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Original Research Article

Graduate Students' Perceptions at An-Najah National University Regarding the Role of Artificial Intelligence in Enhancing Interaction in E-Learning Environments

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Abstract: This qualitative study looked into the views of graduate students from An-Najah National University about the implications of AI in strengthening interaction in e-learning settings. The research used semi-structured interviews with a purposive sample of ten students from different faculties who had prior exposure to online learning platforms and had a basic awareness of AI technologies. The results have shown that the participants largely viewed AI as an opportunity to foster academic interaction via means judged among others by adaptive learning systems, instant feedback, and interactive content. The interviewees also raised serious liabilities concerning data privacy, reliability of AI-generated outputs, and humans being taken out of the equation. Practical recommendations were also made by participants to bolster AI in education, such as further training for instructors and students, development of the teaching platforms, and enforceable policy regulations on AI. The way forward would be for universities to take an approach in considering technology and humanistic perspectives in a balanced way.

Keywords: Artificial Intelligence, Online Interaction, Distance Learning, Higher Education, An-Najah University.

INTRODUCTION

Over the last two decades, the educational arena has transformed deeply and, in the recent past, has begun moving from traditional paradigms of instruction to digital learning models. This massive shift has been instigated mainly by advancements in information and communication technologies. This is where e-learning is perpetrating great opportunity at unprecedented levels in accessing educational content at any time and any place, thus eliminating the temporal and geographical constraints on education that have held for most of history (C. Point, 2024). It is the transition from traditional to digital that enables reconsidering of pedagogic theories, diversification of learning resource bases, and development of flexible learning environments according to learners' needs.

With all its charm, however, the major challenge has become a lack of serious interaction between students and the professors, with solid grounds for deep understanding, maintaining motivation, and instilling critical and collaborative thinking (Panopto, 2024; SMU Learning Sciences, 2025). While real-time communication in the classroom allows students to ask questions and be challenged on thinking and concepts and receive immediate feedback, most online learning will not allow for such an interactive dimension unless it is counterbalanced through the integration of certain previous advanced tools along good pedagogical strategies (Selwyn, 2022; C. Point, 2024). With the lack of interaction comes isolation from an academic point of view, lack of motivation toward participation, and a tendency toward being disengaged—all of which inhibit academic performance (Barayan, 2024).

Thus, AI can be seen as one of the most promising technological solutions to remodel digital learning experiences so as to be entertaining and personalized. AI is set by a configuration of systems and algorithms that permit computers to exhibit human-like cognitive functions such as understanding, learning, and decision-making (UNESCO, 2023). With these capabilities, AI found its way in education—more so in the digital context—to adapt educational content, enhance engagement, and provide personalized real-time feedback (University of Southern California, 2024).

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AI educational applications have worked wonders in analyzing student data, keeping track of their progress, and, in other words, adjusting content to their needs (its so-called adaptive learning) (SMU Learning Sciences, 2025). Its systems provide an entirely personalized learning experience, targeting specific weaknesses and reinforcing strengths, thus further assuring higher engagement and achievement (The Democratic Arab Center, 2024; Alawneh *et al*., 2023). Recent analytical studies predict integration of AI in e-learning systems to further boost student interaction with the system, improve student retention, and strengthen peer-to-peer collaboration (Barayan, 2024; Hyperspace, 2023).

Practically speaking, a variety of intelligent tools—such as virtual assistants and chatbots—have been developed to provide real-time support to learners by answering inquiries and offering instant guidance on educational tasks, thereby narrowing the feedback gap (Panopto, 2024; Hyperspace, 2023). Global surveys indicate that over a quarter of students report feeling more supported in their learning journeys—especially outside formal class hours—thanks to these AI-powered tools (Panopto, 2024).

Moreover, AI-driven big data analytics have enabled precise tracking of students' interaction patterns and provided instructors with immediate indicators for timely pedagogical intervention (University of Southern California, 2024). For example, instructors can now identify content areas that students frequently revisit or where common mistakes occur, prompting them to reteach or offer supplementary resources. This level of intelligent monitoring reaffirms the teacher's role as a more effective facilitator and guide.

Nevertheless, the integration of AI into education is not without ethical, technical, and regulatory challenges. Specialized literature warns that although collecting detailed student data supports personalization, it also raises serious concerns regarding privacy and data security (UNESCO, 2023; Alawneh *et al*., 2022). Some studies also highlight the risk of algorithmic bias—particularly when AI systems are trained on non-representative datasets—leading to unfair content or inaccurate assessments (Panopto, 2024). Additionally, many students have expressed reservations about overreliance on AI tools, with 48% indicating they do not fully trust generative AI outputs without human review (Panopto, 2024).

In the Palestinian context, and more specifically at An-Najah National University—one of the most prestigious higher education institutions in the West Bank—recent years have seen a significant shift toward e-learning systems, especially during and after the COVID-19 pandemic. This transformation included the incorporation of AI-supported tools and applications aimed at enhancing both the quality of education and interaction between students and faculty (Alawneh *et al*., 2022; Alawneh & Al-Shara'h, 2022). With the Palestinian Ministry of Higher Education increasingly embracing digital transformation, there is a pressing need to understand students' attitudes and perceptions, particularly among graduate students, regarding these technological changes.

Assessment design focusing on graduate students becomes especially important, given the advanced levels of their academic experiences and engagement in both traditional and digital learning styles. Their understanding will shed some real light on AI-powered enhancing interaction in online settings. They can provide input whose feedback may be used for improvements on e-learning systems targeted to fit into the learners' needs, which may, in turn, become an avenue for improving higher education in Palestine. Thus, this study in qualitative form aims to explore the perception of graduate-level students in relation to the enhancement of e-learning systems with respect to AI at An-Najah National University by way of in-depth interviews that document their lived experiences and reflections.

Review of Literature and Previous Studies

There has been, in the last few decades, a growing interest in the application of artificial intelligence (AI) technologies in education, especially in relation to e-learning. Within that study field, the goal had been to assess the effect of those technologies on interaction between learners, content, and instructors. This review is based on latest studies published between 2021 and 2024 and identifies three major areas of focus: the role of AI in fostering interaction, ethical and technical issues concerning its applications, and students' viewpoints and thoughts on AI in educational environments.

Artificial Intelligence and the Enhancement of Interaction in E-Learning

According to the literature, AI strongly contributes toward improved interaction in any sort of digital learn. An analysis based upon 19 studies (2021-2024) further shows that using intelligent adaptive learning systems does significantly improve learner engagement with personalized instruction driven by performance analytics along adaptation to learning styles (Barayan, 2024; Learning Sciences, 2025). These systems are capable of providing instant feedback, leveled challenges, and alternative lessons aligned with each student's progress—factors that actively foster deeper learner engagement (SMU Learning Sciences, 2025).

Panopto's (2024) study further revealed that smart assistants—such as chatbots—help keep students consistently engaged with learning content. In that study, 25% of participants reported receiving immediate answers to their queries during study sessions. This

aligns with earlier research indicating that interactive students benefit from richer learning experiences and enhanced critical thinking skills (Panopto, 2024).

In the Arab academic context, a study by Alawneh and colleagues (2023) confirmed that integrating AI tools into university education increased student interaction and continuous involvement, especially when coupled with interactive assessment strategies and live feedback. Another applied study at An-Najah University (2023) demonstrated that using the Moodle platform with AI support helped contextualize learning materials in authentic scenarios, thereby boosting academic interaction and relevance.

Challenges and Concerns Related to the Use of Artificial Intelligence

Despite the promising potential of AI, several studies have raised concerns regarding ethical, technical, and data-related risks. Chief among them are issues of data privacy and security. Intelligent systems often collect vast amounts of student information—including learning behaviors, time on task, and comprehension levels. Research reports suggest that some educational platforms have inadequate security protocols, posing threats to student data confidentiality (Selwyn, 2022; Democratic Arab Center, 2024).

Concerns about algorithmic bias are also prominent. If AI systems are trained on skewed datasets, they may produce unfair or inaccurate content and assessments. Alawneh *et al.,* (2022) emphasized the importance of developing ethically sound models that are culturally and cognitively inclusive when designing AI-supported educational tools.

Moreover, Panopto's (2024) reports indicate a relatively low level of trust in some AI tools among students. Around 48% of surveyed students stated they do not rely solely on AI-generated outputs without human oversight. Additionally, 41% noted the need to verify AI responses before using them, reflecting their awareness of potential errors or what some refer to as "digital hallucinations" within these systems.

Student Perceptions and Attitudes toward Artificial Intelligence in Education

Recent literature suggests that student attitudes toward AI are generally positive, though often conditional. According to Panopto (2024), 63% of university students believe that AI can effectively tailor content to their learning styles, and 59% reported satisfaction with AI tools that identify unfinished lessons or concepts requiring review. These trends align with the findings of Alawneh *et al*., (2024), who noted that students in Palestinian universities largely view AI as a supplementary organizational tool rather than a replacement for the instructor.

Notably, some students expressed a desire for targeted training on how to effectively use AI-based educational tools, signaling a growing sense of critical awareness. In response, working papers presented at the "Artificial Intelligence and the Future of Education" conference (Democratic Arab Center, 2024) called for the development of awareness programs tailored to university students, helping them engage with AI in an ethical and informed manner rather than relying on it indiscriminately or passively.

In the Palestinian context, a survey conducted by Alawneh *et al*., (2022) across several local universities revealed strong acceptance among graduate students for using AI in course organization and content delivery—provided it is guided by transparent and ethical frameworks.

Overall, the literature supports the idea that AI presents a real opportunity to enhance interaction within e-learning environments by enabling personalization, real-time feedback, and teacher support. However, these benefits do not arise automatically. There is a need for comprehensive policies which include ethical, technical, and pedagogical matters. In particular, the voices of students are very important for the future of AI-assisted education, and it is this intent that this study would fulfill by examining the lived experiences and perspectives of graduate students at An-Najah National University.

Study Problem and Research Questions

It is amidst this accelerating wave of digital transformation that is reconfiguring higher education that rapid artificial intelligence (AI) technologies are currently dominating the new horizon, especially in configuring an e-learning environment wherein ways of personalizing the learning experience are made possible, increasing interaction, intelligent feedback, and facilitating multi-directional communication. Several studies across the globe have shown that the incorporation of AI into learning environments has enhanced engagement among learners increasingly, whether by content-recommendation engines, smart chat platforms, or automated systems supporting instructors (SMU Learning Sciences, 2025; Panopto, 2024; Alawneh *et al*., 2023).

In spite of the momentum globally toward AI integration, there continues to be a gap when it comes to understanding the perceptions of students-notably graduate students themselves-on these transformations. Positive impressions of AI tools are generally reported among learners in some studies (Panopto, 2024) while other investigations have indicated reports of caution, if not skepticism, associated especially with issues of privacy, dependability, bias, or overreliance on automation (Selwyn, 2022; Barayan, 2024).

In the Arab context, qualitative studies looking into students' perceptions regarding this phenomenon are

at the beginning stage, with the few having been done in Palestinian universities. Students were anxious to learn about what potential AI has in education, but more importantly, Alawneh *et al*., (2022) noted the lack of research regarding students' real experiences and the technology's influence on their everyday school engagement.

This research problem draws its importance in that it studies how graduate students at An-Najah National University experience AI's role in learning in light of their overall level in postgraduate studies and depth of exposure to digital learning environments. An-Najah University is one of the leading universities in Palestine adopting new e-learning systems along with content management platforms like Moodle, thus being a good ground for measuring the integration of AI tools in supporting education interaction.

Moreover, a clear research gap lies in the lack of qualitative Palestinian and Arab studies that document these perceptions through students' own voices. Most previous research has focused on analyzing systems, evaluating educational outcomes, or addressing the technical aspects of e-learning (Alawneh *et al*., 2023), without sufficiently delving into the interactive and cognitive dimensions as articulated by students themselves—the primary stakeholders in the learning process. Therefore, this study seeks to address this gap through an in-depth qualitative analysis of students' insights, experiences, concerns, and recommendations.

Main Research Question

What are the perceptions of graduate students at An-Najah National University regarding the role of artificial intelligence in enhancing interaction within e-learning environments?

Sub-Questions

1. What do graduate students understand about AI's potential to foster interaction in e-learning settings?
2. What are the primary concerns or challenges students associate with the use of AI in online education?
3. What suggestions or prerequisites do students identify as necessary for the effective and safe use of AI to support interaction?

Objectives of the Study

This study primarily aims to explore and analyze the perceptions of graduate students regarding the role of artificial intelligence (AI) in enhancing interaction within e-learning environments. From this overarching aim, the following specific objectives are derived:

- To investigate students' perspectives on the potential contributions of AI in increasing interactivity in online learning platforms.
- To identify the perceived benefits of integrating AI into e-learning, including improvements students expect in areas such as faster feedback, greater class participation, or the customization of content to individual learning needs.
- To examine students' concerns and challenges related to the use of AI, in order to understand the potential barriers that may influence their acceptance of or engagement with intelligent technologies—whether those concerns stem from direct experience or are based on personal impressions and expectations.
- To collect students' practical suggestions on how to maximize the benefits of AI and minimize its risks, including their user-based recommendations for ensuring safe and effective integration of AI into university learning platforms.
- To build a localized knowledge base by providing up-to-date qualitative data on Palestinian students' attitudes toward AI in education, thereby contributing to the broader body of Arabic academic literature and supporting future evidence-based discussions and planning.

Significance of the Study

The significance of this study emerges from both theoretical and practical considerations, closely aligned with the ongoing priorities for advancing higher education in the digital age.

Theoretical (Academic) Significance

This study offers a deeper understanding of an area that has received limited attention in prior Arabic-language research: how students themselves perceive the role of artificial intelligence (AI) in their educational experience. While much of the existing literature focuses on applied case studies or expert and technical viewpoints, relatively few studies place students at the center of analysis as firsthand agents of the learning process.

Accordingly, this research contributes to filling a critical knowledge gap by examining the readiness of graduate students—arguably among the most academically advanced learners—to adopt AI technologies, as well as their views on its benefits and limitations. Furthermore, it adds a new dimension to the academic discourse by bridging qualitative insights (i.e., student opinions) with findings from previous quantitative and experimental studies on the effectiveness of AI in education. In doing so, this study provides a more holistic perspective that can help validate—or re-evaluate—some theoretical assumptions in light of local student realities.

Practical (Applied) Significance

This study is being conducted at a pivotal moment in which An-Najah National University and other institutions in the region are working toward integrating AI technologies into their digital learning

platforms, with the goal of enhancing the quality of e-learning and increasing student engagement. Understanding the attitudes and perceptions of graduate students—who are expected to be more open to technology and may become future opinion leaders or decision-makers—can assist educational policymakers at the university in making informed choices.

For example, if the study reveals strong enthusiasm among students for receiving personalized AI-generated learning recommendations, this may prompt the university to accelerate the adoption of adaptive learning systems. Conversely, if common concerns around data privacy emerge, this would signal the need for clearer policies and greater transparency, along with efforts to engage students in open dialogue about data protection.

In addition, the study's findings will offer valuable insights to academic development centers and instructional designers at the university, helping them understand user perspectives on current strengths and weaknesses in the system. For instance, students' feedback may highlight gaps in technical support or training—pointing to the need for tailored workshops and capacity-building initiatives for both students and faculty members. The results may also underscore the importance of building digital and ethical awareness among students, suggesting the integration of AI ethics content into research methods or digital literacy courses.

Study Delimitations

To properly contextualize and interpret the findings of this study, it is essential to clarify the specific boundaries that define its scope—namely the human, spatial, temporal, topical, and methodological dimensions:

- **Human Delimitation (Study Sample):** The study is limited to graduate students enrolled at An-Najah National University. More specifically, the sample included 10 students (from both master's and doctoral programs), selected purposively according to qualitative research methodology, as will be described later, to participate in in-depth interviews.
- **Spatial Delimitation:** The study was conducted at An-Najah National University, located in Nablus, Palestine.
- **Temporal Delimitation:** The research was carried out during the 2024–2025 academic year.
- **Topical Delimitation:** The study focuses exclusively on the role of artificial intelligence in enhancing interaction within e-learning environments.
- **Methodological Delimitation:** The study adopted a qualitative research approach, using open-ended, semi-structured interviews as the primary data collection tool.

Definition of Terms

To ensure conceptual clarity and prevent misinterpretation of key ideas within the research context, the study provides the following operational definitions of the main terms appearing in the title and throughout the text:

Perceptions:

In this study, student perceptions are operationally defined as the set of thoughts, opinions, and beliefs held by graduate students about a specific topic—in this case, the role of artificial intelligence in enhancing interaction within e-learning. These perceptions were verbally expressed during the interviews and may include both positive and negative impressions, varying levels of knowledge or awareness, future expectations, and emotional attitudes such as enthusiasm or apprehension. In essence, a perception is what the student thinks and feels about the issue being investigated and how they make sense of it.

Graduate Students:

This term refers to students enrolled in postgraduate programs (master's or doctoral level) at An-Najah National University. These individuals may come from different faculties and academic disciplines but share the common characteristic of having completed undergraduate studies and participating in a more advanced learning and research environment. The study assumes that graduate students possess a higher level of academic experience and awareness, which enables them to provide more in-depth insights compared to undergraduate students.

Artificial Intelligence (AI):

AI is defined as a branch of computer science concerned with designing systems and software capable of performing tasks that typically require human intelligence. Such tasks include learning from data, identifying patterns, understanding natural language, solving complex problems, and making semi-autonomous decisions. Some of the examples of applications of AI in education include adaptive learning algorithms, educational chatbots, plagiarism detection systems, and virtual academic assistants. For purpose of this study, AI refers to any intelligent software-based tool or system integrated in the e-learning platform to enhance or manage the learner's experience.

E-Learning Environment:

This is the state of the art in which any type of educational process is conducted over the internet and through digital devices. It includes a learning management system, whereby the content of courses, communication elements, and assessment methods are hosted, as well as the additional applications (i.e., video conferencing platforms, virtual labs, discussion forums, etc.) needed in this context. In the case of An-Najah University, the e-learning environment incorporates the official LMS of the university and any extra tools or applications used by faculty and students while taking their courses-social media groups, for instance, or

interactive apps from outside the official LMS when they are necessary.

RESEARCH METHODOLOGY

This study adopts a descriptive qualitative methodology, which aims at describing and understanding phenomena by exploring the views and lived experiences of individuals. This approach is especially suited to the problem under investigation, which is about understanding how students perceive and interpret the role of a particular technology in their educational setting through their words and actions-an investigation ill-suited for quantitative instruments like questionnaires but requiring direct engagement and open conversation.

Study Design

The primary data collection technique was through semi-structured individual interviews. It represents the nature of qualitative research tradition since it is flexible enough to explore complex ideas but still from a common framework, ensuring that core themes are covered for each participant. The interview questions were built upon the subs-questions of this study, as stated before, with follow-ups or probing, depending on the flow of each interview.

A guiding protocol was worked out, in which it contained around eight open-ended core questions. Some of them include:

- "In your view, how might artificial intelligence change the way you interact with course content or with your instructor?"
- "Do you have any concerns about using AI systems in your learning? Please elaborate."
- "What do you think the university or faculty members should do before introducing AI tools to ensure you benefit from them effectively?"

These and other questions were used to encourage students to share their experiences, concerns, and recommendations in their own words.

Study Population and Sample

The target of the study entailed all graduate students at An-Najah National University. This population represents a collection of students from diverse academic backgrounds, experiences, and utilizations of e-learning technologies, and hence, it was expected to contribute to most mature and insightful views on what AI has for the digital learning environment.

Purposive sampling was adopted due to the qualitative nature of the study made very suitable by semi-structured interviews being the main data collection instrument, which is in itself a common purposive approach in qualitative research, allowing the researcher to invite participants deemed very knowledgeable or having a prior experience regarding the phenomenon under study (Creswell & Poth, 2018).

Sample Selection Criteria

The following criteria applied in the selection of cases:

1. The student must be participating in a graduate program (Master or Ph.D.) at An-Najah National University.
2. The student must have engaged in the use of an e-learning system, for example, Moodle or Zoom, in courses taken recently, either during or after the COVID-19 pandemic.
3. The student should either have some experience with AI tools in education or at least possess rudimentary knowledge about them (e.g. ChatGPT, content generation tools, recommendation systems).
4. The sample should reflect a reasonable degree of diversity in both academic discipline and gender to enrich the data and ensure a variety of viewpoints.

Based on these criteria, coordination took place with the university's Deanship of Graduate Studies to obtain a list of potential participants. Email invitations were sent out, explaining the study's objectives and its confidential nature. Upon receiving signed informed consent from the selected participants, interviews were scheduled in comfortable environments, with full respect for participant privacy and confidentiality.

Description of the Final Sample

The final sample consisted of ten graduate students, with varied distributions in terms of gender, academic degree, and specialization, as outlined in the table below:

No.	Gender	Academic Degree	Major	Experience with AI
1	Male	Master's	Educational Administration	Used ChatGPT and Moodle
2	Female	Master's	Curriculum & Instruction	Used AI-based data analysis tools
3	Male	Master's	Clinical Psychology	Familiar with content generation applications
4	Female	Master's	Counseling	Experienced with intelligent Moodle
5	Male	Master's	Curriculum & Instruction	Familiar with content recommendation systems
6	Female	Master's	Clinical Psychology	Used chatbots during practical training
7	Male	Master's	Educational Administration	Designed smart educational tools
8	Female	Master's	Educational Administration	Used learning management systems
9	Male	Master's	Curriculum & Instruction	Used automated content generation models
10	Female	Master's	Curriculum & Instruction	Attended a workshop on AI in education

Data Collection Procedures

The interviews were conducted during February and March 2025. Most took place in person at the university campus, while a few were conducted via Zoom in cases where physical attendance was not feasible. Each interview lasted approximately 45 minutes to one hour.

Interviews were audio-recorded (with the participant's explicit consent) to ensure accurate documentation and avoid the loss of valuable details. The researcher also took field notes during and after each session to capture general impressions, tone of speech, and any meaningful non-verbal cues.

Before beginning the recording, the researcher explained the study's purpose, emphasized the confidentiality of responses, and clarified that all data would be used strictly for research purposes. Participants were also informed that their participation was voluntary and that they had the right to withdraw at any time or skip any question they were uncomfortable answering.

Research Ethics

The study adhered to all ethical standards of scientific research. Informed consent was obtained in writing from all participants before the interviews, outlining their rights to privacy, confidentiality, and data usage procedures. To maintain anonymity, participant names were replaced with coded identifiers (e.g., Participant 1, Participant 2, etc.) in the transcripts and analysis. No personally identifying information was included in the final report.

Additionally, the research plan received prior approval from the Research Ethics Committee at the Faculty of Graduate Studies, particularly regarding the handling of audio recordings and participant data.

Data Analysis Method

After data collection, the recorded interviews were transcribed verbatim. The analysis followed a content analysis approach, commonly used in qualitative research to identify patterns and thematic insights. The process included several steps:

- **Initial Reading:** Each transcript was read in full to gain a general understanding of the participant's responses and overall tone.
- **Segmentation and Preliminary Coding:** The transcripts were divided into small meaningful units (sentences or short passages conveying a single idea). Each unit was assigned an initial code representing its core concept. For instance, statements about "instant feedback" were labeled as "Immediate Feedback," while those concerning "privacy" were labeled "Privacy Concerns."
- **Theme Development:** Codes were then reviewed and grouped into broader themes representing patterns across multiple interviews. This led to the identification of three major themes common to most participants:
  1. Perceived Benefits of AI in Interaction
  2. Concerns and Barriers
  3. Recommendations for Effective Use

Each theme included several subthemes capturing the nuances of students' experiences.

Research Tool: Interview Guide – Validity and Reliability

As noted earlier, the primary data collection tool was the semi-structured interview. Below is an overview of the tool's structure and how its validity and reliability were established:

1. Development of the Interview Guide

The guide was designed to address the three core areas derived from the research questions:

(a) Perceived benefits and roles of AI in educational interaction
(b) Concerns and challenges associated with AI use
(c) Student recommendations for effective implementation

The finalized version of the guide included eight main open-ended questions, along with additional prompts as needed. Some questions were intentionally framed in an expansive way to encourage deeper discussion. For example:

- "Tell me about your experience with e-learning in your graduate studies. How do you perceive the level of interaction, and do you think AI can change that? If so, how?"
- "In your opinion, what are the key benefits of integrating AI into the learning platform? Can you give examples of how AI might improve your interaction with course content or instructors?"
- "On the other hand, do you have any concerns or reservations about relying on AI in education? What's the source of those concerns?"
- "What do you expect from the university or instructors to ensure successful implementation of AI tools? Are there specific preparations, policies, or trainings that you think are necessary?"

2. Ensuring Validity

To ensure that the questions effectively captured the intended constructs and were clear to participants, several steps were taken:

Content Validity:

The interview guide was reviewed by a panel of three experts in educational technology, qualitative research, and instructional design. Their feedback led to meaningful improvements. For instance, one reviewer

suggested that the term "artificial intelligence" be defined in simpler terms within the first question to ensure consistent understanding. Another recommended adding a question that explores students' prior experiences with AI tools. Based on this feedback, the guide was revised—some questions were reworded, and others were removed due to redundancy.

Face Validity:

Two pilot interviews were conducted with students from the same population but outside the main sample. These pilot tests revealed that the questions were generally clear, although one participant noted the length of the interview. As a result, the number of follow-up questions was reduced, and two overlapping items were merged to streamline the process without compromising content depth.

3. Ensuring Reliability

In qualitative research, reliability refers to the consistency of results if the tool were used in similar conditions. To enhance reliability:

- The researcher maintained a consistent interview protocol: the same introduction, question order, and probing techniques were used in each interview.
- For data analysis, inter-coder reliability was assessed. An independent co-coder reviewed selected transcripts, and agreement between the two coders was calculated using Holsti's formula:

  R = (2M) / (N1 + N2)

Where *M* is the number of matched codes between the two coders, and *N1*, *N2* are the total number of codes by each coder. The agreement rate was 0.90 (90%), exceeding the acceptable scientific threshold (typically 80–85%).

A high degree of consensus indicates an objective coding process, such that the results were not solely determined by the interpretations of any one researcher. Absolute reliability is hard to acquire, owing to the subjective and interpretive nature of open-ended data. Notwithstanding, the techniques adopted in this study have extraordinarily high trustworthiness and consistency. Established validity assures that the questions measured the perceptions intended, while the achieved reliability guarantees that the interpretation of student responses was systematic rather than arbitrary.

FINDINGS AND DISCUSSION

Research Question 1: Graduate Students' Perceptions of AI's Contributions to Enhancing Interaction

The first research inquiry aimed to understand how students see the potential of AI to enhance interaction in e-learning platforms, as well as specific benefits or application possibilities they perceive. The almost unanimous approval of the role of AI in improving interaction suggested a very positive attitude, while most participants seem to have emphasized different aspects.

A Strongly Positive Outlook:

Eight participants (80%) shared their enthusiasm and belief about the application of AI towards promoting engagement and interactivity in online learning. They thought intelligent technologies could narrow down the lack of interaction that is inherent in online education compared to face-to-face instruction. Some key contributions were made:

- **Instant and Personalized Feedback:** Most of the students (about seven out of ten) said that AI could give an immediate response to their questions or assignments, instead of the usual delay of waiting for the instructor's feedback. This way, they think, they create a continuous presence.

One of the students said: "When I submit an assignment through the platform, I wish I could get instant feedback. If an AI system could grade my work and point out mistakes right away, I'd definitely engage more with the material."

Another said, "AI could be like a personal assistant. For example, when I write code, the system could instantly identify the error and offer a suggestion. That would encourage me to keep trying rather than get stuck waiting for help."

- **Personalized Learning Experiences:** About half of the participants (5 out of 10) stated that AI could personalize the learning process, thereby enhancing engagement. They saw platforms that would adapt to students' performance and interests, giving more tasks to advanced learners and easier explanations to those having difficulties. As one student explained:

"Sometimes I get bored during recorded lectures—they're either too hard or too easy. If the platform used AI to assess my level and provide more relevant examples, I'd be more focused and involved."

This view aligns with the concept of adaptive learning, a core application of AI in education.

- **Interactive Content Delivery:** A number of participants (4 to 5 students) highlighted the potential for AI to make learning content more interactive—such as adaptive quizzes that appear during video lectures, AI-enhanced educational games, or immersive simulations that allow students to explore concepts firsthand. One student recounted:

"I read about an app where you can talk to historical figures powered by AI. Imagine asking

Napoleon or Saladin questions during a history class—less like reading a book and more like a real conversation."

- **AI-Supported Peer Interaction:** A smaller subset (around 3 students) saw potential for AI to improve peer interaction, for example through intelligent systems that automatically group students based on similar interests or remind them to contribute to discussion forums. One participant joked:

  "Maybe AI could act like a moderator and say: 'Hey, you haven't participated this week—how about a comment?' That way, we'd all be forced to engage!"

Neutral or Reserved Views:

Two participants (20%) expressed a more cautious or neutral stance. They didn't reject the idea outright but emphasized that interaction is primarily a human and pedagogical issue rather than a technical one. One noted:

"If the instructor isn't interested in engaging with students, what will AI really change? It could be a help, but interaction would still need the touch of a human."

Another added: "Some students won't participate, no matter what: online or offline, AI or no AI. It's about motivation."

These statements highlight the thinking that, yes, AI can be helpful in such circumstances, but it's not a complete solution on its own

Interpretation and Discussion of Research Question 1

The analysis reports sustained enthusiasm by grad students in availing AI solutions to enrich greater capacity for interaction in e-learning scenarios. Nearly 80% of participants expressed their excitement for the use of AI applications in their learning experience because they believe that these tools provide novel solutions for challenges such as slow feedback, passive content delivery, and little to no real-time interaction with peers or instructors.

As one student summed it up:

"Sometimes I wait two or more days for feedback. But if a smart system could respond immediately, I'd be more motivated to keep going."

These findings are consistent with Feen-Calligan *et al*., (2021) that AI systems capable of real-time feedback can increase student engagement and participation rates in educational activities.

Personalization was the other major theme. Students were quite interested in AI systems that adapt content delivery to their learning pace and level. This is in line with findings of Guo *et al*., (2025), which have shown that adaptive AI models can significantly enhance academic performance by providing learning experiences tailored to individual needs.

One of the students shared that:

"Sometimes the material just isn't aligned with my level. If there were a system that understands me and adjusts the content accordingly, I'd feel more engaged."

This perspective is in accordance with Vygotsky's theory of the Zone of Proximal Development, which speaks to the demand for properly challenging content in order that active learning might truly flourish.

Some students lauded AI-driven simulations and other interactive educational tools, such as those for virtual role-playing, or AI-based historical avatars. These align with global initiatives, such as Character.AI and AI tutoring bots, which Kimi *et al*., (2020) showed can increase student motivation and immersion.

"Imagine a program that lets you talk to a historical character—then you're not just reading information; you're living it."

Against this general positivity, 20% of the participants expressed some concern and mentioned that any technology could not replace the human aspect of education. One respondent summarized:

"No matter how advanced AI becomes, if the teacher isn't genuinely engaged, the interaction will still feel mechanical."

This comment captures the spirit of Brookfield's (2013) recognition that the heart of educational technology should rest in the pedagogical values and human connection, and that AI should thus complement rather than replace the interpersonal aspects of teaching and learning.

Likewise, Alawneh *et al*., (2023) stressed in their study that AI tools in higher education work best when placed within a flexible, student-centered instructional framework, rather than being used as a replacement for traditional educational practices. To sum up, findings from this question reflect a strong psychological and pedagogical readiness of graduate students toward the use of the AI tool as an interactivity enhancer in online learning. This readiness provides a solid basis for future integration of AI into the university systems; given that the integration is guided by clear pedagogical reasons and raises awareness of all stakeholders (Democraticac.de, 2024).

Research Question 2: Students' Concerns and Perceived Challenges Regarding AI Use in E-Learning

This question focused on the counterpart of the previous one—namely, the concerns or reservations that graduate students hold about integrating AI into their

online learning environment. While the findings from Question 1 reflected considerable enthusiasm for AI's benefits, the analysis here uncovered a significant degree of caution among many participants regarding various potential risks associated with AI in education.

Prevalence of Concerns:

Seven out of ten participants (70%) openly expressed at least one form of concern about AI use in educational contexts. These concerns clustered around three core themes: (a) privacy and data security, (b) accuracy and reliability of AI-generated outputs, and (c) social and pedagogical implications for human roles in education.

1. Data Privacy and Security

This was the most frequently mentioned concern, cited by at least six participants. Students were particularly uneasy about the volume and sensitivity of personal and academic data that AI systems might collect—such as detailed performance records, learning patterns, or even cognitive tendencies.

One student remarked:

"If everything becomes online and monitored by a smart system, where does all that data go? Who gets access to it? "I fear it might get into the wrong hands."

Another speaker added:

"What guarantees do we have that these AI systems won't be hacked? I'm not comfortable with machines knowing so much about me."

This indicates obvious fears associated with data breaches and personal information—fears that, at times, have basis in real-world examples of data dying on social media sites.

2. Accuracy and Trustworthiness of AI Outputs

A total of about five interviewees articulated doubts regarding AI content being trusted. Several interviewees have had either direct experiences or heard second-hand stories of AI tools like ChatGPT forging confident answers that were incorrect.

One student recounted:

"I asked ChatGPT to solve a math problem. It gave me an answer with full confidence-but when I double-checked with my professor, it was completely wrong."

Another comment:

"AI doesn't fully understand context like humans do. It might give suggestion that are irrelevant or even misleading. My worry is that students might trust it blindly."

These concerns align with a well-documented issue known as AI hallucination, where generative models produce false or misleading outputs—particularly when their training data is incomplete or biased (Zhou *et al*., 2023).

3. Erosion of Human Interaction

Approximately four participants voiced concerns of a more social or pedagogical nature. They worried that over-reliance on AI might weaken the human relationships that form the backbone of meaningful learning.

One student expressed:

"If everything is automated, will we even need to communicate with instructors? What if they start relying on system reports instead of talking to us personally?"

A female participant added:

"I'm afraid students will just let AI do all the work—write reports, complete assignments. That's not real learning—it's just polished cheating."

These concerns echo the global discourse around AI-induced academic dishonesty and the fear that content-generation tools could be misused to bypass genuine learning efforts.

Varied Degrees of Concern:

Not all participants expressed these worries with the same intensity. Some described their fears cautiously and viewed them as solvable with proper oversight. Others were clearly more anxious, to the point of rejecting the idea of AI integration altogether. As one student from a social sciences background remarked:

"Honestly, if this means data leaks or misleading information, I'm not comfortable with AI in education until we're 100% sure about the controls."

Minority without Major Concerns:

Three participants (30%) indicated that they were not particularly concerned about AI use, or at least had not considered any specific risks. Some expressed a sense of digital resignation or comfort with the idea that privacy is already compromised in today's online world.

As one student stated:

"We're already exposed online—I don't really worry much about data at this point."

Another said:

"I'm looking at AI as just another tool. Yeah, it's not perfect, but I can't see the University implementing something dangerous."

This small group may have either an issue with technical awareness or carry merely more positive personality traits.

Interpretation and Discussion of Research Question 2

From the interviews came a finely nuanced juxtaposition of AI's potential possibilities on the one hand and the dangers it poses on the other. While the majority seemed aware of serious concerns that block unconditional acceptance of AI in education, this demonstrated a mature, critical outlook, not unqualified optimistic acceptance.

Student fears revolved around the improper storage, analysis, and misuse of educational data. One of the participants queried:

> "Is it really safe for a system to know how I think and respond? Who guarantees that this information will not be exploited?"

This concern links with Feen-Calligan *et al*., (2021) in that those authors stated that applying AI in the educational environment without strong data-protection policies poses a real threat to students' personal information. Halcomb *et al*., (2016) pointed out that educational data changes might reflect cognitive and behavioral capabilities.

Participants worried that the AI might provide wrong information, especially in areas requiring accuracy like math or data analysis. One student's experience with a confidently incorrect AI model response correlates with what Zhou *et al*., (2023) called "AI hallucination." This view was shared by Bourbakh and Amour (2022), who found 48% of graduate students hesitant to rely on AI content due to worries over its factual reliability, thus calling for some degree of human oversight and validation.

Participants expressed concerns that AI would pollute the quality of interaction between teachers and students. One asked, "If everything becomes mechanical, who will encourage me? Who will assess me fairly? Human interaction can't be replaced?"

This viewpoint resonates with Brookfield (2013), who claimed that educational activities rely on empathy and trust, with technology aiming at supporting rather than replacing this pillar. Correspondingly, Merji (2018) argued that what AI should do is relieve teachers of administrative loads to be able to spend more time on meaningful relationships with students.

Concerns about cheating were also raised. Some students said that classmates were already using AI to complete assignments without understanding the material. Alawneh, Shadid, and Salman (2024) warned of the potential ethical risks of relying on AI tools for academic writing and called for institutional action to protect academic integrity.

While 30% of participants did not indicate serious concerns, this comparatively optimistic outlook or lesser understanding of ethical and technical issues may qualify this last group. While this confidence is reassuring, it also leaves them vulnerable to unintended abuses, further necessitating targeted awareness programs.

The findings are corroborated by Kim *et al*., (2020), which suggested four main challenges facing AI in education: privacy, algorithmic fairness, transparency, and overreliance. Zhou *et al*., (2023) also stressed clarity in classroom rules, as well as thorough training of both teachers and students.

That is, while students do exude some excitement for AI in their learning environments, they are not free of doubt. Rather, these doubts are signs of a mature and thoughtful engagement with ethical and practical dimensions of educational technology. Therefore, any plans to adopt AI in higher education will have to address these concerns well, in terms of clear policies on data use, ethical frameworks, and human-led oversight systems to ensure responsible and judicious integration of AI.

Research Question 3: Students' Proposals for Effective AI Integration to Enhance Interaction

This question sought to gather student-generated recommendations and requirements that they deemed essential for maximizing the benefits of AI to enhance interaction and mitigate the previously discussed risks. After discussing the advantages and challenges of AI use, each participant was invited to offer concrete suggestions. Remarkably, all ten participants (100%) presented at least one practical idea, reflecting a thoughtful and solutions-oriented engagement with the topic.

The proposals were categorized into two main domains: (a) human-focused training and awareness, and (b) technological development and infrastructure enhancement.

(a) Human-Focused Training and Awareness

A large majority (approximately 8 out of 10) emphasized the centrality of preparing people—teachers and students alike—for effective AI integration.

- **Training for Instructors:** Six participants specifically recommended that the university invest in training faculty members—both in the technical use of AI tools and in pedagogical strategies to interpret and apply AI-generated insights. One student noted:

  > "If they want to implement AI, they need to start with workshops for instructors. Many professors still don't have a solid tech background. If the teacher doesn't understand the tool, students will be lost."

Another commented:

> "Honestly, some faculty still struggle with basic Moodle features—how will they manage AI tools? Proper training is essential to avoid confusion."

- **Orientation for Students:** Five participants also stressed the importance of educating students on how to use AI responsibly and effectively. One female student suggested:

  > "They should offer a short course for students introducing us to AI tools and how to use them ethically. That way, we know our boundaries and avoid misuse."

Another participant added:

> "I support holding introductory sessions in each college about the available AI tools and how to benefit from them without violating academic integrity."

These comments reflect students' recognition that successful implementation depends not only on access to tools but on guided, ethical usage.

(b) Technological Development and Infrastructure

Nearly as many participants (7 out of 10) emphasized the need for technical enhancements and institutional investment in infrastructure.

- **Upgrading Learning Platforms:** Six participants emphasized that the university should modernize its learning platforms to ensure compatibility with advanced AI tools. Some referred to the current LMS (e.g., Moodle) as limited in scope. One student stated:

  > "If they're going to use AI, they might need to bring in a new platform—or upgrade the current one to better support these technologies."

Another added:

> "I'd love to see a chatbot on the university website that answers students' questions 24/7—that could even improve administrative interaction."

One participant referenced other universities with virtual assistants for enrollment and registration, suggesting that similar tools would enhance student services and academic engagement.

- **Continuous Technical Support:** Four participants recommended that the university strengthen its IT support teams to assist with any technical issues arising from AI tools. One student said:

  > "There will be a flood of tech questions like 'Why didn't the bot respond?' or 'Why is my score like this?'—so support teams need to be ready."

- **Clear Institutional Policies:** Five participants emphasized the need for clear, written guidelines regulating the academic use of AI. Students should know what is permitted and what is not—such as acceptable levels of AI assistance in assignments. One proposal stated:

  > "We need academic policies that say, for example, you can use ChatGPT for comprehension questions but not to write a whole paper. This has to be clear from the start."

Other Innovative Suggestions

Beyond these two central themes, a few students offered creative proposals:

- Two participants suggested pilot testing AI systems in specific courses or faculties before university-wide implementation.
- Another proposed establishing a university-level AI committee to monitor developments in educational AI and propose updates regularly.
- One technically inclined participant recommended launching a small AI Lab at the university where graduate students in computer science could develop customized AI solutions for academic use. As he put it:

"This way, the university benefits twice—from student-led innovation and from real research."

Although such ideas may not be feasible for all students, they reflect a forward-thinking mindset.

Interpretation and Discussion of Research Question 3

The findings from this question highlight a comprehensive awareness among graduate students—not only in diagnosing problems but also in proposing structured, actionable solutions for AI integration in online education. These proposals can be grouped into four core categories:

Most participants underscored the importance of training instructors not only in technical use of AI tools but also in pedagogically sound integration. One student noted:

> "Some professors don't know how to use the platform properly—how can they handle AI tools?"

This aligns with Kim *et al*., (2020), who identified faculty readiness as a critical barrier to AI adoption. Selwyn (2022) also emphasized that ongoing professional development is essential to effective AI integration. In the Arab context, Alawneh *et al*., (2023) stressed that training academic staff improves both content quality and digital engagement.

Students expressed a clear need for orientation sessions and training programs that teach ethical and effective AI use. One of the students aptly remarked:

"Without proper training, students run the risk of being overly dependent on AI-just because everybody else is doing it, and that's where the temptation to cheat sets in."

Feen-Calligan *et al*., (2021) pointed out that students lacking digital literacy may be more likely to violate academic or ethical codes. In support of this, Alawneh, Shadid, and Salman (2024) have voiced for the integration of AI ethics and digital literacy into the university curriculum.

Some participants pointed out that existing learning systems are not really geared toward the AI capacities of predictive analytics, adaptive learning, or virtual tutoring. One student said, "The current LMS doesn't support AI—we either need to upgrade it or replace it."

According to UNESCO (2023), the statement stands true, as the AI-ready infrastructure is the foundation for any successful digital transformation change in higher education. Bourbakh and Amour (2022) further warned that lack of technical support can inhibit sustainable AI implementation.

A number of participants noted that there are no formal policies established to regulate the use of AI tools in a manner that could compromise academic integrity. As a student put it:

> "We need clear rules—so we don't get in trouble for using a tool we didn't know was off-limits."

Halcomb *et al*., (2016), in reference to educational tools whose legal standing is uncertain, warned that AI tools could gravitate academic conversation towards confusion or misconduct. Panopto (2024) mentioned that such guidelines for AI use are already being published by the leading institutions so as to promote ethical and transparent implementation.

The introduction of strategic roll-outs such as limited pilot programs, dedicated university committees, and AI-focused innovation labs was also floated by some of the respondents, ideas which bay with Brookfield's (2013) principles of educational change management. Such forward-looking notions showcase a profound understanding of the complex dynamics associated with technology implementation.

In sum, these student proposals are far more than preliminary reactions to AI's risks or promises, but rather informed and pragmatic responses aimed at a responsible implementation of AI. The call for training and awareness addresses concerns like dependence or misuse, while reforms in infrastructure and policies articulate the desire to utilize AI's interactive potential to the fullest.

Above all, this readiness to engage in constructive discourse reflects that students are not just passive recipients of educational technology. They are active stakeholders seeking a balance between human-centered learning and intelligent systems—a balance that, if appropriately supported, can herald a dynamic and ethical future for higher education.

Recommendations

In view of the results from this study and the positions of graduate students from An-Najah National University, the following recommendations are put forward so as to promote effective and ethical use of artificial intelligence, along with enhancement of interaction in e-learning environments:

1. Create AI integration training programs tailored to faculty, focusing on technical and pedagogical issues. The training should involve practical workshop-style seminars to guide instructors on how to apply AI tools—such as intelligent feedback systems, adaptive content delivery, and predictive learning analytics—in bolstering student engagement and interaction.
2. Offer orientation sessions or short courses for students focusing on digital literacy and ethical AI usage. Such programs should make students familiar with the most commonly used AI tools in educational settings and the guidelines for their responsible usage. Incorporating this in first-year research methodology or ICT courses would also be beneficial.
3. To foster AI use fairly in academic works, provide clear institutional policies that define good vs. unacceptable practice regarding AI use (e.g., assist in writing assignments, prepare educational material, etc.) and communicate these rules openly to students and staff alike. An AI issue conduct code for all universities would assist in standardizing practice.
4. Old learning platforms (like Moodle) should be upgraded and modernized through AI-supportive enhanced features such as virtual assistants, auto-grading systems, and smart feedback modules, informed by students' needs and usability research aimed at assuring maximum satisfaction.
5. Ensure that students and instructors receive uninterrupted technical support to allow them to explore AI-enhanced tools. A well-structured helpdesk or support team is extremely critical if AI acceptance is to be successful, with no extra burden or pressure.
6. The setting up of a center or working group at the university level to promote AI integration in teaching and learning should be considered. This committee should include representatives from faculty, IT services, student bodies, and academic development units; it would be tasked with monitoring trends, evaluating tools, and updating guidelines as needed.

7. Students should be encouraged to participate in AI-related decision-making via focus groups, questionnaires, or student councils. Such participation builds confidence and guarantees that AI initiatives resonate with genuine student experience and expectations.
8. Interdisciplinary collaboration between computer science departments and faculties of education should be promoted in research and innovation concerned with AI-enhanced education. Examples include student-run AI labs and thesis projects in educational technology that can resolve a series of local context issues.

With these suggestions, higher education institutions in the Arab world can move towards a more inclusive, interactive, and responsible adoption of AI-in-a-way that respects human agency and benefits from intelligent systems. Most importantly, these actions will ensure that AI is an empowerment tool accrued by all.

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