

CHAPTER 9

Constructing an Artificial-Intelligence Higher Education Environment

Guidelines for the Future¹

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Abstract

The ongoing advancement of artificial intelligence (AI) presents both significant opportunities and challenges for higher education (HE) and for HE institutions. In this chapter, we adopt a constructivist perspective to explore the implications of integrating AI in research, teaching, and learning, with a focus on fostering inclusion and accessibility within the HE environment. We begin

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by examining the constructivist world view as a theoretical foundation for understanding the role of AI in facilitating knowledge construction and active participatory learning experiences. Next, we address concerns related to the ethical, social, and pedagogical aspects of AI implementation in HE, such as privacy, equity, and the potential for bias in AI algorithms. We then discuss the transformative potential of AI in HE, and its capacity to personalise learning experiences, enhance teaching effectiveness, and improve research methods. To guide the responsible integration of AI in HE, we propose specific actions for research, as well as for teaching and learning. By embracing AI integration with caution, HE institutions can maximise the potential of AI to foster an inclusive, engaging, and transformative learning environment as we move into a constantly changing future.

Preamble

As lecturers and young academics in a Faculty of Education at a high-ranked university in South Africa, we play an important role in helping to shape the education and future of our students, and by implication, future teachers. Our roles can be divided into three main areas: teaching, research, and community service within the South African context. Our primary responsibility as lecturers is to teach future teachers. We design and deliver lectures, modules, and practical sessions, and assess student work. We have, through our teaching, an opportunity to inspire and motivate students, and we seek to provide them with the knowledge and skills they need to succeed in the field of education. As academics, we are also expected to engage in research and scholarship. This involves conducting original research, publishing research articles and book chapters, and presenting at conferences. Our research can help to advance knowledge in our field, and it also influences our evolving teaching practices and pedagogies.

We also engage in service-learning projects at our institution and in the community. We participate in outreach activities, as well as in service-learning projects that promote the quality of

education in the communities. We aim to empower teachers to improve their own teaching, and by implication, positively influence the learning experience of learners in our community. We also have some influence on the curriculum and pedagogy within our Department of Language for Education, where our focus is on language education and integrating technology not only at the tertiary level but also in schools.

In today's technologically advanced world, the significance of artificial intelligence (AI) in higher education (HE) cannot be overstated. AI has the potential to revolutionise HE by providing personalised, adaptive learning experiences tailored to individual learners' needs, while supporting academic staff with grading and administrative duties, thus allowing them to have more time to focus on lesson plans, student support, and research projects (Alam, 2021; Reis et al., 2019).

AI through our looking glass: A constructivist viewpoint

ChatGPT, an AI-powered language model, was launched in November 2022 (OpenAI, 2022). By then we were familiar with AI and its capabilities, and we had started to delve into both its implications for HE and how as academics we might use it within our context. Our curiosity and interest have steered us on a road of discovery, experimentation, and questioning. On this road (in mid 2023), we are viewing AI from a constructivist viewpoint, as it emphasises the active and dynamic nature of learning, and the importance of learners in constructing their own knowledge (Mcleod, 2022; Phillips, 1995).

Tegmark (2018) states that, given the interdisciplinary nature of the field of AI, there is little agreement among AI researchers on a common definition and understanding of AI—and about intelligence in general. Jianzheng and Xuwei (2023) also emphasise that even though AI technology is already being introduced in the field of HE, many academics are unaware of its scope and, above all, what it consists of, or its potential.

For our analysis of AI in HE, we first clarify what we mean by constructivism as a paradigm concerned with learning that acknowledges the active role of learners themselves in the learning process, not just as passive recipients. We are then placed to consider how, by recognising the learner's agency, the constructivist approach influences views on the use of AI in HE. LeBow et al. (2003) explain through the lens of this paradigm how learners themselves are involved in constructing knowledge and understanding, through their interactions and experiences, and interpretations of them. Huitt (2009) similarly explains in terms of constructivism that each person brings to the learning process their own unique perspectives, beliefs, and assumptions, which can influence how they interpret and construct new knowledge.

Constructivism therefore sees learning as an individualised process that is shaped by each learner's prior knowledge, experiences, and understandings (Hein, 2016). For co-authoring this chapter, we used a collaborative action research approach to bring together our own individual understandings and discoveries to form a shared understanding. We engaged in learning and knowledge creation for this chapter not as three individual authors working independently, but through ongoing interaction and collaboration among ourselves and others. We appreciate that through collaboration, individuals can engage in purposeful dialogue, reflect critically on actions and understandings, share perspectives, co-create mutual understanding, and construct new knowledge together (McNamee et al., 2020). In essence, because constructivism underscores the active and dynamic nature of learning, we believe it is a very useful framework for conceptualising and applying AI in HE. Here students as well as academics can use AI as a tool to help in actively creating their own knowledge and in making this knowledge available to others. Our own collaborative inquiry into AI encourages the critical thinking and scepticism essential for forming reliable ideas. Our own perceptions are then validated by developments and scholarly articles of other academics that are currently exploring AI in HE.

We acknowledge that in these early days of the public life of AI, we three authors, perhaps like most people inside and outside HE, are on a perplexing and intriguing journey to construct our own understanding of it. We have drawn from existing literature and tested new AI innovations in our classes. We have exchanged ideas with each other and with interested students and colleagues, and together developed a common understanding of the benefits, potential pitfalls, and applicability of AI in HE in these early days of its public usage. We understand that as AI makes headway in the sphere of HE, our journey as both academics and learners will be one of exploring possibilities, talking, and collaborating with others—and discovering. Our knowledge and action will change with the times—with our students' needs and with our own evolving understandings within a participatory action learning and action research (PALAR) approach—as AI takes on a life of its own, metaphorically and perhaps literally.

A changing world—AI and HE

AI refers to the ability of computers and machines to perform tasks that require human intelligence, such as learning, problem-solving, decision-making, and language understanding. AI systems are designed to function autonomously, adapting to new situations and improving their performance over time. Machine learning is a subset of AI that enables computers to learn from data without being explicitly programmed (Aggarwal et al., 2022; Cioffi et al., 2020; Huang & Rust, 2018). Looking at this definition it is understandable that there is distrust in AI, and that some HE institutions have even banned the use of ChatGPT (Mearian, 2023). We see this response as throwing out the baby with the bathwater—while trying to remove something unwanted, also unintentionally removing something that's potentially valuable. We feel it is wiser to explore AI to find out how it can improve learning and teaching in HE, what are the ethical considerations, and what discussions we should have with students and faculty

alike so that we can maximise the benefits it offers and minimise the risks.

Ideas on harnessing the benefits of AI and reducing its risks

We share the view that HE is not transforming at the pace required for teaching and learning to stay relevant (García-Morales et al., 2021). Without clear understanding of AI, teaching staff remain sceptical. Yet scepticism has a valuable place here, as Popenici and Kerr (2017) warn of its absence:

Maintaining academic skepticism on this issue is especially important in education, as this is an act that can be reduced to information delivery and recollection; we need to maintain its aim to build educated minds and responsible citizens that are attached to general values of humanism. (p. 3)

Ultimately, the use and incorporation of AI in teaching, learning, and research hold vast possibilities that will be lost if academics choose to avoid AI (Baidoo-Anu & Ansah, 2023). That is why academics can recognise AI as a tool that, when used effectively, has ability to expand human capabilities and the teaching, learning, and research experience. So that AI is used most effectively in HE, it is crucial to critically examine and evaluate the possible implementation of AI specifically from an academic perspective. Popenici and Kerr (2017) see that the role of technology in higher learning is to enhance human thinking and to strengthen the educational process, not to reduce this learning to a set of procedures for content delivery, control, and assessment. Shifting the focus from teaching new knowledge to teaching adaptive expertise will equip students with the skills they need for life in the 21st century. This will likely require HE institutions to incorporate AI literacy and critical thinking guidelines and courses on AI in the HE curricula.

The increasing prevalence of AI creates the need for meaningful discussion about how AI will shape the future of teaching and

learning in HE, and what decisions universities will ultimately make about integrating it most effectively. The rapid pace of technological advancement, along with the acknowledged potential for job displacement in this field (Zawacki-Richter et al., 2019), point to a pressing need to reconsider the role of teachers and the pedagogical approaches used in HE. We believe a primary objective is to create an environment where the capacity of students to learn efficiently and effectively is further developed by utilising the ability of AI, sophisticated data analytics, and machine learning. Here the perspective of teaching staff is important. They are key players in revolutionising academia, as they hold a key to unlocking students' potential to use AI effectively and maximise students' learning experience. AI-driven education empowers teaching staff to provide individualised instruction and personalised feedback that are unmatched by traditional HE teaching methods.

Ethical, social, and pedagogical aspects of AI in HE

Increasing use of AI by ever more students and teaching staff has inspired investigation of ethical, social, and pedagogical aspects. AI systems can amplify existing biases in education such as gender, race, and socio-economic status (Baker, 2021), so fairness, transparency, and accountability need to be upheld as key concerns in the development of AI algorithms (Baker, 2021). Teaching staff need to keep in mind the potential impact of AI on pedagogy and on their own role in the classroom and recognise the need to harness advancements in automation and personalisation to ensure they and their students use AI most effectively for the learning process. For example, AI algorithms might be trained on biased datasets, leading to discriminatory outcomes. Similarly, existing racial and socio-economic disparities might be reinforced if AI-based decisions favour certain groups over others. The problem of algorithmic bias is particularly evident in recruitment and admissions processes, where AI might rely on standardised measures

and ignore individual circumstances of potential students such as socio-economic background or non-traditional routes to HE. Thus, institutions need to ensure that AI systems are designed to address and mitigate underlying biases, and that ethical standards are integrated throughout the decision-making process to enhance transparency and fairness. Ultimately, the goal should be to use AI to create more equitable and inclusive learning environments that promote academic success and social mobility for all students, regardless of their background or identity.

The increasing role of AI in our daily lives has prompted the need for ethics education for both AI developers and users. AI can greatly impact society and individuals, so it is important to be aware of the ethical implications of AI systems. AI developers need to consider ethical principles when designing and deploying AI, since they have a responsibility to ensure AI systems function responsibly and do not cause harm. Meanwhile, AI users must be responsible and diligent in using AI to avoid unintended consequences and understand the ethical implications of their choices. Ethics education for AI developers and users can help build a culture of responsible AI use, which can ensure equitable and safe deployment. Moreover, universities can integrate ethics education into AI curricula, ensuring that graduates are equipped with the knowledge necessary to use AI responsibly and ethically (Williamson et al., 2020; Zawacki-Richter et al., 2019).

The drive for ethical use of AI has subsequently initiated competition to develop AI detectors that can identify where students may have used AI to aid their writing. Some experts believe that it may be difficult to detect AI usage (De Carvalho, 2023; Fowler, 2023; Mujezinovic, 2023), but Liang et al. (2023) suggest that these detectors may be biased against non-native English speakers. It is clearly important for educators to discuss the use and ethics of AI in academic work, and to carefully consider the reliability of AI detectors and associated consequences and rather focus on training users to use AI in an ethical way.

Improving research

AI can be used to improve research methods, including the accuracy and efficiency of data analysis and modelling. This enables researchers to better understand complex phenomena and provides insights into previously unexplored areas. Machine learning algorithms can quickly identify patterns and correlations within large datasets, helping researchers to draw meaningful conclusions and make more informed decisions. Additionally, AI-powered data visualisation tools can help to present research findings in clear and engaging ways, making it easier for non-experts to understand complex information. By automating many of the labour-intensive tasks associated with research, AI can free up time and resources for researchers to focus on higher-level tasks and more creative endeavours.

ATLAS.ti is a computer-assisted data analysis software that facilitates analysis of qualitative data for quantitative, qualitative, and mixed-methods research. It has included AI coding that enables researchers who conduct qualitative research to use AI to conduct thematical groups from narrative data. This can help researchers to identify new areas of study, refine their research questions, and develop more effective research designs. Yet it is important to keep in mind that AI can only react to text and cannot necessarily evaluate and comment on human behaviour and emotions. Ultimately, AI's capacity to help with research methods has the potential to enhance the quality and impact of research across a range of disciplines and therefore to contribute to advancements in knowledge and innovation, but it is imperative the user evaluate the results, as through our experiments we have seen that the results cannot necessarily be trusted.

Benefits of AI in promoting inclusivity and accessibility

One benefit of AI is its capacity to be instrumental in promoting inclusivity and accessibility in HE. For example, AI tools can

help overcome language barriers by providing real-time translations during lectures and discussions. AI can help students with disabilities by providing them with equal access to educational resources and materials through the use of technologies such as text-to-speech and image recognition software. AI can also provide personalised learning experiences for each student, tailoring the content and delivery of coursework to their individual needs and preferences. Personalising the learning experience is highly valuable in HE, as it provides students with the support they need to excel academically and develop as individuals who can contribute positively to their communities. In this context AI has the potential to revolutionise the way education is delivered by providing personalised recommendations and feedback to students based on their learning style, preferences, and progress. With the help of AI, educators can create personalised curriculum, customised assessments, and adaptive learning paths that cater to students' individual needs (Ouyang et al., 2022). For example, AI algorithms can analyse individual engagement patterns and provide tailored recommendations to improve student success.

AI-powered tutoring tools can also adapt to individual student needs and provide individualised feedback, increasing the chance that every student receives the attention and support they need to maximise learning as they choose. This enables students to learn at their own pace, and in so doing to strengthen their motivation, retention, and engagement in the learning experience. These possibilities of AI-powered tutoring tools also apply in the multilingual environment. For example, AI can be used for language editing, as we have done for this chapter, and such editing can also help with improving learners'—or any author's—language skills. By personalising learning experiences for each student, AI-enabled systems have the potential to create a more inclusive and accessible learning environment that can accommodate a much wider range of students with different learning needs and aptitudes. By utilising the capacity of AI in this way, academics can help to make HE more inclusive, accessible, and effective for all students (Vincent-Lancrin & Van der Vlies, 2020).

One of the most promising applications of AI in HE is its ability to provide access to educational materials for learners with disabilities. For instance, AI can convert written materials into audio (*VEED*), thereby providing access for visually impaired learners. AI can also help deaf learners by providing real-time captioning of lectures and videos (*Captions*). Furthermore, AI can be used to create personalised learning plans that cater to learners with distinctive needs, challenges, and backgrounds. This can be done by using a chatbot like *ChatGPT*, *Bart*, or *Copilot*, once it is activated within *Microsoft 365*.

Students can ask questions, or, with the correct prompts, have these chatbots plan a personalised learning plan. By making education more inclusive and accessible, AI can help reduce the inequality gap and ensure that all students have an equal opportunity to succeed in their university learning. This is especially relevant for a multilingual environment such as South Africa where we have 12 official languages. Students whose first language is not English can use AI chatbots like ChatGPT or Bart to find more accessible material. Such capabilities promote a more inclusive learning environment, breaking down the barriers that can stand in the way of students from marginalised backgrounds, and helping them to feel a greater sense of belonging in the HE community.

Utilising AI in the HE environment is problematic for some academics, as they feel that students will not engage critically with the content. Yet students' critical engagement with content of materials, whatever their form or source, is an aspect of university education that most academics seek to achieve in their teaching, whatever the subject or teaching mode. We understand that academics should collaborate with each other and with any other people who are AI capable and interested in its application. Through training, discussions, and working with students, academics can cooperatively develop a way forward where AI becomes part of the HE landscape. Above we have explored different types of AI and different applications of them, so here we believe it is useful to offer practical suggestions for ethically including AI and maximising the value of its utility in the HE landscape, but it is important

to note that AI is developing at exceptional speed and that several new uses of AI in HE will have been developed after the date of publishing of this chapter.

Postscript

Integrating AI into mainstream teaching and research in HE is a new development that requires careful understanding not just of procedure, but also—vitaly—of its potential impact. It is important to foster AI literacy and to continuously explore new ways to use AI. By critically discussing and evaluating AI applications, teaching and research staff in HE can better prepare students for future work environments and ease concerns about using AI. In this fast-paced field, a central question is which applications in what context/s? Practical collections of AI applications have been created (see, for example, Nerantzi et al., 2003). By exploring and using AI, we can collectively develop a better understanding of how AI fits into HE. HE institutions can lead the way in adapting proactively to change by addressing potential challenges and solutions associated with AI. An important aspect to keep in mind is that AI is changing at an accelerated rate and will continue to do so for the foreseeable future. Within the HE context these developments will not only influence our interaction with AI, but also the approach to teaching by lecturers and the way that students learn. We now provide some practical suggestions on how stakeholders in HE may begin to do this.

Practical suggestions for consideration, discussion—and action

Developing interdisciplinary collaboration on ethical and philosophical concerns

One way to develop interdisciplinary collaboration on ethical and philosophical concerns about AI is by establishing platforms or forums for cross-disciplinary dialogue and discussion. Such

discussions could bring together professionals from diverse fields, including computer science, philosophy, sociology, psychology, law, policy, and ethics, to exchange ideas and engage in productive debates.

To promote transparency and accountability in the development and use of AI technologies, we will have to establish governance frameworks that incorporate interdisciplinary collaboration. Such frameworks need to have capacity to consider ethical and philosophical concerns and to incorporate diverse viewpoints, including those of marginalised and under-represented groups. Governing bodies within HE institutions should establish policies that encourage the adoption of ethical AI systems. Adopting ethical AI technologies that respect human rights, privacy, and dignity will be key to preventing harmful impacts of AI on society, while also promoting digital equity and accessibility for all students. These measures will help ensure that AI technologies are developed and used in a responsible and transparent manner, providing a more equitable path towards realising full potential.

Collaboration across different academic disciplines encourages innovation and contributes to the development of more informed and thoughtful approaches to ethical concerns and considerations related to AI technologies. Interdisciplinary collaboration can also help to identify potential negative consequences or outcomes of AI implementation, enhance ethical decision-making processes, and improve the overall quality of moral and ethical discussions on AI.

Introducing ethical and philosophical concerns in AI

Uncertainty surrounding AI means that as people and AI itself continue to develop AI technology, ethical and philosophical implications of developing and implementing AI need to be considered deeply—inside and outside HE. AI has the potential for untold impact on societal norms and values, raising serious concerns around issues such as privacy, autonomy, bias, and plagiarism. Moreover, as AI becomes increasingly prevalent, AI literacy

and critical thinking need to be integrated into HE curricula to prepare students for the diverse challenges they may face. Incorporating AI literacy and deepening the reach of critical thinking about AI in HE curricula can enable students to better understand the ethical and societal implications of AI technologies. It can also help to maximise the chances that people involved are well-equipped to develop and deploy AI technologies in a responsible, critically considered, humanitarian manner.

Banning the use of AI on the grounds of ethical and philosophical concerns is not an option. Graduating students will enter a work environment where AI and the use of AI may well be part of their daily tasks, whether they recognise this or not. Ethical and philosophical concerns around AI should therefore be discussed widely and embedded in the HE culture of learning and knowledge creation so staff and students understand as clearly as possible the implications of AI usage. It is also important to foster throughout HE equity in both digital access and digital literacy to help ensure that all learners have access to and learn to use these technologies. Finally, promoting transparency and accountability in development and use of AI technologies is vital for building trust with stakeholders and for preventing potential negative consequences, as we discuss later in this chapter.

The importance of integrating AI literacy and critical thinking about it in higher education

Developing capacity to think critically—to carefully unpack, analyse, and evaluate so we can understand clearly and act wisely—has always been a highly valuable purpose of HE. Given the complexity of what some warn about—and what some applaud—as potential consequences of AI, AI literacy and critical thinking about it are essential skills in today's world. As AI continues to impact our lives, people need to be able to understand it and to navigate the responses it creates. This suggests the need to incorporate AI literacy, with a firm component of what we might call AI critical thinking, into HE curricula, to equip students with the

necessary skills to tackle these issues. AI literacy should include critical discussion about the AIs available within the HE context and their positive and negative aspects. Importantly, students and teaching staff alike need to understand not only how AI can be used to aid learning, but also how it can be used in unethical ways. A key aspect here is rethinking assessment standards in both undergraduate and postgraduate coursework. Assessments need to focus on ability to critically evaluate content, a skill that students will find not just practically useful but also life-enriching for the rest of their lives. We should adapt our understanding of the use of AI and train students and staff alike in the use of AI.

AI literacy also equips students with the skills they need to communicate their findings effectively to stakeholders outside the computer science field. These skills are especially valuable as AI technologies continue to permeate ever more aspects of life, as experiences in HE reveal. Critical thinking skills enable students to evaluate the limitations and biases inherent in AI technologies and in the output such technologies generate. Already the use of these skills to critically analyse content created by AI is becoming more important than using AI to create that content.

These days, when equity stands as not just a social, economic, and political concern, but as a goal many communities and societies are now working towards, incorporating AI technology into HE curricula is vital for fostering digital equity as well as literacy. Hand in hand with this is making sure that all learners, regardless of socio-economic status, have access to the resources and knowledge they need to understand, create, and use AI technologies. Universities and colleges can promote digital equity by giving priority access to technology and training for under-served and under-represented communities. Training in AI, including in high-quality AI applications, can make a valuable contribution to preparing students for the workspaces of the future.

Using AI as a tool of inclusion

Assistive technologies—such as text to speech, speech to text, zoom capacity, predictive text, spell checkers, and search engine—are just some examples of technologies initially designed to help people with a disability. Use of these technological solutions was later expanded, and we find them now as generic features in all personal computers, handheld devices, or wearable devices. These technologies now augment the learning interactions of all students globally, enhancing the possibilities opened for teaching and designing educational experiences (Popenici & Kerr, 2017). Using AI to support speakers of additional languages can open the HE landscape for many multilingual students. These students' language ability and the language editing of texts they create could be supported by AI, and doing so would expand the opportunity for them to succeed in and beyond HE. We therefore encourage teaching staff in HE institutions to explore AI-assisted technologies, and to use these resources with their students.

Promoting transparency and accountability in the development and use of AI technologies

Increasing use of AI technologies in various domains strengthens the need for transparency and accountability of AI systems to ensure they are credible and trustworthy. Transparency can be achieved through measures like adherence to ethical guidelines, clear communication of algorithmic decision-making processes, and deployment of documentation and reporting capabilities. Accountability can be ensured by implementing mechanisms for feedback, correction, and remedy of any flaws or biases that may be introduced into the AI system. To deploy AI successfully, promoting transparency and accountability in the development and use of AI technologies is prerequisite.

It is also crucial to have open and well-researched dialogues about the applications of AI within the field of HE. AI is a relatively new addition to the HE ecosystem, so it is important to not

simply make assumptions about it. Instead, people in the HE field need to focus on exploring the implications of AI usage, particularly with regard to problematic AI detectors.

Interactions with AI systems

Promoting practical experiences and hands-on projects that enable students to interact with AI systems may expose students in a more powerfully educative way to the benefits and limitations of AI. These experiences could involve designing and implementing AI-based applications and lessons, which will help deepen students' understanding of the limitations and biases of AI algorithms, and better prepare them to critically evaluate algorithm performance.

Questions for discussion

1. What are your views on the ethics of using AI? What do you think it can be used for in HE, and what should it not be used for?
2. How can AI be used to open HE for all students?
3. How can assessment be adapted to counter students' use of AI chatbots?

Notes

- 1 This chapter was initially language edited by ChatGPT, and later by a professional academic copyeditor.

Recommended reading

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