

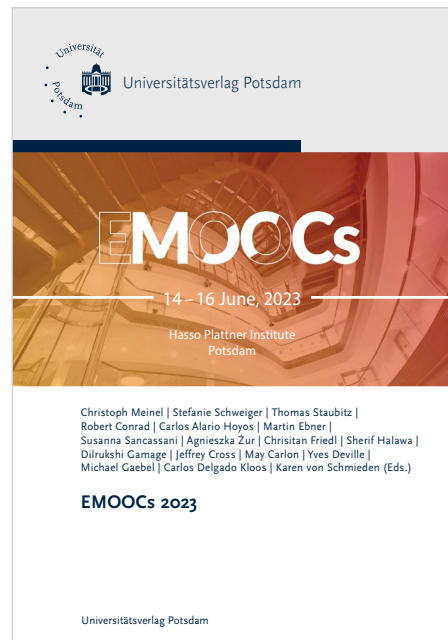
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Optimizing the Design, Pedagogical Decision-Making and Development of MOOCs Through the Use of Ai-Based Tools

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This work explores the use of different generative AI tools in the design of MOOC courses. Authors in this experience employed a variety of AI-based tools, including natural language processing tools (e.g. *Chat-GPT*), and multimedia content authoring tools (e.g. *DALLE-2*, *Midjourney*, *Tome.ai*) to assist in the course design process. The aim was to address the unique challenges of MOOC course design, which includes to create engaging and effective content, to design interactive learning activities, and to assess student learning outcomes. The authors identified positive results with the incorporation of AI-based tools, which significantly improved the quality and effectiveness of MOOC course design. The tools proved particularly effective in analyzing and categorizing course content, identifying key learning objectives, and designing interactive learning activities that engaged students and facilitated learning. Moreover, the use of AI-based tools, streamlined the course design process, significantly reducing the time required to design and prepare the courses. In conclusion, the integration of generative AI tools into the MOOC course design process holds great potential for improving the quality and efficiency of these courses. Researchers and course designers should consider the advantages of incorporating generative AI tools into their design process to enhance their course offerings and facilitate student learning outcomes while also reducing the time and effort required for course development.

1 Introduction

Massive Open Online Courses (MOOCs) have revolutionized traditional educational models by offering students flexible access to high-quality instructional content [4]. Effective instructional design is essential for meaningful and thor-

ough learning, and MOOC design can engage students and facilitate such learning. Several instructional design models appropriate for online environments have been developed, including the models: *ADDIE*, Dick and Carey, Bates, Dabbagh, and Bannan-Ritland, and Morrison, Ross, Kemp, Kalman, and Kemp [2]. Despite standard design procedures, different instructional designs for MOOCs can result in varying outcomes. Therefore, the design of MOOCs should consider multiple perspectives, such as the learning environment, the learner cohort, the prior knowledge of the learners, the scaffolding, and social interaction among learners in order to accommodate a variety of learning circumstances and needs [8]. Authors in [1] conducted a study that classified MOOC design considerations into three major categories: resources, pedagogy, and logistics. MOOC design should incorporate key principles of instructional design, connectivist learning theory, and self-regulated learning strategies to ensure rigorous instructional design, promote social interaction, and enhance learners' self-direction and time-management abilities.

The use of generative AI tools in instructional design represents an interesting field of exploration. Such tools can assist instructional designers in multiple tasks, including content analysis, identifying learning objectives, designing interactive learning activities, and evaluating student learning outcomes. By analyzing and categorizing course content, generative AI tools can identify gaps and redundancies, and provide insights into learner preferences and behavior [3]. Previous courses and experiences can also provide valuable insights and opportunities to create new courses [7]. It is important to note that generative AI tools should not replace instructional designers; but rather support them in their job. Instructional designers must have a clear understanding of the learning objectives, learner needs, and course requirements before incorporating generative AI tools into the design process. This means that instructional designers must collaborate with generative AI tools to ensure that the course is tailored to the learners' needs. One of the biggest challenges of generative AI tools (e.g. *ChatGPT*) is that, while they can generate consistent and sometimes surprising responses, these responses may not always be accurate or reliable. The lack of context and limited training can lead to incorrect or inappropriate responses. Furthermore, using Generative AI tools requires instructional designers to have a certain level of technical expertise. They must understand how the tools work, what data they are analyzing, and how to interpret the results. This requires instructional designers to undergo training to develop skills to work with Generative AI tools effectively.

This paper describes the experience designing a MOOC using the help of generative AI tools. The specific tools employed are described, along with key considerations and best practices for optimizing the pedagogical decision-making, design, and development of MOOCs. The course "Transforming Education with Artificial Intelligence: How to Use ChatGPT in the Classroom" serves as a guide and provides examples for innovative educators interested in incorporating AI into

their teaching methods. The experience of designing and developing the course provided teachers with valuable insights on how to enhance their pedagogical approach with generative AI tools. This work highlights the potential of generative AI tools in the design of MOOCs, particularly in the creation of educational resources as well as authentic and engaging learning experiences for learners from diverse backgrounds. In addition, the course is an invaluable resource for educators interested in exploring the educational potential of AI. The experience underscores the importance of integrating emerging technologies into pedagogical practice to foster meaningful learning experiences.

2 MOOC Course Design

The objective of the course titled “Transforming Education with Artificial Intelligence: How to Use ChatGPT in the Classroom” was to share fundamental knowledge on the integration of AI in education, with a particular emphasis on sharing practical examples of using prompts to help teachers maximize *ChatGPT*’s potential. The course focused on instructing participants how to correctly create prompts and use certain applications, including extensions and tools that utilize *GPT-4*. The course was designed with 25 short video lectures distributed across five modules. These modules included an introduction to *ChatGPT*, practical examples of how *ChatGPT* can be used effectively in the teaching process, AI-based content generation tools and *ChatGPT*, ethical and privacy challenges in the use of *ChatGPT* in education, reflections, and additional resources for further research. The course also identified the potential of generative AI tools as an integral part of the learning process. The role of the tools was to assist instructional designers with several tasks, including educational planning, learning planning, the creation of personalized instructional materials, the design of learning activities, and assessments.

To implement the course, the platform *Thinkific* was utilized. *Thinkific* is an online course platform that provides instructors with various tools for creating, marketing, and selling their courses. It includes a course creation tool, a website builder, a marketing and sales package, and tools for student engagement. The platform made it easy to distribute course materials, monitor student progress, and communicate with students. It provided an intuitive interface for participants to access course content and complete assessments. The course was taught in Spanish, and the response from Latin American students was overwhelmingly positive. The first cohort consisted of 1433 students, with 52% being male and 48% female. The majority of students were from Ecuador, Guatemala, and Mexico. The course’s 15 percent completion rate indicates a high level of interest in the topic among the participants.

The methodology used to design the MOOC course with generative AI tools was meticulously crafted to ensure a highly efficient and effective design process. Beginning with the identification of learning objectives and course content, the process continued with the establishment of the MOOC structure design, including the determination of workload per module, learning objectives, syllabus, study guide, and timeline. *ChatGPT* played a crucial role in the development of the video's script and concept by recommending the most suitable video format, such as animations, infographics, talking heads, or screencasts, and assisting in identifying graphic elements that could highlight the course's core concepts. In addition, *ChatGPT* was utilized to generate PDF-formatted supporting documents, whereas *DALLE-2* and *Midjourney* were utilized to generate supporting images. *DALLE-2* is a state-of-the-art language model developed by OpenAI that can generate coherent and high-quality realistic images and art based on a given prompt. In this course, the designer used *DALLE-2* to generate initial versions of course graphical content and infographics, which allowed her to quickly generate engaging content reducing the need of a professional graphic designer. *Midjourney* is an AI-based tool that can generate suggestions for visual aids, such as infographics and charts based on a given prompt. By using this AI-based tools, the designers were able to quickly generate ideas for visual aids that helped to enhance the learning experience for the students. *Tomme.app* was used to create presentations, whereas *Play.ht* was used to create podcasts. *Tome.app* is a tool that uses AI to generate alternative text descriptions for images and storytelling and was used to generate the storytelling and alternative text descriptions for images used in our course, which helped to ensure that all learners were able to engage with the course content. Both *ChatGPT* and *Overleaf* were utilized to create mind maps, with *ChatGPT* also being used to create learning activities, self-assessment tests, and peer assessment tasks. Within a microlearning environment, synthetic videos were produced with the help of AI and served as instructional video content. Text-to-video (TTV) was produced with photorealistic synthetic images using the AI-powered video creation platform *Heygen*. *Heygen* created a synthetic clone of the teacher after establishing the photorealistic quality of the generated videos using multiple images of the teacher from different profiles and background scenarios. The synthetically generated video representation of the teacher that TTV input initiated received realistic gestures and movements thanks to neural video synthesis for the final production asset. Additionally, lip-sync feature of *Heygen* made it easy to create videos with a more authentic feel. The advanced features of *Heygen* have made content creation more efficient, empowering users to create high-quality, audience-engaging video content that generates results. In addition, *ChatGPT* was used to generate quizzes for summative assessment, providing a comprehensive evaluation of the students' learning outcomes. Table 1 outlines the learning resources developed and the tools used.

Table 1: Educational resource type and generative AI Tools used

Educational resource type	Generative AI tool used	
Content creation	Video script	ChatGPT
	Video concept	ChatGPT
	Video production and post-production	Heygen
	Support images	DALLE-2
	Support documents PDF	ChatGPT
	Podcast	Play.ht
	Content presentations	Tomme.app
	Mind maps	ChatGPT+ Overleaf
	Learning activities	ChatGPT
Design of the communication tools	Asynchronous tools: forums, blogs, wikis	ChatGPT
Design of assessment activities	Self-assessment tests (formative)	ChatGPT
	Tasks for peer assessment (P2P)	ChatGPT
	Test (summative)	ChatGPT

The integration of generative AI tools into the process of designing MOOCs has demonstrated several benefits for this experience. The creation of highly engaging and interactive educational resources that cater to the diverse learning needs of students is a significant advantage. These tools utilize AI-based algorithms to generate educational content that adapts to the preferences and proficiency levels of individual learners. In addition, the incorporation of these tools in the experience has improved scalability, allowing educational content to be delivered to a larger audience.

As discussed previously, AI has the potential to enhance the effectiveness of certain MOOC design and development processes. Even though these tools can generate content rapidly and efficiently, human input is still necessary to ensure the quality and accuracy of course materials. It is essential to create effective prompts to align generated content with course objectives and ensure that it is appropriate for the intended audience. This requires a thorough understanding of the topic and the needs and preferences of the audience. Prompts are phrases or questions that are used to direct a language mode, such as *ChatGPT*, to produce a response [6]. The quality of prompts is one of the most important factors in achieving a successful conversation with AI-based tools. Well-defined and accurate prompts can help

guide the conversation effectively, ensuring that the user's topics of interest are addressed. On the other hand, poorly defined prompts can generate unfocused and unproductive conversations, resulting in a less engaging and informative experience [8]. Therefore, it is crucial to pay attention to the quality of prompts and ensure that they are well constructed to achieve a successful conversation.

The quality and relevance of the prompts used can have a significant impact on the effectiveness of the response of the AI-based tool. In the context of instructional design for MOOCs, prompt engineering is a critical aspect of working with generative AI tools such as *ChatGPT*. To effectively communicate with AI-based tools, instructional designers must design prompts that are clear, concise, and relevant to the learning objectives of the course. In this context, we propose a set of prompt examples centered on the "educational field" that can be used in communication with *ChatGPT* to achieve better results.

(a) *Sequential prompts* aim to establish a logical progression in the conversation by employing a series of prior texts that permit a more elaborate and contextual response. To achieve this, they are organized in a logical order that guides the communication towards a particular goal. In the educational field, for instance, a sequential prompt can be used to ask the AI to describe the evolution of education over the past 50 years and how it has influenced educational innovation, followed by a question asking the AI to identify two examples of innovative technologies that have transformed education and explain how they function. Finally, the AI could be prompted to compose a concise article that synthesizes the aforementioned information and adds two examples of innovative technologies that have revolutionized education. This type of prompt enables a more elaborate and structured communication, which can be extremely beneficial in the field of education.

On the other hand, the (b) *comparative prompt* asks the AI to compare two or more things and/or situations in order to produce more precise results. For example, the AI could be asked to compare the effectiveness of online education with face-to-face education in terms of learning and motivation. It could also be asked to compare two innovative teaching methods and explain which one is more effective and why.

(c) The *argumentative prompt* intends for the AI to generate a coherent argument or position on a specific topic. In this type of prompt, there is typically a direct request for the AI to argue for or against an idea using previously supplied information. For example, the AI could be asked to argue why it is important to implement educational innovation today or to argue against online education and explain why face-to-face education the most effective option is still.

One of the most common types of dialogue generation prompts is (d) the *professional perspective prompt*, which requires the AI to assume the role of a particular person or profession and describe a topic within a given context. It has been demonstrated that using professional perspective prompts improves the quality of

responses generated by language model-based dialogue systems. The suggested structure for professional perspective prompts is “Act as [author or profession] and describe [topic] + context,” allowing *ChatGPT* to assume a particular role and provide a more detailed, objective, and structured response. For example, a professional perspective prompt could read, “Assume the role of a public health expert and explain how the current pandemic could be addressed through public policies”.

(e) *Wish list prompts* are another commonly used structure for obtaining more specific and relevant responses from *ChatGPT*. By providing a list of specific requirements that need to be met, users can provide detailed information about their needs and preferences, which allows *ChatGPT* to provide a more precise and focused response. The suggested structure for wish list prompts is “I am looking for [option/object/solution] with [requirement 1], [requirement 2], and [requirement 3]. Could you recommend some ideas?” For example, a wish list prompt could be “I am looking for a gamification tool to improve student engagement in my online classes, with student progress tracking and the ability to customize content. Could you provide me with a list of some applications that meet these requirements?”. As AI continues to advance, the potential of technology to transform education is increasing. In [5], a collection of prompts for instructional design is presented. In addition to the prompts, new ways of using chatbot and *ChatGPT* technology in education are being researched, such as creating personalized virtual tutors, gamification, and dialogue-based learning.

It is important to note that while AI can streamline certain aspects of content creation, it cannot replace human expertise entirely. It is essential to strike a balance between AI-generated content and human input in order to develop effective educational materials in the digital age.

3 Conclusion and Future Work

Future work in the field of instructional design and generative AI tools for MOOCs is promising. One area of potential future work is the application of natural language processing (NLP) to enhance the effectiveness of AI-based tools. NLP can improve the accuracy and relevance of responses provided by AI-based tools, making them more valuable for learners. Additionally, ongoing research focuses on developing more advanced generative AI tools that can adapt to the individual learner’s needs and preferences. It is also crucial to ensure that generative AI tools can be trained on real data from courses prepared by the institution’s teachers to maintain the editorial line and maintain consistency and a similar style.

Another area of future work is the establishment of best practices for integrating generative AI tools into instructional design. As the use of generative AI tools becomes more widespread in MOOC design, it is essential to develop standardized approaches and guidelines for their implementation. This will help ensure that the tools are used effectively and that the resulting courses are engaging and effective for learners. In conclusion, the use of generative AI tools in instructional design for MOOCs has the potential to revolutionize the way courses are designed and delivered. By leveraging generative AI tools such as *ChatGPT*, instructional designers can reduce the time and effort required to develop courses while also improving the engagement and effectiveness of the resulting courses.

However, it is important to note that the use of generative AI tools requires a deep understanding of the learning objectives and the learners' needs. Moreover, effective communication with generative AI tools requires prompt engineering, data selection, and ongoing monitoring and evaluation. As the field of AI-based instructional design continues to evolve, there is a need for ongoing research and the development of best practices to ensure that generative AI tools are used effectively and that resulting courses are engaging and effective for learners.

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