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Generative artificial intelligence (ChatGPT): Implications for management educators

Vanessa Ratten [a], Paul Jones [b,*]

[a] Department of Management and Marketing, La Trobe Business School, La Trobe University, Melbourne, Australia
[b] School of Management, Swansea University, Bay Campus, Fabian Way, Swansea, Wales, SA18EN, UK

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ABSTRACT

ChatGPT has been one of the most talked about computer programs amongst management educators in recent weeks due to its transformative ability to change how assessments are undertaken and graded. Unlike other educational technologies that can be tracked when used, ChatGPT has superior abilities that make it virtually untraceable when used. This creates a dilemma for management educators wanting to utilise the technology whilst staying relevant but also interested in authentic learning. Thus, it is critical for management educators to quickly implement policies regarding ChatGPT and subsequent new generative artificial intelligence because of its ease of use and affordability. This article is conceptual in nature and discusses ChatGPT as a generative form of artificial intelligence that presents challenges for management educators that need to be addressed through appropriate strategies. Thereby contributing to the literature on how technological innovations can be included in curriculum design and management learning practices. Practical and managerial implications are stated that highlight the critical need to re-examine existing education practices as a way of incorporating new technological innovation that can be utilised in a beneficial way.

1. Introduction

Artificial intelligence is a buzzword that has special meaning for management educators as it offers systematic computing capabilities that result in human like answers (Goralski & Tan, 2022). Previously, artificial intelligence was a dreamlike concept and was discussed in the same way as stargazing projects like space tourism. However, artificial intelligence has suddenly become a reality and real time need due to the effects of the COVID-19 pandemic and interest in real time computing (Lim et al., 2022). Originally artificial intelligence was considered to solve problems but not to disseminate information (Dwivedi et al., 2022). The usage of artificial intelligence has now evolved based on new computing capabilities becoming apparent (Buhalis & Karatay, 2022). Neural networks and algorithms have enabled artificial intelligence to engage in deep learning (Lundmark, 2022; Moy & Gadgil, 2022). Concurrent with the ongoing development of artificial intelligence has been the increased interest in chatbots that enable students to ask questions and obtain answers (Buhalis et al., 2023). Chatbots provide a similar service to teachers in providing real time feedback (Davis et al., 2009).

Some recent generative artificial intelligence programs include ChatGPT and Bard with ChatGPT being the most discussed regarding new technological innovation (Dwivedi et al., 2023). ChatGPT was developed by the company OpenAI which acts as an artificial intelligence laboratory (Ali and OpenAI, 2023). It is apparent that ChatGPT will have a significant impact on management

* Corresponding author.
E-mail addresses: v.ratten@latrobe.edu.au (V. Ratten), w.p.jones@swansea.ac.uk (P. Jones).

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education because it is a machine learning system that is constantly updated with new information (Chatterjee & Dethlefs, 2023). It automatically learns unlike previous educational technology which was less sophisticated (Damar, 2022). Therefore, ChatGPT is a disruptive technology that was largely unpredicted by educational technology users and has potentially revolutionised the way management educators assess students and led to panic (Dibble, 2023).

ChatGPT is trained with a reinforcement learner in which inputs are used for subsequent outputs, which means it is a generative pre-processed transformer that can predict answers (Dowling & Lucey, 2023). This results in ChatGPT being more advanced than other forms of generative artificial intelligence as it can conduct multiple tasks such as chatbot and conversationalist at the same time (Hammer, 2023). Therefore, it is unique for its ability to generate and report on topics as well as contributing to knowledge development (Floridi & Chiriatti, 2020).

ChatGPT is capable of conducting a variety of human tasks that raises ethics issues (van Dis et al., 2023). This is based on current societal expectations regarding whether humans are required for certain tasks. Currently, the general sentiment is that ChatGPT does enable students to potentially cheat on assessments (Mollman, 2022). Thus, management educators need to change their assessments to include originality and creativity in the responses so it goes beyond the current capabilities of ChatGPT (Hu, 2023). The initial hype around ChatGPT has evolved to an ongoing discussion around authentic learning (O'Connor & ChatGPT, 2023). This is due to the implications of ChatGPT usage on students and educational institutions. The potential of student interaction via ChatGPT has engendered significant debate around educational technology and its place in society (Kung et al., 2023). It is apparent that the current literature has yet to fully explore the role of ChatGPT in management education (Liebrenz et al., 2023). Thus, the aim of this article is to bridge the gap between the artificial intelligence and management education literature by highlighting the relevance of ChatGPT as a form of generative learning. This will help in identifying what is missing in the current management education literature and provide some guidance for management educators in terms of practitioner and future research suggestions. At the moment there is a sense of uncertainty about the use of ChatGPT so the research objective of this article is to provide a discussion about how management educators can utilise the technology as a form of artificial intelligence. Thus, the main research question is:

How can ChatGPT as a form of generative artificial intelligence be used by management educators?

The structure of this article is as follows. The role of management education in society is discussed that highlights the requirement for future and existing business leaders to acquire new skills. The way artificial intelligence is being utilised in the current management educational context is stated that focuses on the important implications of technological innovations. Furthermore, ChatGPT as a technology is examined that includes a focus on its neural network and conversational computing elements. The last section investigates the challenges and strategies of ChatGPT usage for management educators.

2. Management education

Management academics will play a key role in shaping future business leaders in terms of teaching key skills and enabling students to obtain a sense of responsibility whilst being proactive to learning relevant new technologies (Greenland et al., 2022). Promoting the use of new technology is essential for managers who need to keep abreast of global developments. Artificial intelligence as a form of technological innovation is the critical issue shaping the future of management education. The COVID-19 pandemic acted as an accelerator for managers to adopt digital technology and be ready for further artificial intelligence usage.

Goralski and Tan (2022) suggest that management education is in a state of transition. This is due to large amounts of data being made available, making students need to access information as well as decipher its usefulness. Students learn in different ways compared to the past because of advanced technologies becoming available. This includes recognising real and fake information as well as being knowledgeable about credible sources of information. It is becoming difficult for management educators to predict the future needs of students due to continual global change and technological evolution. This means the future is unknown due to the unprecedented digital transformation that has recently occurred. The digitalization of many tasks means there is an emphasis on the digital and knowledge economy (Kraus et al., 2021).

The current understanding of management education does not consider ChatGPT and subsequent artificial technologies. Consequently, to train students to use these technologies educators need to focus on creativity and futuristic thinking. This will enable students to solve problems through critical thinking that stresses continual learning. By questioning knowledge students can learn how to upskill and stay ahead of new developments. Educators should convey ideas in a way that makes sense, which means communication needs to be done in an efficient way. Currently, management educators tend to teach the what, the how and the how come in assessment. Table 1 presents some examples of these current management education assessments in terms of the task and examples.

Table 1
Examples of management education assessments.

The task	Examples
The what	Blog, concept map, flow chart, process description, peer review of content, podcast, poster, quiz, short answer questions
The how	Annotated bibliography, debate, essay, case study analysis, group or individual presentation, group tasks that make students work together, industry meeting presentation, interpretation, marketing strategy, negotiation contracts in terms of how function together, news story, research proposal, simulation, social media campaign, summarising key concepts, synthesis of websites or articles, topic analysis, viva voce (pitch to a business)
The how come	Cultural competency, goal setting, needs analysis, personal learning, social learning, reflection summary, reflective tasks, updating interactive contents, updating LinkedIn with skills learnt

Source: Author's own

The what involves information and content that enables students to enlarge their knowledge repository. This can include a range of resources such as blogs and podcasts that detail information about how ChatGPT can be used in assessment items. The what provides a way for management educators to ask students to conduct a task using specific content or forms of process description. The how is the way the knowledge is learnt as a form of information acquisition. This can include doing tasks such as case studies or essays that enable students to integrate ChatGPT with the assessment item. By doing so they can find information using ChatGPT then apply that knowledge to a specific context. The how come is the resulting way students can utilise the knowledge in other contexts. This often refers to developing a skillset such as cultural competency in order to know how to analyse and obtain information. Other examples of the how come can include updating LinkedIn with skills used in relation to ChatGPT in order to show understanding of artificial intelligence resources.

3. Artificial intelligence in management education

Emerging artificial intelligence capabilities are most likely to change management education in an unprecedented way. Di Cuonzo et al. (2023:2) defines artificial intelligence as "an imitation of human cognitive function". The recent breakthrough artificial intelligence chatbot ChatGPT will dramatically alter natural learning practices and analytical problem-solving abilities (Dwivedi et al., 2023). Artificial intelligence tools are a catalyst for educational change and will improve learning methods (OpenAI, 2022). Originally artificial intelligence was initially discussed in the context of science and engineering in terms of computer usage (McCarthy, 1958). It has rapidly evolved as computing processing speeds have increased to include reasoning and prediction power. Giuggioli and Pellegrini (2022:2) define artificial intelligence as "the examination of how digital computers and algorithms perform tasks and solve complex problems that would normally require or exceed the human intelligence".

Artificial intelligence can improve the quality of education by optimizing access to knowledge (OpenAI, 2023). Thereby making real time communication possible that reduces delays in the learning process. Another definition of artificial intelligence by Huang and Rust (2021:31) states that it involves "the use of computational machinery to emulate capabilities inherent in humans, such as doing physical or mechanical tasks, thinking and feeling". This means the emphasis is on the interaction between computers, machines and humans in doing certain tasks that require some form of thinking. There are a range of artificial technologies utilised by management educators that range from traditional symbols based on mathematics to evolutionary computation and machine learning (DiCuonzo et al., 2023).

Artificial intelligence can have different forms such as mechanical, thinking and feeling (Huang & Rust, 2018). Mechanical artificial intelligence involves repetitive tasks that occur on a frequent basis. Normally this involves routine tasks that need to be performed. Examples of mechanical artificial intelligence include translating text into verbal speech (Pechenkina, 2023). Thinking artificial intelligence requires more difficulty as it involve processing information. This includes deriving new knowledge based on the data provided. Thinking artificial intelligence goes beyond the abilities of mechanical artificial intelligence in recognising patterns in data. Thus, it infers deep learning that requires sophisticated information technology systems. Feeling artificial intelligence is more complex than thinking artificial intelligence as it involves some kind of emotional understanding. This means analysing sentiments in words and speech. Artificial intelligence assists educators to respond quickly to student needs by using technology and is helpful to deduce student

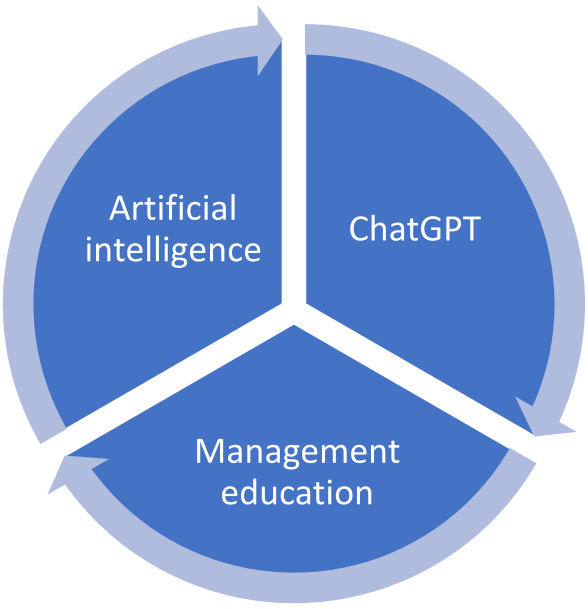

Fig. 1. The interaction between artificial intelligence, ChatGPT and management education.
Source: Author's own

expectations regarding information and knowledge (Ratten, 2020). (Verma et al. 2021) states "AI-enabled systems are designed to observe and react to their surroundings". This means they work with large amounts of data to deduct environmental changes.

We are now entering the fourth revolution in which digital technology is used and artificial intelligence plays an important role (Giuggioli & Pellegrini, 2022). Industry 4.0 involves an emphasis on digitalization in terms of automating tasks (Kagermann, 2014). This means it focuses on interconnected technology that helps improve workflows. This involves the Internet of Things in which devices communicate amongst each other. Artificial intelligence can help educators who are facing pressure to stay competitive (Ratten & Jones, 2021). This is due to freeing up time for educators to be involved in other tasks (Stokel-Walker, 2022). This means it empowers educators to act in a different way. Fig. 1 below provides a useful figure depicting the interaction between artificial intelligence, ChatGPT and management education.

4. ChatGPT as a technology

ChatGPT as a technology is easy to use so it is destroying the old way of researching answers to a question (Lukpat, 2023). Currently, management educators cannot distinguish between a computer generated and human made piece of writing. This is likely to be an ongoing battle between plagiarism software and AI packages such as Chat GPT for technological ascendency (Dwivedi et al., 2023). GPT is defined as "a machine learning model that uses unsupervised and supervised learning techniques to understand and generate human-like language" (Lund & Wang, 2023, p. 1). Chatbots are a computer program that acts like a human in conversing with people over the internet. A generative model makes new data instead of relying on input data.

ChatGPT is free to use which is different to other software that has been expensive to buy (Yeo-Teh & Tang, 2023). As a result, ChatGPT decreases the inequality gap between rich and poor thereby democratizing the market. Soon ChatGPT will be used by many students to summarise literature as well as to write papers. This makes it a major change to management education and has revolutionised educational practices. As it evolves its functions become more sophisticated and it is able to support decisions as well as writing responses. On the downside, is that students will become reliant on ChatGPT to complete assignments, and they may not develop intuitive skills. This degrades the quality of their work and fundamentally alters assessment practices.

ChatGPT utilises multimodel neurons to internet text and images (Nature, 2023). A neural network is defined as "a machine learning model composed of interconnected processing nodes that is trained on data to perform specific task by adjusting the strengths of connections between them" (Lund & Wang, 2023, p. 1). These neurons are part of a neural network that processes information as a form of machine learning. This means it is trained to perform a task based on the connections between data in a neural network.

ChatGPT uses knowledge from tasks to fine tune information in order to improve results (Open Culture, 2023). This allows patterns in the data to emerge that enables transfer learning to occur. Chat GPT is based on the GPT language model technology but enables conversations to occur (Terwiesch, 2023). It acts like a chatbot in answering questions as well as completing more sophisticated and complex tasks. ChatGPT interprets users' requests in order to fulfill their needs. It is a radical innovation in the context of natural language processing as it leverages data to understand information. This means it extracts meaning from text or speech in order to produce a result.

Some aspects of ChatGPT can be biased in terms of gender or cultural connotations that makes them wrong when used (Pavlik, 2023). This can then lead to stereotypes rather than individualised and contextualised responses. Due to the emphasis on machine learning rather than human interaction the text produced can spread misinformation. Students then rely on these answers rather than thinking for themselves. Due to the technology available in the workforce there is now more emphasis on soft skills rather than hard skills. This is due to soft skills like teamwork and communicability being more important than hard skills such as data analysis that can be done by a computer. In order to differentiate themselves in the marketplace students will need to stand out with their personality and be accountable. These skills can be learnt via educational technology but are mostly learnt through social interactions in a real life environment.

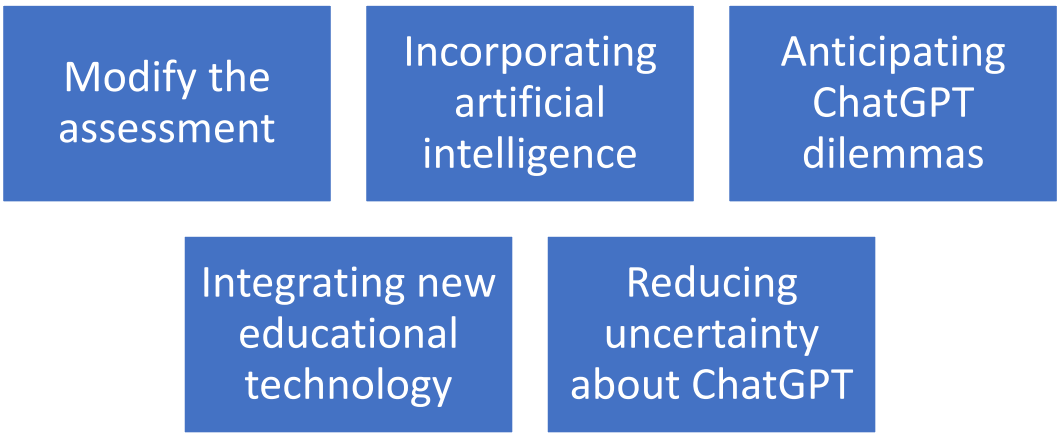

Fig. 2. Ways management educators can handle ChatGPT and future artificial intelligence.

5. Suggestions for management educators

Management educators need to embrace new technology and this includes ChatGPT. There is no use in being negative about the introduction of artificial intelligence into management education as it is inevitable. This is particularly the case for technology competent young students who have used technology throughout their lives. In order to be more positive and proactive regarding artificial intelligence like ChatGPT management educators need to design new assessments that integrate technology with creative thinking. This is a difficult task to do as the normal practice for some time has been a shift from exams to case studies and assignments. ChatGPT allows for a student to ask a question then the program can write an essay, which is hard to differentiate from human made content (Taecharungroj, 2023). Thus, this creates a dilemma for management educators who tend to have similar types of assessment each semester. The question is: how can management educators engage with ChatGPT whilst maintaining learning standards? This is hard to answer due to the newness of ChatGPT and requirement to rethink existing curriculum. Perhaps what management educators can do is to include contextual studies that make it hard for ChatGPT or simulate environments in which ChatGPT has no knowledge. There are many alternatives and ways to do this but it will take some novel thinking about the best way forward. Fig. 2 states the main ways management educators can handle ChatGPT and future artificial intelligence.

6. Challenges and strategies of ChatGPT usage for management educators

Given the influence of management education in the global economy, it is critical to address the challenges of ChatGPT and artificial intelligence. We focus on five main challenges, recommendations and implementation guidelines on how to address these challenges which are summarised in Table 2. The first challenge involves making assessment to do via ChatGPT. This means management educators should incorporate a real life example that provides a context-based approach. The second challenge is incorporating artificial intelligence usage into the learning experience. This means exposing the students to new learning mechanisms that require new learning activities. The third challenge involves anticipating and recognising ChatGPT related dilemmas. This means contextualising learning resources so that business realities are recognised. The fourth challenge involves integrating new educational technology into education. By doing so it will take advantage of new information and communication technologies that can clarify why technology is useful in management contexts. The fifth challenge is to reduce uncertainty and cautiousness regarding ChatGPT. This means openly discussing its ramifications as a way of considering multiple learning methods.

7. Theoretical implications

This article contributes to the literature on management education and use of new technologies by focusing on generative artificial intelligence, thereby extending current literature on how management education can incorporate technological innovations through the design of better assessment and learning practices. Existing theory does not adequately discuss the nature and role of ChatGPT in management education and instead relies on theory from other technologies. This means this article has provided a way of addressing current challenges faced by management educators and implementation guidelines around ChatGPT. As further generative artificial intelligence is used in a management education setting the findings of this article will be useful for future research.

Table 2
Summary of challenges, recommendations and implementation guidelines.

Challenges	Recommendations	Implementation guidelines
Making assessment hard to do via ChatGPT: How can management educators design assessment so ChatGPT is not solely used?	Incorporate a recent real-life example, made up case study or scenario that is specifically related to the assessment.	Adopt a context-based approach which involves students analysing a specific context that is unknown to ChatGPT by incorporating topics of interest that require synthesis. This context will only be known to students in that class so they will need to critically assess the information.
Incorporating artificial intelligence usage into learning experiences: How can management educators encourage usage of artificial intelligence?	Expose students to new learning mechanisms via artificial intelligence.	Implement learning activities that incorporate artificial intelligence that might in turn lead to new information being found.
Anticipating and recognising ChatGPT related dilemmas: How can management educators solve dilemmas when designing learning activities?	Contextualise learning resources relative to business needs to realistically represent the market.	Recognize the business realities of what ChatGPT means for information acquisition and dissemination.
Integrating new educational technology into education: How can management educators integrate rather than discard educational technology?	Take advantage of new educational technology that can provide benefits to students.	Clarify why and how the educational technology is useful.
Reducing uncertainty and cautiousness regarding ChatGPT: How can management educators reduce uncertainty and cautiousness regarding ChatGPT?	Openly discuss the ramifications of ChatGPT for management education.	Consider using multiple learning methods including ChatGPT as well as traditional material.

8. Practical implications

ChatGPT is a form of generative artificial intelligence that has only recently been introduced to management educators. Thus, there is still a lot to know and learn about how to embed it in management education curriculum and course design. This article has provided information about the role artificial intelligence plays in educational practices thereby highlighting the advantages and disadvantage so its usage. This is helpful for management educators who want to know more about current technological innovation as well as future technological change that will impact the way they teach management subjects. The information provided in this article is useful in terms of capturing the debate around how, why and when to use generative artificial intelligence. This includes focusing on how management educators can learn about new artificial intelligence and how they can be proactive about dealing with its usage.

Many case studies in existing business management courses currently use static information but could be updated using the suggestions discussed in this article by taking a context-specific approach. This means the case study is dynamic and changing based on current events and business activity. For example, given the current conflict between Ukraine and Russia, a case study can incorporate recent information about changes in currency exchange rates and interest rates. This would mean students would be required to reflect on current alterations in the global business environment that would require critical thinking. They could utilise ChatGPT to gather information about how conflict influences business activity but would require recent and up to date information to answer the question. Thereby combining information technology usage with problem solving activities.

9. Limitations and suggestions for future research

The use of ChatGPT is still in its infancy so there is some sense of unease about the direction it will take. The discussion presented in this article provides some guidance and suggestions for management educators in terms of how to integrate artificial intelligence. The main limitation is the newness of ChatGPT as a technology and educational resource. This means more research is required on how management educators are using ChatGPT and how university policy regarding its usage is affecting its development. Future research should incorporate case study data as well as statistical verification about ChatGPT usage. This could include studies from a longitudinal perspective in terms of researching initial perceptions about ChatGPT and how this altered or stayed the same over time. It would be helpful to bring in both student and educator examples of ChatGPT usage in terms of knowing more about artificial intelligence usage. More research is required also on comparing ChatGPT to other artificial intelligence programs in terms of its advantages and disadvantages. This comparison would yield useful results that future researchers could then integrate into their research studies.

10. Conclusions

ChatGPT is a novel technological innovation that is influencing how management educators think about curriculum development and learning practices. This article is amongst the first to specifically examine the role ChatGPT plays in a management education context. Due to the large student numbers studying management education and its relevancy for global economic development it is important to consider the implications of ChatGPT. This article has presented some suggestions about how management educators can implement artificial intelligence into assessment and teaching practices. Thereby offering help to those who are currently struggling with the need to balance the advantages and disadvantages of generative artificial intelligence like ChatGPT (Lim et al., 2023). Further research is required to explore effective assessment practices in the era of ChatGPT. This research should encompass all educational sectors including school, further education and higher education. Potential research could consider the effective design of assessment to effectively combat ChatGPT. The emergence of ChatGPT means reconsidering assessment practices to real time options such as exams. Furthermore, ChatGPT places increased pressure on e-learning programmes to demonstrate the identity of their students.

Author statement

Vanessa Ratten: Conceptualization, Methodology, formal analysis, writing original draft; Writing - Review & Editing, Visualization. **Paul Jones:** Writing - Review & Editing, Visualization.

Data availability

No data was used for the research described in the article.

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