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Leveraging ChatGPT for open educational resources in higher education: Potential benefits and multidimensional challenges

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Abstract:

This research paper highlights the potential of leveraging cutting-edge artificial intelligence technologies, exemplified by the ChatGPT application, as a model within Open Educational Resources (OER) platforms for higher education. The study reviews the latest developments in large language models and the ChatGPT application, presents the concept of OER and its significance in universities. It also explores the potential benefits of utilizing ChatGPT in this domain and analyses the associated technical, financial, and legal threats.

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Introduction:

As the world is currently witnessing rapid developments in the field of Artificial Intelligence (AI) and its applications, Large Language Models, such as ChatGPT, have brought about a qualitative leap in the machine's ability to understand natural language and produce written content in a human-like manner. Simultaneously, Open Educational Resources (OERs) continue to thrive as a global movement that promotes free and equitable access to knowledge and education, as endorsed by UNESCO in its recommendation on OERs (UNESCO, 2019). Amidst this momentum, higher education institutions, like other participants in OER initiatives, stand at the forefront of revolutionary developments in AI, especially with the accelerating pace of these advancements, of which ChatGPT is considered a driving force (Grassini, 2023) .Accordingly, this research paper explores the potential of leveraging AI, represented by the ChatGPT application, as a model in the field of OERs for higher education, highlighting the opportunities offered by this technology in the realm of OERs, as well as the major technical, legal, and financial threats associated with it.

Furthermore, this paper derives its significance from its direct relevance to employing the latest AI advancements to enhance the learning experience and access to knowledge, while shedding light on the relevant technical, legal, and financial challenges. The study aims to contribute a qualitative addition to the specialized literature and stimulate further research and practice on leveraging AI to promote OERs and support university education.

Problematic:

The rapid emergence of AI technologies like ChatGPT presents both opportunities and challenges for integrating them into open educational resources (OERs) in higher education. While offering immense potential to enhance OERs, their effective utilization faces significant obstacles across technical, legal, financial, and ethical domains.

Despite ChatGPT's capabilities in content generation and educational services, its practical use within OERs is hindered by threats like inaccuracies, data privacy concerns, and lack of comprehensive guidelines for effective implementation while addressing intellectual property rights.

The core challenge lies in striking a balance between binding AI's transformative possibilities and safeguarding the integrity, accessibility, and ethical foundations of open education. This requires understanding technical issues, legal complexities surrounding content ownership and copyright, and addressing financial constraints in resource allocation for infrastructure and technological evolution.

Addressing this multidimensional challenge necessitates a general approach that harmonizes AI's potential with the core values of accessibility, academic consistency, and democratization of knowledge dissemination within higher education.

Methodology:
This study followed the descriptive-analytical approach through:

- Reviewing the literature and previous studies related to the research topic.
- Collecting and analysing information on the concepts of AI and its applications, as well as OERs.
- Examining leading experiences in employing AI in higher education and OERs.
- Concluding the threats associated with investing in AI technologies in OERs**.**

Study objectives:

1. Highlight the latest developments in artificial intelligence, particularly large language models like ChatGPT.

2. Explain the concept and importance of Open Educational Resources (OERs) in higher education.

3. Explore the possibility of utilizing ChatGPT as a model for Open Educational Resources in universities.

4. Analyse the technical, financial, and legal threats associated with investing in artificial intelligence for Open Educational Resources.

1- ARTIFICIAL INTELLIGENCE AND LARGE LANGUAGE MODELS (LLMS)

1-1 Definition of Artificial Intelligence:

In 1955, the term "Artificial Intelligence" (AI) was coined by scientist John McCarthy, who was the first faculty member at Stanford University dedicated to AI research(Britannica, 2023). McCarthy's initial definition of AI enabled its portrayal as "the science and engineering of making intelligent machines." (Manning, 2022). Although the primary research efforts in the early years focused on developing AI programs and agents that acquire knowledge and perform tasks in the way humans do, recent advancements in the field of AI have significantly

contributed to shifting the focus toward AI agents capable of self-learning, just as humans adapt and interact in our dynamically changing world.(Manning, 2022) The rapid progress in the field of AI has led to a qualitative shift in the concept and applications of this domain. It has become clear that self-learning AI agents are the primary focus of interest. This new development reflects a response to emerging challenges and opportunities resulting from continuous changes in the environment and knowledge.

These developments began with the emergence of machine learning techniques and artificial neural networks, allowing AI agents to analyse and understand data in advanced ways. However, the significant breakthrough came with the introduction of large language models (LLMs). These models combine deep learning and natural language processing (NLP) to achieve a deeper understanding and more accurate text generation, providing better responses to user needs (Firat, 2023).

The importance of this shift lies in the ability of AI models to adapt to continuous changes in the environment and acquire knowledge and skills on an ongoing basis, reflecting the natural way humans learn and interact. This approach opens doors to numerous applications across various domains, including technology, education, and economics, paving the way for sustainable development in the field of AI.

1-2 The Emergence of Large Language Models:

Language models (LMs) are computational models capable of understanding and producing human language. These models have the transformative ability to predict the probability of word sequences or generate new textual content based on the given input (Hiemstra, 2009).

Large Language Models (LLMs) constitute a class of language models distinguished by their outstanding performance across a diverse range of tasks in the field of Natural Language Processing (NLP). They have emerged as a prominent area of research, characterized by their ability to generate human-like language and their potential to achieve significant progress in the fields of science and technology. Their emergence was announced as a groundbreaking development by Google developers in 2018 (Vaswani et al., 2023).

With the strong proliferation of generative AI in 2023, the majority of emerging AI systems rely on a set of powerful LLMs that have taken the market by storm. In addition to dozens of open-source and closed-source models, both well-known and obscure, these models include, but are not limited to:

Table 1: Some Existing AI Models

Model Name	Developer	Use & Capabilities
GPT-4	OpenAI	Generates text, translates languages, writes different kinds of creative content, answers your questions in an informative way (powers ChatGPT Plus, Bing search)
PaLM 2	Google AI	Focuses on factual language tasks, excels at reasoning and answering complex questions, can generate different creative text formats
Megatron -Turing NLG	NVIDIA & Microsoft	Processes and analyzes massive amounts of language data, useful for advanced research on language and AI
Llama 2	Meta	Open-source option, good for various tasks including writing different creative text formats and translating languages (multiple versions with different parameter sizes)
Jurassic-1 Jumbo	AI21 Labs	Known for factual language tasks and code generation, can answer your questions in an informative way
WuDao 2.0	BAAI (Beijing Academy of Artificial Intelligence)	Primarily developed for Chinese language processing, can be used for similar tasks as other large language models

Source: Prepared by the researchers

1.3 Overview of the ChatGPT Application:

ChatGPT, a product of the Generative Pretrained Transformer (GPT) language model, has generated significant interest. The term "Generative" referred to by 'G' in the GPT acronym refers to the model's ability to generate texts. "Pretrained," denoted by 'P,' refers to the use of a machine learning model's initial knowledge to train another model, similar to how individuals use prior knowledge to learn new things. The transformer-based neural network, represented by 'T,' deals with the "Transformer" and evaluates the overall relationships between the components of a data sequence (Vaswani et al., 2023)

ChatGPT is often used as a chat bot accessible through multiple platforms, including websites and mobile applications. Users can interact with ChatGPT using text, and it is likely that future updates will support voice interaction, where ChatGPT is expected to provide immediate responses (Firat, 2023).

ChatGPT is based on the GPT-3.5 and the latest GPT-4 language models, a powerful chat bot that provides customized and engaging assistance to users in a natural, human-like conversational manner (Sabzalieva & Valentini, 2023).

2- OPEN EDUCATIONAL RESOURCES AND HIGHER EDUCATION

2-1 Open Educational Resources:

Open Educational Resources (OERs) are materials used for learning, teaching, and research purposes, available in any form or medium, and either in the public domain or under an open license that allows for free use, re-use, adaptation, and redistribution. (UNESCO, 2019)

An open license is a type of license that respects the intellectual property rights of the copyright holder while granting permissions that enable the public to utilize, repurpose, adapt, modify, and redistribute educational materials. These permissions or authorizations associated with open content are also referred to as the 5Rs: the ability to retain, reuse, revise, remix, and redistribute the content for educational purposes (Heck et al., 2020).

2-2 The Role of Open Educational Resources in Higher Education:

Undoubtedly, universities have the most mature group of learners, and as their knowledge needs grow, so does their responsibility in increasingly directing their learning approach to satisfy these needs. In this context, OERs play a prominent role in achieving a positive transformation in teaching and learning processes, as they contribute to facilitating interaction and interactivity between students and teachers (Griffiths et al., 2022).

Through the aforementioned principles, OERs have changed the traditional roles of teachers and students, attracting new participants to the processes of preparing and designing educational content. The practices of these digital resources in higher education institutions show that teachers allow their students an active role in producing and sharing digital content, indicating that OERs significantly contribute to liberating knowledge and enabling its reuse by providing organizational structures that help organize educational activities in the absence of traditional roles (Al-Omari & Al-Ibrahim, 2021).

2-3 Open Educational Resources and Artificial Intelligence: Prospects for Benefiting from ChatGPT

Undoubtedly, productive tools like ChatGPT exhibit great potential in terms of saving time and effort for OER creators. By continually using it with carefully crafted prompts, ChatGPT can generate abundant content on a given topic, generate a large number of model questions suitable for inclusion in open resources, allowing students to self-assess their educational progress.

Additionally, it can design comprehensive course lesson plans, assignments, and inquiry guidelines, reducing the burden on instructors and facilitators of the educational process and encouraging discussions in online forums(Firat, 2023).

Some of ChatGPT's usages in the field of OERs can be as follows:

• First: automated content generation: The ChatGPT AI model has the ability to create educational content across various domains. For example, AI can be used to automatically produce textbooks, worksheets, or lessons based on curriculum guidelines or learning objectives. It also helps in formatting resources and recommending performance designs based on individual learners' needs. Updating and improving existing resources: ChatGPT can assist in updating OERs by creating new content based on recent developments or research. It can also identify gaps or inaccuracies in OERs and generate content to address them (Biswas, 2023).

• Second: ChatGPT acts as an answer generator, allowing it to generate alternative ways to express the same ideas. Students can enter their inquiries into ChatGPT and use the "regenerate response" feature to explore diverse responses. This helps them digest educational resources and courses while enhancing creative thinking and language skills. Additionally, ChatGPT provides support for collaborative research and problem-solving. Students can work in groups and use ChatGPT to obtain the necessary information and insights to complete tasks and assignments, fostering collaborative learning (Firat, 2023).

• Third: in the context of a mentor role, ChatGPT assists in guiding students and beneficiaries through courses, lessons, and concepts alike. Teachers and OER creators use ChatGPT to create supplementary content for academic sections, such as discussion questions and providing guidance on how to support students in learning specific concepts, aiding students in their educational journey and experience with OERs and enhancing the effectiveness and quality of the latter (Rahman & Watanobe, 2023)

• Fourth: following the above, the role of this technology can form as a design assistant, where ChatGPT aids in the process of designing OERs. Teachers can request ideas and recommendations from ChatGPT for designing or updating these resources, making their evaluation processes more effective, or achieving specific educational objectives (Rahman & Watanobe, 2023).

• Fifth: additionally, ChatGPT acts as a "personal tutor," providing individualized instruction and immediate feedback on students' progress. It tailors those responses based on information provided by students themselves or teachers,

including factors such as test results, ensuring a personalized learning experience and relieving the burden on teaching staff (Sabzalieva & Valentini, 2023).

• Finally, ChatGPT functions as an assessment mechanism for student levels and a processor of their academic data and performance, providing teaching staff with profiles that illustrate each student's current level of knowledge. Students can engage with ChatGPT in a qualitative dialogue akin to educational lessons and then be asked to produce a summary of their current level that can be shared with teachers or used for assessment purposes(Rahman & Watanobe, 2023). By analysing a student's performance, learning style, and interests, AI can suggest resources that are more likely to benefit that particular student (Sabzalieva & Valentini, 2023)

In addition to the above, ChatGPT's multifaceted functions include personal tasks, such as research assistance, thesis and paper review, personalized learning, and increased student engagement. This diversity allows both teaching staff and students to benefit from AI as an educational tool, enhancing the role and status of OERs in university education (Sabzalieva & Valentini, 2023).

3- CHALLENGES OF IMPLEMENTING CHATGPT IN OER PLATFORMS FOR HIGHER EDUCATION

Despite the opportunities mentioned, which make AI a viable horizon in itself, higher education institutions, as entities responsible for funding and supporting OER initiatives, found themselves considering the potential benefits and impacts associated with generative AI tools like ChatGPT and integrating the AI-generated content into the OER development process. It should be particularly noted that there is a lack of available guidelines on using generative AI tools within the framework of creating OERs. Additionally, doubts surround the efficiency of generative AI tools and the quality of the texts and resources they generate, not to mention unresolved issues related to intellectual property laws concerning the content generated by these tools in the absence of clear guidelines and frameworks. Thus, linking open licenses to AI-generated content poses a complex challenge. Based on these considerations, there is a diverse set of multifaceted issues that require clarification, including the technical, financial, and legal requirements for effectively investing in such technologies within the field of OERs in higher education institutions (Lalonde, 2023)

The existing challenges can be classified as follows:

3-1 Technical challenges:

Hallucination and generation of incorrect content: Despite the novelty of the technology and its early stages, ChatGPT has invaded various fields, including

education and scientific research. Although it can generate scientific texts, a troubling issue has accompanied the emergence of this technology: ChatGPT often generates information that may be inaccurate, including links, references, and events, known as hallucination. Therefore, caution may be advised in determining the extent to which ChatGPT services should be integrated into generating OER content (Alkaissi & McFarlane, 2023)

Privacy and data sensitivity: Since these models are based on collecting user data, privacy issues have taken center stage among the threats accompanying the use of this technology. In April 2023, Italy became the first country to ban ChatGPT due to privacy concerns. The country's data protection authority stated that there was no legal basis for collecting and storing the personal data used to train ChatGPT(EDPB, 2023). The authority also raised ethical concerns about the tool's inability to identify the user's age, meaning that minors could be exposed to age-inappropriate responses. This example sheds light on broader issues related to the data collected, by whom, and how it is applied in the field of AI (Yan et al., 2024).

3-2 Legal challenges:

In light of the unlimited possibilities offered by ChatGPT in content generation, the debate over OERs and their practices related to content ownership has intensified. Generally, OERs follow open licenses, as mentioned earlier, where authors specify the type of permission granted. On the other hand, as indicated by the United States Patent and Trademark Office, outputs from generative AI programs like ChatGPT are not eligible for copyright protection... except for any transformative works. Unless there are radical changes, AI outputs will enter the public domain without ownership, which is undoubtedly consistent with OER licenses and their five R's (Bozkurt, 2023).

However, this may differ in the near future, especially considering that the data fed into AI models from the web, even if copyrighted, is not subject to any permission for use by the companies developing these models(Kretschmer et al., 2024). Consequently, measures should be taken to establish a legal framework for regulating the use of ChatGPT in OERs and ensuring the intellectual property rights of the generated content, even amid the turbulent landscape of AI, which appears unlikely to stabilize anytime soon. These measures may include:

- Developing usage policies that outline the parameters for using ChatGPT in OERs and aligning them with global trends.
- Amending intellectual property laws and usage policies on platforms affiliated with higher education institutions to ensure the use of ChatGPT services without infringement.

- Fully licensing all content generated by ChatGPT under open licenses, such as Creative Commons licenses.

3-3 Financial challenges:

According to a study by (Al-Shuhomiya & Al-Abdalia, 2020), financial requirements are the most vital resource upon which digital projects of all kinds are based. The project budgets in the case of investing in ChatGPT vary between operational budgets, such as the need to acquire an Application Programming Interface (API)(OpenAi, 2024), which in turn may vary depending on factors such as usage rate, the size of logged inquiries, and even the type of model provided by OpenAi. Additionally, there are budgets allocated for developing an interface through which ChatGPT is made available, which may include equipment and dedicated servers that also take up a portion of the development budgets. Moreover, there are separate budgets for future maintenance and update operations, and their importance lies in the fact that AI models are in a highly accelerated stage in terms of the pace of development and improvement, and these developments can sometimes be radical. For example, the GPT-4 model is larger, more powerful, and more advanced than older models (OpenAi, 2023), with fundamentally different features such as its ability to process requests in various formats (image, audio, etc.) and its ability to perform more complex tasks with greater efficiency. This implies that the risk of technological obsolescence is real, and continuous monitoring and updating of this technology is necessary. Consequently, the implementation of such rapidly evolving technologies is accompanied by the threat of exceeding allocated budgets, which jeopardizes the process of leveraging this technology and even its continuity(Bates, 2019).

4- Conclusion

The integration of advanced AI technologies like ChatGPT into open educational resources (OERs) in higher education presents a promising frontier, offering transformative potential to enhance learning experiences and promote accessible knowledge dissemination. Leveraging ChatGPT's capabilities in content generation, tutoring, assessment, and personalized learning could revolutionize the creation, delivery, and utilization of OERs. However, this challenge is accompanied by multifaceted challenges across technical, legal, and financial domains that necessitate proactive planning and mitigation strategies.

Technically, issues such as hallucinations, inaccuracies, and privacy concerns surrounding data collection and usage demand robust measurements and quality assurance mechanisms. Legally, the lack of a comprehensive framework governing intellectual property rights for AI-generated content poses

uncertainties, necessitating revisions to usage policies and licensing practices aligning with evolving global trends.

Furthermore, the substantial financial investments required for acquiring APIs, developing interfaces, dedicated infrastructure, and continuous updates to keep pace with rapid AI advancements underscore the importance of diligent budgeting and resource allocation. Failure to address these financial challenges could obstruct the sustainability and longevity of AI integration within OERs.

Overcoming these multidimensional obstacles requires a concerted effort from higher education institutions, policymakers, legal experts, and technology providers. Establishing clear guidelines, fostering interdisciplinary collaboration, and striking a balance between harnessing AI's transformative capabilities and preserving the core values of open education will be crucial to unlocking the full potential of this cooperative relationship.

By proactively addressing these challenges, higher education can pioneer the responsible and ethical adoption of AI within OERs, fostering a future where the democratization of knowledge transcends boundaries, and the pursuit of lifelong learning is empowered by cutting-edge technologies.

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