total of 40 studies retrieved from the year range between 2013 to 2023 and cut across 22 countries (Croatia, Iran, China, India, South Korea, Austria, Australia, Romania, Hong Kong, Singapore, Germany, Canada, Türkiye, Qatar, Oman, Fiji, Spain, UK, Finland, Slovenia, Italy). The USA had the highest concentration of studies with 5 in total coming from the following authors (Tounsi et al., 2023; Crompton & Burke, 2023; Wang et al., 2023; Fuchs & Aguilos, 2023; Steele, 2023). Thereafter comes a tie of 15 articles from China, Romania, Honk Kong, Germany, and the UK written by the following authors accordingly (Ionesco & Enescu, 2023; Bucea-Manea-toniş et al., 2022; Kuleto et al., 2021; Chen et al., 2020; Chan, 2023; Ong & Gupta, 2019; Chen, Xie, & Hwang, 2020; Chen, Xie, Zou, et al., 2020; Chiu et al., 2023; Laupichler et al., 2022; Hornberger et al., 2023; Köbis & Mehner, 2021; Sweeney, 2023; Kile, 2013; Tyukin et al., 2018). The remaining 20 papers were shared between the 14 countries left. Figure 4 previews a pie chart with the breakdown of the demographic distribution

Figure 4.

Demographic Distribution of studies by countries.

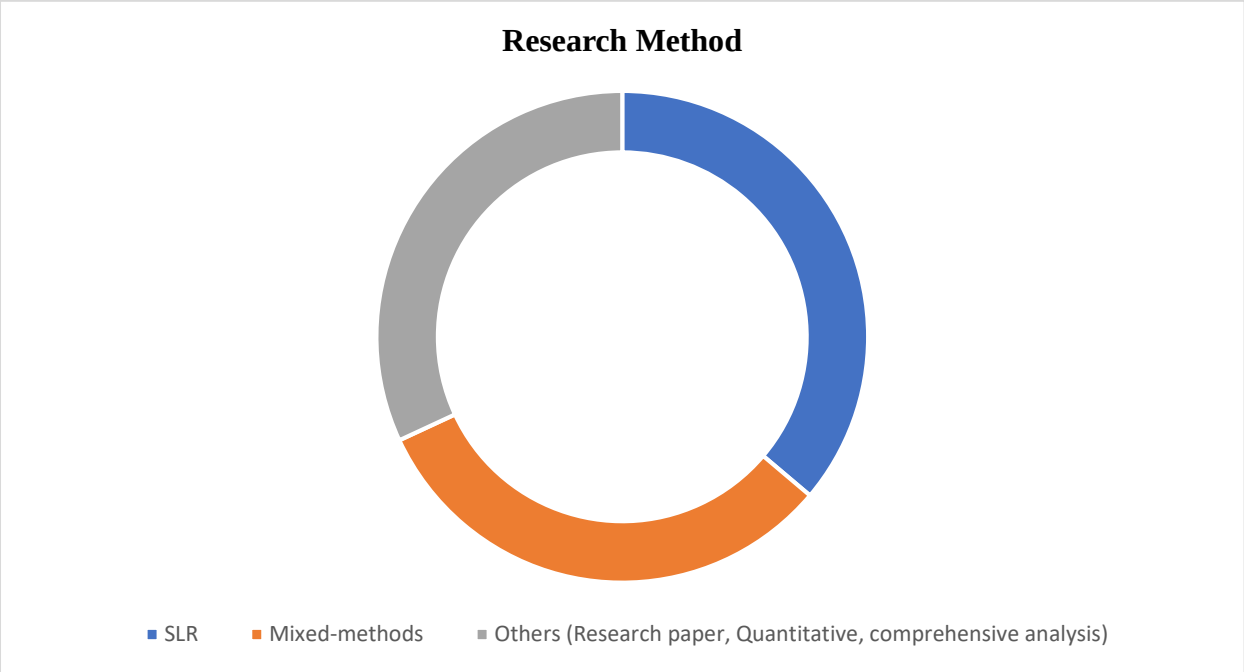


- **By Research Method**

The study applied a common methodology, the systematic literature review (SLR) which is being used to analyse several techniques and publications from various opinions that the authors express within the context. The demographic distribution provides very crucial insights and data into the dominant patterns and inclinations in the corpus of literature which is studied. Within the articles review for this study, 17 were predominantly an SLR study, 8 used the mixed-methods and the remaining 15 were a combination of research papers, quantitative and comprehensive analysis. The figure below portrays the demographic distribution by research method.

Figure 5.

Demographic Distribution of studies by research method.

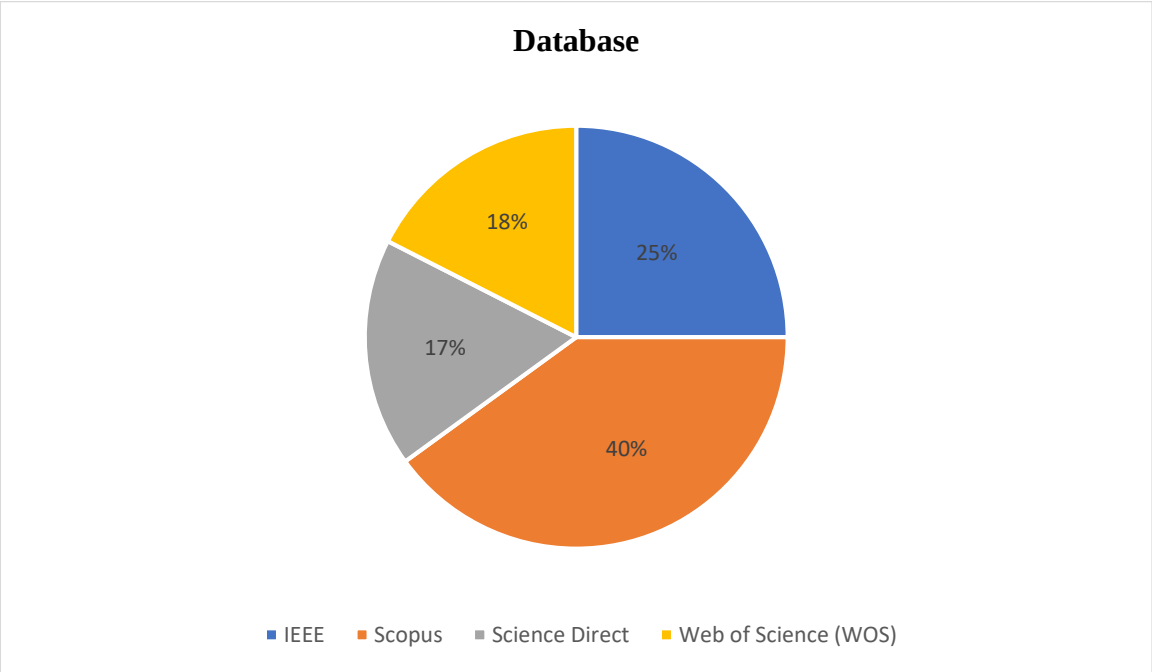


- **By Database**

This study reviewed 40 articles from 4 separate scientific databases to determine the SWOT and analyse each of them accordingly. These 4 databases include IEEE, Scopus, Science Direct and Web of Science. 10 papers were retrieved from IEEE, 16 were from Scopus, 7 were from Science Direct and 7 from Web of Science. Below is a graphical representation of how many papers were retrieved from each database for this study after screening.

Figure 6.

Demographic Distribution of studies by database.

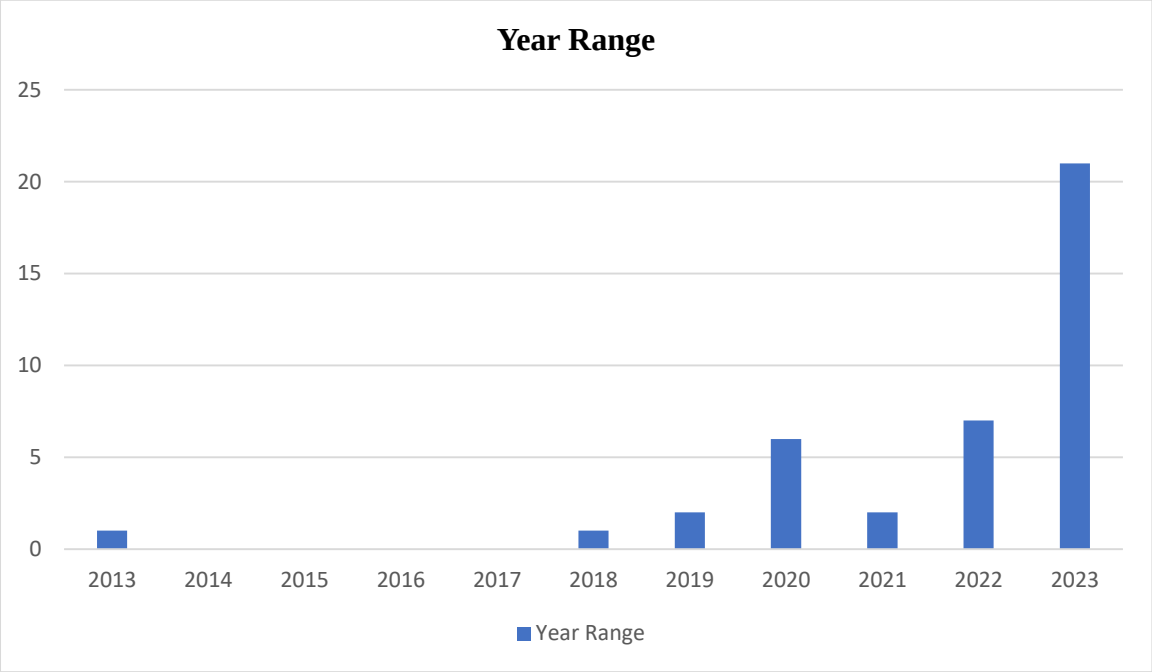


- **By Year**

From a total of 40 studies which were used to conduct the systematic literature review, they were retrieved between a 10-year range. This articles have been published between 2013 to 2023. Although, some years did not include any publications related to the subject area, the graph below identifies what years were each of the papers published in. 21 papers were published in 2023, 7 were published in 2022, 6 in 2021, 2 were published in 2029, 1 in 2018 and 1 in 2013.

Figure 7.

Demographic Distribution of studies by year.



4.2 Strength of artificial intelligence in higher education

Artificial intelligence technologies have produced rapid growth in the interests of their application within the educational contexts, multiple scientific literature studies present different perspectives on how AI is being applied and integrated into the system. Technologies today have a very significant impact in the society as a whole and influences greatly the way many people think, feel, act, communicate, and interact with each other (Chen et al., 2020).

Artificial Intelligence as a tool has a lot of benefits attached to its very existence and application in various aspects. Several research projects how artificial intelligence in education has become a game changer to many stakeholders and the general public. The existence of artificial intelligence in current systems enhances labour works with regards to how humans have become more time efficient, energy efficient, having easy access to readily available information effortlessly. Artificial intelligence is recognized as an ascertained tool that can perform diverse functions such as administrative functions, reviewing and grading student's assignments more effectively and efficiently, producing teachers with high quality in teaching activities for higher education instructors; the application of AI also helps the education system to provide intelligent education, innovative virtual learning, making data analysis and

predictions. ChatGPT as an example of an artificial intelligence application which is reckoned to embody great features like the capability to generate responses which makes it difficult to distinguish from human-like written text and this application develops a very high level of interaction with users (students and teachers), displaying high level of intelligence (Wagholikar et al., 2023). This tool is designed amongst many other things, to improve learning value and efficiency (Chen, Xie, & Hwang, 2020).

The implementation of artificial intelligence into the educational system brings a very different but effective and interactive approach to learning for students and teachers which is considered to be really fun because several applications and tools have been introduced to the system already like digital apps and educational tools in teaching; some of which can be game-based learning platforms and this is very different to the traditional classroom notion of teaching (Sertić et al., 2023). As an ancillary modeling tool, implementing AI into education represents an advanced learning analytic methodology which has the ability to offer objective methodology collating and modeling information and developing intelligent management systems that rapidly assesses student's success rates efficiently (Deo et al., 2020). Having a better understanding of how human beings communicate and interact helps AI engineers and developers to be able to implement AI assistants into the system for various purposes. Ionescu & Enescu. (2023) identifies ChatGPT to have the ability to generate and evaluate online tests; it is able to automate an entire process from quiz creation up to grading level and the users, the students and teachers have the opportunity of becoming initiators and supervisors of the process instead of the creator and executor. This gives room for a speedy and increased level of productivity. As multiple researchers discover that artificial intelligence deals with various disciplines and is multidisciplinary so it benefits teachers and students in higher education alike because it can contribute to a wide range of ideas and concepts that can be utilized in presenting information or data (Chen, Xie, & Hwang, 2020). With the use of AI technology in education it helps facilitate teaching and learning by simulating human intelligence at various degrees to infer, judge, predict, and make decisions. This development produces an impact on how students frame and investigate problems, explore multiple perspectives and leverage on multiple resources via collections and social interactions with one another (Tan et al., 2022). Year after year institutions continue to experience increasing results with how students are being taught emerging and producing bright outcomes and achievements from different disciplines and subject areas including computer science. Artificial intelligence in education

has given learners the wonderful opportunity of becoming personalized self-taught learners and meeting their individual goals strategically (Chen et al., 2020).

As the application of AI continues to surge in education from admissions and recruitment to adaptive learning and assessment, this technology is finding its place comfortably anywhere that requires an induced logic and automation. It is regarded as all the classification, trainable, predictive, and smart models that can either follow a set logic or offer new logic along with the necessary data. This is as a result of being able to computationally and mathematically achieve great strides in decision-making beyond human control (Memarian & Doleck, 2023). AI systems are capable of analysing large datasets including unstructured data, in real-time and detecting patterns or structure that can be used to support user's decision making as well as solve team based problems (Joksimovic et al., 2023). The three roles categorically attributed to artificial intelligence in teaching includes; providing adaptive teaching strategies, enhancing teacher's ability to teach and finally, supporting teacher professional development. Whereas, assigning tasks based on individual competence, providing human-machine conversations, analysing student work for feedback and increasing adaptability and interactivity in digital environs are four major benefits for applying artificial intelligence to student learning (Chiu et al., 2023). These roles are assigned to AI in teaching and learning to contribute to the enormous success and records seen in the system already.

AI in education is a very powerful and technical combination due to the high level frequency of achievements that can be accomplished in minimum time frame such as collaborating with human and technological strengths to make valuable insights and analysis and develop strong human judgement (Gürkut et al., 2023). The trending technology in the internet space today plays a pivotal role in converting many educational procedures from the traditional system to an electronic system whereby many educational functions relies totally on artificial intelligence technology. An example of this would be a throwback to the recent global Covid-19 pandemic whereby AI technology helped many institutions with the swift continuity of their educational system during the pandemic thereby reducing routine procedures that required the draining of human resources (Alqahtani, 2023). When considering the level of different learners in a school setting and the needs that comes with the different students, artificial intelligence can adapt instruction to the specified needs of each individual student in providing customized prompt feedback, in developing assessment and predicting academic success AI supports instructors in generating questions tests and exam questions and can make use of natural language process

to create systems that automatically creates tests. The technology holds the ability to develop and generate multiple questions and answers within a quick rate for subject disciplines that cuts across language education, engineering education, mathematics education and even medical education (Crompton & Burke, 2023). Teachers can have a bit of free time to themselves which could help increase their level of productivity by implementing certain AI tools into the higher education institutions (HEIs) because artificial intelligence can automate some learning and evaluation activities, monitor speech and search habits, offer online resources to supplement student's knowledge thereby assisting more individuals in developing their digital literacy abilities (Bucea-Manea-Tonis et al., 2022). In higher education institutions (HEIs), the application of AI improves the level of safety and efficiency, contributing to the learning and teaching process by working together with machine learning (ML) technologies to provide personalized learning experiences, automate administrative tasks, and enhance the quality of education overall. Artificial intelligence can also help identify students who might be at risk due to their poor performances and provide targeted interventions to improve their grades (Kuleto et al., 2021).

An AI-based analysis carried out in the University of the South Pacific (USP) to predict student performance in a first-year information technology literacy course showed an accuracy value of 97.03%, sensitivity value of 95.26%, specificity value of 98.8% and precision value of 98.8%. This analysis therefore indicates clearly that the use of AI technology in education has significantly improved both the teaching and learning process and experience for students and teachers alike, this robust technology continues to encourage the process of knowledge construction, helping with the understanding of student behaviour and assessing student performance in and outside of classes which therefore leads to more innovative ways of teaching and learning (Johkan et al., 2022). As diverse studies present the great aspect of how artificial intelligence has revolutionized the teaching and learning industry, making sure it becomes personalized and adaptive to individuals needs and pace, AI provides enormous support for autonomous learning and digital and artificial learning. (Fuchs & Aguilos, 2023). (Yilmaz & Karaoglan Yilmaz 2023, Rudolph 2023, Hornberger 2023, Sweeney 2023) stresses that the strength of artificial intelligence in education lies in its ability to provide educators with educational content and decrease their workload and at the same time ensuring that students receive the necessary learning materials and have the appropriate learning environment to learn efficiently, therefore personalizing learning experiences for the students that leads to profound learning outcomes.

4.3 Weaknesses of artificial intelligence in higher education

Artificial intelligence in education (AIED) is rising rapidly in notable parts across the globe and as the system implements this technology with great hopes on it, scholars are increasingly finding concerns with the amount of people yet to become aware and educated on artificial intelligence and the technology as a whole due to AI literacy in many higher education lagging behind in research (Laupichler et al., 2022). ChatGPT, the powerhouse has raised many eyebrows for its inability to become trustworthy as many complaints of inaccuracy of data are being raised, this machine learning tool cannot understand or comprehend the content of conversations it engages in and therefore, the generated responses are pattern based on whatever information jr received through learning and acquiring from the training dataset (Wagholikar et al., 2023). As a tool that is powered by artificial intelligence designed to be able to answer questions accurately, its level of accuracy and knowledge is questioned when compared to other enigmas like Google and therefore termed as "not dependable enough to replace Google". ChatGPT is also limited to data which makes it inefficient to answer current questions (Tounsi et al., 2023). Another noticeable challenge that comes with some of the artificial intelligence tools and technology, is the limitation of free versions and this could include things like size, or number or texts that can be generated in a period of time therefore institutions would have to either pay as a subscription to have full access and control and even go as far as customize certain features (Ionescu & Enescu, 2023). The AI industry is a commodity in education and the effect it should have in qualitative and general research is not as pragmatic (Memarian & Doleck, 2023). The level of investments going into the development of smart automated solutions is high considered to how artificial intelligence are integrated into human groups like institutions, this is largely overlooked and therefore depriving many people of the opportunity to learn about this technology (Joksimovic et al., 2023). There are not many published studies that looks into relevant literature examining how artificial intelligence technologies can be integrated into any of the four educational domain (learning, teaching, assessment and administration) therefore the relationship between technologies and learning outcomes of students and teachers are being robbed (Chiu et al., 2023). In the aspect of data analysis, it has become a holy grail for higher education administrative technology trying to produce information that is meaningful, accessible and managed efficiently (Gürkut et al., 2023). Therefore, the brilliant concept of the application of artificial intelligence in education is now challenged with the limited resources in many countries worldwide (Alqahtani, 2023).

There is a lack of accurate knowledge and understanding drawn towards the power of context within artificial intelligence in education (AIED) (Crompton & Burke, 2023).

Teachers do not receive appropriate training on how to handle digital problems and therefore integrating cognitive projects with system and privacy issues is significantly challenging for some higher education institutions as there are not sufficient experts in the field that can provide problem solving solutions for unexpected or critical problems which could come up (Bucea-Manea-tonis et al., 2022). Another weakness of artificial intelligence in education is the increase chance of discrimination and bias. AI systems can perpetuate existing biases and inequalities, which could mislead to poor and unfair treatment of certain groups of students in school. Additionally, the implementation of AI in education needs a significant amount of investment in several infrastructure and training which this might not really be feasible for a lot of higher education institutions (HEIs) (Kuleto et al., 2021). Wang et al. (2023) profoundly states the concerns for student and teacher's privacy, cultural differences, language proficiency and ethical implications being some drawbacks for the application of artificial intelligence technology into the education system. Many educators and students lack trust in AI as a technology to be of viably much help for them as these technologies are sending people on a run for their job positions (Al-Maskari et al., 2022). When identifying the necessary conditions for technology to assist and not obstruct teaching and learning, there need to be carefulness as the use of AI in education brings some negative impact on how bias the tools can be with decision-making and replacement of human teachers (Jokhan et al., 2022). Much ethical concerns particularly around academic misconduct and privacy are to be addressed because AI replacing human labor leads to lack of human interaction and socialization therefore reducing the expected level of effectiveness (Fuchs & Aguilos, 2023). There has been a level of bias algorithm that has devastatingly affected students during admission or granting process (Slimi & Carballido, 2023). Educators currently are not really open-minded to the idea of integrating AI technologies into the system which they have dominated for many years, they are yet to embrace technological changes, and adapt to innovative teachings (Rudolph et al., 2023). Artificial Intelligence may not be able to fully understand the nuances of human language and communication, which leads to misinterpretations and misunderstandings (Hornberger et al., 2023). The technology of artificial intelligence risks the credibility of assessment approaches within higher education institutions worldwide (Sweeney, 2023). Replacing human teachers leads to a large decrease of the human touch and personalized attention that many students

require in the learning process therefore limiting their potentials and opportunities (Gams et al 2019, Kile 2013, Tyukin et al 2018, Buttazo 2023).

4.4 Opportunities of artificial intelligence in higher education

The future of education is, to a large degree, related to the advances in novel intelligent technologies and the rapid development of computational capacities. Hence, the educational community is facing the opportunity brought by the continuous developing of AI technologies which is set to fundamentally change the structure, operations and governance of education institutes (Chen, Xie, & Hwang, 2020). The introduction and integration of AI into education brings a certain level of expansion in the already existing industry. The integration of AI and education is considered an active topic among researchers and this industry has an estimate of reaching a net worth of $5.80 billion by 2025. The great potentials of AI make it a wonderful tool to be used in education systems in order to enhance the functionalities of such systems and this resulted system is called Artificial intelligence education system. With the series of developments of technology associated AI, computing and robots, there is a huge tendency toward embodied intelligence produce and services that has been noticed due to the wide range of domains that AI covers. Researchers and practitioners are encouraged to explore solutions for building safe, reliable, and efficient system that works for the education sector to enhance students and teacher's experience considerably (Zafari et al., 2022).

Current literature study shows that there are multiple opportunities for the education system and all stakeholders present and in the future with a solid integration of AI. The technology has the potential to truly revolutionize the way teaching and learning gets carried out (Buttazo, 2023). Artificial intelligence can provide improved ways and methods of delivering content like through vertical and augmented reality, automated administrative tasks and lots more. The opportunities presented includes the transfer of knowledge and experience between otherwise independent AI agencies, without requiring significant computational resources and therefore producing more efficient and effective AI systems in education (Tyukin et al., 2018). There are lots of augmented cognitive capabilities and improved decision intelligence in high-impact stress like education, so AI can really help with personalizing learning experiences and providing needed support for students in real time whenever they need that wherever they might be, with or without internet connection (Ong & Gupta, 2019). Enhancing mentoring process by automating some of the responsibilities that mentors bear like giving individual feedback or personal recommendations and helping to design individual learning paths or

career strategies is an important aspect to the success of applying artificial intelligence into higher education (Köbis & Mehner, 2021).

With the integration of artificial intelligence into education there will be great potential of providing access to education for individuals that may not have had it otherwise; such as those habitants in remote areas or underprivileged places (Kile, 2013). The potential of providing unprovoked learning experiences to many more students increases and the demand for education soars higher as AI greatly impacts the system (Gams et al., 2019). With such high demand for learning, there will be great expectations and AI will help improve student's outcomes and also increase access to education for many students (Sweeney, 2023). Artificial Intelligence can help to bridge the gap between formal education and real world applications of knowledge and skills by preparing students for the fluctuating job market and increasing demand for digital skills. This technology can help identify and address learning gaps and challenges that may go unnoticed in a traditional classroom setting (Hornberger et al., 2023). With the solution of being able to investigate the learning needs of students and teachers, teachers can be able to tailor their teaching strategies and skill set to the individual needs of their students (Rudolph et al., 2023). Students can get empowered and their level of educational playing field increases due to AI helping them become critical thinkers, being able to comprehend texts, aggregate knowledge and understand genre conversations in prose as well as programming, so therefore students can leverage on artificial intelligence in education (AEID) as a tool that they question and critique, advancing their own comprehension, research and composition skills in the process (Steele, 2023). The quality of education generally will improve for both students and teachers (Yilmaz & Karaoglan Yilmaz, 2023). AI technology can help reduce teacher's workload in classrooms (Fuchs & Aguilos, 2023). The use of Information communication and technology (ICT) tools contributes to an excellent learning environment among students and learning pedagogues and with an AI-based student performance predictor, the potential for improving education grows rapidly (Jokhan et al., 2022). Not only will AI help in addressing then skill gaps that many schooling students currently experience but the application of the technology can prepare students for jobs in the future in the fourth Industrial Revolution (4IR) era. Artificial intelligence an improve the efficiency and effectiveness of education by automating administrative tasks (Al-Maskari et al., 2022). The opportunities of AI in education are vast; balancing leveraging AI's benefits and preserving human educator's critical role in supporting students' academic and personal growth is essential so therefore artificial intelligence is viewed as a tool of change that

complements and enhances the educational process rather than as a substitute for human development and interaction (Wang et al., 2023).

Research identifies several significant opportunities for HEIs with the integration of AI and machine learning (ML) technologies; these include helping higher education institutions identify new revenue streams and improve their competitiveness in the education market (Kuleto et al., 2021). Artificial Intelligence can supplement formal university education through Massive Open Online Courses (MOOCs), which are a helpful form of online learning and as a result many individuals would be able to develop their digital literacy abilities (Bucea-Manea-tonis et al., 2022). The organization of student's data will become smoother with more accurate technology managing the large data set of influx of large number of students (Crompton & Burke, 2023). The various dimensions of artificial intelligence (machine learning, natural language processing, expert systems and machine vision) are all centered on defining patterns of computational learning and finding prediction models that can simulate human capabilities using big data that humans may have a hard time understanding (Alqahtani, 2023). Asides from the directly involved stakeholders who are the first beneficiaries of this great technology, other entities like government offices, accreditation committees could become indirectly impacted by the success of the educational system (Gükut et al., 2023). As a result of the increasing prevalence of AI technology in education, many graduates will be required to have strong understanding of certain AI principles in order to succeed in their respective fields and discipline (Chan, 2023). Artificial Intelligence in education (AIED) has enormous potential to improve and foster teachers understanding of students learning process and providing anywhere anytime machine supported queries and immediate feedbacks (Chiu et al., 2023). There is a need for skills to engage with new challenges and also a nuanced understanding of how to approach them in the context of an academic setting so therefore learners and educators will have a new approach to complex problems by solving them with personalized insights and data-driven recommendations (Joksimovic et al., 2023).

Students stand a chance of becoming a part of AI education by serving as research participants or contributing to reproducibility reports which will allow them feel and gain experience in the role of ethics play by observing the outcome from their participation (Memarian & Doleck, 2013). There will vacancies opened up to training interested participants to adopt to the AI technology for the purpose of being able to interact with this new technology on a regular basis. And governments are recognizing the need for artificial intelligence literacy programs and are

investing heavily into these courses in higher and adult education (Laupichler et al., 2022). With the increasingly wide application of AI technology for teaching and learning, instructors are offered the opportunity to get rid of repetitive and tedious tasks and be able to reply to students timely (Chen, Xie, Zou et al., 2020). The international research and development community are presented with the opportunity to make use of the openly available toolbox which contains guidelines and materials supporting personal development for AI as well as templates and pictures for person's visualization (Holzinger et al., 2022). AI-based learning analytics can be adopted to model and track student's performances, evaluate their progress and report on findings and outcomes (Deo et al., 2020). Students can get oriented, trained, and developed for skill based education and other critical skills to help them be able to make use of AI technology's in their learning environments (Wagholikar et al., 2023).

4.5 Threats of artificial intelligence in higher education

The three main threats posed by artificial intelligence in education are measurement, information accuracy and skill devaluation. AI tools like ChatGPT can potentially replace human evaluation of student's comprehension and writing skills, making it difficult to assess their abilities, understanding, insight, and clarity of expression. Additionally, AI generated information may not always be accurate, leading to potential misinformation and harm (Steele, 2023). The issue of committing malpractices is a very big threat as a study conducted during the Covid-19 pandemic showed that the level of cheating was very high during online classes from a university in the USA. Cheating in online classes was more frequently reported compared to cheating in person classes. The overall reporting of cheating in the study was very high with a rate of 74.8% of the surveyed students found to have been caught cheating at least with one type of material. Also cheating in online classes was more present during online exams, quizzes and homework assignments done with the help of some AI tool compared to the traditionally delivered on-site classes. Another study conducted in 2022 to investigate the motive for cheating in online assessment showed specific ways of and their reasons. The study showed that students sometimes cheat during online assessment due to exams being poorly designed and no set punishment for cheaters, lack of strict rules and policies on the act, also the student's inadequate academic performances and low interest in the course or even knowledge acquisition as a result of being lazy (Bubaś & Čižmešija, 2023). The AI technology, ChatGPT poses the threat of being able to debug a program due to having a memory (Wagholikar et al., 2023). Many educators believe it can be utilized as a tool for cheating and some professors think their services will not be "necessary anymore" and their homework will

become obsolete with this tool on open use; so some schools have gone as far as restricting access to ChatGPT on computers and networks available to students due to worries about adverse educational effects and the reliability and safety of the content (Tounsi et al., 2023). Ai-tutor would replace expensive private teachers who are hired by learner's parents for certain subjects such as language learning or quantitative analysis courses (Kim & Kim, 2020). Instructors fear that when students make use of ChatGPT for assignments and tests, the automated results given by ChatGPT may not always be accurate and if nobody cross checks could be worrisome (Ionescu & Enescu, 2023). The morality of AI in education is at question because of the rapid rate at which artificial intelligence can mine datasets and precut or offer new models surrounding higher education programming, teaching and learning and education may become a target of humans using poor logic or data and AI's trial and error (Memarian & Doleck, 2023).

The use of generative AI may lead to a decline in students writing and critical thinking skills as they become more reliant on automated tools to complete their work (Chan, 2023). Though AI technology can generate assessment questions and answers, sometimes the answers may not be accurate (Crompton & Burke, 2023). There could be risky behaviors involved with the adoption of AI in higher education if teachers are not brought to awareness or concerns regarding the cost of technology, its difficult nature and inappropriate strategies for implementation within HEIs (Bucea-Manea-tonis et al., 2022). Job replacement is a major threat for many admin staffs, AI and ML technologies can automate many administrative tasks and this can cause a reduction in the demand for human services. Additionally, the implementation of artificial intelligence into higher education institutions may raise concerns about privacy and data security as well as ethical issues related to the use of AI in decision-making processes (Kuleto et al., 2021). Language proficiency is also another risk factor which should be effectively addressed to ensure that AI applications are implemented to maximize their benefits and not to undermine the concerns of students (Wang et al., 2023). Artificial Intelligence stands a great risk of exacerbating existing inequities in education if not implemented in an equitable manner. It could be used for unethical purposes such as surveillance or data mining and this could easily happen with lack of regulation or oversight of AI in education thereby leading to unintended consequences and negative outcomes (Al-Maskari et al., 2022). The implementation of AI in education requires significant investment in technology and infrastructure for innovation purposes (Jokhan et al., 2022). For this reason,

the cost of implementation may be prohibitive for some smaller institutions who may not be able to afford the technology (Fuchs & Aguilos, 2023).

The ethical challenges posed by AI in higher education have a possibility of maximizing potential adverse effects if not carefully accounted for (Slimi & Carballido, 2023). There is a risk of academic integrity breaches as some units in higher education may explicitly allow or require the use of AI in assessment tasks (Rudolph et al., 2023). AI may reinforce a narrow and standardized approach to education, limiting creativity and critical thinking for students (Hornberger et al., 2023). This tool could facilitate academic dishonesty and undermine academic standards which would limit educational progress and expectations for many (Sweeney, 2023). The misuse of sensitive and personal data belonging to individuals could lead to privacy violations and discrimination (Köbis & Mehner, 2021). Issues related to resilience, reproducibility, realism, and responsibility are significant challenges facing the field of AI which should be addressed in order for AI to be more widely trusted, accepted and seamlessly integrated within the fabric of society (Ong & Gupta, 2019). As artificial intelligence becomes more advanced, it may weaken the education workforce and there could and increased rate of laziness found amongst students and teachers which could eventually be a threat to their health and bodies (Buttazzo, 2023).

CHAPTER V

Discussion

Artificial intelligence technologies are revolutionizing the educational system, making online studying and teaching a practical alternative to just in-person lectures. Businesses, government agencies and academic institutions need to become involved and learn about all aspect and concomitants of AI along with its impact in the system so as to decide whether to embrace the various approaches of opportunity's that present themselves as potential solutions to problems. Enhancement and advancement is essential for the solid success of attracting many attentions to the strengths, weaknesses, opportunities and threats of AI in higher education. Majority of the reviewed papers for this study outlined some key strengths of integrating artificial intelligence platforms and tools into the system. These studies outlined that artificial intelligence is an ascertained tool that can function independently on different levels such as administrative functions, reviewing and grading student's assessments and providing innovative educations (Zafari et al., 2022; Chiu et al., 2023; Kuleto et al., 2021). The presence of artificial intelligence in higher education eases work load for instructors in classes and takes unnecessary burden off for them to be more effective, and productive working time efficiently and at a faster pace (Rudolph et al., 2023).

AI-powered tools utilize human judgement and collaboration of the strength from human and technology to achieve outcomes on large scales (Gürkut et al., 2023). There is an overall increase in the learning experience and developmental learning networks that is designed to keep accurate records of student's performances and identify their status and preferences (Kim & Kim, 2020). Major weaknesses outlined in the course of this study include: artificial intelligence is a human created tool which is still subject to constant improvement and development so therefore is prone to not providing accurate information or data for users and can be misleading at some point (Tounsi et al., 2023). There is also a huge decline in knowledge and understanding of this technology in the system as many professionals and career experts are still yet to bridge their awareness gap and get educated on artificial intelligence to not only improve their overall AI literacy in higher education but to improve the general understanding of the digital world in education (Laupichler et al., 2022). Researchers are concerned about the power of replacing human teachers, job losses and the lack of human connection and how it affects badly the roles and functions of interpersonal interactions, feedback, creativity, feelings and emotional intelligence that revolves around the learning process (Kile, 2013; Rudolph et al., 2023).

The opportunities that lie within the application of AI technology in teaching and learning include instructors having the ability to reduce or eliminate repetitive and tedious tasks, advancing the adaptive and personalized teaching process (Chen, Xie, Zou, et al., 2020). Students can get recognized in the classroom and within the system at large by joining the education of AI in serving at various capacities like research participation or contributing to reproducibility reports which will not only expose them but provide them viable experiences with how ethics play into their participation outcomes (Memarian & Doleck, 2023). Several governing agencies are realizing and beginning to recognize the importance of AI literacy program being integrated into the education system and therefore many bodies are engaging in talks on investing into credible AI literacy courses in higher and adult education (Laupichler et al., 2022). ChatGPT is one example of an artificial intelligence technology platform that has recently been developed and already functioning heavily in different market spaces. Many educators feel that this technology poses the threat of debugging a program due to having a memory and also could be used for the wrong reasons like students committing malpractice in their exams and homework's therefore professors think they will not be of necessity any longer. Certain institutions have gone ahead with restrictions to access to ChatGPT on their computers and networks which are exposed to student's access due to worries about adverse educational effects and the reliability and safety of content (Tounsi et al., 2023). AI poses the threat of exacerbating the current existing inequities in education if not implemented in an equitable manner (Al-Maskari et al., 2022). Some worry for AI in education threatening the potential transformation of a student's journey through academia which embodies aspects such as admission, enrollment, career services and additional support therefore breaching the integrity of higher education and students learning process (Rudolph et al., 2023).

In light of future research, the author recommends deeper studies into how artificial intelligence can be sustained for better outcomes in the system with regards to student's performance and investments being made. This would provide a clear understanding of the right pathway to follow through to witnessing growth and success on several scales with artificial intelligence in higher education, considering the limitations of the knowledge AI. Awareness for AI literacy need to increase with advanced investments made from the part of the government to get all stakeholders educated on the strengths, weaknesses, opportunities and threats of the robust AI technology and higher education industry.

CHAPTER VI

Conclusion and Recommendations

The study of artificial intelligence in education was systematically reviewed through past research articles within the past decade based on analysing the strengths, weaknesses, opportunities, threats compiled together by the researcher. The purpose of this analysis was to be able to identify, determine and evaluate the SWOT of artificial intelligence in higher education and discuss the impact of the technology within the system. The study resulted in findings that identified and presented information regarding what the strengths, weakness, opportunities and threats of AI in higher education are. Artificial intelligence can be a very powerful and effective weapon in the system to provide alternative solutions for methods of teaching and learning in schools. This technology can provide several opportunities for bridging the gap between formal education and real-world application of knowledge and skills, it also can help prepare students for the fluctuations in the job market even after graduation from higher institutions considering the increasing demand for digital skills. Artificial intelligence can help identify and address several learning gaps and challenges that may not be noticeable in a traditional classroom environment. There still is a lack of awareness behind and about the impact of artificial intelligence technology in the system. Government agencies and bodies are slowly turning to investments into the future of digital technologies and AI due to the rising impact and effect that this technology brings to stakeholders. However, multiple concerns are not to be neglected as the application of artificial intelligence is also a worry to many people with the potential of risking job offers and eliminating human connection between students and teachers. Artificial intelligence poses some severe threat to the system and its sustainability for the future such as misuse of sensitive and personal data which could lead to privacy violations and discrimination. This technology could also be used in facilitating academic dishonesty, undermining the set standards of academic integrity, as well as limiting the creativity and critical thinking ability of students. We hope that this study could present useful insights for students, teachers, and all stakeholders to benefit from and gain great awareness about artificial intelligence technology; the impact and importance of being enlightened, and engaged with necessary knowledge to achieve common goals.

There are several limitations in this systematic literature review which are outlined accordingly. First, this study is limited with the selected databases considering the keyword query used for retrieval of studies. The time boundaries allocated is not enough to cover many studies related

to AI in higher education. Also the researcher had to make some methodological decisions which were strictly abided by to avoid any form of biased judgements in making a selection of appropriate research articles to be included for this study, and included but not limited to the 4 databases aforementioned. Second, only articles written in English language were selected and all other papers in other languages were eliminated from the search results, likewise only peer reviewed journal articles that are open access and full test accessing were included in this SLR. Finally, the type of research included was mostly research articles and for the purpose of future literature reviews, this type of research includes other forms of research like book chapters, editorial and conference papers to have an expanded reach of other databases and papers. The findings of this SLR will serve as a guide to higher educational institutions, organizations, educators, learners and learners guardians to make informed decisions in embracing and implementing artificial intelligence into the higher education system.

Recommendations for Stakeholders:

- Embrace AI integration in higher education and heavily invest in faculty training programs to ensure effective utilization.
- Actively foster collaboration between industry and academia to align students and instructors with the vast evolving industry needs.
- Establish regular feedback mechanisms that will be able to address concerns and improve AI applications in the learning environment.
- Continuously encourage and support the development of ethical guidelines and standards for AI implementation in higher education.

Recommendation for Future Researchers:

- Make Investigations into the impact of AI on student learning outcomes and career trajectories for a long period of time.
- Explore innovative ways to enhance adaptive learning systems using AI for personalized education.
- Conduct cross-disciplinary studies to understand the holistic implications of AI adoption in higher education.
- Explore strategies to mitigate potential biases in AI algorithms and ensure inclusivity in educational settings.

Recommendation for Higher Education Policy Makers:

- Develop comprehensive policies that support the responsible and ethical use of AI in higher education.
- Invest in infrastructure and resources to facilitate the seamless integration of AI technologies across institutions.
- Establish frameworks for continuous evaluation and adaptation of AI strategies based on emerging technologies and educational needs.
- Collaborate with international counterparts to share best practices and collectively address challenges in AI implementation.

Recommendation for Higher Education Students:

- Actively engage with AI tools and platforms to enhance your digital and AI literacy which will help prepare for future workplaces.
- Advocate for transparent policies regarding the use of AI in education to ensure fairness and accountability.
- Seek and grab opportunities to participate in AI-related projects and initiatives to gain practical experience.
- Stay updated about emerging AI technologies and their potential impact on your field of study to stay competitive in the job market.

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Appendices

Appendix A

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Appendix X

Turnitin Similarity Report

(A plagiarism report is included at the end of the thesis immediately before the CV of the author.)

CV

Note: Please refer to the Institute's Guidelines for Thesis Writing to better understand this template!