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Creative Uses of ChatGPT for Education: a Conversation with Ethan Mollick

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There is a popular cliche ... which says that you cannot get out of computers any more than you put in. Other versions are that computers only do exactly what you tell them to, and that therefore computers are never creative. The cliche is true only in the crashingly trivial sense, the same sense in which Shakespeare never wrote anything except what his first school teacher taught him to write—words. — Richard Dawkins

If educators are not using AI as creative tools, they are in trouble. — Ethan Mollick

Introduction

This column on technology, creativity and learning has, for several years, focused on conversations with preeminent creativity scholars. More recently, we have done mini-sequences of articles focused on one particular theme or domain (such as our series last year around creativity and mindfulness). Currently, our thematic focus is on creativity and artificial intelligence—interviewing recognized thinkers and scholars in this area. This is the second article in that series, the first of which was a conversation with Dr. Chris Dede (Warr et al., 2023).

Interestingly, our AI-themed focus was planned well before large language models like ChatGPT came to the attention of the broader public late last year. This year's AI focus was planned in early 2022—when Silicon Valley had

not yet unleashed ChatGPT, and text-to-image generators or AI art (e.g., DALL-E) was not as widely used or accessible as they are now. We knew, early on, that AI tools would feature heavily in educational futures, but what we did not predict was the explosion of interest in these tools in recent months. These tools have since entered the popular imagination, and discussions abound on its capabilities and risks. It is difficult at present to judge the impact of these technologies and to distinguish truth from hype.

We have always, in this series, been sensitive to chronocentrism (the tendency for people to overestimate the importance of their own time as being the most groundbreaking in history), something we addressed in the very first article in our series, over a decade ago. We revisited the idea in a recent article (Mishra et al., 2023), acknowledging that over the years many tools and technologies have come and gone, evolved, or simply enabled gradual changes over time, without the world shifting on its axis.

That said, we also know that there are moments in history that are legitimately transformative, and that have genuinely shaken the foundations of our culture, our politics and our economics. Some technological moments change everything. The advent of the printing press was one of those moments, where books could suddenly be distributed into the hands of the masses, allowing knowledge (and literacy) to spread in ways not possible before. These moments are often obvious in hindsight. For instance, we can look back and see that the advent of print was a critical turning point in human civilization, but its effects took decades, if not centuries, to manifest. The scientific revolution, the American and French revolutions, and the enlightenment were all long-term effects of the advent of printing and the spread of information and literacy. Knowledge was no longer restricted to special privileged few, but became a fundamental part of citizenship. It is unsurprising that the idea that "all men (sic) are created equal," emerged in a world where the printed word, once privy to just the clergy (as the knowledge gatekeepers),

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became available to the broader population. But these effects were slow to emerge. In contrast, almost 100 million people signed up for OpenAI's ChatGPT3 within a month of its release to the public—a transformation at scale never seen before.

Thus, AI feels like a possible watershed moment, which can reveal gaps in our prior understandings of creativity or learning. In this context, we are excited at the opportunity to talk with, and share the work of, Dr. Ethan Mollick, a creative innovator and a scholar of entrepreneurial innovation, who has become particularly recognized for his creative uses of AI in his own teaching practices. Dr. Mollick received his PhD and MBA from MIT's Sloan School of Management and his bachelor's degree from Harvard University. As an Associate Professor at the *Wharton School of the University of Pennsylvania*, he studies and teaches innovation and entrepreneurship, and leads *Wharton Interactive*, an effort to democratize education through games and simulations. His scholarship has been published in top management journals and his research has been covered by *CNN*, *The New York Times*, and other leading publications.

Our conversation with Dr. Mollick was engaging, fun, and enriching, given the breadth of his knowledge and genuine passion for ideas. The conversation was a window into a creative mind, someone who had glimpsed the potential of these new technologies for education and was committed to tinkering and exploring these possibilities.

Dr. Mollick is a natural, seasoned innovator who has worked at the intersection of technology and learning for years, including the design and use of games and simulations for learning. He has also lived in the world of business practice, having co-founded his own startups, and even today advises startups and other organizations on entrepreneurship and innovation. All these real-world experiences, and his genuine commitment to innovation, contribute to his own philosophy of teaching and learning.

A Teaching Philosophy Built from Innovation in Practice

Dr. Mollick didn't enter the field of education via a traditional path, but "came into it the long way around," from a business background and his professional experience as an entrepreneur. A startup company that he had co-founded invented the paywall—so he noted, with a smile, that he is trying to "pay that off in my life—because of my sins." In realizing the stumbles and challenges of entrepreneurship, he decided to study the topic further, first through an MBA, and then via a PhD focused on learning and teaching in entrepreneurship and innovation. The development of his academic research and pedagogy stemmed from his real-world experiences as an innovator, which requires a natural curiosity around playing with ideas, innovating,

and learning in real-world contexts. This philosophy, developed by intertwining learning with innovation, led to his interest in teaching and learning through games, and he started developing games that could be used in teaching:

> Ever since becoming an academic, I have been obsessed with the idea of how to teach at scale and how to teach better, so I have been using game interactivity for a long time. We have a free simulation called Blue Sky Ventures, where students run a fake startup in real time over the course of six class periods. We have another simulation called The Saturn Parable, where you are on a space mission to Saturn in 2087, and it secretly teaches leadership skills. I have also been playing with AI since it started to become practical, even before the release of ChatGPT 3.5.

This interest in the design of technology, or educational games in general, grew out of his interest in building or making things—but it has also pushed him to think more about pedagogy and what it means to design learning experiences for a range of people. Game design is one way that he can enact this, and it enables a philosophy of personalization in learning, at scale. Dr. Mollick noted the possibilities opened by the design and use of educational games or simulations:

> We can control lots of pedagogical outcomes [in these games and simulations] that we can't control in classrooms. I can adapt educational outcomes to people based on how well they do with the simulation. If you do badly, we can give you easier questions. If you do well, we give you harder questions. We can also take advantage of lots of things we cannot do in classrooms as easily without careful classroom design (which is difficult at scale). Intermittent and interleaved practice is easy to do in a long-scale simulation where we can revisit topics in different and interesting ways. We can offer all sorts of interesting stories to make learning more compelling…keep people focused, and have healthy competition happen.

Dr. Mollick views learning through a lens of deep engagement in experience, not unlike some of our prior focus in this column about learning through play (Henriksen et al., 2015). Games provide situated, action-oriented, embodied experiences (Gee, 2003). Within the game world, decisions have consequences (albeit in a low-risk environment), and the agency afforded to players can produce a sense of flow or emotional engagement in which people are receptive to learning. Knowledge then shifts from an abstract set of ideas to being embedded in the interactivity of the game design itself (Boltz et al., 2015). In that sense, Dr. Mollick's pedagogy resonates with experiential learning, but with a focus on how this can happen at scale, via elements

of personalization via technological affordances and good design:

> We can give people feedback because we are observing behavior or interactions in a much deeper way than you would with just formative assessments…So there are many advantages, and we can do it at scale—it does not have to just be a single classroom. We spend the time building a teacher a game—deploy that to 10,000 learners or 100,000 learners and get good feedback on that.

This tension between scaling and personalization may become easier to navigate through technological tools, like games and AI, as Dr. Mollick pointed out. Yet, these technologies can be disruptive as well in many ways.

Scaling Teaching with Technology

Rapid advancement and dispersion of digital technology have led to a variety of challenges, including technological access, literacy, and competency, along with well-being, online security, and data privacy (García-Morales et al., 2021; Rasheed et al., 2020). That said, these technologies can be seen as being positive disruptions as well, akin to Schumpeter's (1976) idea of "creative destruction" where new technologies, tools, and ideas disrupt and change existing systems—leading to new systems and practices. Dr. Mollick spoke to the potential of these new technologies to change and disrupt existing educational practices. Yet, he argued that despite the disruptive potentialities of these technologies, outmoded views of pedagogy that do not work, still persist:

> This huge gap between the science of teaching and how we actually teach is quite frustrating. We have been telling people that they cannot keep teaching the same way, but everyone is doing it anyway. We are pretending that a 2000-year-old method of teaching is the best way to teach. All of that is wrong, and we know it is wrong. The teaching methods that are most invalidated by AI are the worst teaching methods. AI is absolutely disruptive to a bunch of bad models, and it is also disruptive to a bunch of good models. For those of us who have been calling for advances in pedagogy for a while, there is some feeling of relief.

We would like to unpack one key sentence in the quote above—namely that "the teaching methods that are most invalidated by AI are actually the worst teaching methods." One of the biggest points of handwringing and consternation about these new AI tools has been around academic integrity and the idea that the rise of large language models means that the "student essay, as a tool of assessment, is dead." Dr.

Mollick, however, makes a bigger point—that maybe these ways of assessing student learning (e.g., writing standard five-paragraph essays) were fundamentally flawed from the start. The fact that AI can generate these essays with ease, despite having no real knowledge of the world, no awareness of context or a sense of feeling, is an indictment of the current system; it should push us to reform it rather than bemoan its possible demise.

Dr. Mollick emphasized the need to "take advantage of all these technological and pedagogical revolutions and apply them"—to experiment with AI to advance teaching practices and enhance learning experiences. Moreover, insights on teaching, learning, and design gained from these types of experiments can be applied to critically reexamine and potentially redefine existing educational systems (Hwang et al., 2020). Dr. Mollick acknowledges that there are situations where we *are* constrained by the realities of the world, the realities of economics and student choice, to teach in less-than-ideal contexts (such as large-enrollment online courses). For example, massive open online courses have been used by millions of learners for over a decade, yet challenges in personalization and sustaining learning engagement have persisted (Fournier & Kop, 2015). This means, he argues, that we have a moral imperative to do better:

> I have these massive online courses, which can be terrible ways to teach—but they are popular. So we need to explore and figure out how to actually take advantage of all these technological and pedagogical revolutions we are seeing and apply them.

This also means that we need to look beyond the potential misuses of AI, to instead focus on preparing students to thrive in a technology-driven world. This is not an overly optimistic view of technology, and Dr. Mollick recognized that "plagiarism is a real issue and problem, but that is just the tip of the iceberg. We know there are ways to solve this problem, we have already solved this with calculators." The problem is that many see AI tools as automatizing writing in the same way that calculators were initially believed to be harmful to the learning of mathematics. But progressive mathematics educators embraced the calculator, arguing that removing the cognitive load of calculations was, at the end of the day, a good thing. It allowed educators to focus on the ideas that underlie mathematics, rather than the more mechanical aspects of computation. The argument here is for the development of more progressive, creative educators who embrace these tools, who are not blind followers of existing, mechanistic, and often non-impactful practices, but rather see themselves as designers who ask the "right" kinds of questions aligned with their pedagogical goals and visions. This connects with what Dr. Dede discussed in our previous piece in this series (Warr et al., 2023), where he made a similar distinction between basic arithmetic

manipulations and understanding fundamental concepts, like the number line—which serves as a foundation for exploring and understanding higher-order mathematical ideas. The tools then become ways of minimizing the learners' cognitive load and time spent on unimportant tasks, to get them to focus on deeper ideas of disciplines, and maybe just as importantly, to become creative users of these tools.

Potential of Educators and Students Using AI as Creative Tools

Dr. Mollick believes that AI, if used well, can serve as a kind of resource to increase both productivity and creative outputs. He described creativity as an essential component of the beginning stages of innovation, which involves finding unusual concepts and connections and fluently recombining or generating new ideas. Based on this description of creativity, he emphasized that AI can be creative and can act as a creative support or collaborator, especially with thoughtful and savvy use. Elaborating on this, he said:

> If educators are not using AI as creative tools, they are in trouble. I am a fairly creative person, and I have a lot of weird ideas, but it is really hard for most people to generate 400 ideas about something. However, Bing AI is really good at novel combinations, and it does an amazing job of taking a theory and applying it elsewhere. It is mind-blowing what this could do in terms of creating connections between disparate concepts. So, if creativity is about finding unusual concepts, connections, and variations, AI is creative.

AI, he argues, has many advantages as a creative tool. First and foremost, educators can use AI tools to automate aspects of their teaching and increase their productivity. In contrast to learner management systems (which require large investments in effort and training for small gains in productivity), AI tools might "increase productivity by as much as 80% and require no investment from educators and students." Educators can also use AI tools to design structures that support students' creativity and creative outputs, like board games designed to generate ideas (e.g., The Breakthrough Game by Justin Gary). Additionally, in learning environments designed to facilitate creativity, AI tools can provide students with more opportunities to take risks, further develop ideas, and problem-solve in diverse ways (Richardson & Mishra, 2018). Reemphasizing the point of looking beyond the potential misuses of AI, Dr. Mollick argued that educators need to focus on "the power of what AI is doing. There are so many educators who are reacting to ChatGPT after spending three minutes having it try to do their assignments. They need to see more than how it can be used to cheat."

To demonstrate the potential of AI as creative tools, Dr. Mollick shared several examples of how he and his students have utilized ChatGPT as a creative tool, for instance:

> My favorite example of how disruptive ChatGPT is that it came out on a Wednesday, and I taught my students about it the following Tuesday. Many of them had never used it. However, by the end of the first class, one of my students in my undergraduate entrepreneurship class had already used its coding ability to create an app. It used libraries he had never used, and this would have taken him six or seven hours before. He posted about it on Twitter and had venture capital offers by the end of the day.

Since then, his students have regularly used ChatGPT to collaboratively brainstorm ideas, write essays, and review wrong answers to test questions. In a recently published article (Mollick & Mollick, 2022), Dr. Mollick explained that students need exposure to varied examples and explanations to transfer and apply what they learned in the classroom (e.g., knowledge, skills, strategies), and AI can be used to improve the transfer of concepts. For instance, students could ask ChatGPT to demonstrate a concept in different scenarios, and then point out what ChatGPT got right and wrong and how the output could be improved. Students might also ask ChatGPT to write an essay and then provide prompts to correct and improve the essay.

As an educator who is passionate about designing games and simulations for teaching, Dr. Mollick has also experimented with using ChatGPT as an interactive tutoring tool. For instance:

> If you are teaching history, ChatGPT is incredible—I told ChatGPT that it was 1913, and I am having dinner on a really nice luxury cruise ship out of Southampton. It responded that I might, unfortunately, be on the Titanic and that I should finish dinner quickly. I asked ChatGPT what I should do, and then we talked about where the lifeboats were located and who else was on the ship. Another time, I asked it to give me a multiple-choice quiz. I instructed it to make the questions and language of the explanations easier if I got questions wrong, and to make it harder if I got questions right. It is a crazy situation to be in because some people's life's work has been to build these kinds of interactive tutoring tools, and all I needed to do was write a paragraph.

These illustrative cases show how AI exists within a *zone of possibility* (ZoP) (Dirkin & Mishra, 2010); this ZoP is the possibility space in which educators and students can conceive of or reinterpret the purposes or uses of technologies or tools (based on their assumptions about them and their surrounding environment) and align them with their beliefs, values, and visions. Building on this, Dr. Mollick enthusiastically stated that the future directions of AI, learning, and

creativity are "so exciting because there are no rules, and no one knows what the future looks like. Everyone needs to be using AI because anyone can find good ideas and build on them and discover new uses."

AI and the Future of Human Creativity

How might AI affect human futures? On that point, Dr. Mollick is understandably hesitant to offer concrete views, given AI's wide-open, fast and ever-evolving landscape. He noted how the capabilities of AI have changed dramatically in a short amount of time and, even in this nascent stage, these tools have already destabilized and unseated our current understandings of concepts like intelligence or creativity. So, it is difficult to establish a solid view of how it may challenge other existing understandings of our world. He noted:

> I am a firm believer in dodging the hard questions on AI. We have bad definitions of sentience, and we just keep revising them to fill in gaps. Before last November, we thought we could define it, but now we have AI chatbots that can easily fool humans to believe they are sentient, when they are clearly not. We cannot rely on existing tests anymore. AI absolutely can fake it—it can pass the Turing Test or do well on many creativity tests. What does that mean? I have no idea.

Dr. Mollick's point underscores how preexisting definitions of psychological constructs like "creativity" or "intelligence" have often been grounded in a human-centered view of the world. Yet, as our prior interviewee Dr. Dede pointed out, AI is an alien form of intelligence (Warr et al., 2023). Even before the emergence of ChatGPT, some scholars used a posthuman perspective to critique the existing psychological understandings of creativity (Harris & Holman Jones, 2022), pointing out the ways in which creativity can also be viewed as embedded in the world around us, including the natural world (plants, animals, etc.) and the artificial world (material objects, tools, the digital or computational world)—more than Western psychology has recognized (Henriksen et al., 2022). While Dr. Mollick doesn't explicitly take a posthuman perspective, his questioning of these constructs points to AI's destabilization of human understandings:

> What does it mean that it is intelligent or creative? I fall back on the great American philosophy of pragmatism…We need to think about what this is and what it does, because we have seen how inadequate our tests are in this space. AI can perform on creativity tests—does that mean it is creative? People point out that many such tests were always bad, like the Remote Associates Test. But they were not *that* bad until AI came along—they were what we had. But now tests like the RAT or the Alternative Uses Test are terrible.

Many scholars have written about the "alignment problem" with respect to AI (Christian, 2020), namely that the goals of the AI system may not necessarily align with the goals of its human creators. Dr. Mollick goes even deeper, revealing alignment problems in our assessments of understanding, creativity and more. When there were no AI systems, an essay was a possible adequate proxy for capturing student understanding. But the advent of generative AI systems has laid bare these foundational alignment problems, and pushes us as educators to go deeper and think harder about how we assess student learning, creativity, and maybe, even raise questions about what makes us human.

In many ways, human exceptionalism has always been a moving target, and AI simply lays that instability bare. Dr. Mollick pointed out that as people try to figure out what defines intelligence or humanity, AI forces them to move the goalposts to argue that these things are innately human. He compared this to what has been termed as the "God of the Gaps" argument, which has become a way of pointing to how often theological perspectives take gaps in scientific knowledge to be evidence or proof of God's existence (Snoke, 2001). This suggests that humans are often looking for the gaps in understanding to find evidence of what is uniquely "human" or special, and then we try to define our constructs based on those gaps. He noted that the things that are uniquely human keep shrinking and then people end up shrinking their targets:

> We are in that place with consciousness and sentience—where we are left realizing that AI can do these things that have typically been indicators of sentience, and AI, by definition, cannot be sentient. So, soon all humans will be left to point to in our definitions will be that 'ineffable spark of humanity.'

And this sense of trying to figure out what forms of thinking are human, and which are not, readily spills over into education. This concern is most familiar currently as people try to figure out what constitutes, or what should constitute, evidence of students' thinking and learning. The most basic form of this is, of course, the concerns around how to determine if students' written products have been created with the help of AI. As he put it:

> For the people saying, "Oh, I can tell an AI-written essay," …you can tell an AI-written essay for students who put the absolute bare minimum effort into it. But in my assignments, I have forced my students to use AI and they need to iterate multiple times with the AI. After two or three good iterations, there is really no way to detect an AI-assisted paper, and you would read it and think, "This is really good." So, we need to be cautious about our assumptions.

So much of the uncertainty, unknowability, and caution surrounding AI is related to the rapid pace of digital/computational evolution and change, which in recent decades has happened at a rate never seen before in human history; and AI will only amplify these rates of change. Dr. Mollick noted how less than a year ago, he started playing with Midjourney, and while he has no artistic training or experience, he could create an account and use the tools. Some of his Midjourney tweets went viral, and people began paying attention to his artworks, hanging them in their offices. He noted that "these models have increased in ability and scale at a rate that we were not expecting to happen, and it has been a progressive thing." And while "the first round of education changes are the obvious ones," we don't have a way to predict what will happen next, since AI evolves so rapidly. In that sense, any immediate or obvious changes to teaching, learning, and education via AI are "just the tip of the iceberg."

Conclusion

Our conversation with Dr. Mollick illuminated how important it is that educators familiarize themselves with AI and use it frequently and fluidly—to be comfortable living in a world where it's part of the ecosystem.

> I think everyone needs to be using these tools. I may come across as a wild-eyed tech enthusiast…but I am very conservative about technology. However, the more I use it and talk to people who use this in different ways, the clearer it becomes that this is profoundly different and ever-changing. What makes it exciting is that there are no rules here. Anyone can be the person who discovers a new use. So, I think everyone needs to be using this because we do not know what the future looks like.

Dr. Mollick's perspective is by no means an uncritical embracing of AI. Certainly, in our conversation, he recognized a range of possible problems, tensions, or concerns that we should be aware of and ready to address as they evolve. Rather, he pragmatically recognizes that AI is part of our world now, is rapidly ever-changing, and has an unpredictable trajectory—a situation that demands educators become savvy about it and willing to engage in productive, creative and effective uses that maximize its learning potential and mitigate its pitfalls. In that way, we may be able to shift away from outmoded practices of the past, to serve students better right now, and prepare them for the unknowable future.

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