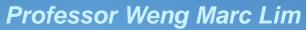


## **GENERATIVE AI IN EDUCATION**









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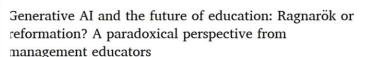
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(eywords: Academic integrity ChatGPT critical analysis )ALL-E thics uture of education Benerative AI Jenerative artificial intelligence loogle ducation Educator Aanagement education Aanagement educator )penAI aradox 'aradox theory tagnarök Reformation 'ransformation ransformative education

#### ABSTRACT

Generative artificial intelligence (AI) has taken the world by storm, with notable tension transpiring in the field of education. Given that Generative AI is rapidly emerging as a transformative innovation, this article endeavors to offer a seminal rejoinder that aims to (i) reconcile the great debate on Generative AI in order to (ii) lay the foundation for Generative AI to co-exist as a transformative resource in the future of education. Using critical analysis as a method and paradox theory as a theoretical lens (i.e., the "how"), this article (i) defines Generative AI and transformative education (i.e., the "ideas"), (ii) establishes the paradoxes of Generative AI (i.e., the "what"), and (iii) provides implications for the future of education from the perspective of management educators (i.e., the "so what"). Noteworthily, the paradoxes of Generative AI are four-fold: (Paradox #1) Generative AI is a 'friend' yet a 'foe', (Paradox #2) Generative AI is 'capable' yet 'dependent', (Paradox #3) Generative AI is 'accessible' yet 'restrictive', and (Paradox #4) Generative AI gets even 'popular' when 'banned' (i.e., the "what"). Through a position that seeks to embrace rather than reject Generative AI, the lessons and implications that emerge from the discussion herein represent a seminal contribution from management educators on this trending topic and should be useful for approaching Generative AI as a game-changer for education reformation in management and the field of education at large, and by extension. mitigating a situation where Generative AI develops into a Ragnarök that dooms the future of education of which management education is a part of (i.e., the "so what").

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### **GENERATIVE AI**



... a type of artificial intelligence that can generate human-like content in response to complex and varied prompts

	ChatGPT	
-ò;-	4	
Examples	Capabilities	Limitations
"Explain quantum computing in simple terms" →	Remembers what user said earlier in the conversation	May occasionally generate incorrect information
"Got any creative ideas for a 10 year old's birthday?" →	Allows user to provide follow-up corrections	May occasionally produce harmful instructions or biased content
"How do I make an HTTP request in Javascript?" →	Trained to decline inappropriate requests	Limited knowledge of world and events after 2021

### **PARADOX**

... a situation or statement that appears to contradict itself, yet might be true



#### PARADOX #1: GENERATIVE AI IS A 'FRIEND' YET A 'FOE'



#### **Positive**

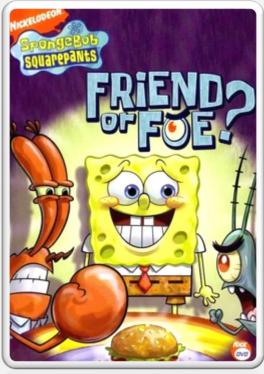
Enhances knowledge acquisition and elevates assessment rigor.

### **Negative**

 Blurs line between new and recycled knowledge, may make assessments redundant.

### **Implication**

Requires careful design in educational settings for maximum benefit.





### PARADOX #2: GENERATIVE AI IS 'CAPABLE' YET 'DEPENDENT'





#### **Positive**

Highly capable in delivering responses.

### **Negative**

Quality depends on prompts and training.

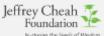
### **Implication**

Educate users to maximize benefits.









#### **Positive**

Democratizes education.

### **Negative**

Usage may be restricted.

### **Implication**

Need for equitable conditions to realize impact.



#### **PARADOX #4: GENERATIVE GETS 'POPULAR' WHEN 'BANNED'**





#### **Positive**

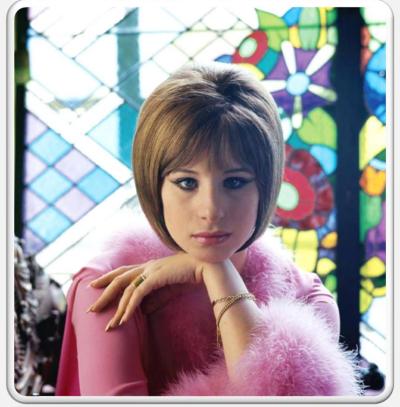
 Gains popularity via the Streisand effect and psychological reactance.

### **Negative**

May be banned for perceived threats.

### **Implication**

• Educational institutions should embrace and strategize, not shun, Generative AI.





#### CONCLUSION





#### **Ways forward**

- Embrace Generative AI as a tool, not a threat
- Educate users for responsible usage
- Prioritize equity in access and benefits
- Keep evaluating and iterating for continuous improvement

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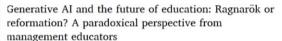




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#### ARTICLEINFO

Academic integrity CharGPT Critical analysis DALL-E

Ethics auture of education

Jenerative artificial intelligence Joogle.

Education Educator Management education Management educator OpenAl Paradox

Paradox theory Ragnarök Reformation Transformation

Transformative education

Generative artificial intelligence (AI) has taken the world by storm, with notable tension transpiring in the field of education. Given that Generative AI is rapidly emerging as a transformative innovation, this article endeavors to offer a seminal rejoinder that aims to (i) reconcile the great debate on Generative AI in order to (ii) lay the foundation for Generative AI to co-exist as a transformative resource in the future of education. Using critical analysis as a method and paradox theory as a theoretical lens (i.e., the "how"), this article (i) defines Generative AI and transformative education (i.e., the "ideas"), (ii) establishes the paradoxes of Generative AI (i.e., the "what"), and (iii) provides implications for the future of education from the perspective of management educators (i.e., the "so what"). Noteworthily, the paradoxes of Generative AI are four-fold: (Paradox #1) Generative AI is a 'friend' yet a 'foe', (Paradox #2) Generative AI is 'capable' yet 'dependent', (Paradox #3) Generative AI is 'accessible' yet 'restrictive', and (Paradox #4) Generative AI gets even 'popular' when 'banned' (i.e., the "what"). Through a position that seeks to embrace rather than reject Generative AI, the lessons and implications that emerge from the discussion herein represent a seminal contribution from management educators on this trending topic and should be useful for approaching Generative AI as a game-changer for education reformation in management and the field of education at large, and by extension, mitigating a situation where Generative AI develops into a Ragnarök that dooms the future of education of which management education is a part of (i.e., the "so what"),

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Who is the winner of the Australian Open in 2023?



I'm sorry, I don't have information about the winner of the 2023 Australian Open as my training data only goes up until 2021 and the event has not yet taken place.

Fig. 1. ChatGPT acknowledging its limitation.



Which country won the 2022 FIFA World Cup in Qatar?



The winner of the 2022 FIFA World Cup in Qatar was France.

Fig. 2. ChatGPT revealing an incorrect answer when it disregards its limitation.

DBS-MALITY REPORT				OpenAI, eresearch organization focused on advancing artificial intelligence, created a chatbot of ChatGPT in November 2022. ChatGPT is built on OpenAI's GPT-3 family of large language mode		
59% SIMILARITY INDEX	57% INTERNET SOURCES	0% PUBLICATIONS	29% STUDENT PAPERS	was fire-tuned using both supervised and reinforcement learning technique of gained popular quickly due to its articulate answers across various knowledge domains, but its uneven factual accuracy was a ganificant drawback. Following the release of ChatGPT, OpenATs valuation was estimated at \$39 billion.		
RMARY SOURCES				To improve ChatGPT's performance, it was fine-tuned using both supervised and reinforcement learning. The supervised learning approach involved providing the model with conversations in		
1 WWW.Wi	kinone.com		48%	which human trainers played both the user and the AI assistant. In the reinforcement step, hun trainers ranked responses that the model had created in a previous conversation, and their process that the process that the models was put that fire from the or using the terrainers of Proximal Policy Optimization (PPO). These models were trained in collaboration wi		
2 WWW.fir	nancialexpress.c	om	5%	Microsoft on their Azure supercomputing infrastructure.  OpenAl continues to gather data from ChatGPT users that could be used to further train and fit tune the model. Users can upvote or downvote responses they receive from ChatGPT and prov		
Student Pape	ed to University	of College Corl	3%	additional feedback in a text field.  ChatGPT is versatile and can perform various tasks such as writing and debugging computer programs, composing music, teleplays, fairy tales, and student essays, answering test question		
en.wikip	pedia.org		2%	writing poetry and song lyrics, emulating a Linus system, simulating an entire that room, playit games like tic-tac-toe, and simulating an ATM. Its training data includes man pages and inform about internet phenomena and programming languages.		
				or comparison to its predecessor, instructOPT, ChatGPT attempts to reduce harmful and deceil responses. It acknowledges counterfactual questions and frames its answers a high-orderical considerations, preventing offensive outputs from being produced. ChatGPT also remembers previous prompts given to it in the same conversation, allowing it to be used as a personalized therapist.		
aclude quotes aclude bibliography	Off On	Exclude matches	on	Nower, Charloff has entained, Openia absorptioned that it "sweetens writer plantable solution by his Exercise in consention allowing," a behavior common to large language behavior among the second of the provingility, the how every plantage and builty private performance. Level of an loss is treated toward of events that occurred after 2011, and it if not allowed the express political against one political activities. Outside I'm we obtain a growth to be set in the second of the when it generated a rap indicating that women and scientists of color were inferior to white a male scientists.		
				In conclusion, ChatGPT is a chattod developed by Capacit that gained attention for its articular activement areas are used to the control of the control of the control of the control large in the control of the control large in the control of the accuracy, algorithmic bias, and limitations on expressing political opinions or engaging in politic activities.		

Fig. 3. Similarity index of a paraphrased essay about ChatGPT by ChatGPT based on a Turnitin plagiarism scan.



What is marketing insights? I want you to include relevant examples. Your answer should also be cited and the corresponding list of references should also be included.



Marketing insights refer to a deep understanding of the market, consumers, and competition, gained through research and analysis, which guides marketing strategy and decision making.

Examples of marketing insights include:

- Consumer behavior: Understanding how consumers make purchasing decisions, what motivates them, and their preferences.
- Market trends: Understanding changes in consumer demands, market dynamics, and the impact of external factors such as the economy and technology.
- Competitor analysis: Understanding the strengths, weaknesses, and strategies of competitors, as well as their target audience and positioning.
- Customer segments: Identifying specific groups of consumers with common needs and characteristics, and developing tailored marketing strategies for each segment.
- Pain points and needs: Identifying the problems and needs of customers, and developing solutions and products that address them.
- Brand perception: Understanding how consumers perceive a brand, and how to improve or maintain brand image.

These insights help organizations to identify opportunities, develop effective marketing plans, and make data-driven decisions.

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Fig. 6. ChatGPT providing an elaborate response with references.





Table 1

A paradoxical perspective of Generative Al and transformative pathways for the future of education.

Takeaways	Generative AI  Paradox	●Generative AI can be defined as a technology that leverages deep learning models to generate human-like content in response to complex and varied prompts.		Transformative	Definition  *Transformative education can be defined as education that is transformative in its process and product in response to grand challenges.	
Lesson ↓/→				education		
		Positive	Negative	Key implications	Guidelines for practice	Directions for research
To scope expectations and secure the best results, Generative AI users can: • Be complete and specific in	Paradox #1: Generative AI is a 'friend' yet a 'foe'	<ul> <li>Generative AI is a 'friend' when it facilitates knowledge acquisition through timely and human-like responses.</li> </ul>	<ul> <li>Generative AI is a 'foe' when it makes it difficult to ascertain novel versus recycled knowledge.</li> </ul>	Generative AI can accelerate learning and thus the discovery of new knowledge, though distinctions on novel and recycled knowledge need to be sorted effectively.	Adopt Generative AI as a tool to transform and support educational activities.	What educational- related problems and tasks can Generative A tools address, and how well do they fare?
prompts.  Engage in laddering (e.g., clarifying with examples, structured questioning).  Keep in mind the technology's limitation and be ready to		Generative Al is a 'friend' when it elevates the rigor in assessment.	Generative AI is a 'foe' when it threatens to make assessment redundant.	Generative AI can serve as an impetus to reform the design of assessments and elevate them to a higher level in terms of critical analysis and rigor, whereas sticking to traditional ways of assessing may very well be a recipe for disaster.	Engage in authentic and problem-based/ industry-focused assessments where both the process and product of Generative AI- human collaboration are assessed.	Which assessment designs or types can most effectively integrate Generative AI, how can they be varied, and how can educators and student be encouraged to engage in such assessments and tools proactively and productively?
engage in further work.		Generative Al is a 'friend' when it realizes its capability in offering true information.	Generative AI is a foe' when it reveals its flaws in offering false information.	of unsaster.  Generative AI can serve as a useful informant to users in education, though caution should be afforded due to its susceptibility to information disorders such as disinformation and misinformation.	Engage in fact checking and verification for information produced by Generative AI while feeding it with more information/ prompts in tandem with upgrading of deep learning algorithms to allow it to detect and correct its flaws.	How can Generative Al be trained to evaluate and make trustworthy decisions, and how can educator and students also engage in counterchecking of the responses produced by such tools?
		<ul> <li>Generative AI is a 'friend' when the information it provides is used ethically or with good intention.</li> </ul>	<ul> <li>Generative Al is a 'foe' when the information it provides is used unethically or with ill intention.</li> </ul>	<ul> <li>Generative AI will inherently have an impact on academic integrity, including its improvement.</li> </ul>	Establish and periodically revise policies and guidelines for ethical use of Generative AI in education as and when the technology advances and develops over time.	What is the impact of Generative AI on academic integrity policies, how can institutions encourage educators and student to use Generative AI while maintaining academic integrity, an what, if any, methods should educators use to detect use of Generative AI in assessment submission?
				Generative Al is inherently neutral but could be trained to promote the good and mitigate the bad among users in education.	Establish Generative AI protocols that can alert users and institutions on potential criminal and unethical engagement, as well as opportunities to improve proficiency,	» How can Generative AI tools be trained to detect potential criminal and unethica engagement as well as opportunities to improve proficiency, productivity, and performance (i.e., the P s) in education, and how well do they fare (continued on next page

Takeaways  Lesson ↓/→	Generative AI	Definition  Generative AI can be defined as a technology that leverages deep learning models to generate human-like content in response to complex and varied prompts.		Transformative education	Definition  •Transformative education can be defined as education that is transformative in its process and product in response to grand challenges.	
	Paradox					
		Positive	Negative	Key implications	Guidelines for practice	Directions for research
	• Paradox #2: Generative AI is 'capable' yet 'dependent'	Generative AI is 'capable' in delivering responses.	Generative AI is 'dependent' on the quantity and quantity and the type of training it receives in delivering responses.	Generative AI education is necessary to enable its users in education to make the best use of its tools and maximize the returns from its usage.	productivity, and performance in education.  • Develop Generative AI educational modules to upskill and reskill educators and students.	What are the strengths and shortcomings of different categories o Generative AI tools, how can educators at students be trained to effectively use such tools, and how do different training methods and progran fare in improving the proficiency, productivity, and performance (i.e., the 7s) of its users in
	• Paradox #3: Generative AI is "accessible" yet 'restrictive'	Generative AI is 'accessible' for people to use.	Generative AI is 'restrictive' in what and how much people are allowed to use.	Generative AI can democratize the power of education, though any conditions imposed will need to be managed equitably in order to realize its impact potential.	Establish a sustainable model for Generative AI that would promote equitable access in education.	education?  • What are the roles the developers and educational institutio in creating and maintaining access to Generative AI tools for students, how can su access be made equitable and sustainable, and how would this impact on the equity of student learning experience among different student groups along with their academic and non-academic performance in the
	Paradox #4: Generative AI gets even 'popular' when 'banned'	Generative AI is 'popular' for its value, even more so from the Streisand effect and psychological reactance.	Generative AI gets 'banned' for its supposed threats (e.g., academic integrity, ethics).	Generative AI is inevitable and banning it will likely drive students to want access more through heightened attention and psychological reactance, and thus, educational institutions should embrace rather than shun its use.	Establish and promote the use of Generative AI for education and its best practice instead of banning or limiting it.	short and long run?  How do students perceive and respond policies regarding Generative Al, how does banning its use impact on students accessing such tools outside educational settings, and how car Generative Al be buil into education in a meaningful way?

