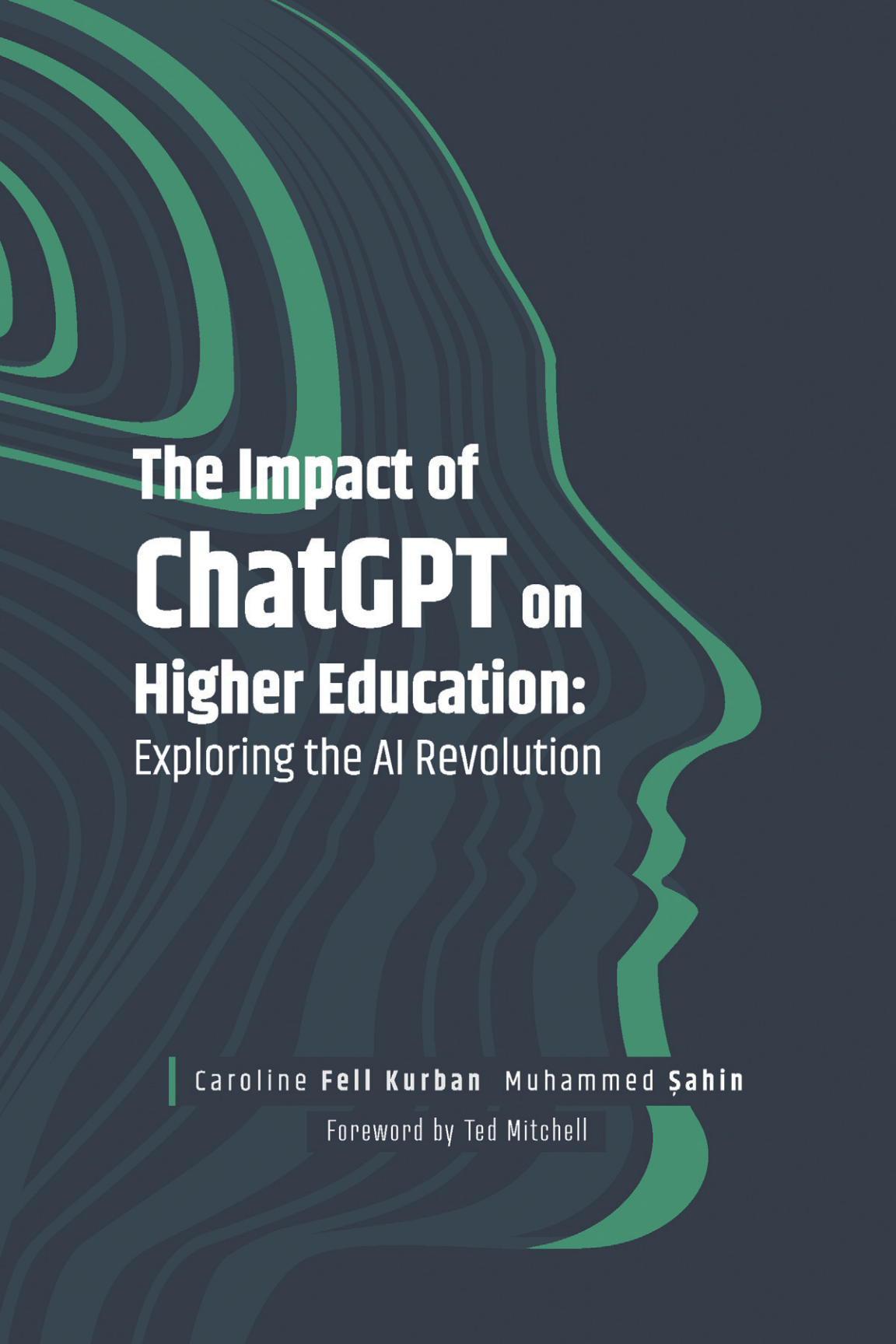

The Impact of ChatGPT on Higher Education:

Exploring the AI Revolution

Caroline **Fell Kurban** Muhammed **Şahin**

Foreword by Ted Mitchell

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The Impact of ChatGPT on Higher Education: Exploring the AI Revolution

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Emerald Publishing, Floor 5, Northspring, 21-23 Wellington Street, Leeds LS1 4DL

First edition 2024

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN: 978-1-83797-648-5 (Print)
ISBN: 978-1-83797-647-8 (Online)
ISBN: 978-1-83797-649-2 (Epub)

Contents

We dedicate this book to the memory of Dr İbrahim Arıkan, the founder of MEF Schools and MEF University, who dedicated his life to revolutionising education. Dr Arıkan's ultimate dream was to establish MEF University as a fully flipped university, but sadly, he passed away before witnessing its realisation. He was a pioneer across all stages of education, from kindergarten to university, and believed in a democratic approach to education that prioritised the individuality of each student.

Dr Arıkan implemented full academic independence for teachers at his institutions, and his commitment to creating a learning environment that nurtures the potential of every student has left a lasting impact on the field of education. His spirit lives on in the hearts and minds of every student and teacher who had the privilege to know him. As we continue to honour his legacy, we are proud to say that MEF University has become the realisation of his dream, an innovative and fully flipped university that empowers students to take control of their education and become lifelong learners.

We believe that Dr Arıkan would have been proud of the innovative direction MEF University is taking by incorporating cutting-edge technologies like ChatGPT to further enhance the teaching and learning experience. As a pioneer in education, he always believed in implementing new and effective teaching methods to provide his students with the best possible education. His spirit continues to inspire us to strive for excellence in education, and we dedicate this book to his memory.

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About the Authors

Caroline Fell Kurban is an academic, educator and consultant with a diverse educational background, including a PhD in Applied Linguistics, MA in Technology and Learning Design, MSc in Teaching English to Speakers of Other Languages and BSc (Hons) in Geology. Her expertise in flipped learning and contributions to publications on digital teaching and learning have been instrumental in advancing initiatives at MEF University in Istanbul. As the principal investigator, Caroline's extensive background and prior studies have influenced the selection of theoretical frameworks for this investigation of ChatGPT integration in education. Her expertise in Clayton Christensen's Theory of Jobs to be Done, critical examination of power dynamics through theorists like Bourdieu and Marx and understanding of phenomenology through Heidegger's philosophy bring a comprehensive perspective to her research. With her credentials and passion for enhancing educational practices, she is well-suited to lead this project.

Muhammed Şahin, an esteemed academic leader, holds a geomatics engineering degree from Istanbul Technical University (ITU) and earned his master's degree from University College London in 1991 and a PhD from the University of Newcastle in 1994. He joined ITU as an Assistant Professor in 1994 and climbed the ranks to become a tenured Professor in 2002. Şahin's remarkable career includes serving as the Rector of ITU from 2008 to 2012 and later as the founding rector at MEF University, the pioneering institution fully based on the flipped learning methodology in which this research is located. With esteemed leadership roles in various organisations, substantial contributions to research and strategic management and influential work in engineering education, his expertise spans diverse domains. However, his current passion and dedication revolve around educational transformation, especially with regard to the impact that technologies are having on reshaping learning experiences and empowering students for the future. He strongly believes that the experiences derived from this transformation should be shared with others, which is what prompted the development of this book.

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Foreword

In the dynamic and ever-evolving landscape of education, one of the most profound shifts is the integration of emerging technologies. As an advocate for access to high-quality education for all, I find this era of technological advancement an intriguing period of transformation. This book dives deep into the exploration of artificial intelligence (AI) in education, specifically focusing on AI chatbots like ChatGPT, and the implications they bring to our learning environments.

My pleasure in presenting the foreword for this book is twofold. Firstly, because the authors have undertaken a rigorous exploration of a critical topic. Secondly, because this subject resonates with my professional journey, spent in pursuit of improving student outcomes and democratising access to quality education.

MEF University in Istanbul, the book's focal research site, stands as a beacon of innovation for its integration of AI, offering a unique context for this study. The authors critically examine ChatGPT, discussing its development, the ethical considerations surrounding its use, and the need for a globally inclusive discourse on the ethical guidelines for AI technologies.

From my tenure as US Under Secretary of Education to leading the American Council on Education, I have seen the impact that a conscientious integration of technology can have on access to high-quality education. In this book, by delving into the history and ascent of chatbots, formulating a theoretical framework for evaluating AI's influence, conducting a contemporary literature review and embarking on an exploratory case study, the authors shed light on how AI chatbots have the potential to reshape the very foundations of teaching and learning.

What the authors present is not just a well-researched treatise on ChatGPT, but a tool for future exploration. The book's concluding chapters provide a blueprint for how to effectively and ethically integrate these AI technologies in our classrooms and institutions, a guide I wish I had when piloting early edtech initiatives in my own career.

The insights gleaned from this book go beyond ChatGPT. They will shape how we, as educators, policymakers, and students, navigate the rapidly changing technological landscape of education. The authors have not only provided a comprehensive exploration of AI chatbots in education but also prompted us to consider how we can harness this technology to create an equitable and inclusive future for all learners.

In the grand scheme of things, the integration of AI in education is a new frontier. This book stands as an essential guide for all those venturing into this new territory. We stand on the precipice of a new era in education – an era where AI can help us achieve our shared goals of equity, excellence and accessibility in education.

Let us not just read this book but act on its insights to ensure a future where all learners have access to quality education.

Ted Mitchell
President of the American Council on Education

Preface

It is my pleasure to introduce our new book, *The Impact of ChatGPT on Higher Education: Exploring the AI Revolution*. As the founding rector of MEF University in Istanbul, Turkey, I am proud to say that our institution has always been at the forefront of innovative and cutting-edge approaches to education.

Since our establishment in 2014 as the world's first fully flipped university, we have been dedicated to providing our students with the skills they need to succeed in their future careers. However, we also recognise that the landscape of education is constantly evolving, and we must adapt our methods accordingly. That is why, in this book, we are excited to share our exploration of how ChatGPT may affect the roles of students, instructors and institutions of higher education.

Our university has always been a pioneer in the use of technology in education. We were early adopters of the flipped learning approach, which has now become widely recognized as an effective pedagogical method. We were also at the forefront of using digital platforms with adaptive learning capabilities to provide our students with personalised and individualised learning experiences.

As we embrace new technologies and innovative approaches to education, the potential of AI in education using ChatGPT is both exciting and promising. However, it is crucial to thoroughly explore and understand how this technology will impact students, instructors and universities themselves. Moreover, universities will have a vital role to play in the global discourse of AI as it rapidly transforms various aspects of our lives.

This book presents an in-depth analysis of our institution's exploratory case study, investigating the potential effects of ChatGPT on various stakeholders. Through the sharing of experiences, anecdotes and perspectives from various practitioners' viewpoints, our goal is to offer a glimpse into the transformations occurring within our organisation. This endeavour can serve as a useful reference for other institutions seeking to undertake similar inquiries. We are excited to be at the forefront of this discourse and to contribute to the progress of knowledge in this field.

Muhammed Şahin
Rector of MEF University

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Acknowledgements

In creating this book, we have been fortunate to receive significant support, assistance and inspiration. We are profoundly grateful to all who contributed. Our students, especially Levent Olcay, Utkan Enis Demirelgil, Nida Uygun and Mehmet Oğuzhan Unlu, brought invaluable enthusiasm and insights to the project. We would also like to acknowledge the diligent assistance of our student volunteer, Muhammet Dursun Şahin. We are deeply thankful to the İbrahim Arıkan Education and Scientific Research Foundation, a guiding light in our pursuit of educational excellence, and the MEF University faculty, whose creative ideas and persistent motivation were indispensable. We express our gratitude to Professor Muhittin Gökmen, Director of the Graduate School of Science and Engineering and the Chairman of the Department of Computer Engineering at MEF. His valuable insights concerning AI theorists like Tegmark, Marcus, Davis and Russell greatly enriched our understanding. Additionally, we extend our appreciation to Professor Mustafa Özcan, Dean of the Faculty of Education at MEF, for his continuous feedback and unwavering support throughout the duration of this project. We owe a debt of gratitude to Paker Doğu Özdemir and his team at the MEF CELT, along with the MEF Library staff, especially Ertuğrul Çimen and Ertuğrul Akyol, for their tireless support and valuable contributions. Our heartfelt thanks also go to our colleagues, including Ted Mitchell, whose thoughtful foreword frames our work; Leonid Chechurin, for his astute critique; and Juliet Girdher, whose expertise on Heidegger enriched our understanding of AI through a Heideggarian lens. We also extend our appreciation to the members of our AI think tank, Errol St Clair Smith, Thomas Menella, Dan Jones and Juli Ross-Kleinmann whose thoughtful discussions helped shape our ideas. Finally, we express our sincere gratitude to Emerald Publishing for making this book possible. In essence, this book is a testament to the strength of collaborative effort and the pursuit of knowledge. Each of you has enriched our work, leaving an indelible mark that we will forever appreciate. Thank you.

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Chapter 1

Exploring ChatGPT's Impact on Higher Education – A Case Study

The Revolutionary Impact of AI

Throughout the ages, technological advancements have disrupted traditional practices, necessitating individuals to adjust and weigh the potential advantages and disadvantages of emerging technologies. From the printing press to the blackboard, from the computer to the internet, each new innovation has shaped the way we teach and learn. And artificial intelligence (AI) is set to be the next catalytic jump forwards. Although AI has been around since the mid-1950s, it is only in recent times that data mining, advanced algorithms and powerful computers with vast memory have been developed, thus making AI increasingly relevant. From problem-solving in the 1950s to the simulation of human reasoning in the 1960s, from early mapping projects in the 1970s to the development of intelligent assistants in the 2000s, AI has made impressive strides. Today, AI manifests in household personal assistants like Siri and Alexa, self-driving cars and automated legal assistants. It has also spawned AI-assisted stores, AI-enabled hospitals and the ubiquitous Internet of Things. In the realm of higher education, the integration of AI technologies holds transformative potential for traditional teaching and learning practices. However, a new era has now arrived with the emergence of ChatGPT, the game-changing AI chatbot. So what is ChatGPT?

The Arrival of Chat Generative Pre-trained Transformer (ChatGPT)

ChatGPT, an influential AI chatbot developed by OpenAI, has emerged as a game-changer in education, offering students dynamic and human-like conversations through natural language processing (NLP). Since its launch on 30 November 2022, ChatGPT has revolutionised the educational landscape, providing students with immediate access to information, personalised recommendations and continuous support throughout their academic journey. However, its implementation has also raised concerns about academic integrity, leading some institutions to ban its usage or adopt stricter assessment methods to

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doi:10.1108/978-1-83797-647-820241001

combat AI-based cheating. This has sparked global discussions among educators, debating whether ChatGPT represents an opportunity or a threat.

At its core, ChatGPT operates by harnessing the power of NLP to comprehend and respond to human queries in a conversational manner. Through advanced algorithms and machine learning techniques, ChatGPT has been trained on vast datasets to generate human-like responses, making it an indispensable tool for engaging with students. The interactive and personalised nature of ChatGPT's conversations makes it highly valuable in the educational landscape. Students can instantly access answers to their questions, relevant resources and tailored recommendations based on their learning needs. Whether seeking clarifications, additional information or guidance, ChatGPT serves as a reliable and readily available support system throughout their academic journey. Furthermore, instructors can leverage ChatGPT to streamline administrative tasks and enhance the learning experience. By automating routine administrative processes, such as addressing frequently asked questions and providing course-related information, instructors have more time to focus on meaningful interactions with students. Additionally, ChatGPT can offer timely and personalised feedback, providing students with real-time guidance and support. Integrating ChatGPT into the educational environment can lead to a more engaging and interactive learning experience. Students benefit from immediate assistance, personalised guidance and a supportive learning environment, while instructors can optimise their teaching practices and facilitate more meaningful interactions.

As we can see, the potential of ChatGPT in higher education is promising. However, it is essential to recognise the caveats that accompany it. To begin with, addressing the ethical considerations and limitations surrounding ChatGPT is crucial. These encompass concerns about its reliance on heuristics, lack of transparency in internal workings, issues with capability versus alignment, limitations in helpfulness, interpretability challenges, issues of bias and fairness, factual accuracy and truthfulness, as well as ethical concerns regarding data privacy and cybersecurity. Moreover, the impact of ChatGPT on industries, including higher education, necessitates thorough investigation. The integration of AI technologies like ChatGPT brings transformative effects on job markets, resulting in the elimination and transformation of positions, requiring a re-evaluation of traditional work models. Within education, institutions and companies face disruptive challenges as ChatGPT alters job roles, posing questions about the value of human expertise and critical thinking skills. Additionally, financial implications and the costs associated with implementation and ongoing support require careful consideration. Furthermore, the concentration of AI power and the potential for corporate dominance are critical factors to explore. The risk of a few dominant companies controlling and influencing AI raises concerns about limited diversity, choice and fair competition, emphasising the need to address data ownership, privacy and the possibility of monopolistic practices. Establishing comprehensive policies and regulations becomes essential to ensure ethical use, responsible deployment and accountability in the integration of ChatGPT and similar technologies. Lastly, the scarcity of research on the specific impact of ChatGPT in teaching, learning and higher education

institutions underlines the significance of investigation. The limited availability of case studies, insufficient student perspectives and inadequate understanding of necessary adaptations in educational objectives and practices create a substantial knowledge gap. It is therefore crucial that investigations of ChatGPT in higher education are undertaken, due to its potential as well as its associated caveats.

In the wake of the COVID-19 pandemic, educational approaches underwent a significant shift. However, compared to the emergence of ChatGPT, the impact of the pandemic may appear relatively small. While instructors and institutions had the option to revert to traditional educational methods as the pandemic receded, the same cannot be said for ChatGPT and AI chatbots. In fact, one could argue that ChatGPT represents a new kind of 'pandemic' in the educational landscape. So, how should this be addressed?

MEF University's Response to ChatGPT

MEF University, a pioneering non-profit private institution located in Istanbul, Turkey, has been at the forefront of embracing innovative educational methodologies since its inception. Founded by Dr İbrahim Arıkan, the university envisions revolutionising higher education by equipping students with the skills necessary for future careers and addressing the dynamic demands of contemporary industries and society. By strategically investing in infrastructure and cutting-edge technology, MEF has solidified its reputation as a forward-thinking institution. Since its establishment in 2014, MEF became a trailblazer by fully embracing the flipped learning approach across its entire campus. This pedagogical model emphasises student-centred learning and the cultivation of critical thinking skills. Under this framework, students engage with course content outside of class, while in-class time is dedicated to the practical application of these principles. Instructors adopt roles as facilitators or coaches, delivering personalised support and feedback. However, MEF University's commitment to enhancing the learning experience and embracing innovation did not stop there. In 2019, the institution phased out traditional final exams in favour of project-based and product-focused assessments, fostering active learning and tangible application of acquired knowledge. Additionally, digital platforms and adaptive learning technologies were seamlessly integrated into programmes, providing interactive resources and tailoring the learning journey to each student's unique needs. The integration of Massive Open Online Courses (MOOCs) further expanded self-directed learning opportunities, culminating in the development of the Flipped, Adaptive, Digital and Active Learning (FADAL) model (Şahin & Fell Kurban, 2019). This model proved its worth when the COVID-19 pandemic struck in 2020. While conventional institutions grappled with the transition to online learning, MEF University's FADAL approach facilitated a seamless shift. The institution's emphasis on technology, active learning and personalised education ensured a smooth transition to remote learning. Accolades, including being recognised as Turkey's top university for effectively navigating the pandemic through national student satisfaction surveys and receiving

the 2020 Blackboard Catalyst Award for Teaching and Learning, underscored MEF's successful adaptation to the new educational landscape. Building on this foundation, the institution introduced an AI minor programme, Data Science and AI, in 2021. This programme equips students across all departments with comprehensive skills in data management, analytics, machine learning and deep learning, preparing them for real-world applications. Through these strategic initiatives, MEF University's commitment to disruptive innovation and investment in new technologies have positioned it as a leader in preparing students to meet the evolving demands of industries and society.

The public launch of ChatGPT on 30 November 2022 sparked robust discussions at MEF University about the potential opportunities and challenges it introduces to higher education. In response, three individuals at the university volunteered to undertake an initial experiment spanning from December 2022 to January 2023. This experiment involved integrating ChatGPT into course design, classroom activities and evaluating its impact on assessments and exams. The findings from this experiment catalysed a faculty meeting in January 2023. During this meeting, the origins and potential implications of ChatGPT were presented, and the volunteers shared concrete examples of its incorporation in various educational contexts. The diverse array of perspectives expressed during the meeting underscored the necessity for an in-depth institutional case study to comprehensively explore ChatGPT's impact on education within MEF University. Specifically, the university aimed to understand how ChatGPT could potentially reshape the roles of students, instructors and higher education institutions. Recognising the gravity of the situation and the imperative for further exploration, the concept for the research project outlined in this book was conceived.

The core objectives of our research project encompass a thorough exploration of ChatGPT's potential impact on students and instructors within the realm of higher education. By immersing ourselves in the implementation of this transformative technology, our study aims to unearth potential challenges and barriers that may emerge. This endeavour offers invaluable insights into the transformative role AI chatbots like ChatGPT can play in reshaping the teaching and learning landscape. Our overarching mission is to delve into how the integration of ChatGPT might redefine the roles of students, instructors and higher education institutions. Through this inquiry, we aspire to gain a profound understanding of how AI chatbots might reshape dynamics and responsibilities within the educational sphere. By scrutinising these shifts, we seek insights into the implications for educators, learners and universities as a whole. Furthermore, our research aims to contribute to the broader discourse surrounding the integration of AI technologies in higher education. Guided by three pivotal research questions that structure our investigation, namely, 'How may ChatGPT affect the role of the student?'; 'How may ChatGPT affect the role of the instructor?'; and ''How may ChatGPT affect the role of institutions of higher education?', our study aims to offer valuable insights that will inform educational practices, guide policy formulation and shape the future integration of AI technologies in higher education institutions. Ultimately, our research endeavours aim to contribute to a

deeper understanding of the potential benefits and considerations associated with ChatGPT, ensuring its effective and responsible integration within the realm of higher education.

Purpose and Scope of the Book

This book aims to provide a comprehensive analysis of MEF University's exploratory case study, delving into the potential impacts of ChatGPT on various stakeholders. Drawing from diverse perspectives, experiences and anecdotes, our objective is to offer a profound understanding of the transformative shifts occurring within our institution. By delving into these findings, we intend to contribute meaningfully to the broader discourse on ChatGPT's implications in higher education and offer valuable insights to institutions facing similar inquiries.

In this opening chapter, we introduced ChatGPT and highlighted the significance of investigating its role in higher education. We established our research context, reasons for conducting this study, research objectives and research questions. Chapter 2 delves into the emergence of chatbots, shedding light on their limitations and ethical considerations. Additionally, we explore ChatGPT's profound impact on employment and education, as well as scrutinising evolving educational policies in response to these changes. We conclude this chapter by discussing the need for robust policies to address potential risks associated with AI. Chapter 3 constructs a theoretical framework by incorporating critical theory and phenomenology. This framework enables us to comprehensively examine ChatGPT's impact, encompassing power dynamics, social structures, subjective experiences and consciousness, thereby providing deeper insights into its relevance and broader implications. In Chapter 4, we present a literature review of ChatGPT in higher education, identifying valuable insights and specific gaps, while explaining how our study addresses these gaps and advances understanding. Chapter 5 introduces the research methodology, employing a qualitative exploratory case study approach at MEF. We utilise interviews, observations, research diaries and surveys for data collection. Thematic analysis aids in interpreting the data, leading to the identification of themes, including: Input Quality and Output Effectiveness of ChatGPT, Limitations and Challenges of ChatGPT, Human-like Interactions with ChatGPT; the Personal Aide/Tutor Role of ChatGPT; Impact of ChatGPT on User Learning and Limitations of Generalised Bots for Educational Context. Chapter 6 offers an interpretation of these themes, linking them to the research questions, data, literature review and theoretical framework. The book then transitions to discussing the practical implications derived from the findings and interpretation. In Chapter 7, we delve into the ethical implications, including critiquing AI detection tools, scrutinising current AI referencing systems, the need to rethink plagiarism in the AI age, the need to cultivate proficiency in AI ethics and the importance of enhancing university ethics committees' roles. Chapter 8 delves into product implications, emphasising the necessity of fair access to AI bots for all students, the importance of fostering industry

collaboration to understand AI developments, how we should approach decision-making regarding specialised bots and the importance of integrating prompt engineering courses into programmes. Chapter 9 explores educational implications, discussing the impact of AI on foundational learning, how we can navigate AI challenges through flipped learning, how we can design AI-resilient assessment and instruction strategies, and the importance of fostering AI literacy in students and instructors. In Chapter 10, we highlight our study's contributions to knowledge and research. Beginning with an overview of our research structure, the chapter delves into key insights and findings, revisiting essential themes. Our theoretical framework is discussed for advancing AI discourse by blending philosophy and technology in educational research. We explore practical implications for higher education institutions. Moreover, we advocate that universities bear a moral duty to actively engage in the global AI conversation. Addressing research limitations, we outline how we plan to overcome them in future studies. Recommendations for additional relevant research areas are also presented to further explore AI in higher education. The chapter concludes by underscoring our role as authors of the AI narrative, with the power to shape AI technologies in alignment with our shared values and aspirations.

In conclusion, this book provides a comprehensive exploration of the implications of ChatGPT within both our institution and higher education at large. Our in-depth case study yields profound insights into the transformative power of AI tools like ChatGPT. By sharing these insights and their broader implications, our goal is to foster meaningful discussions, critical engagement and purposeful initiatives in the field. Our endeavour offers valuable guidance to other institutions, allows us to reflect on our experiences and envisions a future where education thrives in an AI-enhanced environment. We extend a warm invitation to educators, university leaders and institutions to join us in responsibly harnessing AI's potential, thereby shaping a more promising horizon for education.

Chapter 2

Navigating the Landscape of AI Chatbots

Emergence and Growth of Chatbots

Artificial intelligence (AI) has transformed human existence by processing vast data and performing tasks resembling human capabilities (Anyoha, 2017). Early AI faced challenges, but the breakthrough Logic Theorist showcased its potential (Anyoha, 2017). Thriving in the 1990s and 2000s, AI achieved landmark goals despite funding hurdles (Anyoha, 2017). The development of conversational AI systems progressed significantly, with milestones like ELIZA, ALICE and SmarterChild (Adamopoulou & Moussiades, 2020; Shum et al., 2018). In November 2022, OpenAI unleashed Chat Generative Pre-trained Transformer (ChatGPT), a powerful natural language processing (NLP) model with 175 billion parameters, rapidly gaining one million users. GPT-3.5, developed in 2020, marked a significant advancement in language models, capable of learning from any text and performing various tasks (Rudolph et al., 2023).

In 2022, OpenAI unveiled ChatGPT-3.5, followed by GPT-4 in 2023. Notably, companies like Microsoft seamlessly integrated ChatGPT into their products (Milmo, 2023a; Waugh, 2023). The rising popularity of ChatGPT has ignited discussions about the future of search engines, particularly concerning Google (Paleja, 2023b). In response, Google introduced its own chatbot technologies, including LaMDA and Apprentice Bard (Milmo, 2023a). Sundar Pichai, CEO of Alphabet, voiced strong confidence in Google's AI capabilities (Milmo, 2023a) and revealed plans to seamlessly integrate chatbots into their product offerings. Furthermore, other companies have also entered the AI chatbot arena. In April 2023, Elon Musk, CEO of Twitter (now renamed as X), playfully proposed the idea of 'TruthGPT' in response to ChatGPT's reluctance to address controversial topics. Musk highlighted the need for an AI system free from such constraints, leading to the inception of a cryptocurrency-based project to tackle this challenge (Sabarwal, 2023). Later, in July 2023, Meta introduced its advanced AI system, 'Llama 2'. Mark Zuckerberg proudly announced its collaboration with Microsoft and the availability of this AI for research and commercial purposes (Sankaran, 2023). Thus, industry has now taken the lead in machine learning model development, surpassing academia. This is the current situation. However, what lies ahead?

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doi:10.1108/978-1-83797-647-820241002

OpenAI states that its long-term goal is to create 'artificial general intelligence' (AGI) (Brockman & Sutskever, 2015). AGI refers to AI systems that possess the ability to understand, learn and apply knowledge in a way that's comparable to human intelligence. AGI would be capable of performing a wide range of tasks and adapting to new situations without being explicitly programmed for each specific task, making it a higher level of AI than the specialised, narrow AI systems currently available. Tech entrepreneur, Siqi Chen, claims that GPT-5 will achieve AGI by the end of 2023, generating excitement in the AI community (Tamim, 2023). Chen's claim, while not widely held at OpenAI, suggests that generative AI is making significant strides (Tamim, 2023). Sam Altman, the CEO of OpenAI, goes one step further, hinting at the potential for AI systems to far surpass even AGI (Sharma, 2023). He believes that AI's current trajectory indicates remarkable potential for unprecedented levels of capability and impact in the near future (Sharma, 2023). In summary, AI's transformative impact on human existence, coupled with the rapid advancement of chatbots like ChatGPT, highlights the potential for significant changes in various industries and the field of AI as a whole. However, this does come with caveats.

Challenges and Ethical Considerations in AI

As AI chatbots like ChatGPT continue to evolve and become more prevalent in our daily lives, we are starting to understand more about their limitations. One of the biggest questions surrounding ChatGPT is how it works, and even the creators themselves do not fully understand it. They attempted to use AI to explain the model, but encountered challenges due to the 'black box' phenomenon present in large language models like GPT (Griffin, 2023). This lack of transparency raises concerns about biases and the dissemination of inaccurate information to users. Researchers are exploring 'interpretability research' to understand the inner workings of AI models (Griffin, 2023). One approach involves studying individual 'neurons' within the system, but the complexity of billions of parameters makes manual inspection impractical. To address this, OpenAI researchers employed GPT-4 to automate the examination of system behaviour (Griffin, 2023). Despite limitations in providing human-like explanations, the researchers remain optimistic about AI technology's potential for self-explanation with continued research (Griffin, 2023). However, further work is needed to overcome the challenges in this field, including describing the system's functioning using everyday language and considering the overall impact of individual neuron functionality (Griffin, 2023).

At the core of ChatGPT lies language processing, encompassing various aspects like grammar, vocabulary and cultural context. While it can perform numerous language-related tasks, its understanding is limited to learnt patterns from training data. Unlike humans, ChatGPT lacks actual consciousness or self-awareness, relying on heuristics, which are rules of thumb used to make efficient decisions in complex situations (Kahneman, 2011). In language processing, heuristics help parse sentences, recognise patterns and infer meanings