



AFTER GENERATIVE AI

Preparing Faculty to Transform Education,
Learning, and Pedagogy

Mariann Hardey & Samar S. Aad



GREAT DEBATES IN HIGHER EDUCATION

AFTER GENERATIVE AI

Great Debates in Higher Education is a series of short, accessible books addressing key challenges to and issues in higher education, on a national and international level. These books are research-informed but debate-driven. They are intended to be relevant to a broad spectrum of researchers, students, and administrators in higher education and are designed to help us unpick and assess the state of higher education systems, policies and social and economic impacts.

RECENTLY PUBLISHED IN THIS SERIES

Teaching Excellence in Higher Education: Challenges, Changes and the Teaching Excellence Framework

Amanda French and Matt O’Leary

British Universities in the Brexit Moment: Political, Economic and Cultural Implications

Mike Finn

Higher Education Funding and Access in International Perspective

Sheila Riddell, Sarah Minty, Elisabet Weedon and Susan Whittaker

Sexual Violence on Campus: Power-Conscious Approaches to Awareness, Prevention, and Response

Chris Linder

Evaluating Scholarship and Research Impact: History, Practices, and Policy Development

Jeffrey W. Alstete, Nicholas J. Beutell and John P. Meyer

Access to Success and Social Mobility through Higher Education: A Curate's Egg?

Stuart Billingham

The Marketisation of English Higher Education: A Policy Analysis of a Risk-Based System

Colin McCaig

Refugees in Higher Education: Debate, Discourse and Practice

Jacqueline Stevenson and Sally Baker

Radicalisation and Counter-Radicalisation in Higher Education

Catherine McGlynn and Shaun McDaid

Perspectives on Access to Higher Education: Practice and Research

Samantha Broadhead, Rosemarie Davies and Anthony Hudson

Cultural Journeys in Higher Education: Student Voices and Narratives

Jan Bamford and Lucie Pollard

Degendering Leadership in Higher Education

Barret Katuna

A Brief History of Credit in UK Higher Education: Laying Siege to the Ivory Tower

Wayne Turnbull

The Fully Functioning University

Tom Bourner, Asher Rospigliosi and Linda Heath

Leadership of Historically Black Colleges and Universities: A What "Not" to Do Guide for HBCU Leaders

Johnny D. Jones

Challenging the Teaching Excellence Framework: Diversity Deficits in Higher Education Evaluations

Kate Carruthers Thomas and Amanda French

Combating Marginalisation by Co-creating Education: Methods, Theories and Practices from the Perspectives of Young People

David Thore Gravesen, Kaz Stuart, Mette Bunting, Sidse Hølvig Mikkelsen and Peter Hornbæk Frostholt

Higher Education at the Crossroads of Disruption: The University of the 21st Century

Andreas Kaplan

Reimagining Historically Black Colleges and Universities: Survival Beyond 2021

Gary B. Crosby, Khalid A. White, Marcus A. Chanay and Adriel A. Hilton

Degrees of Success: The Transitions from Vocational to Higher Education

Geoff Hayward, Eugenia Katartzi, Hubert Ertl and Michael Hoelscher

Transformational University Leadership: A Case Study for 21st Century Leaders and Aspirational Research Universities

Hilary L. Coulson, Yali Zou and Frank Fernandez

Theory of Change: Debates and Applications to Access and Participation in Higher Education

Samuel Dent, Anna Mountford-Zimdars and Ciaran Burke

Selling Our Youth: Graduate Stories of Class, Gender and Work in Challenging Times

Harriet Bradley, Richard Waller and Laura Bentley

From Access to Engagement and Beyond

Stuart Billingham

The Affective Researcher

Andrew G. Gibson

Arts and Academia: The Role of the Arts in Civic Universities

Carola Boehm

Recognizing Promise: The Role of Community Colleges in a Post-Pandemic World

Michael A. Baston, Beatrice L. Bridglall and Michael Nettles

Building a Better Normal: Visions of Schools of Education in a Post-Pandemic World

*Priya Goel, Jonathan Simmons, Smridhi Marwah,
Lars Andersson, Sinikka Neuhaus and Marian Mahat*

Refugees in Higher Education: Debate, Discourse and Practice
(2nd edition)

Jacqueline Stevenson and Sally Baker

Leadership Talks: Candid Conversations with Academic Leaders

Frank Fernandez, Hilary L. Coulson and Yali Zou

Living and Studying at Home: Degrees of Inequality

*Sheila Riddell, Lyn Tett, Hazel Christie, Rachael King and
Sofia Shan*

Sexual Violence on Campus: Power-Conscious Approaches to Awareness, Prevention, and Response, Second Edition

Chris Linder

This page intentionally left blank

AFTER GENERATIVE AI

Preparing Faculty to
Transform Education,
Learning, and Pedagogy

BY

SAMAR S. AAD

Lebanese American University, Lebanon

And

MARIANN HARDEY

Durham University, UK



United Kingdom – North America – Japan – India
Malaysia – China

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

First edition 2025

Copyright © 2025 Samar S. Aad and Mariann Hardey.
Published under exclusive licence by Emerald Publishing Limited.

Reprints and permissions service

Contact: www.copyright.com

No part of this book may be reproduced, stored in a retrieval system, transmitted in any form or by any means electronic, mechanical, photocopying, recording or otherwise without either the prior written permission of the publisher or a licence permitting restricted copying issued in the UK by The Copyright Licensing Agency and in the USA by The Copyright Clearance Center. Any opinions expressed in the chapters are those of the authors. Whilst Emerald makes every effort to ensure the quality and accuracy of its content, Emerald makes no representation implied or otherwise, as to the chapters' suitability and application and disclaims any warranties, express or implied, to their use.

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library

ISBN: 978-1-83549-949-8 (Print)

ISBN: 978-1-83549-946-7 (Online)

ISBN: 978-1-83549-948-1 (Epub)



INVESTOR IN PEOPLE

CONTENTS

<i>About the Authors</i>	<i>xiii</i>
<i>Preface</i>	<i>xv</i>
<i>Acknowledgments</i>	<i>xix</i>
Introduction	1
1. Historical Perspectives: Evolution of GAI	5
2. How GAI Works: Fundamentals	31
3. GAI as a Persona in Education: Enhancing Interaction and Engagement	55
4. Human-GAI Collaboration in Education: Fostering Deeper Learning and Innovation	83
5. GAI as a Learning Catalyst: Igniting Curiosity and Creativity in the Classroom	105
6. Ethical Considerations for GAI in Education: Ensuring a Human-Centered Approach	119
7. GAI for Personalized Learning: Tailoring Education to Individual Needs	143
8. Universal Access to Education: Bridging the Digital Divide with GAI	157
9. Beyond GAI: Future Trends	179
10. Implementation Strategies: Where Do We Go From Here?	195

Conclusion: A New Chapter in Education	211
<i>References</i>	<i>217</i>
<i>Index</i>	<i>241</i>

Sharing a common vision and a deep respect for each other's expertise, this book is the fruit of true collaboration, our voices interwoven on every page as equal co-authors.

This page intentionally left blank

ABOUT THE AUTHORS



Dr Samar S. Aad is an Assistant Professor at the Lebanese American University (LAU), where she contributes to the Adnan Kassar School of Business, Management Department. With a Doctorate in Business Administration from Durham University, Dr Aad's research interests span AI in management, online learning, sustainability, and the influence of student media influencers. Her teaching expertise encompasses a wide range of courses, including Introduction to Management, Project Management, Strategic Management, and Information Technology Management. Beyond her academic role, Dr Aad facilitates executive education workshops on project management and AI, demonstrating her commitment

to practical application. Dr Aad's dedication to social responsibility is evident in her passion for community service and her encouragement of students to create projects that positively impact their society. Her international collaborations and successful grant applications further underscore her commitment to research excellence.



Dr Mariann Hardey is a leading authority on business and computing, passionate about promoting equity and accessibility in technology. As a Professor at Durham University, her research and commentary have shaped the conversation around gender, technology, and social change. Her acclaimed books, *The Culture of Women in Technology* and *Household Self-Tracking*, have made her a prominent voice in the field.

PREFACE

This isn't a book about AI.

Our focus lies on the implications of Generative AI (GAI) within education. We aim to understand the generative capabilities of AI and how these are reshaping the dynamics of teaching and learning. Rather than cataloging its features or giving a blow-by-blow account of the pros and cons, we underscore its inevitable influence.

GAI is already amplifying existing educational structures and learning processes at a global level. A recent report has described AI more broadly as “the next industrial revolution,” made unpredictable because of the inconsistent uptake (Franklin and Taylor 2024). Our aim is to prepare you for this revolution, not to scare you off with its potential challenges.

We have structured *After* Generative AI as a resource that can answer your questions about new learning cultures and different international viewpoints. Some of these points are based on our personal experiences of seeing our students and colleagues use GAI. Sometimes, these experiences come with shame and fear, but more often with an open and creative outlook.

We hope *After* Generative AI will interest students, educators, and anyone curious about how GAI operates and how it will find a place in education. It's a book about change, culture, and new learning forms, and it's designed to be a

useful guide for those with questions about education policies, governance, and power – including points of resistance.

Among the broad topics and to give an opening feel for the book’s tone, we provide the reader with the critical and conceptual lens through which to engage with GAI’s framing, implementation, and forms of play in education. Of course, *After* Generative AI needs to be comprehensive in its descriptions of the types of AI tools and technology architectures that act upon us, but it is hoped that the ideas here can be applied widely in response to the different forms of learning in our lives. We would like to use this very brief preface to clear our throats and offer some reflections on the ideas we’ve cultivated and the approach we have taken in this book.

During the academic year 2021–2022, we observed a change to the tone of student anxieties. Initially, we concluded this was the trauma of the global pandemic that had amplified so many learning inequalities. Our colleagues were also reaching out for new levels of support, combined with the highest workloads we had ever experienced. Feeling “burnt out” was a blunt and common phrase to describe surviving the job. During this period, there was a need to create space to deal with the consequences of the pandemic and properly support different learning needs in a cutthroat education environment. The release of ChatGPT on November 30, 2022, by OpenAI compelled new conversations. We were jumping off from a point of deficit (funding, our energy, and resources) and into the promise of something new that would lift us up again.

Or so we thought.

In writing *After* Generative AI, we collectively wanted to carve out some new vantage points that would allow us to see what types of questions might be shaped through GAI, how these tools become part of the education world, and how we

might respond critically to how AI structures shape and cajole education into new frameworks (or maintain traditional framings). We needed thinking space to consider how we can be more definitive and assertive in our response to the education changes promised by AI. As we argue later, the challenge at hand is not only related to the implementation of the technology (i.e., where and with whom does it land?) but also to the emotions it evokes and the lessons it can teach us.

Our teaching experience highlighted the need for a more hands-on approach to understanding the generative aspects of AI. We sought to move beyond theoretical discussions and (like our students were already doing) actively experiment and play with the technology. This book reflects our journey to unravel GAI's impact on education. By examining how GAI cuts across educators and learners, we aim to uncover patterns and insights that inform future developments.

We invite readers to join us in this exploration and to help us to join the dots in shaping the future of GAI in education.

This page intentionally left blank

ACKNOWLEDGMENTS

Our joint thanks goes to a number of colleagues who bravely shared their hopes, disquiet, and excitement about AI and many conversations about the generative aspects of AI and education.

Samar: My deepest thanks go to Maz, who was once my supervisors and has now become my coach, mentor, and cherished friend, despite the miles between us. What began almost five years ago as a journey to complete my thesis has evolved into something far more enduring. Our work was supposed to end the day I defended my thesis, but instead, that successful conclusion marked the beginning of many enriching collaborations. We've researched together, published together, and now, thanks to her belief in me, we've written a book together – something I never even dreamed of. Maz, with her wealth of experience and numerous published books, invited me into her world, shared her passion for writing and research, and continuously encouraged me to grow. I am truly honored to have my name alongside hers on this book. Her wisdom, warmth, and unwavering support have made the experience of writing my first book incredibly rewarding, and I am deeply grateful to have had the opportunity to collaborate with someone I admire so much.

I also hope that this book will be a guiding resource for my daughters, Bella and Zoe, as they grow up in a world where

AI will not just surround them but become a part of their everyday lives. I hope they will be proud of this work and they will be inspired to equip themselves with the skills and knowledge they need and be reminded of the endless possibilities that lie ahead in a future where AI and human creativity intertwine.

Mariann: This book is dedicated to my daughter, Darcey, who already does amazing things using AI drawing tools and is teaching these models as much as she can about alicorns¹.

And to her late grandfather, Mike Hardey, who would have loved watching her imagination grow. My sincere thanks to Miss Leung who made learning fun for me and opened so many doors. I hope she reads this.

¹ An alicorn is a mythical creature that combines the characteristics of a unicorn and a Pegasus. This means it has a single horn on its forehead like a unicorn, and wings like a Pegasus, allowing it to fly.

INTRODUCTION

EDUCATION, TECHNOLOGY, ARTIFICIAL
INTELLIGENCE, PEDAGOGY, LEARNING

We view generative artificial intelligence (GAI) as a tool, not a replacement to education, nor are its components entirely educational – a note of caution here dear reader. We find ourselves in step with other educators and learners who are curious about how GAI tools can align different forms of learning with us and not against us.

We are writing about a specific aspect of artificial intelligence (AI), “GAI,” to emphasize the generative features and active engagement required by the user. To clearly define this term, GAI refers to the generative features where the user can create new content, such as text, images, and code. In education, this means that GAI can be used to create personalized learning materials, provide learner feedback, report the educator’s learning outcomes, and create interactive learning experiences tailored to particular learning needs. These are the generative aspects that we will focus on throughout this book.

In each chapter, we explore the intersection of cutting-edge technology with pedagogy, aiming to equip students and faculty with strategies to navigate different aspects of GAI – especially where this is viewed as a disrupting force. GAI has entered education through backdoors and without formal review. *After GAI* serves as a timely exploration of these developments. We touch on the technical fundamentals of AI,

machine learning, and deep learning, providing readers with a foundational understanding of the technologies shaping the future of education.

To be clear, this is nontechnical book in so far as we set out the theoretical discussions and examining the practical applications of GAI in both learning and teaching contexts. We focus on adaptive learning systems, intelligent tutoring, automated grading, virtual classrooms, and other AI-driven tools that promise to enhance the educational experience for students – and save time for educators. Additionally, we look into how GAI can support teachers in content creation, professional development, and classroom management, offering a comprehensive view of the impact on the systems and processes across education.

One key focus of *After GAI* is to address the ethical minefield. As GAI become more prevalent, concerns about algorithm bias, data privacy, accessibility, and inclusivity become paramount.¹ Our goal is to provide insights into how other educators and learners have navigated ethical challenges. Then we take a step back and set out how the adoption of GAI can be done responsibly.

Like other educators, we recognize the need for practical guidance to use GAI. Each chapter offers implementation strategies for students and faculty, acknowledging that successful integration of GAI requires a thoughtful and informed approach. We present real-world case studies and tangible examples of how GAI is effectively used in current educational settings.

After GAI is intended for a diverse audience mainly those who are shaping the future of education and AI – many of whom will be the students themselves. It is addressed to those

¹ Author 2 is dyslexic and enjoys exploring the neurotypical dimensions, biases, and limitations of GAI.

who seek to understand and responsibly implement GAI technologies in learning environments, including:

Educators and Students: Students and educators would be interested in the book seeking to understand and integrate GAI into their teaching and learning practices. *After GAI* provides a comprehensive overview of GAI, its applications in education, and strategies for implementation. It also discusses the ethical considerations surrounding GAI, such as bias, privacy, and inclusivity, and guides how to navigate these challenges responsibly. It also prepares students to understand the need to enhance their AI skills to be ready for the work environment. Additionally, it prepares educators to understand the importance of enhancing their AI skills, to help their students navigating AI-driven environment.

Computer Scientists: Computer scientists would be interested in the book's discussion of the technical aspects of GAI, such as its algorithms, data sets, and applications in education. The book also provides insights into the future of GAI and its potential impact on the educational landscape.

Psychologists: Psychologists would be interested in the book's discussion of the psychological aspects of GAI in education, such as how learners and educators interact with and perceive AI-powered tools. The book also explores the potential impact of GAI on motivation, engagement, and learning outcomes.

Social Scientists: Social scientists would be interested in the book's exploration of the broader social implications of GAI in education, such as how these technologies may impact society, culture, and equity in education. The book considers the potential impact of GAI on access, affordability, and the distribution of educational opportunities.

Policymakers: Policymakers would be interested in the book's discussion of the policy implications of GAI in education. The book provides insights into the challenges and

opportunities GAI presents and offers recommendations for developing responsible and effective policies.

Industry Experts: Industry experts would be interested in the book's discussion of the potential applications of GAI in education. The book provides insights into how AI-powered tools can improve teaching, learning, and assessment.

HOW TO USE *AFTER GAI*: A READER-FRIENDLY APPROACH

Whatever your background of motivation for picking up *After GAI*, we have designed the journey through the content to be as accessible as possible. It is unlikely that you will pick up and read from cover to cover in a learn fashion such a book. With this in mind, each chapter begins with a real-world example of GAI in action, or a central statement designed to spark curiosity and thought.

Each chapter has a clear tri-part structure:

1. *Introduction* outlining the theoretical lens and frameworks discussed where relevant.
2. *Relevant Case Studies:* Real-world examples illustrate the practical applications and implications of AI in education.
3. *Actionable Insights:* Each chapter concludes with a summary of key arguments, our *Reflections*, and *Recommended Readings* to guide your further exploration.

We believe that this approach will allow you to navigate *After GAI* at your own pace, focusing on the areas most relevant to your interests and needs. By providing a blend of theoretical knowledge and practical insights, we aim to equip you with the confidence to understand and effectively utilize GAI as part of your educational experience.

1

HISTORICAL PERSPECTIVES: EVOLUTION OF GAI

CHAPTER SUMMARY

- Traces the historical development of generative artificial intelligence (GAI) from its early conceptualizations to its current state-of-the-art capabilities.
- Explores the key milestones and advancements that have shaped the evolution of GAI, including the development of machine learning, neural networks, and deep learning.
- Introduces the educational impact of GAI, highlighting its transformative influence on various industries and domains.
- Outlines milestones in GAI evolution

INTRODUCTION

*Cutting-edge AI-powered tutoring system,
“SageMind” shakes up the world of math education.
(Kestin* et al., 2024)*

Students using SageMind reported feeling empowered by the program's ability to tailor explanations to their individual understanding. This raises intriguing questions about the future of education: Can AI truly become a superior teacher, or is there something irreplaceable about human interaction?

In this chapter, we explore the historical development of GAI and its implications for education. Drawing parallels with Mary Shelley's *Frankenstein*, we explore the idea of GAI as a co-created entity that shapes and is shaped by human society. The chapter establishes a foundational framework for understanding the evolution of GAI and sets the stage for the subsequent chapters. We argue that GAI is not merely a tool but a catalyst for transforming learning experiences – like those experienced by learners using SageMind. Rather replacing teachers and traditional education processes, GAI can enhance and augment them, creating new opportunities for learners and educators alike.

Theoretical Lens

- *Sociotechnical Systems Theory*: This framework emphasizes the interplay between technology and social context, highlighting the mutual influence between artificial intelligence (AI) and human behavior.
- *Actor-Network Theory (ANT)*: ANT provides a lens to examine the complex relationships between humans, AI, and other elements within the educational ecosystem.

- *Critical Theory*: This perspective encourages a critical examination of power dynamics and potential biases embedded within AI systems.

Key Themes

- *The Frankenstein Complex*: Here, the ethical implications of AI development, including concerns about control, autonomy, and the potential for unintended consequences.
- *The Social Construction of Technology*: This theme emphasizes the role of human agency in shaping AI technologies and their subsequent impact on society.
- *AI as a Cultural Artifact*: We introduce AI as a product of human creativity and imagination and ways it reflects societal values and aspirations.

The concepts we've explored – ranging from sociotechnical dynamics to cultural interpretations – lay the groundwork for a deeper inquiry into GAI's role in learning environments. With this foundation in mind, it seems fitting to lead by example and turn to a practical exploration by prompting ChatGPT to generate a response to our question.

Prompt: Generate a response to the question, “What is GAI?” Later refined to: “Generate a response suitable for education and learning context in response to the question, ‘What is GAI?’”

The reply:

Generative AI is artificial intelligence that generates new things. Unlike traditional AI, which focuses on

*analysing and comprehending existing data,
generative AI is designed to create new content.*

– Generated by Google Gemini, then known as ‘Bard’
(2024.10.01)

Predictably, GAI will be used to generate a working definition of itself – and so it appears in this book. Not to showcase the laziness in generation of ideas by the authors but to illustrate how educators and students can (and already do in our experience) use such tools to enhance learning and understanding. Note that the source for the GAI is referenced to inform the reader of where and, crucially, how the text was generated – as in the actual text used as the input prompt.

We can create images too to help us visualize what GAI looks like.

Prompt: Generate an image illustrating the concept of “AI in Education.”

Result: The Canva image generator created the image in [Fig. 1](#).

The image depicts a classroom setting with students using computers and surrounded by screens displaying various digital content. It’s a clear representation of the integration of technology into education.

What might this image tell us about the context of AI and education?

- *The Prevalence of Technology:* The abundance of screens and computers suggests that technology is a central component of this classroom environment. This aligns with the increasing use of AI tools in education.
- *Collaborative Learning:* We could interpret the students are working together, possibly on group projects or discussing topics presented on the screens. This indicates a shift toward collaborative learning models, which AI can