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Generative AI in higher education and beyond

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Abstract Generative artificial intelligence (GenAI) is a method of machine learning that uses algorithms to create new content such as images, text, and video. In the last year, the popularity of GenAI has exploded. Websites like ChatGPT and DALL-E have become ubiquitous in everything from logo and NFT creation to social media content and artistic verse construction. While the popularity of GenAI is undeniable, the adoption of these technological tools has been splintered in higher education. This conceptual study examines the relationship between transparency and responsibility in the usage of GenAI. We go further, examining the relationship between training and application of skills within higher education. Finally, we propose a framework for how higher education can engage with GenAI to better prepare students to use it outside of school.

1. Generative AI: Opportunity or obstacle?

The dawn of the 21st century has brought about a whirlwind of technological advancements, particularly in artificial intelligence (AI). AI has the potential to transform industries, ranging from manufacturing to customer service. AI can potentially replace jobs, enhance productivity, and even transform business ecosystems altogether (Bessen, 2019). As a result, organizations must now grapple with the impact of GenAI and how it can benefit their operations. Hendrith Vanlon Smith Jr.—CEO of Mayflower-Plymouth, Business Essentials—once spoke of this challenge: "How will you add value in the era of GenAI? If you aren't attempting to answer this question now by choice, it will ultimately be answered for you by force."

No industry has been more affected by the growth and adoption of AI than higher education. As we prepare students to enter the workforce, we must prepare them to use AI while also educating them on the many ethical considerations. It is also important that we prepare students for AI's growth

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and future development. Despite the phenomenal capabilities of AI, the academy has been slow to adjust its culture and curriculum to accommodate these changes (Brynjolfsson & McAfee, 2014). Of note, chatbots have existed since the 1960s; AI was born out of technology formed in the 1990s (Kietzmann & Park, 2024). Since the 1990s, phenomenal growth in AI has resulted in GenAI (Kietzmann & Park, 2024). Generative AI (GenAI) is a website or program that uses algorithms for content creation (McKinsey, 2023).

To date, higher education has had a mixed response to free GenAI websites such as ChatGPT and DALL-E (Heaven, 2023). When GenAI came on the scene, most educational institutions banned the use of GenAI and told students that usage of these sites would be seen as cheating and would result in punishment (Heaven, 2023). With time, however, many institutions of higher education have embraced GenAI as a means of enhancing student learning rather than a deterrent to learning. This conflicted response to AI and its capabilities has left many educators in a quandary: Academics need to find ways to balance the knowledge of AI usage for unethical reasons with the value of AI usage for business professionals.

The need for reform in educational institutions is palpable as they play a crucial role in preparing future employees to adapt to and prosper in the changing work landscape. However, the exploration of how academia should evolve to prioritize skills pertinent to this new era has been scant. With this article, we aim to fill this gap by providing a roadmap for both academia and industry to better prepare for a future in which AI tools, particularly GenAI, are ubiquitous. We also analyze the impact of GenAI on business school education and propose AI employment methods to benefit student learning and increase postuniversity AI usage.

The article will proceed as follows: We start with a historical look at the growth of AI, continue to examine academia's response to AI, propose a typology to inform educators, and conclude with some thoughts on tools educators can use to engage with AI in the classroom.

2. AI as a disruptor in the workplace: A historical perspective

AI as we know it today traces its roots back to the mid-20th century when the concept was introduced at a Dartmouth conference in 1956 (McCorduck, 2004). However, its impact on the workplace became apparent in the last few decades, particularly with the advent of GenAI.

Generative AI harnesses the power of machine learning (ML) to generate new content. It can create images, texts, and even sounds by learning from a dataset without any explicit supervision (Goodfellow et al., 2016). Among the most remarkable examples of GenAI are the large language models (LLMs) like OpenAI's GPT-3, which can generate human-like text given a prompt.

GenAI's capability to mimic human-like tasks has far-reaching implications for the job landscape. Its ability to generate content and automate repetitive tasks has sparked discussions on job displacement. For example, AI can streamline data-entry tasks, potentially replacing jobs requiring this skill (Arntz et al., 2016).

However, AI's role is not limited to job displacement. AI also has the potential to enhance productivity and transform jobs. For instance, AI can assist doctors in diagnosing diseases, augmenting their capabilities and enabling them to work more efficiently (Topol, 2019).

ChatGPT and other chatbots have had a significant impact on the learning ecosystem (Taecharungroj, 2023). ChatGPT crossed the 1 million user threshold within a month of its launch. In its first 3 months, monthly user numbers skyrocketed to 100 million. Essentially, ChatGPT augments students' research capabilities, allowing them to access additional content to promote and enhance learning.

As the capabilities of AI have become more evident, industry's response has generally been enthusiastic. This enthusiasm is largely driven by AI's potential to optimize operations, enhance productivity, and offer new avenues for innovation and growth (Bughin et al., 2017).

Different industries have responded to AI in varying ways. In the healthcare sector, AI has been leveraged to diagnose diseases, predict patient outcomes, and personalize treatment plans. DeepMind's AI, for example, has been used to predict patient deterioration hours before it happens (Cho et al., 2020). In the financial sector, AI is transforming how transactions are processed, risks are assessed, and customers are served. Companies like Lemonade use AI to handle insurance claims swiftly, enhancing efficiency and customer satisfaction (Davenport, 2018).

AI adoption in sectors like manufacturing and transportation has been slower due to the higher costs and more complex integration required (Bessen, 2019). The manufacturing industry, for instance, needs to consider factors such as workforce displacement and upskilling workers to manage AI systems.

Despite the uneven pace of adoption across industries, there is an overall agreement that AI will

play a significant role in the future of work. Industries are acknowledging the need to invest in upskilling their workforce and redesigning jobs to accommodate AI's strengths and limitations.

However, there are also concerns about potential job displacement and ethical considerations. The misuse of AI, especially in terms of privacy violations and algorithmic bias, has sparked discussions about the need for appropriate regulation and guidelines (Crawford & Calo, 2016).

In sum, the response of the industry to AI has been a complex mix of enthusiastic adoption, cautious experimentation, and urgent calls for ethical guidelines and regulatory oversight. While there has been a growing acknowledgment of AI's potential, GenAI is a product of industry, not academia. It was in industry where AI's transformative potential was first recognized and harnessed. These origins pose a unique challenge for academia, which now must catch up and adapt to the changing landscape of jobs and skill demands brought on by AI's growth.

Despite these ongoing transformations, the lack of comprehensive strategies to prepare future employees for a workplace infused with AI points to a pressing need for a systematic framework. The following sections of this article will delve into academia's response to these challenges and propose strategies to address them.

3. Academia's response to AI

Academia, as the traditional center of knowledge and skill dissemination, is grappling with the implications of AI. The responses to GenAI have been mixed, reflecting broader debates on AI's impact on society. Some universities have expressed concerns about AI and have banned its use outright. The concerns stem primarily from fears about academic dishonesty and how AI could be used to generate assignments or exam answers, undermining the educational process (Kelion, 2018).

Some institutions have embraced AI, viewing it as an opportunity rather than a threat. These universities encourage students to interact with AI tools as part of their learning experience. For example, the Massachusetts Institute of Technology (MIT) has integrated AI into various courses, allowing students to experience AI's potential and limitations firsthand (MIT News, 2021).

A comprehensive framework for how to incorporate AI in academic settings is largely missing. The current academic culture must evolve to acknowledge the role of AI in the future of work and adapt its pedagogical approaches accordingly. This includes teaching students how to use AI responsibly, ensuring transparency in AI applications and equipping them with the skills to discern when to use AI and when not to.

Specifically, there needs to be a clear understanding of the strengths and limitations of various AI tools. While AI can be a powerful tool for coding, data analysis, and project planning, it may not be suitable for historical essays or research due to its limitations, such as its inability to understand context or verify facts.

It is crucial for academia to take a proactive approach, transforming teaching methodologies and curricula to reflect the changing realities of the AI-infused world. This may include creating an academic framework that encourages professors to embrace AI tools, discourages the banning of AI, and educates students on the responsible use of AI. Such changes would ensure that academia remains relevant and effective in preparing students for the AI-augmented future of work.

4. The future landscape: Skills needed and the role of AI

As AI continues to permeate various industries, the skills needed for future employees are evolving. A common misconception is that AI solely affects lower-skilled jobs. In reality, AI impacts a broad spectrum of roles, from manual labor to cognitive tasks, necessitating a shift in the competencies required by workers of the future (Bughin et al., 2018).

One of the primary skills required in an AI-driven future is prompt engineering. As AI systems like GPT-3 rely on prompts to generate desired outputs, the ability to design effective prompts is vital. This requires knowledge of AI behavior and its limitations to generate meaningful, accurate, and nuanced responses (Brown et al., 2021). Understanding the limitations of GenAI is also essential. For instance, it is crucial to know that AI lacks common sense reasoning and does not understand the content it generates. Its outputs are solely based on the patterns it has learned from its training data (Marcus, 2018).

Apart from technical skills, soft skills such as critical thinking, creativity, and emotional intelligence will be of increased importance. While AI can analyze data or generate text, it lacks human qualities like empathy, ethical judgment, and the ability to think outside the box. These are skills that can complement AI rather than be replaced by it (Brynjolfsson & McAfee, 2014).

In addition to these skills, the responsible use of AI should also be a part of the skillset of future

employees. As AI increasingly becomes part of decision-making processes, understanding its ethical implications, potential biases, and issues concerning data privacy is paramount (Crawford & Calo, 2016).

In essence, the future work landscape will require a mix of technical and soft skills, underpinned by an understanding of AI's capabilities, limitations, and ethical implications. This necessitates a reevaluation of current education and training frameworks to ensure they equip future workers with the skills to thrive in an AI-infused workplace. Academics must find ways to address these new needs. Teaching students to utilize AI, both effectively and ethically, will become crucial as industry finds new ways to utilize it.

5. An academic typology: Preparing students for an AI-driven future

In response to the impending influence of AI, academia must reassess its educational frameworks. An effective academic framework for preparing students for an AI-driven future should focus on teaching AI responsibly and transparently, as well as showing students how to discern when and where to utilize AI tools.

5.1. Responsible AI usage

AI usage must be taught responsibly, with an emphasis on understanding the ethical implications of AI. Students should be informed about potential biases that can occur due to skewed training data and the risks associated with privacy and data security. Moreover, students should learn the importance of using AI as a tool to assist and augment human capabilities rather than replacing human input altogether (Crawford & Calo, 2016).

5.2. Transparent AI usage

Transparency in AI usage is another critical aspect. The black box nature of many AI algorithms can be mystifying. Thus, students should be taught the basics of how AI works, its limitations, and the implications of those limitations for its usage (Castelvecchi, 2016). This will help students understand *AI hallucinations* that are often associated with irresponsible use of AI (Hannigan et al., 2024). AI hallucinations are results generated through AI that can be misleading (IBM, n.d.).

5.3. Discerning AI usage

Students also need to discern when and how to use AI. While AI can assist, with little human interaction, in tasks such as coding, data analysis, and project planning, its use for writing historical essays or research requires a deep understanding of context. Fact-checking is required, and human interaction becomes vital. The ability to understand how to use the right tools for the right tasks is crucial. By examining AI usage in the manner described above, we propose the typology outlined in Sections 5.3.1—5.3.4. and Table 1 to assess student readiness for AI usage in the classroom.

5.3.1. Learners 2.0

These students understand the ethical implications and functioning of AI. They use it as a tool to assist and enhance human capabilities, understanding strengths and limitations. Students who fall into this category should be encouraged to both use AI in their work and help others who are still learning. Learners 2.0 are outstanding sources through which to foster true learning in the classroom via cocreation and adaptation of lessons.

As an example, in a coding class for MBA students, the students were taught the basics of SQL and concepts of how to create basic queries over four sessions. Later, in one session, students were taught how to prompt ChatGPT to create more complex and interesting queries directly related to solving business problems. Overnight, the students learned to responsibly use AI as a tool and to use it to answer/solve complex business problems efficiently. They were able to discern if and whether the query answered the question posed or to modify it manually so that it would. This is a primary example of how GenAI augments human capabilities to accelerate from a basic understanding to a more complex and advanced skill set overnight.

Data collected at classes that incorporated and embraced responsible use of AI showed that over

Table 1. Academic typology: Responsible usage X transparency

	Responsible AI usage	Irresponsible AI usage
Transparent AI usage	Learners 2.0	The savvy cheater
Opaque AI usage	The amateur	AI illiterate

79% of the students felt they were knowledgeable on how and when to use AI.

5.3.2. The savvy cheater

Students who understand the functioning of AI but use it unethically or unfairly (e.g., for cheating or plagiarism) fall into this category. This group includes students who caused the initial backlash toward GenAI. Punitive methods of controlling cheating online are playing catchup with the movement of the technology itself. While punishment and control are certainly a start in how to deal with students who fall into this category, the imperative should be placed on educating students about what constitutes using AI in an unethical manner and the issues involved. Moreover, tailoring assignments to allow students to use GenAI while also forwarding initial thought would strengthen the relationship between educators and students.

Some students feel they are knowledgeable enough to use AI to game the system. We have seen this in essay writing assignments in which students use GenAI to produce essays for homework assignments, etc., despite clear instructions from their respective instructors not to use them. In addition, many students went on to claim the results of such AI usage as their original work. A recent poll in Canada showed that 60% of students used GenAI in their classwork in ways that they felt constituted as cheating (KPMG, 2023), while 17% of the students said they used GenAI in their finals in ways they deemed as cheating (Cu, 2023).

5.3.3. The amateur

Some students use AI responsibly but do not fully understand how it works, leading to potential misuse or over-reliance on AI tools. Some have argued that over-reliance on AI poses significant risks, such as loss of skills, physical health, and social abilities due to reduced necessity for human involvement in various tasks. There is a risk of a losing-it-for-not-using-it future in which our cognitive and physical abilities degrade due to over-dependence on AI for routine tasks. (Markoff, 2015). However, we argue that students who fall into this category need educators to teach them when and how to use GenAI. Like all amateurs, the key here is to allow students to practice so they can become proficient AI users.

Students will find themselves tempted to fully rely on AI for all the answers. It is important to educate students that AI is not a panacea but simply a tool that could potentially help improve their work. Using classroom examples, unless students know what problem they are solving in coding and how to run the code, they may be tempted to use AI to generate truly meaningless code. They may not understand the output of a code generated by AI if they do not understand how to read/understand the code in the first place. They may even produce incorrect code as a result. As an example, in the same MBA course, there existed a small number of students who did not follow or were absent from the session on responsible use of AI. As a result, a typical response after generating a failed SQL query was to blame the AI tool: "The [tool name] doesn't know how to create the SQL query."

5.3.4. AI illiterate

These students neither understand the functioning of AI nor use it responsibly. This could lead to unintentional misuse and potential harm. Students who do not understand the function of GenAI are liable to be forced to the side and overlooked in work environments. Students in this category need to be educated and helped to understand how to use AI and how to do so responsibly.

Students who fall into this category find themselves frustrated and often blame the AI for the inaccuracies and misuse. In one example, students were asked to complete a midterm that involved creating advanced complex SQL queries with the help of any GenAI tool, to answer significant business questions. Students who did not understand AI found themselves using phrases such as:

- "This doesn't make sense, I don't think [AI tool] knows what it is doing."
- "[AI tool] made it even more confusing."
- "I will never trust [AI tool] for anything."

The assignment was verified beforehand to have a solution that they were unable to arrive at due to their misunderstanding of the use and capabilities of AI. However, only 5% of the students from that class fell into this category.

It is important to note that we expect the distinction between Learner 2.0 and the savvy cheater to be changing even as we speak. Parallel to how calculators were first viewed when they were developed (Banks, 2011), they were deemed as a mechanism that allowed students to cheat. Marches were held by mathematicians calling for calculators to be banned. Over time, calculators not only became required in many areas but also accepted at a societal level (Banks, 2011).

Following similar logic and patterns, we predict that what currently constitutes cheating to be

changing and that GenAI adoption will rapidly increase over the next several years. We see quick adoption (McKinsey, 2023) within some fields (e.g., computer science, data science) and resistance within other fields (e.g., arts and humanities, philosophy).

We believe our typology assist in creating responsible use of AI across any field when applied appropriately. It allows alignment with clear outcomes stemming from a deep understanding of how it is being used and the knowledge required to use it.

The key to ensuring that students can use AI effectively and responsibly necessitates teaching them about how AI works and the potential ethical issues inherent in its use. This further requires educating students not just about how AI functions but also its limitations. Likewise, students need to be able to practice using AI effectively and responsibly, which calls for assignments that are designed to promote this kind of learning. One ethical consideration to be considered is DEI initiatives included to decrease bias in AI output (Abdelhalim et al., 2024).

5.4. AI tool variety

It is important to remember that when we talk about AI, we are talking about an increasing variety of different, specific AI tools, each with its own design priorities and aims.

An understanding of different AI tools, each with their unique strengths and weaknesses, should be part of the curriculum. A comparative study of various AI models can equip students with a comprehensive understanding of AI and its potential uses and limitations.

In summary, the proposed academic framework revolves around educating students on the responsible and effective use of AI. Professors should be encouraged to integrate AI tools into their teaching methodologies, and any banning of AI tools should be discouraged. In this way, academia can ensure it equips students with the necessary skills to thrive in an AI-infused future.

6. Educational toolbox: Preparing future employees for AI use

As AI becomes increasingly prevalent, educators must have the necessary tools to help students utilize AI in ways that mirror the workplace. The framework below shows how educators can systematically change their coursework to address such changes in the workplace. To this end, educators are asked to assess if AI within their domain is replacing human beings in the workforce or enhancing their abilities. Further, we recommend that educators look at their current curricula and assess if the skills needed are already being covered in their syllabus. The framework presented in Table 2 proposes a method for how educators should use these assessments to meet students' AI needs.

6.1. Amplifying knowledge

For skills that educators are already teaching in their curriculum and that match up with how AI is being used in the workplace to enhance human ability, we recommend amplifying the teaching and focus. This is an ideal area in which to embed AI training into the curriculum. One example is in computer science programs that teach programming. In industry, AI is being used regularly to enhance human abilities in computer programming. Students need to understand the basics of computer programming, but utilizing AI allows them to code faster and more efficiently. This will give them an advantage in the workplace. Here, we recommend that educators embed AI training into their curriculum strategically so that students are trained to use AI once they understand the basics of programming.

6.2. Diminished focus

For skills that educators are already teaching in their curriculum and for which AI is being used in the workplace to replace human ability, we recommend diminishing teaching and focus. As has

Table 2. Educational toolbox: Recommendations for increasing AI in the curriculum

	Existing skill in curriculum	New skill in curriculum
AI human enhancing	Amplifying knowledge: Amplify curriculum to include AI training on the skill.	Curriculum addition: Add curriculum to cover the skill and show students how to use AI.
AI human replacing	Diminished focus: Lessen focus on skill training.	Ethics and foundations training: Include building block training for the skill.

been discussed, there are numerous ways AI is replacing humans in the workplace, and it is happening faster than expected. In some situations, entire sections of curriculum are becoming less important because AI is replacing human interaction in the workplace. It is important to lessen this impact within the curriculum but not ignore it altogether. In this category, educators must keep those lessons within the curriculum. For example, in sales/consumer psychology classes, students will learn that many customer complaints are being transferred to AI. This is for many reasons, not the least of which is that, for minor complaints, it is more cost-effective to have AI conduct consumer interactions. While it is important for business leaders to understand how to dissipate and respond to customer complaints, it is important to focus on more complicated complaints or areas in which human interaction mitigates the complaint. Customer service must understand how to address customer complaints but not as exhaustively as in the past. Further emphasis should be placed on how to program AI to address consumer issues.

6.3. Curriculum addition

For skills educators who are not already teaching AI usage in their curriculum and where AI is being used in the workplace to enhance human ability, we recommend adding AI skills to the curriculum as needed. Many educators have added new skills to their curriculum that are needed in the changing marketplace. When these changes include AI aiding in human ability, it is important to cover AI usage and the basis of the changes in the marketplace. One example is in logo creation. Many companies are using AI to create or modify existing logos. Human ability is being amplified insofar as AI can generate images faster and can modify with input from a human. Both the speed of AI and the human understanding of logos and design are important. In this area, it is important to add theories of design—such as the gestalt principles—to the curriculum, so that students can effectively tell the AI how to design or redesign logos. Students do not need to be art experts, but they do need to understand design theory to utilize AI to design the logos.

6.4. Ethics and foundations training

For skills educators who are not already teaching AI usage in their curriculum and for areas in which AI is being used in the workplace to replace a human workforce, we recommend teaching the ethics and foundations that drive AI. Areas in which educators are currently covering subjects related to AI replacing humans in the workplace are tough domains. It is difficult in part because neither the educator nor the student will use these skills directly once they enter the workplace. Nonetheless, it is still important that students understand the building blocks and ethical implications within these areas. Thus, we recommend that educators include discussions that promote an understanding of the ethical implications of how AI works so that students will better be able to guard against pitfalls in the market. One example of this is content creation. More and more marketing firms are using AI as a means of content creation. While many marketing professors focus on content creation, others do not. However, content created through AI can impact consumers significantly. Given this, students must understand the ethics involved in using AI-generated content in corporate settings as well as how this use impacts consumers when they read or interact with such content. Students who do not learn these ethical considerations may inadvertently contribute to existing biases and other problems.

7. Summary

As AI continues to disrupt various industries, its implication on the future workforce becomes more evident. Academia needs to adapt their practices to equip future employees to thrive in an AI-infused workplace.

The academic typology we have posited proposes a way of looking at AI in education from a student perspective, while our academic framework proposes specifics that educators can embed into their curricula. This involves teaching students how to use AI responsibly and transparently, understanding when and where to use AI tools and recognizing the ethical implications of AI. These measures can ensure that students are equipped with the necessary skills to succeed in a workplace increasingly reliant on AI. We have indications of how technology will grow (Berthon et al., 2024), and so we should not only prepare students to deal GenAI as it exists today but also address a rapidly changing environment.

This article highlights the need for a proactive approach to AI education in both academia and industries. By acknowledging the profound impact of AI and adapting accordingly, we can ensure that future employees are not only prepared for the changes AI brings but can leverage it to create a more productive and innovative work environment.

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