.Integrating Generative AI with Open Educational Practices (OEP) in an Online Learning Environment: College Instructors' Perceptions, Potentials, and Challenges

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Abstract
This article explores open educational practices (OEPs) and generative artificial intelligence (AI) from college instructors' perspectives. The novelty of this study lies in bringing new insights by thoroughly examining the adoption of open educational resources (OERs) using generative AI in an online learning environment. Furthermore, it adds to the global conversation on OERs implementation in transitioning nations, emphasizing how OERs can democratize knowledge and enhance skill development in such environments. In terms of practical application, the study offers valuable insights to equip policymakers, educators, and institutions with the necessary information to address current challenges and devise effective strategies for integrating OER into OEPs. Investigating perceptions of combining generative AI tools with OERs can help instructors better plan activities that utilize these tools in the context of higher education. The present research considers four components of college instructors' perceptions of generative AI tools: efficiency, interaction, affect, and intention. A mixed-method research approach combines quantitative and qualitative methodologies with a questionnaire, focus groups, and semi-structured interviews. A total of 50 college instructors responded to the questionnaire; they teach different disciplines at Palestine Technical University-Kadoorie and used generative AI in their courses. The findings indicated significantly high perception scores for interaction, medium scores for intention and efficiency, and low scores for affect. Content creation and personalization emerged as a main theme in qualitative findings. Themes for challenges that emerged include data privacy, transparency, and ethical use. It is recommended that practical approaches for responsibly integrating AI tools be implemented in educational settings, including robust data governance frameworks to safeguard privacy and regular audits of AI systems to detect and address biases.

Keywords: Generative artificial intelligence (AI), open educational resources (OERs), open educational practices (OEPs), online learning, perceptions, Palestine Technical University-Kadoorie (PTUK)

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Openness in education encompasses methods, educational resources, and a philosophical mindset that can bring about a transformation in teaching and learning. It is a dynamic idea influenced by the evolving requirements of different societies, cultures, locations, and economies, making a single definition problematic (Bozkurt, 2019). Many categories like OERs and OEPs have been investigated in the literature (Bozkurt, 2023a; Panke, 2024; Paskevicius & Irvine, 2019; Van Wyk et al., 2023). The literature underscores the importance of open processes involving the development, utilization, and acceptance of OERs within educational settings (Bozkurt et al., 2019). In this continually changing environment, OEPs have developed as an expression of open pedagogy aimed at empowering learners to collaboratively create course content (Wiley & Hilton, 2018). Open pedagogy transcends the mere utilization of OERs in classrooms towards the creation and dissemination of OERs among learners who actively participate in shaping their learning materials (Baran & AlZoubi, 2020). Generative artificial intelligence (AI) holds immense promise in data analysis, pattern recognition, and transformative opportunities for generating and managing OER content (Panke, 2024) by enabling customization to individual or local requirements and improved accessibility.

Although OERs have existed for more than twenty years, their widespread adoption has faced numerous challenges, including time required to find and adapt materials, quality and accuracy assurance issues, and a frequent lack of institutional incentives for instructors to use them (Han & Kumwenda, 2025). In contrast, since generative AI was unveiled in late 2022, it swiftly amassed a staggering 100 million users within two months (Mesko, 2023). Consequently, generative AI has emerged as a prominent subject in educational technology discussions (Panke, 2024).

The main objective of this article is to examine the influence of generative AI on the creation and utilization of OEPs. Perceptions of college instructors play a crucial role in the adoption of these tools in their teaching practices.

Literature Review

Generative Artificial Intelligence

Artificial Intelligence (AI) has revolutionized online learning, with capabilities like automatic learner data analysis and personalized learning process (Willis, 2023). AI is a broad concept encompassing various technologies and approaches, including machine learning, natural language processing, data mining, neural networks, and algorithms. AI and machine learning are frequently linked together. Machine learning serves as a technique within AI, utilized for tasks like supervised and unsupervised classification and profiling. For instance, it can be applied to predict outcomes such as student dropout rates or admission probabilities or to detect themes within written assignments (Zawacki-Richter et al., 2019).

Baker and Smith (2019) offer a broad definition of AI, framing it as computer systems performing cognitive tasks akin to human minds, particularly in learning and problem solving. This expansive definition encompasses various technologies and methodologies, including machine learning, Natural Language Processing (NLP), data mining, neural networks, and diverse algorithms (Bozkurt, 2023a).

In discussions about the future product of emerging open pedagogy and generative AI, Tlili and Burgos (2022) highlight AI's potential to significantly enhance both teaching and learning experiences based on OEPs with different layers. For example, the first layer

involves the mindset and personality of learners and educators; the second involves changing the design from static to dynamic; the third mandates that the AI algorithm itself should be open; the fourth addresses the necessary competencies educators and learners must develop; and the fifth is a policy layer to protect all previous ones. This literature review section summarizes established principles of open pedagogy ideas when adopting generative AI.

While the body of literature regarding OEPs is limited, its richness in comprehending and valuing emerging technologies positions it as a suitable framework for the present investigation. Ultimately, the exploration of educators' perceptions on integrating generative AI with OEPs and investigating potentials and challenges, is essential and holds a significant promise in this field.

Open Educational Practices (OEPs)

The open education movement aims to democratize education by eliminating barriers and by leveraging the advantages of openness, an approach that has significantly influenced higher education (Mojtahedzadeh et al., 2024). Within this movement, OEPs have emerged as a central concept. While OEPs are closely associated with OERs, they represent a broader shift in pedagogical approach. As Bozkurt et al. (2019) explained, OEPs originated from the examination of OERs and are often discussed in the context of removing obstacles to their creation, use, and adoption. Essentially, OERs are the open content while OEPs are the open practices that use that content to empower learners.

The literature outlines two primary strands of OEPs. The first, and most common, focuses on practices directly related to OERs, such as creating, adapting, and using open resources (Koseoglu & Bozkurt, 2018). The second encompasses a wider vision of openness, including open pedagogy, open learning, and open teaching. Research into these practices has identified significant advantages, including enhanced accessibility, reduced student costs, and improved opportunities for collaborative learning and content customization (Adil et al., 2024). However, major challenges persist, such as quality assurance, sustainability concerns, a lack of institutional support, and technological barriers. This highlights a need for better strategies to support educators in adopting OEPs effectively.

Further, Paskevicius and Irvine (2019) noted that OEPs are being utilized within higher education, proposing that OEPs signify an evolving approach to learning design. They found that faculty members showed a growing interest in employing open strategies and technologies to facilitate active learning experiences, showcase learners' work in real-time, facilitate formative feedback and peer review, and foster community engagement within coursework. Hence, open pedagogy, or OEPs, involves utilizing OERs to aid learning, as well as openly sharing teaching methods to enhance education and training across institutional, professional, and individual levels (Maultsaid & Harris, 2023). Some studies (Khan et al., 2024; Tamoliūnė et al., 2024) investigated the use of OERs in an online environment and found that OERs offer significant and unique advantages for an online learning environment by providing no-cost or low-cost access and opportunities for creating, sharing, and using educational resources.

Open Pedagogy is an educational method that has been conceptualized in various ways. At its core, it encompasses teaching and learning methods facilitated by the open licensing of content (Werth & Williams, 2022) along with a philosophical and practical commitment to education that prioritizes accessibility and learner empowerment. A study conducted by Chen and Henricks (2023) reported that students recognized numerous

advantages of open pedagogy tasks, such as exerting greater effort to generate superior-quality output and heightened focus on the coherence of their writing. Students noted an augmented sense of accountability as creators of knowledge, evidenced by meticulous attention to the precision of their work and the credibility of their sources. Indeed, the term “open pedagogy” has been in use for several years. Bloom (2019) defined open pedagogy as a wider approach to transforming the educational journey to be more significant by utilizing the freedoms of open content to engage students in a more interactive learning process through tasks involving curation and remixing.

Generative AI in Education

Both scholarly reviews of literature and anecdotal evidence related to the use of AI in higher education are on the rise. Studies by Asaad (2024) and Sarwanti et al. (2024) have shown the significant role of generative AI in supporting college instructors, researchers, and students in higher education institutions. Additionally, recent studies have shown the potential of using generative AI in enhancing various aspects of education including improving personalized learning by supporting individual learning journeys, increasing productivity, generating ideas, and improving the efficiency of academic work (Bae et al., 2024; Chan et al., 2024; Karataş et al., 2024; Sarwanti et al., 2024).

Also, it is crucial to recognize potential issues associated with integrating AI tools in the classroom. For example, the use of an AI-powered platform can support collaborative learning by promoting increased engagement, idea-sharing, and collective problem solving among students. When students received feedback from the AI, some were able to ask follow-up questions via the chatbot (Ho, 2024).

A study conducted by Bozkurt et al. (2023b) investigated a variety of uses of generative AI in education and indicated that educators use AI to support learning. For example, educators employ AI to broaden and enrich traditional teaching methods, incorporating AI to bolster collaborative learning, demonstrate methodologies, and facilitate visualization. A noticeable shift towards novel applications of AI, such as employing AI tools to simulate a beginner learner, positions students as educators responsible for instructing the novice learner. In this regard, Baidoo-Anu and Ansah (2023) noted that generative AI offers incredible adaptability, spanning from generating language to producing images, and boasts diverse applications across various sectors, including education. One of its most compelling aspects is its capacity to revolutionize learning encounters. Through harnessing AI-powered content creation, educators can fashion engaging and interactive educational materials customized to the unique needs of each learner. Whether through adaptive learning platforms, personalized instructional guides, or virtual simulations, generative AI enables educators to design dynamic educational experiences that accommodate various learning styles and preferences. Furthermore, by generating authentic assessment tasks and feedback mechanisms (Cacho, 2024), AI enhances the assessment process by furnishing timely insights into students' progress and levels of proficiency. A recent study by Kurtz et al. (2024) outlined how generative AI presents significant prospects for enhancing students' learning journeys by creating customized learning environments that cater to their educational requirements. These advancements empower collaborative knowledge construction, nurturing an inclusive and interactive educational atmosphere. By offering personalized learning experiences coupled with immediate feedback, generative AI possesses the potential to enhance educational achievements and prepare students for upcoming career demands. Additionally, it aims to democratize education by offering adaptable, scalable solutions that accommodate diverse learning preferences and speeds.

Integration of Generative AI and OEP

The expansive influence of AI has a profound impact on OEPs. Mills et al. (2023) examined how to invest in OEP in the era of generative AI, highlighting practices that involve engaging with online communities to crowdsource and curated learning materials across institutional boundaries. A core tenet of this approach is that by openly licensing resources for reuse and adaptation, educators can build upon existing work and collaborate with students to develop emergent, student-centered learning approaches. Generative AI is a powerful catalyst for these OEPs. For example, AI can directly enhance OERs across their entire lifecycle. Building on this, Ossiannilsson et al. (2024) reported that AI can enhance OER production (e.g., by generating initial drafts of text, images, or quiz questions), access (e.g., through AI-powered search and recommendation systems that connect learners to relevant OER), reuse and adaptation (e.g., by instantly translating content, lowering its reading level, or converting a text into a lesson plan), and redistribution (e.g., by helping to tag and categorize OER for wider dissemination in repositories). Also, generative AI can help address issues within OEPs by promoting openness and ethical use. Its generative capabilities and human-like language proficiency enable the creation of resources such as course materials, activities, examples, questions, assessments, and learning outcomes in the context of OEP. Through machine learning and deep learning, generative AI can improve the discoverability and accessibility of open resources by enhancing metadata quality (Aksoy & Kursun, 2024). Panke (2024) investigated the convergence of OER and artificial intelligence (AI), with a specific focus on open pedagogy applications. Panke (2024) also explored course concepts and provided firsthand insights into crafting and executing student-oriented, sustainable assignments by integrating AI tools into open-access book projects. Meanwhile, Panke (2024) expressed fears of generative AI tools such as ChatGPT where students can easily create paragraphs and summarize entire essays, potentially compromising academic integrity by bypassing the learning process. Additionally, Mills et.al (2023) proposed that teachers should teach about generative AI using a set of OEPs, inspired by OERs. These practices include shifting toward online communities across institutional boundaries.

Bozkurt (2023a) critically examined the shift from human-generated to AI-generated content, marking a new era in education, especially regarding OERs and OEPs. The research investigated the potential of generative AI in OERs and OEPs, encompassing tasks like automatic content creation, resource curation, material updates, collaborative creation, and the facilitation of collaborative learning settings. Nevertheless, it highlighted the need to address challenges including quality and reliability of AI-generated content, data privacy concerns, and equitable access to AI technologies. Moreover, because generative AI introduces challenges like data privacy, security concerns, copyright issues, biased outputs, and the risk of generating misinformation, Bozkurt (2023a) emphasized the need for a balanced approach that considers both the advantages and risks of integrating generative AI into OEP. Ongoing research and development in applying these technologies to education are crucial for shaping the future of learning (Aksoy & Kursun, 2024).

Theoretical Framework: Community of Inquiry (CoI)

Community of Inquiry (CoI) provides a good framework for this study since it focuses on understanding and designing meaningful online experiences (Garrison et al., 2000). The CoI framework states that learning occurs by three intersecting components: social presence which relates to interaction; cognitive presence, which relates to meaning construction through dialogue; and teaching presence, which relates to the facilitation of the educational experience (Fiok, 2020). The CoI framework informs this study since generative AI is not merely a tool but a transformative agent that interacts with all three

components. It can enhance teaching presence by helping instructors in the design of OERs. It influences social presence by serving as a conversational partner for both instructors and students. Additionally, it impacts cognitive presence by offering a variety of raw material for synthesis and co-construction (Mielikäinen & Viippola,2023). This framework informed the study's design since generative AI is not merely a content creation tool, but a dynamic engine for personalization within OEPs. It guided the researcher to investigate how AI-driven algorithms could analyze learner data to customize educational resources and assessments in an open education environment. Therefore, this framework is robust in analyzing instructors' perceptions: efficiency and intention (teaching presence), interaction (social presence), and affect (comfort with the three components). It is also useful for analyzing the potentials and challenges of integrating generative AI into OEP.

In conclusion, although generative AI tools show great promise in enhancing learning experiences, concerns remain regarding accuracy, potential over-reliance, and unclear AI usage policies. Current research lacks a comprehensive exploration of AI-driven environments in open education, particularly from the viewpoints of college instructors. Thus, further studies are necessary to fully understand generative AI integration in open educational contexts. We provide a thorough understanding of this topic by considering the perspectives of college instructors. While considerable research has been conducted on generative AI such as ChatGPT, investigations have not specifically addressed its integration within the context of open distance e-learning (ODeL) environments; this gap in the literature sparked the author’s interest to examine this phenomenon within an Open education. This study explores the perspectives of educators regarding the use of generative AI tools within open pedagogy aiming to address the following questions:

1. What are college instructors’ perceptions of integrating generative AI tools with OERs in their teaching?

2. What are the potentials of integrating generative AI with OEPs from college instructors’ perspectives?

3. What are the challenges of integrating generative AI with OEPs from college instructors’ perspectives?

Methodology

A convergent mixed-methods design was conducted to provide a comprehensive understanding of the study problem (Creswell & Clark, 2017). This approach involved collecting quantitative and qualitative data in sequence but for complementary purposes. The quantitative tool addressed college instructors' perceptions (RQ1), while the concurrent qualitative tools of focus groups and interviews explored the underlying potentials and challenges (RQ2 & RQ3) of integrating generative AI with OEP. The findings were integrated during the interpretation phase to develop a holistic understanding of the phenomenon. Quantitative findings were used to provide context for qualitative data, allowing for a deeper assessment of the potential and challenges. The research began with a descriptive quantitative phase, using a questionnaire for college instructors, followed by a phenomenological qualitative phase to describe the experiences of instructors. A qualitative design with a phenomenological approach was conducted to gather information for qualitative data. A phenomenological study is conducted to investigate specific lived experiences of college instructors who integrate generative AI tools into their OEPs.

A qualitative research approach, specifically using the inductive coding method, was utilized to analyze data. A qualitative study was also selected because it is best suited to capture the complex and nuanced aspects of users' reactions and responses to new technologies, trends, and phenomena (Blandford et al., 2016; Mogavi et al., 2024). The inductive method is particularly appropriate for this study due to the apparent lack of prior empirical research on user experiences related to the use of generative AI and OER in an online learning environment. Moreover, the inductive coding approach allows the researcher to develop themes from the data without preconceived notions or prior assumptions (Blandford et al., 2016; Mogavi et al., 2024).

Semi-structured interviews and focus groups with 21 participants were performed with college instructors who use generative AI and OERs in their online teaching via Zoom. These participants were selected based on their expertise in generative AI in their educational practices in online learning.

Participants

Participants who responded to the questionnaire are shown in Table 1.

Table 1

Respondents' Characteristics **Variable**	**Category**	**Number**	**Proportion**
Gender	Male	24	48%
	Female	26	52%
Teaching experience	5-10	10	20%
	11-15	17	34%
	>16	23	46%
Technical skills	Excellent	14	44%
	V.Good	22	28%
	Good	14	28%
	Professor	6	24%
	Associate professor	18	18%
Academic rank	Assistant professor	16	20%
	Lecturer	12	24%
Specialization	Engineering	9	18%
	Applied Sciences	12	24%
	Business & Economics	10	20%
	Agricultural Science and Technology	8	16%
	Arts and Educational Sciences	11	22%

Table 2

Participants' Characteristics of the Interviews and Focus Groups

Instructor	Gender	Years of Experience	Department	Length of generative AI Usage
Instructor1	Female	7	Business Administration	3 months
Instructor2	Female	20	Economics	3 months
Instructor3	Female	7	Technology Education	7 months
Instructor4	Female	13	Math	4 months
Instructor5	Male	5	Computer Engineering	7 months
Instructor6	Male	14	English language	7 months
Instructor7	Male	20	Physics	2 months
Instructor8	Female	13	Technology Education	2 months
Instructor9	Male	17	Electric Engineering	7 months
Instructor10	Male	20	English	7 months
Instructor11	Male	12	Electric Engineering	6 months
Instructor12	Female	5	Chemistry	7 months
Instructor13	Female	13	Applied Biology	9 months
Instructor14	Female	9	Physics	7 months
Instructor15	Female	10	Graphic design	5 months
Instructor16	Male	11	Chemistry	4 months
Instructor17	Male	10	Arabic language	2 months
Instructor18	Male	*30*	Arabic language	3 months
Instructor19	Female	7	Teacher certification	2 months
Instructor20	Female	13	Information Technology	6 months
Instructor21	Female	7	Information Technology	5 months

Data Collection Tools

Quantitative data were gathered using a pre-existing questionnaire based on Daher and Hussein (2024) which assessed four aspects of perceptions toward generative AI: efficiency, interaction, affect, and intention. The questionnaire was adapted to the context of the study by combining generative AI and OEPs as attached in Appendix A. It includes four dimensions of perceptions according to Shoufan's (2023) study which found that perceptions of AI include efficiency, interaction, affect, and intention. Efficiency is related to understanding the concepts while performing tasks with generative AI such as planning lessons, assessing students, and professional development. The interaction dimension is related to the social aspect associated with AI-human interactions. Generative AI tools are specifically designed for conversational usage that imitates human-like responses by providing users with information and knowledge. Confidence to work with generative AI bots is related to the emotional aspect, self-confidence, interest, and motivation affect users' goal-seeking, and developing interest in creating lessons, and it decreases users' anxiety. The intention to use generative AI is related to assisting in problem-solving and assisting in research.

For the reliability of the questionnaire, Cronbach's alpha was computed, resulting in values of 0.748 for efficiency, 0.791 for interaction, 0.727 for affect, and 0.793 for intention, confirming the reliability of the questionnaire. Additionally, Pearson correlation between the items of each scale and the entire scale ranged from 0.651 to 0.842, demonstrating the validity of the four scales. Pearson correlation between each scale dimension and the overall questionnaire yielded values between 0.628 and 0.753.

To gather qualitative data on participants' experiences with generative AI, both focus group sessions and semi-structured interviews were employed. The semi-structured interviews aimed to elicit comprehensive responses to the following research questions:

1. How does generative AI influence open educational practices in your classroom?

2. What are the perspectives of college instructors toward generative AI when using open educational practices?

3. What challenges do college instructors encounter when generating AI in OEP?

Focus group sessions were conducted to collect qualitative data. These sessions, each comprising eight to ten college instructors, were held prior to the semi-structured interviews. Participants were selected based on familiarity with OEP and generative AI. The 120-minute sessions, accommodating 21 participants, were conducted both via Zoom and in-person. Participants' consent was obtained for recording the sessions. Privacy was ensured with participants' names undisclosed and their contact information securely stored.

The focus group discussions were guided by six open-ended research questions, derived from a literature review and reviewed by field specialists. These questions gauged participants' opinions on generative AI with OEP. Questions are listed below:

1. Describe your experience using generative AI tools in your teaching practice, particularly in the context of creating or using (OERs)?

2. In what ways, if any, do you feel generative AI has the potential to transform (OEPs) for you and your students?

3. How does generative AI influence your teaching practices?

4. What specific challenges or barriers have you encountered when trying to integrate generative AI into your open pedagogical approaches?

5. How does using generative AI influence your ethical responsibility as an educator practicing open pedagogy?

6. Please provide an example of a successful instance where you combined generative AI with an OEP. What made it work?

Semi-structured interviews aimed to gather detailed insights into participants' teaching experiences with generative AI. Semi-structured online interviews, lasting 25-40 minutes, were conducted with 21 college instructors who volunteered after focus group sessions. The interviews, conducted via Zoom, allowed participants to reflect on their experiences and offer feedback on the topic.

Participants for this phenomenological study were chosen based on their specific experiences with generative AI and their ability to articulate detailed descriptions of their experiences. Overall, these qualitative methods provided rich insights into participants' experiences, offering valuable information for understanding their perspectives.

Data Analysis

This study employed a phenomenological approach to explore the experiences of faculty members who utilize generative AI and how that might influence open pedagogy. Data collection involved verbatim transcriptions of both focus group discussions and individual interviews. The primary source of information was derived from these discussions and interviews, designed to uncover key themes and categories related to perspectives and obstacles to integrating generative AI with open pedagogy. Participants were encouraged to visually demonstrate their explanations as these interactions were recorded in both video and audio formats.

A content analysis of the semi-structured interviews and focus group transcripts was conducted by using the inductive method. The process involved abstracting and grouping materials to facilitate inductive reasoning in response to the research questions. Inductive analysis was employed to extract emerging themes from participant responses. In this analysis, coding data and categorizing relevant segments into categories and subcategories was done through an iterative process (Vears & Gillam, 2022). This involved multiple data readings, coding pertinent portions, and grouping similar codes into broader themes or categories (Lovri´c et al., 2020; Daher & Hussein, 2024).

Given the inclusion of multiple focus groups, constant comparison analysis proved suitable for data examination, enabling the assessment of both within-group saturation and overall saturation. Data coding followed Creswell's six-step approach, which involved transcription and organization of data, initial analysis to grasp the essence of ideas, statement coding with segment and text data insertion, and code categorization and labeling, culminating in a discussion of themes.

Trustworthiness

To ensure the credibility of the qualitative data gathered from focus group sessions and semi-structured interviews, various techniques were employed. Credibility was established by cross-referencing data from multiple sources, such as interviews and focus groups. Furthermore, member checking was conducted, where participants were consulted later to validate the findings. For dependability, a code and recode strategy was implemented, with data independently coded by the researcher and another specialist, followed by discussions to ensure consistency in analytical approaches. Transferability was addressed by providing a comprehensive depiction of the study's context, enabling readers to assess the applicability of the findings to their situations. Confirmability was maintained by meticulously documenting the procedures for data verification throughout the study, ensuring that the conclusions were derived directly from participants' accounts rather than influenced by researcher biases.

Findings

Perceptions of Integrating Generative AI with OEP

For the first question of this study ("What are college instructors' perceptions of integrating generative AI tools with OER in their teaching?"), the normality of scores for each component of perceptions was analyzed. The Kolmogorov-Smirnov test results indicated that college instructors' perception scores were normally distributed ($p > 0.05$). Additionally, an inspection of boxplots revealed no outliers in the data. To determine the level of each component of college instructor's perceptions, the following ranges were used: .8-1.8 for very low, 1.9-2.6 for low, and 2.7–3.4 for medium, 3.5-4.2 for high, 4.3-5 very high. These intervals were derived from the calculation (5–1)/5 = .8, representing the length of each level. To verify the significance of each perception component's level, a one-sample t-test was conducted, as the scores for each scale were normally distributed as shown in Table 3.

Table 3

One-Sample t-test of Perceptions of College

Instructors of Integrating Generative AI with OEP

	Test Value = 2.6						
		T	Df	p	SD	95% CI	
Component	Mean					Lower	Upper
Affect	2.7072	1.791	49	.079	1.02913	-.0380	.6620
Intention	3.3440	-.405	49	.006	.73406	-.3099	.2059
Efficiency	4.2300	7.167	49	.000	1.94362	.5354	.9526
Interaction	2.9120	2.656	49	.011	1.23166	.1776	1.2824

The result in table (3) show that the mean score for affect (M = 2.71) was not significantly different from the test value, p = .079, while the mean score for intention (M=3.34) is significantly different from the test value, p=.006. Mean score for efficiency and interaction is (M=4.230) and (M=2.656) respectively. These results show that instructors who recognize the potential of generative AI are still grappling with its and hold mixed emotions about it. Crucially, they see enough potential to interact with generative AI.

Potentials of Integrating Generative AI with OEP

For the second question ("What are the potentials of integrating generative AI with OEP from college instructors' perspectives?"), two themes were considered: content creation and personalization, and supporting inclusive education.

Content Co-Creation and Personalization

Content Co-Creation by Instructors

Generative AI could empower instructors to create OER, like H5P's Falcon, which uses AI to transform existing static content (documents, video, or audio) into interactive, shareable content as OER in an online environment. A significant majority of participants

(57%) commented that generative AI is essential for supporting effective use of OERs. This essentiality stems from AI's ability to solve some persistent practical challenges in OER adoption like time required to locate relevant materials and curating content from OER based on specific learning objectives.

Instructor 3 mentioned, "Falcon analyzes the source file, for example, a video, transcribes it into text, extracts the main concepts, and generates new interactive content such as assessment tests or a glossary of terms that I can reuse while I am teaching online."

Content Co-Creation by Students

Generative AI can help the student create and publish OER right with open-licensed projects, so instructors can teach students how to use AI to generate public domain projects.

Instructor 8 mentioned

> So we do not just have to change our thinking a bit about AI not that students are just going to use it to plagiarize all day when they use it online, but you can get students to create AI online-based projects on your instruction like a project and when they create something because it is AI generated it's going to have to be published as an open domain product.

Instructor 5 affirmed that "Students can also prove their knowledge and skills by showing their AI projects when utilizing OER resources to a graduate school or potential employer so prompt engineering is a very important skill today." From these two comments, instructors let students create AI-online based projects to enhance students' AI literacy and to teach them to avoid passively accepting AI's output, instead focusing on the process and not the final product. The learning objective is to engage in critical interaction with the technology. Instructors also use a powerful strategy by asking students to publish their projects online to mitigate plagiarism and ensure transparency which raises AAAI ethical awareness among students.

Development of New Skills

On both sides of the learning process, it is necessary to develop new skills; students must cultivate the fundamental skills that will enable them to exploit the potential of AI and teachers must update their skills for the creative and educational use of tools such as ChatGPT and OER in their teaching practices.

> Utilizing open educational resources (OERs) that are produced by generative AI aligns well with our goals, enabling us to employ collaborative, renewable, reusable, and authentic assignments to bolster our students' roles as both learners and content creators. With numerous platforms and resources available, there's no need to start from scratch; instead, we can work more efficiently by leveraging existing tools and knowledge. (Instructor 12)

It seems that the use of generative AI in utilizing OEPs by generating OERs (e.g., draft texts, questions, case studies) indirectly produces or enables new OEPs by providing the foundational material for renewable student-led projects.

Moving from "Static" to Interactive Content

Generative AI helps to generate interactive online content much quicker than in the past. Many participants mentioned that they have always been bothered by the fact that the

OER tends to be dominated by static materials, much of which is stuff that we could have developed in the late 20th century. And there is very little of it that is very native to the digital environment.

Instructor 3 said

> Creating quality interactive learning content takes time and expertise. And that was always a major stumbling block for us as college instructors. But with generative AI, using the right methodology, you can eliminate weeks of work to make OER that you have more interactive and engaging for your students.

Time and Effort Saving

Generative AI appears to save time and effort for OER content creation. Instructor 13 mentioned that

> If I was creating even a short learning simulation if I wanted to do the first iteration of it. It would probably take me a couple of weeks to plan out the scenarios, the branches, and the feedback, to say nothing of finding the right images that were openly available. It was very time-consuming, and that's certainly not my full-time job. But using a reasonably robust AI tool, I can now create a working prototype within about a day if I'm disciplined. And that's an enormous leap in terms of the time.

Instructor 19 added that

> I think the time issue was the biggest obstacle for creating, modifying, or adapting a lot of quality interactive OER. I think generative AI tools have now removed that wall. And I think we should make people aware of that, that we can now do things that we've never done before. So, that's, to me, the probably most exciting part of the introduction of generative AI to OER.

Personalized Learning Paths

Generative AI can analyze learners' performance and create a tailored learning path for each student. This will ensure that learners focus on the competencies they need to strengthen and learn efficiently. Generative AI offers content suggestions that match their needs.

> The possibilities impact of generative AI's specifically on OER are quite compelling. The advantages of adaptive learning environments, the adaptation of the pace of content delivery and task complexity in real-time, offering a genuinely personalized learning encounter that significantly boosts learner involvement and retention. (Instructor 7)

It seems that adaptive systems can recognize when a learner is facing challenges and provide additional support or simplify the material, just as they can present more advanced materials when a learner is excelling. This adaptability not only optimizes learning efficiency but also sustains learner motivation and engagement, crucial elements for successful educational outcomes.

Collaboration

Generative AI collaborative platforms provide college instructors with significant potential to enhance OER sharing, communication, and collaboration. This was evident from the participant's responses. Instructor 2 mentioned that "even though I have been using generative AI tools for two months, it made my online teaching practices easier by offering more collaboration with my colleagues." This reveals that generative (AI) appears to facilitate collegial collaboration by offering tools for co-creating and curating and contextualizing existing open resources and generating consistent assessment frameworks. Generative (AI) can generate a curated list of resources to initiate collaborative projects.

Supporting Inclusive Education

Combining generative AI with OEP plays a vital role in promoting inclusivity in specialized fields such as chemistry, physics, and biology or other professions requiring tailored educational approaches. By eliminating learning barriers, AI technologies enable personalized education plans that cater to learners with diverse educational backgrounds and abilities. For example, in chemistry education, generative AI can simulate complex reactions for students, providing them with hands-on experience in a controlled, virtual environment tailored to their learning pace and style.

Instructor 11 said, "The availability of educational resources in different languages is a key factor of inclusion and open access."

Although in general, ChatGPT works better in English due to the availability of a larger database to train the systems, its potential for all other minor languages is still enormous.

Examples of AI-driven solutions in specialized learning environments include platforms that adapt teaching methods based on the learner's retention rate and feedback. For individuals with specific learning disabilities, AI systems can adjust content delivery to meet their unique needs, ensuring that each learner can achieve their potential regardless of their challenges. This level of personalization not only enhances learning outcomes but also ensures that education is accessible to a wider audience, fostering a more inclusive educational landscape.

Equitable Teaching Practices

Instructors noted that generative AI with OEP can provide universal access for all students. As Instructor 17 noted, "Integrating OER with generative AI tools helps to reach many learners based on their language preference because you can get for example chat GPT to speak to in Arabic or English or any language that you want."

Universal access supports equity-based teaching and learning. Combining OER with generative AI considers students' learning needs and preferences. Instructor 18 confirmed that "Because generative AI can do that much better than us it can remember what the student said what the student does, hence I could say that generative AI tools enhance OEP online." Generative AI promotes equitable teaching practices and adapts to the learner so it is a form of adaptive learning it can also work as a virtual facilitator so if we know that Chat GPT will soon be embedded.

Improving Student Engagement

Combining generative AI with OEP is revolutionizing content delivery for teachers by creating and adapting interactive and immersive learning resources such as simulations,

virtual labs, and gamified elements. These tools enhance engagement and memorability by enabling learners to experiment in a risk-free setting and apply concepts in virtual scenarios before tackling real-world applications. The interactive nature of this content, facilitated by AI, can lead to increased engagement levels and deeper comprehension of complex subjects.

Instructor 2 commented that "AI-regenerated OER caters to diverse learning styles, enhancing the accessibility of learning materials. Visual learners benefit from rich graphics and videos, auditory learners from podcasts and simulated dialogues, and kinesthetic learners from interactive and tactile interfaces."

By offering a range of content types, generative AI ensures that learning is not only more effective but also more inclusive, accommodating the preferences and requirements of all learners, thus democratizing education.

OER Translation and Localization

Participants reported that integrating generative AI with OER was advantageous for them as well as their students, since it translates and localizes knowledge. Many participants reported that generative AI can translate OER into multiple languages which supports multilingual education and localization.

Instructor 7 mentioned that "generative AI can translate massive OER into multiple languages, which makes and supports high-quality education and making resources accessible to English as second language learners in different regions."

Instructor 5 commented that "Generative AI tools like gamma can adapt and localize instructional content to fit cultural contexts of my students, which ensures that instructional materials are relevant and relatable to students from diverse cultural backgrounds and contexts."

For the third research question ("What are the challenges of integrating generative AI with OEP from college instructors' perspectives two themes emerged: data privacy and transparency.

Data Privacy

As personalized learning necessitates the collection and analysis of extensive personal data, data privacy is paramount. Ensuring the secure handling of this data and maintaining privacy is crucial for maintaining trust.

> Additionally, the potential for bias in AI algorithms can result in unfair advantages or disadvantages for certain learner groups, requiring rigorous testing and calibration to ensure fairness and transparency. "In fact, earlier today, a colleague was talking about using Claude AI to combine and remix existing assignments in new ways. So, for people who have been doing OER work around remixing. It is a great tool for really coming up with innovative new models of existing materials. (Instructor 1)

Transparency and Trust

> Open pedagogy advocates for instructors to empower students to become creators rather than mere consumers. This approach enables students to engage in curating and crafting content, fostering their identity as active contributors to the public sphere of ideas. However, challenges such as transparency were noted as potential hurdles to this creative process. I'm still excited, but I also have, the concerns are more in the

> foreground, and there are some things that we haven't yet figured out and, you know, the copyright issues! And there are some real concerns around source attribution and transparency around AI that I think that it'd be great to come up with some more systematic and clear kind of procedures for those. (Instructor 13)

Instructor 6 added that "An LLM can be an excellent help in defining the setting and structure of the papers, but students will still have to verify the sources, train themselves to decode the truth: activities that require information literacy skills, which is positive."

Discussion

For the first question ("What are the perceptions of faculty members of integrating generative AI with OEPs?"), findings revealed that the average scores for intention and efficiency were notably medium, while the score for interaction to combine generative AI with OER was significantly higher. These results may reflect the nature of generative AI tools like AI bots.

For the medium intention scores, the use of generative AI with OER in higher education has not yet been fully integrated, and college instructors are still exploring and assessing their potential in this integration. This exploration may account for the medium levels of efficiency and low effect dimensions. For medium levels of efficiency, the use of generative AI with OER has not yet been established as a tool in higher education and the ability of these tools to save time and resources is still not within its capabilities. Low effect could be due to lack of using generative AI with OER which creates fewer emotions during the exploratory phase rather than the adoptive phase. Nonetheless, college instructors are keen to use generative AI with OERs to enhance OEPs in their teaching practices, likely due to the perceived benefits and the continuous improvements in these technologies. The medium efficiency scores were reported previously by Ossiannilsson et al. (2024) who reported that harnessing the power of AI to implement OER promotes efficiency by giving users the opportunity to brainstorm, summarize information, enhance discussions, and promote learning pathways. Moreover, while Mican et al. (2023) found a moderate to high value for the behavioral intention to use AI, they attributed this variance to determinant factors like facilitating conditions, habit, and social influence, and its moderators' knowledge of the English language, study domain, and gender. Despite the moderate level of college instructors' perceptions of using generative AI with OER, their intention to use them remains high, indicating that additional factors may influence the evolving capabilities of AI bots in educational settings. Moreover, some demographic variables (interview, participants' field of expertise and length of AI usage) show that they were not all AI experts. Their experience with generative AI ranged from 2 to 9 months, which indicates that they were largely in the early adoption phase. This might explain the medium efficiency and intention scores since they were still exploring the usage of generative AI.

In practical terms, this indicates that while instructors recognize generative AI as a powerful asset, they are still not yet fully committed to integrating it into their regular teaching with OERs. They may be trying to practice with generative AI for specific tasks like brainstorming OER topics but have not yet integrated it into their core instructional design. This limited usage could be due to accuracy concerns of AI-generated content, the time and effort needed to edit the output, and a lack of clear institutional policies. Hence, the medium efficiency score suggests that the promised benefits of timesaving are not yet a consistent reality for many instructors. Meanwhile, the significantly high score for interaction shows

that instructors highly perceive generative AI tools as very responsive and capable of facilitating dialogue. Instructors perceive AI tools as effective for interacting with educational content when creating questions from an OER textbook chapter, creating multiple explanations of complex concepts to meet students' diverse needs, and curating large number of open-access resources. The high interaction score shows the strengths of generative AI, like its ability to generate customized interactive content which aligns well with the dynamic nature of OEPs.

For the second question, two themes (content co-creation and personalization) emerged for possibilities for using generative AI in OEPs. Generative AI is useful as a support for creative unlocking individual brainstorming contexts. The dialogue with the chatbot can provide a starting point for developing unpublished documents by students, who often feel immobilized in front of a blank page. For example, empirical observations suggest that although ChatGPT generates content of moderate quality with limited creativity, this limitation can function as a cognitive scaffold, prompting students to engage in comparative self-assessment and strive for superior outputs. A study by Bozkurt (2023c) confirmed that generative AI can be utilized in OERs and OEPs, including tasks like automatic content generation, resource curation, existing materials updates, co-creation facilitation, and collaborative learning assistance. Hence, it is critical to utilize the power of generative AI and use OERs and OEPs in an online learning environment by creating educational content which is important for both teachers and students. Generative AI tools seem to support the curation and creation of OERs, which offers a more dynamic and interactive online learning environment.

These capabilities directly enable the development of personalized learning paths. Instructors mentioned how generative AI could create different learning paths in the online environment according to data gathered by these systems. This finding is in line with Tlili and Burgos (2022) who reported that generative AI produces automatic and different learning and teaching paths for both learners and educators and facilitates the finding of adequate OERs for better OEPs in the learning and teaching outcomes according to the personality characteristics as well. Therefore, generative AI may provide dynamic OERs that can be customized and tailored to students' needs by making online learning more accessible. This is considered a pedagogical shift in online learning since educators can consider integrating generative AI tools into their teaching practices by fostering a more interactive and student-centered learning experience since an interactive online learning environment was a challenge for some educators.

This finding concurs with Tlili et al. (2021) who demonstrated how AI can facilitate the search for OERs through a sort of automatic tagging, solving the age-old problem of how teachers and students can find relevant open content quickly. In terms of access to education, generative AI can primarily be used to make OERs more accessible to students by, for example, creating translations of OERs in different languages or accessible versions for students with disabilities or adapting content to different socio-cultural contexts. This result could be explained as generative AI can make everything easier and solve some problems that underlie sharing, such as the scarcity of resources in minority languages. Meanwhile, it has some disadvantages like raising the barrier of trust, creating a world in which teachers have to look at themselves not only from colleagues who could use their resources. This is in line with Ossiannilsson's (2023) finding which recommended that the creation and distribution of openly licensed educational materials should be designed with universal accessibility in mind, to benefit students, educators, and researchers globally. Moreover, prioritizing the social, ethical, and moral aspects of learning and education is crucial for

advancing social justice, equality, human rights, prosperity, liberation, and growth in line with major global initiatives.

For the second theme, supporting inclusive education, generative AI leverages its extensive capabilities in data processing and pattern recognition, which supports transformative opportunities for generating and organizing OERs content. It enables adaptation to individual or local requirements and improves accessibility. This represents a chance for students to enhance productivity and foster creativity within open pedagogy and enduring assignments (Wiley & Hilton 2018). Moreover, Generative AI's extensive data-processing capabilities allow for the automatic adaptation of OERs to meet diverse learner requirements. This includes creating language translations, generating accessible versions for students with disabilities, and adapting content to various socio-cultural contexts (Ossiannilsson, 2023). By solving the perennial problem of locating relevant open content through automatic tagging and summarization (Tlili et al., 2021), AI significantly lowers barriers to access which enhances engagement of learners. Prioritizing these applications is crucial for aligning OEPs with global initiatives aimed at promoting equality, human rights, and inclusive growth. Moreover, themes also might be influenced by departments of instructors. For example, science-based departments frequently highlighted AI's usage for creating virtual labs and simulations, while instructors from language and social sciences department discussed its role in brainstorming, translation, and image usage.

For the third question of this study related to the challenges of generative AI integration with OEP, themes were found related to ethical issues like data privacy and transparency of resource production. It is enough to imagine a collection of OER whose resources are autonomously read, updated, and improved by AI to understand the legal and political implications, and it becomes important to ask who develops and controls these mechanisms to support quality (Kamalov et al., 2023).

Trust was also found to be an issue. For example, instructors do not trust the quality of the content produced by others, and at the same time they might not trust the use that others could make of them, the introduction of the magic machine capable of criticizing and improving the teachers' work (Tlili et al. 2021) could create a world in which the propensity to share decreases, rather than increases. In a collection of OER whose resources are autonomously read, updated, and improved by generative AI, it is still hard to understand the legal and political implications, and it becomes important to ask who develops and controls these mechanisms to support quality.

Further challenges reported in using generative AI to support OEP of copyright, privacy, and the use of personal data, for which most teachers are not ready (Tlili & Burgos, 2022). Hence for effective usage of generative AI in online learning while using OER and OEP, ethical use should be considered and generative AI should complement rather than replace online learning strategies.

In summary, generative AI is, and will be, increasingly capable of supporting teachers in all the typical activities of working with OERs: content creation, tagging, promotion of the same, cataloging, and modification, towards dynamic co-creation between teacher and AI (Bozkurt, 2023b).

Conclusion

Generative AI promises significant advancements that will further revolutionize personalized education. Predictive analytics, deeper customization, and even more immersive and interactive learning experiences are just a few areas where AI is expected to make substantial strides. As technology progresses, educators and institutions are urged to remain at the forefront of these developments, embracing new tools and methodologies to enhance educational delivery and outcomes. Generative AI can be utilized in OER and OEP, including tasks like automatically generating content, curating resources, updating existing materials, facilitating co-creation, and enabling collaborative learning.

The proactive integration of generative AI into educational strategies prepares learners for a rapidly changing world and ensures that education remains relevant, engaging, and inclusive. By staying abreast of AI trends and continuously adapting to technological advancements, educators can equip learners with the skills and knowledge necessary to thrive in the future, shaping a new era of education that is personalized, accessible, and effective.

Practical approaches are needed for responsibly integrating generative AI tools in educational settings, and incorporating AI ethics into the curriculum is essential. Integrating generative AI ethics in educational programs is crucial to expanding AI literacy and ensuring that the development and use of AI technologies are inclusive, addressing the issues of underrepresentation in terms of equity and quality (Salhab, 2024). Additionally, establishing an AI ethics code for higher education institutions, with clear guidelines and policies for responsible AI development and implementation, is necessary. Moreover, robust data governance frameworks to safeguard privacy and regular audits of AI systems to detect and address biases must be implemented. More specifically, an ethical AI data governance framework must ensure that educational institutions maintain transparency about how AI models are developed, trained, and delivered. A practical solution for achieving transparency could be the use of unbiased datasets that are fundamental to creating a transparent AI system. Regular evaluations should be conducted to ensure the data stay relevant, free of bias, and accurately represents diverse viewpoints. Furthermore, institutions must focus on bridging the digital divide by ensuring all learners have access to the necessary technology and infrastructure to benefit from AI-enhanced education. Moreover, an ethical data governance framework must include strategies and policies that guide the ethical development, use, deployment, and regulatory adherence of AI technologies within an educational institution. Personal and sensitive data must be treated with strict confidentiality and utilized solely for educational purposes. Additionally, educating students and staff on data privacy is essential. They should be informed about how their data is used and the protective measures in place. Such transparency fosters trust and ensures that everyone understands their data privacy rights. By tackling these challenges directly, educational institutions can harness the full potential of generative AI while upholding ethical standards and fostering an inclusive learning environment.

Like all research, this study has certain limitations that should be acknowledged. First, the sample was limited to Palestinian university instructors from a single institution, which may affect the generalizability of the results to other populations and settings. Furthermore, using self-reported data in the quantitative design could introduce social desirability bias, where participants may exaggerate positive behaviors or downplay negative ones, such as their perceptions of affect and intention domains to use generative AI in open teaching practices (Caputo, 2017). Another limitation stems from the study's cross-sectional design,

which only captures college instructor views and perceptions at a certain time (Bowen & Wiersema, 1999). Additionally, more cross-cultural comparisons should be made that would provide a clearer roadmap for advancing this field. The influence of demographic variables was not explored in this study and could be investigated in future studies.

Future Research

Providing a more comprehensive understanding of using generative AI in open education practice's role in higher education settings necessitates future research. Including college instructors' perceptions from a broader range of geographic locations and academic institution in future studies would improve the generalizability of the findings. Longitudinal studies could help track changes in college instructors' perceptions and behaviors over time, while employing a more balanced mixed-method approach, with in-depth qualitative interviews or focus groups, could offer richer insights into how college instructors incorporate generative AI into their open teaching practices.

Declarations

The author declares no conflicts of interest associated with this study. The authors declare no funding associated with this study. Permission to conduct research on human subjects was granted by the ethics board of the institution.

Data Availability

The datasets generated during and /or analyzed during our current study are available from the corresponding author on a reasonable request.

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Appendix A

Efficiency	1	Generative AI enables OEPs by solving pedagogical problems.
	2	Integrating generative AI with OERs is helpful and effective.
	3	Generative AI tools will really help students and instructors by providing a start point for renewable materials for open content.
	4	Integrating generative AI to assist in OEPs is helpful and effective for learning.
	5	Generative AI enables and scaffolds new forms of OEPs by providing the essential building blocks.
	6	Generative AI tools can process and analyze large amounts of data quickly and accurately that support OERs.
	7	Generative AI can help instructors quickly generate frameworks for student projects to be published as OERs.
	8	Generative AI tools are useful to create different resources for different disciplines.
		Integrating generative AI enables innovative OEPs.
Interaction	1	It feels like having a smart friend who you can ask anything when using generative AI to adapt OERs.
	2	Using Generative AI with OER tools makes a human-like, friendly impression.
	3	You can ask follow-up questions when you modify and adapt OERs and the generative AI tool stays in the conversation.
	4	The interaction with generative AI while co-creating of OER is engaging.
	5	Generative AI tools can understand and respond to my queries effectively while creating and curating OERs.
	6	It is easy to interact with open content that was designed using generative AI**.**
	7	Generative AI tools are clear, which helps me engage in open educational practices
	8	The answers generated by generative AI tools when creating open content are well-structured.

	9	Generative AI tools can generate human-like responses that support open pedagogy.
Effect	1	I find it very motivating to integrate generative AI tools to support OEPs.
	2	I am amazed by the capability of integrating generative AI with OERs.
	3	I find it very interesting to integrate generative AI with OERs.
	4	I feel optimistic about the potential of generative AI tools in supporting OEPs.
	5	I feel confident using generative AI tools to adapt OERs for my academic work.
	6	Working with generative AI tools reduces my anxiety in my profession.
	7	I am comfortable using generative AI as part of my teaching practices.
Intention	1	I intend to use generative AI with OERs tools in my teaching.
	2	I plan to continue using generative AI tools to assist with OEPs.