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Behind the Scenes: A Critical Perspective on GenAI and Open Educational Practices

INNOVATIVE PRACTICE ARTICLE

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ABSTRACT

Artificial Intelligence (AI) is a rapidly evolving field that is influencing every aspect of life. Generative AI (GenAI) as a sub-branch of AI is used to create content in various formats such as text, images, video, and audio. This paper discusses the implications of GenAI for Open Educational Practices (OEP), highlighting the potential affordances and challenges. GenAI can address the challenges within the OEP by leveraging openness and ethical use. GenAI's "generative" nature and human-like language capability can provide resources such as course material, activities, examples, questions, assessment, and learning outcomes in the context of OEP. With machine learning and deep learning infrastructure, it can support the discoverability and accessibility of open resources by increasing the metadata quality. GenAI can automatically score student assignments, answer their questions, and provide instant feedback to address the lack of interaction and feedback that arises due to the large number of students, especially in massive open online courses (MOOC). On the other hand, GenAI brings challenges such as data privacy and security, copyright, biased outputs, and the generation of false information. The conclusions emphasize the importance of a nuanced approach that considers not only the advantages but also the risks associated with adopting GenAI in the OEP world. Researching and developing how to apply these technologies to education is important to shape the future of education.

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INTRODUCTION

How can artificial intelligence be used to unblock the blocked lifelines of the living, evolving, and transforming open educational practices (OEP) ecosystem? Many answers can be given to such a question, however, it would be wrong and populist to expect this ecosystem to develop only with technological solutions. Indeed, the recent history of educational technology justifies our argument. Accordingly, it has been witnessed that the expectations for new technologies are very high at first, and then this effect is not seen. In the early 20th century, for example, there were great expectations that radio would revolutionize education. Similarly, in the 1950s and 1960s, there was a belief that television would transform education and replace teachers. When we look at the past from today's perspective, we can see that these expectations were not realized. It is because technology is only a means [not an end] that facilitates or supports learning in the educational processes. Considering that there are many other components that affect the educational process, from educational strategy to pedagogy, we need to have an inclusive approach when we make arguments about the educational processes. Therefore, instead of focusing only on technology in ecosystems, all components of the system should be evaluated as a whole, considering human agency. In addition to that, educational efforts should focus on fostering critical thinking, problem-solving, and higher-order thinking skills that enable learners to tackle the challenges they face. For instance, during their respective eras, talents like Leonardo da Vinci and Mimar Sinan created masterpieces whose secrets we still strive to unravel today. Thus, regardless of the technology employed, the primary goal should be to cultivate individuals capable of devising and implementing solutions to existing problems.

AI is one of the rapidly developing technologies that can be characterized as a critical turning point in education and learning (UNESCO, 2019). The ability of machines to demonstrate a certain level of intelligence and to perform a wide range of functions and capacities that require human-like abilities are key features of the concept of AI (Chen et al., 2020). GenAI, likewise, is based on machine learning and natural language processing (NLP) by empowering large language models (LLMs). Due to the capabilities of these models, GenAI can learn from large amounts of data and generate new content based on datasets. In addition to producing textual content, GenAI can also create different media formats such as visuals, videos, or audio. For these to be generated, users need to provide a "prompt" to the GenAI model. Prompts can be defined as inputs or questions that are contextually designed, generated, and refined by the users to obtain the expected responses from a GenAI model. According to Bozkurt and Sharma (2023), GenAI is similar to Aladdin's magic lamp, and the prompts are like wishes that the user wishes to come true. From this perspective, the power of GenAI, metaphorically the algorithmic magic, emerges when the communication and interaction between humans and GenAI are facilitated using well-crafted prompts (Bozkurt & Sharma, 2023).

This technology holds unique affordance to generate knowledge, improve educational processes, customize learning experiences, and facilitate the sharing and access to information (Huang et al., 2021). Integrating GenAI into education is a deep and transformative journey involving students, educators, and education systems (Bozkurt, 2023b). Affordance of GenAI can play an active role in critical tasks such as personalized learning and tutoring (Baidoo-Anu & Owusu Ansah, 2023; Michel-Villarreal et al., 2023), creation content (Duan, 2023), quality assurance (Tlili & Burgos, 2022), providing suggestions (Lo, 2023), resource discoverability (Downes, 2019), accessibility (Kopp & Gröblinger, 2023), answering students' questions, providing examples (Trust et al., 2023), creating educational content (Lalonde, 2023), providing instant feedback, creating curricula or learning outcomes, and conducting assessment and evaluation (Chiu, 2023; Khosravi, 2022). In contrast, using this technology entails several ethical obligations and challenges. These challenges include the generation of inaccurate or biased content depending on the data set it is trained on, hallucinations that produce information that is not real (Athaluri et al., 2023; Giray, 2023), risks to data privacy, ethical issues (Akgun & Greenhow, 2022), digital divide (Bozkurt, 2023a), and copyright issues (Verma, 2023).

Growing evidence suggests that, as the debate on the integration of AI with OEP gains momentum, taking advantage of GenAI opportunities within an ethical framework is a viable way to enhance the effectiveness and inclusiveness of OEP. Based on the arguments, the purpose of this paper is to critically examine the potential impact of GenAI on OEPs.

AI INTEGRATIONS IN OPEN EDUCATIONAL PRACTICES

OEP are defined as "...practices that engage learners in an active, constructive relationship with content, tools and services in the learning process and that encourage student self-direction, creativity and teamwork" (Geser, 2007, p.37). Koseoglu and Bozkurt (2018) refer to OEP as an umbrella term that gathers all dimensions of openness under a single roof. Beyond focusing on the usability and accessibility of resources, the OEP also focuses on preparing the learning environment in which resources are created or used. In other words, as echoed by Ehlers and Conole (2010), the OEP represents a holistic approach that addresses all stakeholders, including the context in which OER are created and used. AI, and GenAI in particular, is a critical tool that can serve this mission of OEP. AI with OEP has the potential to increase accessibility, effectiveness, and diversity (Bozkurt, 2023a). There is a belief that solutions leveraging AI can be efficacious in attaining the objectives of OEPs (Kopp & Gröblinger, 2023). Wiley (2023), for instance, argues that with the integration of OER with technologies such as AI, usability and applicability will become more prominent than the content of learning resources. The emergence of GenAI opens exciting avenues for transforming OER and OEP. While GenAI offers the potential for automated content creation, resource curation, resource updates, co-creation, and collaborative learning facilitation, it also presents challenges that demand careful consideration. These challenges include ensuring the quality and reliability of AI-generated content, safeguarding data privacy, and promoting equitable access to AI technologies (Bozkurt, 2023a).

Through a critical lens, this paper critically evaluates the positive and negative outcomes of GenAI's reflections on the OEP. The potential affordances of GenAI presented in Figure 1 and the challenges and concerns are described below.

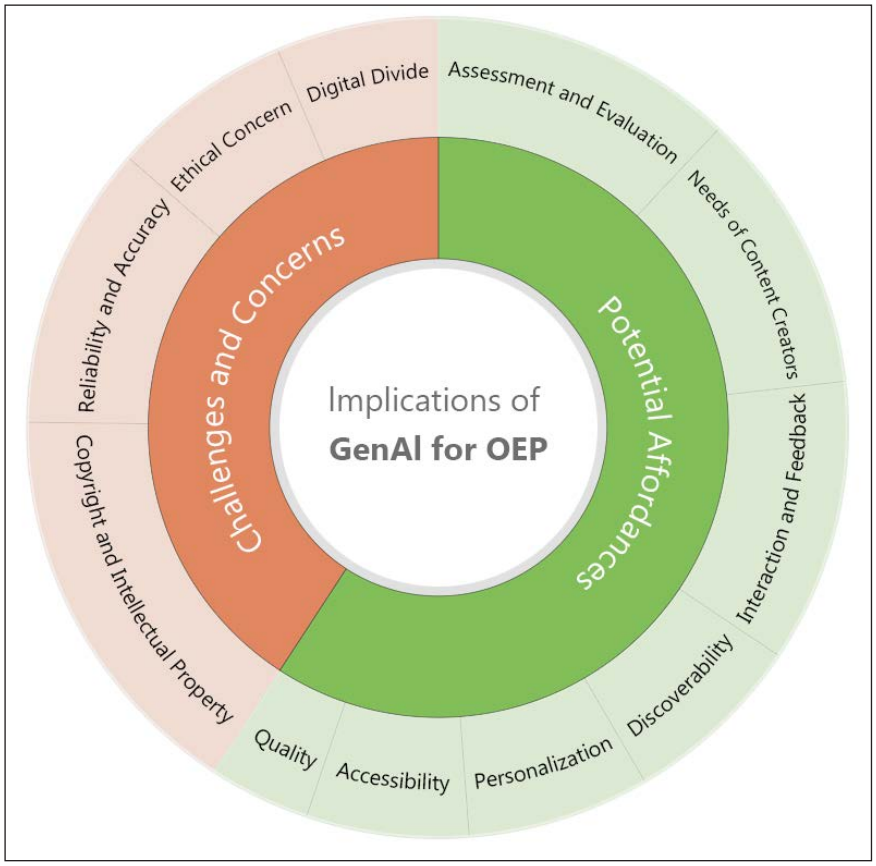

Figure 1 Implications of GenAI for OEP.

POTENTIAL AFFORDANCES OF GENAI IN OEP

This section of the paper highlights potential affordances of integrating GenAI into OEP, focusing on key dimensions of sustainability such as content creation, assessment and evaluation processes, quality, discoverability, accessibility, personalization, and interaction and feedback.

Needs of Content Creators

Content creators or instructors face the challenge of dedicating additional time to evaluate and develop resources or to find suitable resources (Belikov & Bodily, 2016; Tang, 2020; Tang & Bao,

2021). According to Huttner et al. (2018), the preparation of content with specific standards aligned with curricula requires time and intensive effort. Instructors' time commitment to OER depends on their daily and academic workloads (Ganapathi, 2018; Iniesto et al., 2021). GenAI provides solutions by reducing the time and workload associated with content creation (Lalonde, 2023; Tapalova & Zhiyenbayeva, 2022; Wiley, 2023). GenAI enables instructors to swiftly generate context-relevant learning materials of any kind (Duan, 2023; Lalonde, 2023; Lo, 2023) and a more diverse, comprehensive, and inclusive OER (Bozkurt, 2023a). GenAI tools like ChatGPT can assist in various educational tasks, including crafting course outlines, designing lesson plans, formulating classroom regulations, setting learning goals, outlining activity instructions, suggesting discussion topics, preparing for substitute teachers, scripting concise lecture presentations, and providing guidance on classroom organization. It also aids in devising more inclusive learning experiences, diversifying authors featured in reading lists, recommending methods to utilize digital tools for improved teaching and learning, and offering examples to effectively convey concepts to students of varying age groups (Trust et al., 2023). Croom (2023) stated that he used ChatGpt as a GenAI tool to update the open textbook he used in his advertising course. Edelsbrunner et al. (2023) created openly licensed videos for MOOCs without human intervention with the GenAI tool. It was stated that the videos with avatars and language options were created very quickly. In Global South, medical students created a chapter for an open textbook in orthopedics together with ChatGPT. The course instructor performed quality control of the created open textbook chapter (Cox et al., 2024). Another example of AI-powered OER creation, with the help of Falcon from H5P, users can create interactive content from pre-existing specifying materials like documents, audio, or video that can be shared as OER on the H5P Hub (ENCORE+, 2023).

Assessment and Evaluation

AI can streamline the assessment process by automating exam evaluations (Huang et al., 2021). Students' responses and questions in asynchronous discussion forums can be sorted, reported or simple ones that are automatically responded to through AI. It can even use sentiment analysis to identify posts that express negative or unproductive emotional states (UNESCO, 2021). This capability underscores the potential of GenAI to alleviate the burden of student assessments, making evaluation processes more efficient. (Huang et al., 2021). GenAI tools like ChatGPT can simplify quiz creation and identify learning gaps, significantly enhancing the homework and assessment landscape (ENCORE+, 2023). For example, Khan Academi's own GenAI tool, Khanmigo, goes beyond generating questions for assessment, providing overall assessments and guidance to instructors on student progress (Khanmigo, n.y.).

Quality

Quality which affects the use of open resources (Santos-Hermosa et al., 2020; Tang, 2020) is paramount for the success of OEP initiatives (Cechinel et al., 2011). Poor quality OER negatively affects students' perceptions of OER and consequently their use (Farrow et al., 2015). Lantrip and Ray (2021) state that finding, producing, or adapting quality OER affects instructors' acceptance of OER. In the sustainability model introduced for Rice University's "Connexions" project, as outlined by Dholakia (2006), the significance of content quality and quantity is highlighted within the "Content Quality and Quantity" dimension, emphasizing their influence on capturing and retaining students' interest.

Pachigolla (2019) states that through AI, OERs can be developed quickly with high quality and delivered to wider audiences. In the context of content creation, Kopp and Gröblinger (2023) indicate that GenAI can provide suggestions to enhance the writing style, organization, and comprehensibility of content, or identify errors and inconsistencies within the content. AI has the capability to assess the quality of OERs by considering diverse criteria, including student feedback, download frequency, and ratings, among others. Such a process facilitates users in efficiently discovering and utilizing higher-quality OERs (Tlili & Burgos, 2022).

Discoverability

Effective metadata specification is essential for accessible OER helping users find resources aligned with their needs. (Chimbo et al., 2021; Ingavélez-Guerra et al., 2022). Metadata serves to identify, classify, and organize information within the web environment, addressing its

complexity and facilitating the establishment of an information infrastructure (Duval et al., 2002). Improving metadata within the OER platform ensures increased user engagement by simplifying the identification and search for resources (Romero-Pelaez et al., 2018). Moreover, educators encounter challenges in locating suitable resources within the existing OER (Belikov & Bodily, 2016). Comprehensive (Brent et al., 2012) and content-specific metadata (Luo et al., 2020) are highlighted as essential for facilitating user discovery of resources (Kimmons, 2016). Conversely, inadequate metadata increases the time users spend searching for resources, adversely affecting their perception of OER usage (Rennie et al., 2011). AI algorithms can enhance suitable OER discoverability by organizing and tagging content, thus improving searchability, and accessibility (Kopp & Gröblinger, 2023; Recalde et al., 2021). Automated tagging of OERs through AI, especially using machine learning and NLP techniques, can make these resources easier to find online or increase their accessibility (Downes, 2019; Tlili et al., 2021). This automation facilitates the efficient location and utilization of OER, making educational materials more accessible to self-directed learners. (Fırat, 2023).

Accessibility

Ensuring equitable access for all users, including those with disabilities, is a core principle of OEP. Glazko et al. (2023) highlight the potential for GenAI to be used by people with disabilities to provide support for their accessibility needs in low-risk, easily verifiable contexts. AI can also increase hearing-impaired and visually impaired students' access to resources. AI-based speech recognition for the hearing impaired can automatically add captions to videos, transform text into sign language videos, automatically generate alternative text descriptions for images for visually impaired students, or audible text (Kopp & Gröblinger, 2023). For example, OpenLearn offer automatic captioning and voice-over options to improve accessibility for visually impaired and hearing-impaired learners, along with AI infrastructure (OpenLearn, 2022). GenAI tools can assess OER for accessibility compliance (e.g. Web Content Accessibility Guidelines – WCAG) and suggest improvements.

The language used in developing OER poses a significant obstacle for users unfamiliar with that language (Allotey et al., 2021). This linguistic aspect acts as a cultural limitation that impacts user engagement in course discussions and communication within online distance education modules (Zhang & Kenny, 2010). The language barrier not only hampers students but also presents challenges for instructors using OER (Pounds & Bostock, 2019). The present challenge necessitates regionally sensitive localization to adapt resources for diverse linguistic contexts. (Beaven et al., 2013). This language barrier to OEP can be overcome with AI's advanced translation skills (Chen et al., 2020). Overcoming language barriers through advanced AI translation tools can expand OER's reach, making educational content more globally accessible. Additionally, going beyond translation, the content can be automatically interpreted, simplified, and presented to the user through semantic analysis with AI (UNESCO, 2021).

Personalization

AI is redefining the concept of OER by moving away from conventional notions of books and libraries to emphasize data processing networks, cloud services, applications, and AI-integrated design and information processing (Downes, 2019). Its potential extends to recommending OERs and tailoring learning experiences for individual students. For instance, following a student's interaction with an OER, the system can automate teaching and learning methods by suggesting the subsequent relevant resource (Tlili & Burgos, 2022). AI uses machine learning to evaluate students' abilities and needs and develops and delivers personalized or customized content based on the results of these analyses. (Huang et al., 2021; Sharma, 2021; Tapalova & Zhiyenbayeva, 2022). Personalized learning is not a new concept in education, but the way it is implemented is changing with AI and big data analytics (Magomadov, 2020). Personalization of courses affects the retention rate of students in MOOCs (Kaabi et al., 2020). AI-powered personalized and adaptive learning tailors educational materials to meet individual student needs, improving the attractiveness and effectiveness of OER for a broader range of learners (Kopp & Gröblinger, 2023). Some argue that integrating AI can enhance education quality by tailoring content to individual students' personalities, abilities, goals, expectations, and unique characteristics (Tapalova and Zhiyenbayeva, 2022). GenAI is seen as a promising tool for open education because of its potential to foster autodidactic learners' independence and autonomy and to support adaptability (Fırat, 2023). By using AI, instructors can identify effective teaching

methods that are appropriate to the context and the student's level of knowledge and develop an individual learning plan according to students' characteristics and abilities (Tapalova & Zhiyenbayeva, 2022).

Intelligent tutoring systems (ITS) leverage information tracking and machine learning to tailor themselves to individual learning processes. This manifests in dynamic adjustments to content based on student engagement with learning tasks, as well as personalized guidance that cater to each learner's unique strengths and weaknesses (Gillani et al., 2023). An ITS integrated into OEP platforms can provide students with personalized learning materials, activities and assessment tools, real-time feedback, and guidance, generated by GenAI. For example, Khan Academy, an OER platform, offers learners practice exercises, instructional videos, and a personalized learning dashboard at their own pace and level (Khan Academy, n.y.). The Coursera platform, on the other hand, has a GenAI-supported IST, "Coursera Coach", which aims to answer students' questions in real time, provide quick video lesson summaries to better explain a specific concept, and communicate with different languages or educational levels (Minudri, 2023).

Interaction and Feedback

Lack of interaction is one of the barriers in OEP practices that especially negatively affects students (Aksela et al., 2016; Wang et al., 2023). In this context, feedback holds considerable significance as it establishes a two-way communication channel between the student and the instructor. This communication, as highlighted, augments the student's motivation to successfully conclude the course (Khan et al., 2021). When distance education courses lack opportunities for student interaction, it leads to a decline in student motivation to remain engaged in the course (Park & Choi, 2009), potentially resulting in dropout rates. Mayende et al. (2017) suggest that providing feedback can enhance instructor-learner interaction. AI-driven technologies, such as chatbots, can facilitate immediate feedback and support, improving student engagement and performance. (Sharma, 2021). Machine learning and NLP techniques can be used to develop intelligent virtual agents in open learning environments that will temporarily answer students' questions when tutorials are not available. Especially online, when the number of students or courses is large, the ability of AI to categorize student behavior and provide targeted responses that affect academic performance is of significant value. These capabilities can reduce instructors' workload and prevent students from dropping out of the course (Tlili et al., 2021). Alseddiqi et al. (2023) used ChatGpt as a GenAI tool in MOOC and concluded that it was particularly effective in providing immediate feedback to students. GenAI enables prompt and direct feedback for students (Chen et al., 2020; Tlili & Burgos, 2022), fostering interaction and enhancing the learning journey through AI assistants that guide and support students (UNESCO, 2019).

CHALLENGES AND CONCERNS

This section of the paper highlights the potential challenges and concerns associated with merging GenAI and OEP, categorized into digital divide, reliability and accuracy, ethical concerns, and copyright and intellectual property issues.

Digital Divide

The digital divide refers to the disparities in access to and use of information and communication technologies (ICTs) influenced by factors like social inclusion/exclusion, gender, and universal accessibility. Beyond technology, the digital divide manifests in unequal access to information and knowledge, solidifying social stratification through varying levels of digital literacy and proficiency (Farooqi et al., 2022). Universal broadband access emerges as a human rights issue because of the critical role of the internet's integral role in life's facets, from education to health (Sanders & Scanlon, 2021). For students lacking home internet, and ICT access due to socioeconomic disparities, the classroom becomes the sole gateway and limit of formal learning (Sanders & Scanlon, 2021). The rise of AI has not only revolutionized technology, but also redefined the boundaries of the digital divide. The advent of AI has reshaped the digital divide, failure to ensure widespread access, and adoption of AI technologies risks exacerbating this inequality (Efe, 2022; Wu, 2022). AI innovations benefit individuals and organizations that can use this technology, but they disadvantage individuals and organizations that lack

the technological skills required to use this technology effectively (Carter et al., 2020). Carter et al. (2020) identified the AI divide as access to AI, the ability to use AI, and the outcomes of AI engagement. The divide in the outcomes of AI engagement refers to the divide that arises due to biases in AI. For example, facial recognition systems may not work with the same performance for everyone, may exhibit a racist approach in predicting criminals, or may score student assignments based on the language the student speaks. The use of GenAI in education has the potential to exacerbate the digital divide. In the context of the OEP, GenAI can widen the digital divide while strengthening the OEP. For full realization of GenAI transformative potential in open educational frameworks, equitable access to AI technologies remains paramount (Bozkurt, 2023a). Because some in society have ICT facilities, some do not, and some do not have the digital competencies to use these new technologies. Therefore, those with access and skills will be able to benefit from better quality and more diverse OEP supported by GenAI, while others will be left far behind. Moreover, the feature gap between free and paid versions of GenAI creates differential user experiences, potentially impacting the outcomes and benefits derived by those with limited ICT access.

Reliability and Accuracy

AI learns from human-generated data through a binary approach-good, bad, true or false. This situation, called the paradox of artificial agency, leads to potential contradictions. Besides, applying fairness constraints, hiding or blocking access to informative content can reduce the power of AI's algorithmic inference (Osoba & Weller IV, 2017). AI may generate hallucinations due to biases or limitations in the data, false or inaccurate outcomes (Giray, 2023; Green, 2018). According to Ji et al. (2022), the main causes of data hallucination are source-reference divergence, as well as training and modeling choices of neural models. For example, ChatGPT 4 is found to have less hallucinations than ChatGPT 3.5 and Google Bard (Lim et al., 2023). Furthermore, using well-defined prompts can significantly improve the accuracy of the model's responses by reducing hallucinations (Rawte et al., 2023; Xu et al., 2023). AI hallucinations are considered a concern since they cause users to lose trust in the system, hamper their judgment, and may give rise to ethical and legal problems (Athaluri et al., 2023). For this reason, ensuring AI-generated information's reliability and conducting thorough verification are critical. Promoting the reliability of information is the shared responsibility of authors, researchers, and the wider community (Giray, 2023). AI tools used should provide students and educators with accurate content and assessments for the effectiveness, usefulness, and continued trust in the tools. In the OEP framework, the mentioned hallucinations have the potential to spread misinformation rapidly and reach a broader audience, given the open sharing of resources. In addition, while providing personalized education based on student data, the system can also be considered in the context of accuracy by analyzing the data accurately and making appropriate adaptations. Reflections of AI accuracy can also be seen in assessing student performance, providing feedback, and recommending appropriate materials. To harness the complete potential of GenAI within OEP, addressing concerns related to content quality, reliability, safeguarding data privacy, and security is crucial (Bozkurt, 2023a).

Ethical Concern

The transfer of educational processes such as data collection, analysis, evaluation, decision-making, and content generation to the control of AI raises some ethical concerns. Akgun and Greenhow (2022) list the potential ethical risks of AI in education as privacy, surveillance, autonomy, and bias and discrimination. The privacy of learners' data is addressed firstly in the context of ethics. Privacy concerns are not only related to students but also include data of instructors, families, and educational institutions (Regan & Jesse, 2019). UNESCO (2022) firmly states that in AI-enabled education systems, student data should not be misused, including for commercial purposes. It was declared that OER repositories supported by an open and transparent AI can help students trust OER (ENCORE+, 2023).

Secondly, surveillance mechanisms, especially in individualized learning environments, can track students' actions and choices in the system to determine their learning performance, strengths and weaknesses, and learning patterns. However, such monitoring is seen as ethically problematic in terms of threatening students' privacy. It can also make students feel insecure knowing that they are being monitored (Akgun & Greenhow, 2022). Depending on the data

obtained by these monitoring systems, AI systems control the learning process. This power of control is seen as jeopardizing the autonomy of learners, as algorithms make predictions, decisions, or recommendations based on their own knowledge (Regan and Jesse, 2019). It restricts users' ability to make choices of their own free choice (Du & Xie, 2021).

Thirdly, when the data used to train the AI is biased, this bias is carried into the AI system (Akgun and Greenhow, 2022). For example, image recognition systems that recognize white people better than colored people due to biased input data (Kaplan & Haenlein, 2020). Since AI algorithms often operate as a "black box", relevant algorithmic biases remain hidden. GenAI, which owes its existence to the content shared with the philosophy of "openness", needs to be open and transparent. Making the datasets that feed algorithms for machine learning publicly available and transparent is the first step to overcome such biases. This way, biases can be identified, and a balanced dataset can be created in terms of key variables such as gender or ethnicity (Du & Xie, 2021). It is emphasized that AI systems should be equipped with rules to understand human values and instincts (Kaplan & Haenlein, 2020). UNESCO (2022) proposes ethical recommendations to promote the peaceful use of AI systems and prevent harm. In this framework, human rights, fundamental freedoms, and human dignity must be respected and protected throughout the life cycle of AI systems.

Copyright and Intellectual Property

Copyright infringement has become an increasing concern with the development of AI. There is a need to determine whether intellectual property generated through GenAI is eligible for protection under existing intellectual property laws. GenAI's training on copyrighted content raises infringement issues, complicated by the unclear ownership of AI-produced works. It's uncertain who has ownership rights to works created by AI. The AI itself, the user of the AI, the owners of the data used to train the AI, and the AI developers all contributed to the production of these works. In the event of copyright infringement, evaluating responsibility may be significantly influenced by this ownership issue (Verma, 2023). In 2018, the U.S. Copyright Office Board of Review ruled that a visual work was made "without any human contribution" for an application filed in 2018. In another review, in February 2023, the board examined the registration of a graphic novel in which texts with human authorship were combined with images generated by AI. In this case, the overall structure of the work was deemed registrable, but the individual images that are part of this work were not deemed eligible for registration (Copyright Office, 2023). The New York Times filed a copyright infringement lawsuit against OpenAI and Microsoft for their unauthorized use of New York Times articles to train AI models (U.S. District Court, 2023a). Another lawsuit against OpenAI was filed by 18 authors in the United States in 2023. The authors claimed that OpenAI used their work to train language models (U.S. District Court, 2023b).

One of the new challenges to copyright is the possibility of creating new educational materials based on preexisting ones (ENCORE+, 2023). Just as in traditional academic publishing and other types of works, copyright in OER belongs to the original creators. OER creators make their work available in line with the concept of openness. To do this, creators often use CC licenses to grant the right to use it in a way that is protected by copyright (Norris et al., 2023). Accordingly, for OER, the level of human contribution will be an important determinant of right ownership. CC licenses apply to the creative work that emerges as the final product, even if they do not cover the part produced by the GenAI system itself (Walsh, 2023). GenAI systems should not be thought of as authors, but as tools that support and facilitate the work of authors. In this way, the problem of ownership can be solved by assuming responsibility by humans (Bozkurt, 2023a). Bozkurt (2024) suggests aiTARA framework for acknowledging and disclosing the use of GenAI in scholarly writing.

CONCLUSION, IMPLICATIONS AND SUGGESTIONS

This paper examined the potential implications of combining GenAI with OEP. From a general perspective, OEP has a vision that aims for openness and accessibility in education. In this direction, initiatives are focused on the production and sharing of educational content and resources. Quality, content production, accessibility and language, personalization and interactivity are critical factors for OEP sustainability. At this point, we think that GenAI's qualities can support the relevant factors. With GenAI's "productive" nature, it can accelerate

processes by acting as a co-creator in content production. The integration of GenAI into OEP offers significant advantages across various dimensions, including efficiency in content creation, assessment, quality enhancement, improved discoverability and accessibility, personalized learning experiences, and enriched interaction and feedback. However, this integration process raises challenges and concerns about digital divide, reliability and accuracy, copyright, and ethics. As a matter of fact, many technologies were used as tools in content production before GenAI. The important point is that people are in control of the content. We know that concepts such as plagiarism, data security, copyright infringement did not emerge with artificial intelligence, but have been in our lives for a long time. What is important and necessary for these is that humans act within the framework of ethical principles. In the context of GenAI, in order for these problems not to be reflected in the OEP, first of all, digital citizenship awareness should become widespread and individuals should fulfill their responsibilities in this direction.

The main implications of the paper are as follows:

- GenAI has the potential to significantly support OEP in the dimensions of content creation, quality assurance, interactivity, individualization of instruction, assessment and evaluation, accessibility, and language translation, as long as it is used within an ethical framework.
- GenAI should not be seen as a "panacea". GenAI is not the solution for emotional deficits in learning processes in the context of the OEP. Human insight is necessary.
- Without a foundation in openness philosophy, GenAI will continue to be questionable and deficient regarding concerns related to data security and privacy.

The following suggestions are presented for developers, educators, and politicians:

- GenAI developers should use transparent, auditable, and explainable algorithms. They should work in collaboration with educators for the integration of GenAI into education and its pedagogical fit.
- Educators can unlock GenAI's transformative potential in education by maintaining human guidance and taking risks into account.
- Politicians should avoid populist approaches and develop policies for the ethical use of GenAI technology.

The following suggestions are presented for future research:

- Experimental research can be conducted on the use and possible effects of GenAI in the context of the OEP.
- The effectiveness or quality of translation, localization and individualization services provided with GenAI can be investigated.
- The use of GenAI by students or instructors in generating OER can be investigated.
- Long-term projects can be conducted to investigate the impact of AI systems on OEP sustainability.

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We acknowledge the timeless insight of the Anatolian philosopher Yunus Emre, who profoundly stated, 'Whatever you share is truly yours, not the one you save for you.' This sentiment captures the essence of our commitment to the philosophy of openness—emphasizing that it is through the act of sharing that knowledge truly becomes a collective treasure.

COMPETING INTERESTS

The authors have no competing interests to declare.

AUTHOR CONTRIBUTIONS (CRediT)

Dilara Arzugül Aksoy: Conceptualization, investigation, visualization, writing—original draft preparation, writing—review and editing; Engin Kurşun; conceptualization, supervision, writing—review and editing. All authors have read and agreed to the published version of the manuscript.

AUTHOR NOTE

This paper was reviewed, edited, and refined with the assistance of OpenAI's GPT-4 (Version as of April 2023), complementing the human editorial process. The human authors critically assessed and validated the content to maintain academic rigor. The authors also assessed and addressed potential biases inherent in the AI-generated content. The final version of the paper is the sole responsibility of the human authors.

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