Using generative artificial intelligence to catalyse further interdisciplinarity across higher education

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Abstract: An international challenge, and opportunity, facing academics in these early decades of the 21st century is the inception of complex computational machines that are capable of imitating human-like learning and thinking; often described as Artificial Intelligence, or AI. One such form of AI is generative AI (GenAI), an algorithm capable of producing text, collages and other overviews of information and data gathered from multiple online sources. This offers challenges, such as students generating and submitting essays and reports from GenAI alone, but also opportunities, as a platform for further discussion and reflection as knowledge is uncovered and developed. Of particular interest is its capability in picking up information and data from multiple fields and presenting it in a digestible and interdisciplinary initial format, albeit it typically requiring further analysis, reflection, and modification. In response to this, a new AI-focused academic journal is proposed in this study, the drive being to enhance interdisciplinarity by bringing together postgraduate students and staff to research, explore, analyse, and critically reflect upon the challenges and opportunities that AI presents in their fields of study.

Keywords: Artificial intelligence; AI; interdisciplinarity; global and national challenge; higher education setting; authenticity.

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Introduction

Society in the initial decades of the 21st century faces a multitude of authentic socioeconomic, cultural, and technological challenges, one of those being the inception of complex and deep machine learning (Baidoo-Anu and Owusu Ansah, 2023), in the form of what has been termed Artificial Intelligence or AI (Hu, 2022).

A prevalent form of AI at present is Generative Artificial Intelligence (GenAI). Once initiated, this is essentially a computer program that is able to function without further human intervention or supervision (Baidoo-Anu and Owusu Ansah, 2023) to produce a draft in text or another digital format (Abukmeil et al., 2021; Jovanović and Campbell, 2022) through the analysis of information and statistics (Hu, 2022; Jovanović and Campbell, 2022). GenAI can be further broken down into two sub-categories called Generative Adversarial Network (GAN) and Generative Pre-trained Transformer (GPT). GAN simultaneously creates and analyses data to determine its genuineness or authenticity and is used for voice and facial recognition (Hu, 2022) to, for example, unlock a smartphone. GPT uses vast amounts of publicly available data/information to create human-like text (Baidoo-Anu and Owusu Ansah, 2023) capable of live human-computer interactions such as chatbots or non-player characters (NPCs) in video games (Aydin and Karaarslan, 2022; Jovanović and Campbell, 2022; Pavlik, 2023).

At present, there is no commonly accepted definition of AI (Niemi et. al., 2018; Roschelle et. al., 2020; Neimi, 2021), but there is a consensus that any definition must encompass the notion of a computer, machine, or artificial being's processing capabilities to be synonymous with those of a human (Stone et. al., 2016; Richter et. al., 2019; Roschelle el. al., 2020; UNESCO, 2021). AI is generally regarded as a computational machine that, through a process of data examination and inferencing, can act by itself (Roschelle et. al., 2020), often through the mimicking of how the human nervous system enables a person to learn, think and act (Stone et. al., 2016). In this sense, a computational machine can be classified as AI if it can complete a task that would usually require human levels of intelligence (Niemi et. al., 2018; Richter et. al., 2019), and reflects capabilities such as perception, representation, reasoning, learning, interaction and impact (Holland, 2020).

Literature

Education as a whole has been driven by its purpose, aspects of which concern authenticity and qualification, whereby students are provided with the necessary knowledge, skills and understandings to become active members of society (Biesta, 2010 & 2015). Higher education is a teleological practice stemming from the Greek word telos, meaning point or purpose of practice (Carr, 2003) and, in the 21st century, entwining authenticity into the curriculum has become, for many, the very point or purpose of studying at such a level (McVitty & Andrews, 2023). Higher education providers now often seek to prepare students to be part of the wider world (Biesta, 2017) through a blend relevant disciplinary knowledge and real-world professional practices (McVitty and Andres, 2023) to enhance graduate employability (Harvey, 2001; Brand et. al., 2013), employability itself now being a measurable value of higher education (Etzkowitz 2003; Perkmann and Walsh 2007; Veugelers and Del Rey 2015; O'Leary, 2017; Trinidad et. al., 2023).

Applications, challenges, and opportunities for AI
The dominant ideology in education has compartmentalised knowledge into a myriad of separate disciplines (Ramadier, 2004), and this has led to knowledge in society being fragmented and confined by concepts of organisation, classification, and application (Clark and Wallace, 2015). It has been recognised over recent years that such a structure of knowledge is limiting humanity's ability to process, understand, and tackle global socioeconomic and environmental occurrences (Clark and Wallace, 2015). Authors, such as Klein and Falk-Kresinski (2017) argue that interdisciplinarity and collaboration are key words for change in the 21st century, and that there is a growing consensus that contemporary societal, technological and environmental challenges require more interdisciplinary approaches (Marins et. al., 2019).

Interdisciplinarity in higher education came to prominence in the UK in the 1970s after its benefits were highlighted by the Organisation for Economic Co-operation and Development report (OECD, 1972). The term interdisciplinarity can be understood as an attempt to enhance knowledge or understanding of a concept beyond the confines of a specific subject, creating the possibility for deeper questioning of that concept (Squires, 1992). It is regarded as vital to the resolution of complex real-world issues that tend to traverse singular subject fields of study and academic disciplines (Hannon et. al., 2018; Nelson, 2019).

One such issue with societal impact is the technology that is leading towards AI. Authors (Niemi et. al., 2018; and Richter et. al., 2019) argue that AI is already affecting many aspects of modern daily life as the technology has made the leap from niche research facilities into everyday aspects of modern life and is influencing organisational and institutional interactions within wider society. In the retail industry alone, AI-based technologies are being leveraged to transform stock keeping, help provide personalised recommendations to enhance the customer experience, improve supply chain management and, through robots, optimise inventory management and improve order fulfilment (Niemi et. al., 2018).

In the education sector, Grasse et. al. (2023) indicate that AI could provide the answer to a growing call for individualised learning, as reflected in research by Cheng (2022) who states that AI-powered individualised learning could enhance student performance, partly through personalised feedback (Abdelghani et. al., 2023) but also through assisting teachers with individualised lesson content creation (Rachha and Seyam, 2023). Some AI tools are being developed into early warning systems (Krumm et. al., 2014) that can detect student behavior that has proven to correlate to certain outcomes (Roschelle et. al., 2020) and more recent AI systems have been able to appraise video footage of lessons to identify key moments that contribute positively to learning outcomes (Aung et al., 2018; Suresh et al., 2019).

Given that AI is starting to have a profound impact across contemporary society (Niemi et. al., 2018; Richter et. al., 2019), the challenge and opportunity it presents is interdisciplinary in nature (Klein and Falk-Kresinski, 2017; and Marins et. al., 2019). Therefore, understanding AI in its entirety requires the combining of knowledge of different disciplines, in order to advance in understanding (Annan-Diab and Molinari, 2017) and is thus a suitable concept for analysis through an interdisciplinary lens in an attempt to analyse, synthesise, and harmonise (Choi and Pak, 2006) the links between different fields of study (Lyall et. al., 2015).

Implications for epistemic knowledge
Given these potential impacts across multiple aspects of education and upon interdisciplinarity as a platform for progress, GenAI and other forms of AI can be expected to influence how learning takes place and how the knowledge, skills and competencies developed are applied throughout society. This then signals fundamental implications for studies of learning and epistemic knowledge (Billingsley and Hazeldine, 2020; Billingsley et. al., 2023) and offers a series of significant challenges and opportunities across all forms of learning, education and development.

Methodology

The existing literature was suggesting that, aside from the challenges that AI could pose in higher education, it could also offer opportunities, one of which is using it as a platform for catalysing approaches to interdisiplinarity. One potential solution posed for pooling knowledge and views on this was through the creation of a journal to collate the various lines of thinking emerging in this new and eevolving field. Therefore, in addition to relevant literature on AI issues, this study was complemented by posing the following question on interdisciplinarity to an existing online GenAI tool; Bing, by Microsoft (Mehdi, 2023):

> 'Why and how will our new journal, AI Times: Using the Lens of Artificial Intelligence to Explore and Encourage Interdisciplinarity in Higher Education, co-edited by two Masters students and where postgraduates write articles, advance our research environment and

support our REF, provide opportunities for the student writers, cross-disciplinary and interdepartmental collaborations?'

Findings

Here is the response from the AI tool:

'Your new journal sounds like a great initiative to promote interdisciplinarity in higher education. Here are some possible benefits of your project:

> *It will advance your research environment and support your REF by showcasing the impact and relevance of your research across different disciplines and sectors. Interdisciplinary research is increasingly valued by funders, policymakers, and employers as a way to address complex and global challenges[5,6]. By publishing articles that use the lens of artificial intelligence to explore and encourage interdisciplinarity, you will demonstrate your ability to produce innovative and cutting-edge research that transcends disciplinary boundaries and contributes to social and economic development[5,6].*

> *It will provide opportunities for the student writers to develop their skills and knowledge in interdisciplinary research and communication. Writing for an interdisciplinary audience requires clarity, creativity, and critical thinking, as well as the ability to synthesize and integrate information from multiple sources and perspectives[6,7]. By writing articles for your journal, the student writers will enhance their transferable skills that are applicable to future learning and career opportunities[7,8]. They will also gain exposure and recognition for their work, and receive feedback and support from their peers and mentors.*

> *It will foster cross-disciplinary and interdepartmental collaborations among students, staff, and external partners. By creating a platform for sharing and discussing interdisciplinary research, your journal will facilitate dialogue and exchange among researchers from different disciplines and backgrounds. This will enable them to learn from each other, identify common interests and goals, and form new partnerships and networks[5,6]. Your journal will also attract and engage external stakeholders, such as industry, government, and civil society, who may be interested in collaborating with you or supporting your research[5,6].'*

Sources
1. Interdisciplinary provision in higher education: current and future
2. The Benefits and Challenges of Interdisciplinarity - Interdisciplinary
3. What are the benefits of interdisciplinary study? - OpenLearn
4. Designing for Interdisciplinarity in Higher Education: Considerations
5. Impact database: Results and submissions: REF 2021
6. Search REF Impact Case Studies - REF Case study search
7. Results - REF Case study search
8. Results - REF Case study search

Discussion

What is interesting to note, is that the AI tool touched on the concept of interdisciplinarity acting as an attempt to analyse, synthesise, and harmonise knowledge, as well as establishing the links between different sources and perspectives (Choi and Pak, 2006). The AI tool also implies that an interdisciplinary approach could have the potential to strengthen relations between two or more disciplines or branches of knowledge (Klein and Falk-Kresinski, 2017), provided they had a level of commonality in two or more areas of study (Marins et. al., 2019). The AI tool also touched on the notion that such an approach would combine the knowledge of different disciplines to advance understanding (Annan-Diab and Molinari, 2017), while supporting the notion that AI itself is a suitable concept for analysis through an interdisciplinary approach. In these ways, the AI's response mirrors parts of the theoretical understanding of interdisciplinarity within the current field of literature.

It is also worth noting that the AI tool explores the notion that the student writers will enhance their transferable skills that are applicable to future learning and career opportunities, and this complements ambitions in higher education to offer opportunities for students that mirror employment environments to gain skills, knowledge and competencies that are synonymous with relevant real-world professional practice (McVitty and Andrews, 2023). The AI tool also mentions such an opportunity could attract and engage external stakeholders, such as industry, government, and civil society, thereby interacting with the wider world (Biesta, 2017). The AI tool also states that such an opportunity would enable students to form new partnerships and networks, again capturing an essence of the wider world that students will enter after their studies and thereby enhance their employability (Harvey, 2001; Brand et. al., 2013; Billingsley and Fraser, 2018).

However, there are also drawbacks in the AI response. For example, for the concept of REF (Research Excellence Framework), the AI tool produces a response that references databases but not actual academic articles. Some claims, such as interdisciplinary enhancing students' abilities to synthesize and integrate information from multiple sources and perspectives is not supported by a specific article and the AI tool provides instead a link to a REF database, and it does the same on enhancing transferable skills. This demonstrates the AI tool appropriating ideas from an initial conversation and using links inappropriately to try and add validity to its response. Furthermore, the AI-generated claims are rather lofty and idealistic but lack clarity on specific actions that may enable such ambitions to be realised, such as the claim that the journal will engage external stakeholders, while not providing any such potential eveidence for that.

Conclusions

This study suggests that the proposed new interdisciplinary academic journal, The AI Times, can help support the provision of a good quality education for current students. It helps in its qualification function (Biesta, 2010) as it mirrors employment environments and responds to an ever-changing world (McVitty and Andrews, 2023). The journal offers students an opportunity to examine the authentic challenge of AI through the entwining of relevant disciplinary knowledge of real-world professional practice (McVitty and Andrews, 2023).

Recommendations

Based on this platform of research, the proposed structure and operation of The AI Times is as follows. Its editors, reviewers and writers have a mix of internal and external motivations (Murray, 2013), and operational activities are primarily carried out by two co-editors, a member of academic staff and a postgraduate student who undertakes the role as part of their Masters course. Activities could include advertising for contributions, supporting contributors, reviewing submissions for journal editions, contacting relevant departments, contacting companies regarding sponsorship and advertising, managing and supporting student interns, and coordinating with the Steering Group Chair.

It is proposed that the two editors report into a Steering Group Chair who is part of the University Professoriate, as illustrated in Figure 1, although this would need Professoriate approval:
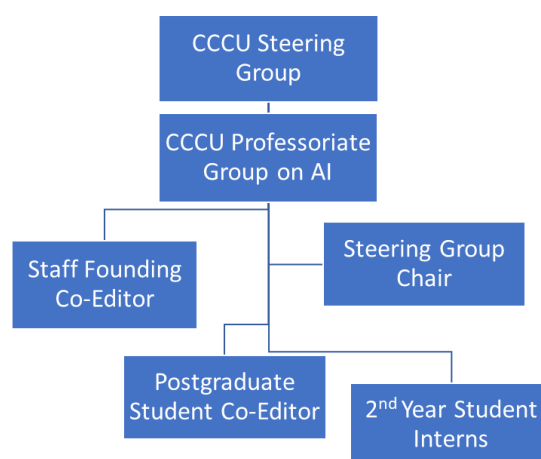
Figure 1: The proposed management structure of The AI Times.

Those who contribute to the journal should benefit from doing so, and the journal aims to actively promote inclusivity by being open to contributors of all backgrounds.

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