Leveraging AI for MOOC Course Preparation: A Reflection From Online Instructors

Y. T. Chow, The Hong Kong Polytechnic University, Hong Kong SAR

The Asian Conference on Education 2024
Official Conference Proceedings

Abstract
Massive Open Online Courses (MOOCs) have entered their second decades of existence and continued to evolve. However, concerns related to their cost, quality assurance, and the problem of low participation rate still persist. While Artificial Intelligence (AI) is widely recognised as a powerful tool for enhancing productivity and even completing tasks that require human intelligence traditionally, the current discussion regarding the potential use of AI in online courses preparation remains fragmented and has yet to be explored. This paper examines the potential of adopting multiple AI tools inspired by the "AI family tree" model in the delivery of MOOC videos. Based on our experience in developing a small-scale private online course, we critically assessed the potential of technology based on different branches of the AI family tree. Our experiences reveal that the ever-evolving speech and natural language processing tools could reduce the time spent in preparing MOOC videos, while new generative text-to-image tools could address the cost concerns from using licensed materials. Meanwhile, an AI-enabled Avatar could encourage instructor's participation in online course development. Besides, this paper also discusses the potential and limitations of using other AI tools, such as machine learning and machine vision, to enhance instructor support and identify non-participative students. Our findings suggest a blended approach, leveraging multiple AI tools in establishing and running engaging MOOC courses, and provide practical insights in addressing cost and time constraints.

Keywords: MOOC, AI Family Tree, Instructor's Participation, Small Private Online Course

Introduction

Massive Open Online Courses (MOOCs) are online courses that are open to the public (Rodriguez, 2012). The "open" nature implies that these courses are supposed to have low entrance requirements and offered at no cost. The MOOC model has been widely recognized by higher institutions across the globe since the 2010s (Reich & Ruipérez-Valiente, 2019) and is now at their second decade of development. Advocates of MOOC concepts often follow the constructivist theories and recognize the significant potential of MOOC courses in creating engaging online learning communities.

Throughout its years of development, MOOCs have taken on various forms. While some MOOC project initiatives could be considered as marketing projects of higher institutions (Paiva & Bittencourt, 2018), it is not uncommon to see MOOC courses now structured in a way that leads to higher online degree qualifications with prices. Additionally, MOOC content developed by institutions can complement regular courses they offered. Some institutions have also created private MOOCs, often referred to as Small Private Online Courses (SPOCs), which are not open to the general public (Thomas et al., 2016). In most cases, such courses adopted a blended learning approach. In other cases, private MOOC courses serve as pilot initiative before being made available to the public (e.g. Nidhom et al., 2022).

Meanwhile, some problems of MOOC courses are highly concerning. As these online courses are open in nature and offered at low cost, low completion rates are reported in many of these courses. Seeing a rather high drop-out rate of 40–80% in early MOOC courses, Kennedy (2014) pointed out that learners in MOOC courses could suffer from a lack of instructor support. Since many of the courses are only offered in English or other designated languages, depending on the instructors, the language barrier could be huge for learners who do not possess strong language skills.

In this modern age, AI is widely integrated into different tools that educators use, which potentially leading to wider access to education (Nidhom et al., 2022). However, Wilton and colleagues (2022) have pointed out that educators nowadays seem to lack awareness of the AI tools that are available to them. Therefore, the current research on AI applications in MOOC are at a fragmented state. Specifically, this study aims to address the following research questions:

1. What is the current utilization of different AI systems in online education video projects?
2. Reflecting on our experience, what are the essential AI tools in MOOC course preparation?

Artificial Intelligence Models

The concept of Artificial Intelligence (AI) is multifaceted. Taking on its literal meaning, Luckin (2018) defines AI as "technology capable of actions and behaviors requiring intelligence when done by humans", which differentiates AI-enabled technology from traditional machines that only complete designated tasks. However, although this definition explains the fundamental idea of AI well, educators seem to have difficulties recognizing the available AI tools in this time of technological advancement and the prevalence of AI tools (Wilton et al., 2022).

In fact, there are many models working on classifying different types of AI. For example, Lee Kai-Fu, a renowned computer scientist and venture capitalist who also served as the former President of Google China, describes that AI actually comes in “four waves” (Lee, 2018). The first wave startes with the Internet AI which refers to algorithmic systems used in search engines to generate personalized results. The next wave involves Business AI, which explores additional business value with the use of data. The third wave, Perception AI, focuses on AI technologies enabling accurate voice and image recognition within sensor ecosystems. The fourth and the last wave of AI technology is named as Autonomous AI, referring to the AI robotic technology that interacts with the physical world based on the perception.

AI systems can also be categorized by their capabilities (IBM, 2023). Artificial narrow AI, as known as Weak AI, refers to AI systems that were trained to perform narrow tasks, but are often more effective than a human mind in those specific tasks. Artificial General Intelligence (AGI), also known as Strong AI, is a theoretical AI system that can use previous learning to accomplish new tasks beyond the specified ones. This means that an AGI system could perform any intellectual task like a human being without requiring a human programmer to train them through data models. The Super AI is with the greatest capability that thinks, reasons and makes judgments beyond human capabilities. Super AI would also be capable to understand human emotions and possess beliefs and desires. AI systems could also be categorized by their functionalities (Rather et al., 2024). Reactive machine is an AI system that is engineered to response only to its environment in real-time. This system is not supposed to remember or record data beyond its established purposes. Limited Memory AI systems are trained by past data to make decisions. They have short-lived memories and cannot expand their experience library. Theory of Mind is an AI system with more advanced capabilities that understands the beliefs, emotions and intentions of other agents. Self-Aware AI possesses a real sense of self on its internal condition and limitations, along with its own set of emotions, needs and belief.

In the current research, the “AI family tree” model is used due to its suitability and simplicity. This model groups different AI applications, including machine learning, expert systems, planning, natural language processing, speech recognition, machine vision and robotics. Like other models discussed in the previous paragraphs, this model first appeared on the internet as a general opinion. The early trace of this model first appeared around 2016 in Thomson Reuters (Mills, 2016), yet it was later widely adopted in academic papers (e.g. Cai, 2020; Katz, 2021).

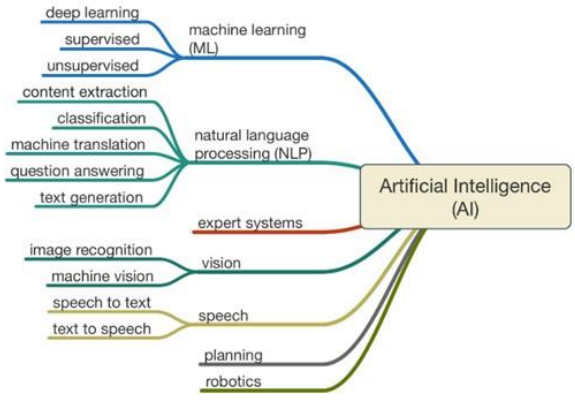

Figure 1: A Family Tree for AI
Source: Mills (2016)

When compared to others AI models, the "AI family tree" model is more straightforward due to the absence of abstract theoretical ideas, while at the same time being more practical because the usefulness of most branches in the family tree for MOOC course preparation can be assessed based on the current technological level. In online learning courses, there might not be any physical presence of activities. That makes this model particularly appropriate since many "AI family tree" branches pertain to the digital domain. While the physical robotic applications of AI will not be discussed in the current study, our discussion still covers most of the model. It is also noted that generative AI tools (e.g. ChatGPT) have not yet gained recognition and popularity yet when this model was developed. Still, most of the generative AI tools described by the academia nowadays could be seen as extensions of the natural language processing (NLP) technology (Iorliam & Ingio, 2024).

Methods

This study was driven by the critical reflection approach (Morley, 2008). Different from a positivist approach to research, the critical reflection approach deconstructs one's experience of a case of analysis and formulates new discourses that are more enabling. In the current research, we reflected on our experiences to reconstruct multiple concerns and constraints in the MOOC video preparation process. According to Ross and Call-Cummings (2020), research on limitations or failures is currently less addressed but is very useful in identifying broader resources and reconstructing new knowledge. Based on our reflection, we then critically assessed the potential of technology based on different branches of the AI family tree.

The Case Institution and Course Concerned

After the COVID-19 pandemic, certain teaching and administrative processes involving digital tools at our college remained in use, for example, the assessment submission and marking of students' results, and uploading teaching videos after each class. Capitalizing on the maturity of such digital tools at such time, the management at our college also explored new digital tools which can further support student learning. Viewing online and blended courses as new branding initiatives and business opportunities (Paiva & Bittencourt, 2018), the college decided to produce new learning video clips for certain established subjects. These video clips were supposed to have higher production quality when compared to general teaching recordings, making them suitable for branding purposes.

Our course is an introductory marketing course. Every year, the course is offered to around 2000 students by 10-15 teaching staff in face-to-face mode. Initially, the management proposed that video clips should cover 20% of the content for a 13-week semester course—equivalent to approximately 5 hours of teaching time. The task force, consisting of three teachers, began by identifying six potential topics for video production. Considering the typical length of MOOC video content, as well as resource and budget constraints, four video clips were eventually produced. One of these video clips provided a briefing on a key assessment item, while the other three videos covered topics that students often found challenging. Altogether, approximately 70 minutes of video content were created in the summer in 2022. Table 1 below provides a description of the content. With the help of our in-house studio, the video production costed $12940 Hong Kong Dollars (approximately USD $1650) of the internal budget.

Table 1: List of Video Content Created

Content	Length of video (mm:ss)	Major content
Group assessment	25:18	Assignment briefing, Assessment rubrics, Elements of marketing plan, FAQs
Marketing research	12:57	Teaching content of marketing research process, self-checking questions
Pricing strategies	15:05	Teaching content of Pricing strategies, role play, self-checking questions
Consumer behavior	16:21	Teaching content of Consumer behavior, role play, self-checking questions

Key Challenges in MOOC Project

In the production process, some immediate concerns were raised. Since the teaching team adopted teaching contents from a textbook, the teaching content was licensed. These copyright-protected materials were strictly for teaching purposes within the school context and should not be used to produce MOOC content. While many teaching materials related to marketing concepts are available on the internet, focused case studies and some related visual materials (e.g., mind maps, figures for illustration) could be strictly copyright protected. Therefore, the subject team created plots for role-playing and avoided using specific case studies. Additionally, for illustrative figures, the in-house production studio incorporated a lot of royalty-free stock video materials in the MOOC videos.

Another immediate concern was the relatively low willingness to participate in video shooting. The video shooting project was considered an extra, underpaid duty. Apart from that, some teachers are also concerned about the potential publicity of the video clips and feel embarrassed. They could be worried about their appearance. To create the video clips, team members divided their work and wrote the script and lines before they could be shown on the teleprompter. While the instructors had no experience in video shooting, the shooting process took 3-5 times the actual video length. After the editing process, the instructors also spent rounds checking the accuracy of the captions. Since there is only one in-house studio serving all video projects, the initial draft of the first video was available only after two months, while all the videos were finalized almost a year after shooting.

First established as a MOOC project, it eventually became an additional learning support source for students, and all face-to-face classes maintained the same coverage and time. Although the instructors included some self-checking questions and frequently asked questions (FAQs) in the videos, like other MOOC projects, further learning support could be limited (Kennedy, 2014). The video clips were hosted in a private video channel that provided basic metrics such as the number of views, viewers, and distribution of watch time; however, the instructors might still lack the resources to conduct in-depth analysis.

Usage of AI in Addressing Challenges of MOOC Projects

The following section maps the potential use of related AI technology within the AI family tree with the challenges of MOOC projects specified in the previous section. We intentionally and purposively searched for scholarly works related to specific AI applications regarding MOOC projects at each branch of the AI family tree. Table 2 below shows a summary of our

results. Additionally, we also group the limitations identified in the previous research at the end of our discussion.

Table 2: Summary of use of AI in Addressing Challenges of MOOC Projects

Branches of AI Family Tree	Challenges	Related Papers	Solutions established
Machine learning / Expert system / Planning	Low finishing rate (Rodriguez, 2012)	Paiva & Bittencourt (2018)	Developed the Pedagogical decision-making process (PDMP) - To use educational data analysis to detect performance and predict who is dropping out or underperforming
	Lack of instructor support (Kennedy, 2014)	El-Rashidy et al. (2023)	Used a new model to classify urgent posts in MOOC platforms
Natural language processing	Lack of instructor support (Kennedy, 2014)	Han et al. (2023)	Developed a chatbot that provides support to course administration matters
Natural language processing: Generative AI	Lack of instructor support (Kennedy, 2014)	Li & Xing (2021)	Developed a GPT-2 based model to reply to students' comments on the discussion forum
	Lack of instructor support (Kennedy, 2014)	Hu et al. (2024)	Incorporated Generative AI in classifying and understanding confusion of MOOC messages
Speech to text	Time consuming process in video editing Language barrier	Miró et al. (2018)	Reported a saving of 25%-75% of the time in post-editing MOOC videos with automatic speech recognition and machine translation while boosting student enrolment by 70%
Machine Vision	Time consuming process in video editing	Zhou et al. (2022)	Reenacted high quality video through gestures recognition and matching
	Low finishing rate (Rodriguez, 2012)	Espacenet (2021)	Patent established for eyeball tracking to track learning state.
Avatar	Instructors' embarrassment from the publicity	Adham et al. (2018)	Used Avatars to break the gender segregated online learning Within MOOCs
Text to image	Restricted use of copyright-protected material	N/A	N/A

The machine learning branch of AI has been widely adopted in MOOC administration. While low-completion rates have long been recognized as a major challenge with MOOC courses (Rodriguez, 2012), machine learning techniques have been used to analyse different data from MOOC platforms. These techniques help identify students who are at risk of

incompletion. For example, Paiva and Bittencourt (2018) developed a pedagogical decision-making process to help online instructors track the progress of their students. Besides, some machine learning solutions acted like virtual assistants, identifying each student's learning style and predicting potential dropouts. El-Rashidy and colleagues (2023) proposed a new algorithm to identify urgent posts in MOOC platforms for instructors managing large MOOC courses. They successfully filtered out around 20% of the total posts that required extra attention.

In the area of Natural language processing, Han and colleagues (2023) developed a Q&A chatbot for their MOOC courses. Focusing on the difference of expectations of native and non-native English users, their results indicated that the chatbot could provide essential help for learners. In terms of speech functions, Miró and colleagues (2018), in particular, investigated the transcription quality and translation quality of a multilanguage MOOC platform with open access tools by measuring the Word Error Rate (WER) and Translation Edit Rate (TER). While reporting satisfactory performance for both the transcription and translation tools, they stressed that even if automatic source subtitles are only available at moderate quality, they remain highly useful for learners whose first language is not English or for those with special needs.

Generative AI tools are highly regarded by educators today. Specifically, the word generation function is considered a branch of Natural Language Processing (NLP) in the AI family tree model. On one hand, some traditional AI functions, such as chatbot and translation can now be efficiently performed by Generative AI due to its enhanced capability and ease of use. For example, Li and Xing (2021) utilized a GPT-2-based language model to provide informational, emotional and community support by responding to learners on a MOOC platform. Hu and colleagues (2024) used a large language model (LLM) based on Generative AI technology to identify word-level indicators of confusion in MOOC messages. On the other hand, generative AI tools could serve more generic functions, including designing learning experiences, assessing student learning, and even content creation (Bozkurt & Sharma; 2023).

In video making, modern video taking tools often utilize certain level of machine vision to enhance video quality. Zhou and colleagues (2022) uses gesture matching technology to reassemble videos and synthesize video frames with audio tracks. However, traditional machine vision may be less relevant to MOOC course development because production studios can handle many tasks based on their expertise. This also explains a relatively fewer literature available on this branch of artificial intelligence. Another MOOC specific innovation involves a patent filed for eyeball tracking tools to monitor learners' states (Espacenet, 2021). Not only could this setting potentially raise privacy concerns, but there is also a need for specific equipment at the learner's premises. However, as an extension of machine vision, avatar creation could address the particular challenge from our case of instructors' reluctance to show their faces. Adham and colleagues (2018) used an Avatar tool to represent a female tutor in a MOOC course in Saudi Arabia as a gender-segregated society. The results indicated that most students were greatly interested in the videos. The teacher also believed that the Avatar contributed to the course's success by conveying teachers' presence and support, even though their faces were not shown.

With the increasing concerns and research for generative AI, Text-to-image as a related AI tool is still under-researched in educational research. To our best effort, no academic work focuses on the applications of such AI technology in creating MOOC content is found. As

pointed out by Vartiainen and Tedre (2023), teachers who use text-to-image technology do have their tensions. Not only did the teachers could create quality visualizations in a fairly short time, but the visualization process could also trigger new ideas. However, the teachers in this research also expressed their concerns about copyright related issues.

Limitations of Artificial Intelligence for MOOC

While artificial intelligence tools can generally address different challenges in preparing and administering MOOC courses, related studies highlight a few limitations. The first limitation lies in the practicality of some AI tools. For example, although gesture recognition tools are believed to enhance the quality of teaching videos when instructors film their own video clips or engage in video conferencing, MOOC video production is often supported by the institution. Besides, editing might still be necessary even when these machine vision tools are used. When avatars are used to replace instructors' faces, Adham and colleagues (2018) noted that such AI technology could incur additional time and effort.

The functionality of AI could be another area of concern, hindered by the quality of data and algorithm used for training. For example, newly deployed chatbot may only understand limited questions and provide standard answers. Since MOOCs are supposed to be held on open education platforms with low enrollment requirements (Rodriguez, 2012), online learners may not possess the same high cognitive and non-cognitive skills as the other learners in tertiary contexts. As described by Han and colleagues (2023), the chatbot they developed could not understand English questions of some non-native MOOC students. Despite the continuous development of new algorithms to detect weak learners, the dropout rate has remained high over the years (Reich & Ruipérez-Valiente, 2019).

The roles of AI and humans are also an area of concern. Users may not feel comfortable when they know certain activities, such as answering their questions and assessing learning progress, are provided by AI (Bozkurt & Sharma, 2023; Han et al., 2023). While overreliance on AI tools could lead to a lack of critical thinking and independent learning (Bozkurt & Sharma, 2023). Like all other AI tools, generative AI tools are trained on designated datasets, which bias in both data and algorithms presents a large area of concern for learning. To a certain extent, the creativity used by AI to generate new materials is based on a massive amount of resources available in the system's database. Lastly, ethical issues and copyright related to the use of generative AI, particularly image generation, are still under debate (Vartiainen & Tedre, 2023). Although the images generated are said to be created by AI, whether the author approves the data used to feed such a system remains a problem in many cases.

Conclusion

Our discussion suggests that different AI tools could potentially address different challenges identified through our critical reflection. AI-enabled technology holds significant potential for facilitating instructors to prepare MOOC video clips and run MOOC courses. In particular, the maturity of Natural language processing branch from the AI family tree could enhance instructors' efficiency. Avatar and text-to-image technology could address specific concerns related to the publicity of instructors and the restricted use of licensed teaching materials. Although the machine learning branch was adopted earlier in MOOC projects, its overall effectiveness for the MOOC community remains in doubt. Compared to other branches, the robotic and machine vision branches receive less attention, and their adoption

should be given lower priority. Still, we expect that a mixed use of multiple AI technologies tailored to the school context will be essential for successful MOOC project delivery.

This study possesses a few limitations. While the AI family tree model provides general guidance to several existing AI technologies for our discussion, it may lack imagination regarding the future work environment when AI technology becomes more mature and ubiquitous. The MOOC landscape could fundamentally change when strong AI and super AI are developed. Moreover, while authentic, the critical reflection approach is subject to bias. In the future, critical reflection research could be carried out in other higher institutions where MOOC projects are carried out. Furthermore, subsequent research could prioritize various AI tools, providing a priority list for MOOC project teams when resources are limited.

References

Adham, R., Parslow, P., Dimitriadi, Y., & Lundqvist, K. Ø. (2018). The use of avatars in gender segregated online learning within MOOCs in Saudi Arabia - A Rwaq case study. *International Review of Research in Open and Distance Learning*, *19*(1), 202–220. https://doi.org/10.19173/irrodl.v19i1.3139

Bozkurt, A., & Sharma, R. C. (2023). Challenging the status quo and exploring the new boundaries in the age of algorithms: Reimagining the role of generative ai in distance education and online learning. *Asian Journal of Distance Education*, *18*(1), i-viii. https://doi.org/ 10.5281/zenodo.7755272

Cai, Y. (2020). Safety analytics for AI systems. In *HCI International 2020 - Late Breaking Papers: Multimodality and Intelligence* (Vol. 12424, pp. 434–448). Springer International Publishing. https://doi.org/10.1007/978-3-030-60117-1_32

El-Rashidy, M. A., Farouk, A., El-Fishawy, N. A., Aslan, H. K., & Khodeir, N. A. (2023). New weighted BERT features and multi-CNN models to enhance the performance of MOOC posts classification. *Neural Computing & Applications*, *35*(24), 18019–18033. https://doi.org/10.1007/s00521-023-08673-z

Espacenet. (2021). *CN113436039 (A) - Student classroom concentration state detection method based on eye tracker in distance education*. https://worldwide.espacenet.com/publicationDetails/biblio?FT=D&date=20210924&DB=EPODOC&CC=CN&NR=113436039A

Han, S., Liu, M., Pan, Z., Cai, Y., & Shao, P. (2023). Making FAQ chatbots more inclusive: An examination of non-native english users' interactions with new technology in massive open online courses. *International Journal of Artificial Intelligence in Education*, *33*(3), 752–780. https://doi.org/10.1007/s40593-022-00311-4

Hu, Y., Giacaman, N., & Donald, C. (2024). Enhancing trust in generative AI: Investigating explainability of LLMs to analyse confusion in MOOC discussions. *CEUR Workshop Proceedings*, *3667*, 195–204.

IBM. (2023). *Understanding the different types of artificial intelligence*. https://www.ibm.com/think/topics/artificial-intelligence-types

Iorliam, A. & Ingio, J. (2024). A comparative analysis of generative artificial intelligence tools for natural language processing. *Journal of Computing Theories and Applications*, *2*(1), 91-105. https://doi.org/10.62411/jcta.9447

Katz, D. M. (2021). AI + Law: An overview. In D. M. Katz, R. Dolin, & M. J. Bommarito (Eds.), *Legal informatics* (pp. 87–93). Cambridge University Press.

Kennedy, J. (2014). Characteristics of massive open online courses (MOOCs): A research review, 2009-2012. *Journal of Interactive Online Learning*, *13*(1), 1-16.

Lee, K.F. (2018). The four waves of A.I. *Fortune*. https://fortune.com/2018/10/22/artificial-intelligence-ai-deep-learning-kai-fu-lee/

Li, C., & Xing, W. (2021). Natural language generation using deep learning to support MOOC learners. *International Journal of Artificial Intelligence in Education*, *31*(2), 186–214. https://doi.org/10.1007/s40593-020-00235-x

Luckin, R. (2018). *Machine learning and human intelligence: The future of education for the 21st century*. UCL Press.

Mills, M. (2016) *Artificial intelligence in law: The state of play 2016*. https://www.thomsonreuters.com/en-us/posts/legal/artificial-intelligence-in-law-the-state-of-play-2016/

Miró, J. D. V., Baquero-Arnal, P., Civera, J., Turró, C., & Juan, A. (2018). Multilingual videos for MOOCs and OER. *Educational Technology & Society*, *21*(2), 1–12.

Morley, C. (2008). Critical reflection as a research methodology. In P. Liamputtong & J, Rumbold (Eds.), *Knowing differently: Arts-based and collaborative research methods* (pp.265-280). Nova Science Publishers.

Nidhom, A. M., Putra, A. B. N. R., Smaragdina, A. A., Dyah, K. N. G., Habibi, M. A., & Yunos, J. M. (2022). The integration of augmented reality into MOOC's in vocational education to support education 3.0. *International Journal of Interactive Mobile Technologies*, *16*(3), 20–31. https://doi.org/10.3991/IJIM.V16I03.28961

Paiva, R., & Bittencourt, I.I. (2018). Helping MOOC Teachers do their job. In: Cristea, A., Bittencourt, I., Lima, F. (eds), *From challenges to novel technology-enhanced solutions. Higher education for all (HEFA) 2017* (pp.52-67). Springer. https://doi.org/10.1007/978-3-319-97934-2_4

Rather, M.A., Ahmad, I., Shah, A., Ahmad Hajam, Y., Amin, A., Khursheed, S., Ahmad, I., & Rasool, S. (2024). Exploring opportunities of artificial intelligence in aquaculture to meet increasing food demand. *Food Chemistry: X*, 22, 101309–101309. https://doi.org/10.1016/j.fochx.2024.101309

Reich, J., & Ruipérez-Valiente, J. A. (2019). The MOOC pivot. *Science*, *363*, 130–131. https://doi.org/10.1126/science.aav7958

Rodriguez, C. O. (2012). MOOCs and the AI-stanford like courses: Two successful and distinct course formats for massive open online courses. *European Journal of Open, Distance and E-Learning*, 15, 1-13.

Ross, K., & Call-Cummings, M. (2020). Reflections on failure: teaching research methodology. *International Journal of Research & Method in Education*, *43*(5), 498–511. https://doi.org/10.1080/1743727X.2020.1719060

Thomas, G., Kumar, A., Bijlani, K., & Aswathy, R. (2016). Phieval: Four-phase plagiarism detection system in private MOOCs. In N. R. Shetty, N. H. Prasad, & N. Nalini (Eds.) *Emerging Research in Computing, Information, Communication and Applications (ERCICA 2015)* (pp. 511–521). Springer. https://doi.org/10.1007/978-981-10-0287-8_48

Vartiainen, H., & Tedre, M. (2023). Using artificial intelligence in craft education: crafting with text-to-image generative models. Digital Creativity, *34*(1), 1–21. https://doi.org/10.1080/14626268.2023.2174557

Wilton, L., Ip, S., Sharma, M., & Fan, F. (2022). Where is the AI? AI literacy for educators. In M. M. Rodrigo, N. Matsuda, A. I. Cristea, & V. Dimitrova (Eds.) *Artificial intelligence in education: posters and late breaking results, workshops and tutorials, industry and innovation tracks, practitioners and doctoral consortium, Part II*, 180–188. https://doi.org/10.1007/978-3-031-11647-6_31

Zhou, Y., Yang, J., Li, D., Saito, J., Aneja, D., & Kalogerakis, E. (2022). Audio-driven neural gesture reenactment with video motion graphs. In 2022 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) (pp. 3418-3428), https://doi.org/10.1109/CVPR52688.2022.00341

Contact email: hester.chow@cpce-polyu.edu.hk