

# AI-driven empowerment of international higher education and international networking: A case study of Moroccan universities

Aicha Adoui<sup>1,2\*</sup>

<sup>1</sup>Communication, Education, Digital Usage and Creativity Laboratory, Mohamed I University, Boîte Postale 724 Oujda 60000 Oriental, Oujda, Morocco 60000

<sup>2</sup>Center for Social Justice Research, Teaching and Service, Georgetown University, 1419 37<sup>th</sup> Street, NW, Poulton Hall 130, Washington D.C., USA 20057

\*Corresponding author

E-mail address: [aichaadoui@gmail.com](mailto:aichaadoui@gmail.com)

DOI: <https://doi.org/10.21107/sml.v7i1.21911>

ARTICLE INFO	ABSTRACT
<p><i>Keywords:</i> artificial intelligence higher education intelligent systems networking international education</p>	<p>In the rapidly evolving 21st century, characterized by technological advances, the integration of Artificial Intelligence (AI) and intelligent systems has become increasingly important. This research focuses on the role of AI and intelligent systems in strengthening higher education and networking in an international context, with a specific focus on Morocco. It is undeniable that the advent of Internet communication technologies has facilitated networking, especially in the international educational context. This paper presents an analysis of three Moroccan universities, shedding light on the impact of international networking on academic and professional experiences, especially for doctoral students in Morocco. This paper is based on a mixed method research with a focus on primary data collection in Morocco. This research aims to provide valuable insights and recommendations for fostering a robust educational ecosystem in the context of international collaboration. Some of the findings of this paper highlight that, despite some limitations, AI and intelligent systems could potentially be used as important tools to create innovative learning materials. AI is becoming essential for predicting student needs and behavior, as well as for enabling international higher education and international perspectives within universities.</p>

### Citation suggestion:

Adoui, A. (2024). AI-driven empowerment of international higher education and international networking: A case study of Moroccan universities. *Simulacra*, 7(1), 1–20. <https://doi.org/10.21107/sml.v7i1.21911>

Received 14 August 2023; Received in revised form 4 May 2024; Accepted 29 May 2024; Published online 25 June 2024.

## Introduction

The internationalization of higher education (or iHED) has witnessed a significant global transformation toward international collaboration in recent decades (Adoui, 2022b). This progress has been further propelled by the swift advancements in cutting-edge technologies, bringing notable significance to the emergence of computational systems that have induced substantial changes in numerous aspects of our lives, encompassing the field of education. Within higher education, these advanced systems are gradually becoming ubiquitous, revolutionizing both research and teaching practices.

For instance, these systems offer the potential to identify and support students who may require additional assistance in a personalized manner. Additionally, they enable the exploration of innovative teaching methodologies and the creation of tailor-made learning experiences for individual students. Despite being in the early stages of integration, it is clear that these technologies possess the capability to fundamentally transform the learning and instructional landscape.

As these technologies continue to advance, their role within higher education will undoubtedly become even more central. Furthermore, these intelligent systems are increasingly serving as invaluable tools for networking purposes within the field. Warschauer and Healey (1998) argued that the use of advanced technologies in education would become highly relevant in the future with issues transcending intelligent call and electronic literacies. As technologies have significantly advanced during this decade, it is no longer a question of connectivity to networks and computer-assisted learning; it is a question of creating, using and implementing intelligent systems that are able to process in a human-like mode.

It is essential as well to highlight that the terms "intelligent system" and "AI" are related but have slightly different meanings. An intelligent system refers to a system or software that is designed to mimic or exhibit intelligent behavior. On the other hand, AI refers to the broader concept of creating machines or software that can simulate human intelligence. Thus, an intelligent system is a specific implementation or application of AI, which focuses on creating systems or software with intelligent capabilities.

The rationale for this research is motivated by the lack of research on the contribution of AI and intelligent systems to effective interpersonal communication and networking within iHED. In addition, there's a limited understanding of the impact of AI and intelligent systems on higher education students' professional skills development and their ability to bridge gaps in international education and academic networking. The relevance of these research gaps lies in the potential benefits and implications they hold for the field. By addressing these gaps in the Moroccan context, the research aims to contribute to the understanding of the role of AI and intelligent systems in fostering effective interpersonal communication, collaboration, and networking within iHED.

This paper, therefore, aims to investigate whether AI and intelligent systems contribute to effective interpersonal communication and international networking in iHED, and how they affect higher education students' professional skills, especially through digital networking. This paper will mainly address the following research questions:

- How do AI and intelligent systems contribute to effective interpersonal communication and networking within international higher education, both in person and online?

- What is the impact of AI and intelligent systems on higher education students' professional skills development and their ability to bridge gaps and distance in international education and academic networking?

Consequently, this research will tackle the following hypotheses:

- The utilization of AI and intelligent systems in international higher education enhances interpersonal communication and networking, leading to more effective collaboration and knowledge exchange among students and educators.
- The integration of AI and intelligent systems in higher education facilitates the development of professional skills among students, enabling them to overcome barriers and foster connections in the global academic community through digital networking.

This paper aims to provide evidence to support these hypotheses through a systematic review of research on AI in higher education, analyzing the impact of AI on higher education and highlighting the benefits of AI in teaching and learning systems. The paper argues that AI has the potential to transform the way we teach and learn, and that it is a disruptive technique that can customize the experience of different learning groups, teachers, and tutors.

Zawacki-Richter et al. (2019) and Zhai et al. (2021) discuss the potential and implementation of AI in education. According to Zawacki-Richter et al. (2019), AI in education (or AIEd) encompasses a range of technologies and methods, such as machine learning and intelligent tutoring systems, that have the potential to revolutionize teaching and learning

processes. AIEd enhances personalized tutoring, collaborative learning, virtual reality, assessment, and administrative support. It highlights the potential of AI to enhance teaching and learning processes in higher education.

Zhai et al. (2021) identified three dimensions of AI implementation in education: development, extraction, and application. In the development dimension, AI techniques are used to create smart learning environments and develop algorithms for teaching and learning. In the extraction dimension, AI techniques are applied to provide feedback, reasoning, and adaptive learning to students. In the application dimension, AI techniques are integrated with human factors to enhance personalized features like creativity and critical thinking. The categories within these dimensions include education system development, feedback systems, reasoning support, and adaptive learning. The discussion emphasizes the importance of considering pedagogical design, domain knowledge, and affection computing in the application of AI in education.

Dogan et al. (2023) findings showed a growing interest in AI technologies and identified three main research themes: educational data mining, learning analytics, and AI for adaptive and personalized learning; algorithmic online educational spaces, ethics, and human agency; and online learning through detection, identification, recognition, and prediction.

Dogan et al. suggest that future research should focus on merging technical processes with pedagogy and learning design, address ethical considerations in AI applications, and develop policies and strategies to create human-centered online learning experiences.

Ocaña-Fernández et al. (2019) discussed the impact of AI and its implications in higher education. The authors highlight the lack of

understanding and awareness regarding AI technologies and their potential effects. They emphasize the need for regulations and policies to address the ethical considerations and risks associated with AI. In addition, Ocaña-Fernández et al. (2019) highlighted the traditional role of universities in preserving knowledge and culture (Adoui, 2023c) in contrast with the challenges posed by new technologies and the need for transformation. The authors highlight the importance of digital skills in the information society and the need for universities to adapt their educational approaches to incorporate new technologies. The teaching of AI presents challenges related to ethics, interdisciplinary approaches, and the development of relevant skills for students, there is a need for stronger accountability and responsibility in adopting AI (Nguyen et al., 2023; Akgun & Greenhow, 2022).

All in all, this section included a discussion on the potential and implementation of AI in education, the impact of AI and its implications in higher education, and the challenges and considerations associated with integrating AI into educational systems. With the lack of literature on the subject matter of this research paper, the paper will fill a specific gap by addressing the perspective of strengthening higher education and networking in Morocco.

## Method

This research paper utilizes a combination of surveys and semi structured interviews as a mixed research method to undertake a comparative analysis of international networking in Morocco. The selection of this research method is predicated on the research inquiries and the goal of acquiring a comprehensive comprehension of the phenomenon being investigated. The primary aim of this study is to investigate and juxtapose the state of

international networking within Moroccan higher education, with particular emphasis on the aspects of AI, intelligent systems, and international networking.

The study utilizes the principled innovation method to analyze the issues of AI, intelligent systems, and international networking within higher education. This method involves understanding the current practices and identifying opportunities for innovation that align with the principles of ethical, social, and sustainable development. This method is particularly relevant to this study because it aligns with the goals of Moroccan higher education institutions, which aim to promote sustainable development and social responsibility.

The data collection and analysis procedure will rely mainly on primary and secondary data, with a focus on the three universities subject to the comparative study: Al Akhawayn University, Mohamed Ben Abdellah University, and Mohamed First University, which represent different cities and regions of Morocco. The selection of Al Akhawayn University, Mohamed Ben Abdellah University, and Mohamed First University for the comparative study is based on their geographical location and diverse institutional profiles. These universities are in different regions of Morocco and represent different types of higher education institutions, including a private university and two public universities. The diversity of these institutions allows for a broader understanding of the issues of international networking in Moroccan higher education.

Overall, the use of the mixed research method and the principled innovation method is substantiated by the research questions and the objective of attaining an in-depth understanding of the state of international networking in Moroccan higher education. By choosing three universities for a comparative study and employing a combination of primary and secondary

data sources, a thorough examination of the investigated matters will be achieved. The utilization of a theoretical framework will facilitate a systematic analysis of the challenges pertaining to AI, intelligent systems, and international networking in the context of higher education. Overall, these methodological decisions ensure a comprehensive and structured approach to the research topic.

Furthermore, as part of the internationally recognized research ethics, confidentiality, privacy, and authenticity were offered to all participants who were given enough time and space to think through and structure their answers. In addition, this paper relied on critical and textual analysis for issues of digitalization within the framework of international networking within doctoral education. Digital networking has been an important element in building interpersonal relationships in combination with offline networking.

## Results and Discussion

### *AI and intelligent systems: The use of new technologies to maintain user experience in Moroccan higher education*

In the survey administered to students at the three previously mentioned universities, a total of 200 participants were recorded. I was able to formulate a better understanding of the current state of use of AI in the context of Morocco. The survey respondents in the three universities replied as follows to the queries in the section on AI use:

The gathered data highlights that most participants, specifically 60%, have utilized AI tools in their communication with colleagues or mentors, as well as in their research. Machine learning algorithms are the most used AI tool, indicating the growing trend of utilizing AI for data processing in research. A lesser percentage of respondents employ chatbots and virtual assistants to simplify administrative tasks, such as scheduling meetings and organizing tasks.

**Table 1. AI use in Moroccan universities**

Section 3: AI Use	Percentage
<b>Have you used any AI tools?</b>	
Yes	60%
No	40%
<b>If yes, please describe the type of AI tool used</b>	
Machine learning algorithms for data analysis	30%
Chatbots for scheduling meetings	20%
Virtual assistants for organizing and prioritizing	13%
Other	20%
No impact	17%
<b>If no, please explain why not used AI tools</b>	
• Lack of familiarity with AI tools	32%
• Not relevant to my field of study	25%
• Concerns about data privacy and security	22%
• Prefer traditional methods	10%
• Other	15%

Most of the participants who used AI tools reported a positive impact on their networking behavior and results. However, a small proportion of 20% of respondents did not experience any impact. This observation may be ascribed to the AI tools employed or the specific tasks for which they were utilized. According to the survey results, 40% of participants acknowledged that they did not utilize AI tools in their research or communication endeavors, with the prevailing rationale being a lack of familiarity with such tools. This finding implies that there could be a necessity for enhanced education and training regarding the utilization of AI tools in higher education, particularly among individuals in disciplines that are not conventionally linked with technology and AI.

In addition, the results also showcase concerns about data privacy and security. Some respondents raising these speculations indicate the need for greater transparency and safeguards when using AI tools in higher education. In general, the findings of this section indicate that a considerable proportion of respondents utilize AI tools. However, it is evident that there remains a requirement for increased awareness and training regarding their effective utilization. Moreover, measures should be implemented to safeguard data privacy and security.

An area frequently neglected in terms of data and user experience pertains to the use of cookies. In the framework of ICT intelligent systems, cookies serve the purpose of tracking user preferences and delivering personalized content (Adoui & Makdad, 2021). However, in higher education, the use of cookies is often seen as a barrier to networking. Digital perspectives on networking suggest that the use of cookies can be an important tool for improving user experience (Quach et al., 2022).

User experience is essential to maintain good service; in the education spectrum, it

is key to maintaining a timely data structure and assessing students' and educators' abilities and needs (Zhao & Zhou, 2022). It is a continuous process of data collection and analysis that ensures real-time data grouping about the targeted audience. User experience or user modeling is more of a business concept that has been used for decades to analyze customer satisfaction and customer services to ensure that users are satisfied and happy with the services (Martínez-Navalón et al., 2021). Currently, a sample of the digitalization of this concept also takes the form of cookies that are used to collect data on user experiences and thus help the main party or the third party within the website to analyze your browsing patterns and thus create modeling patterns (Dwivedi et al., 2021).

According to Kaspersky (2021), cookies are intended to be used as follows:

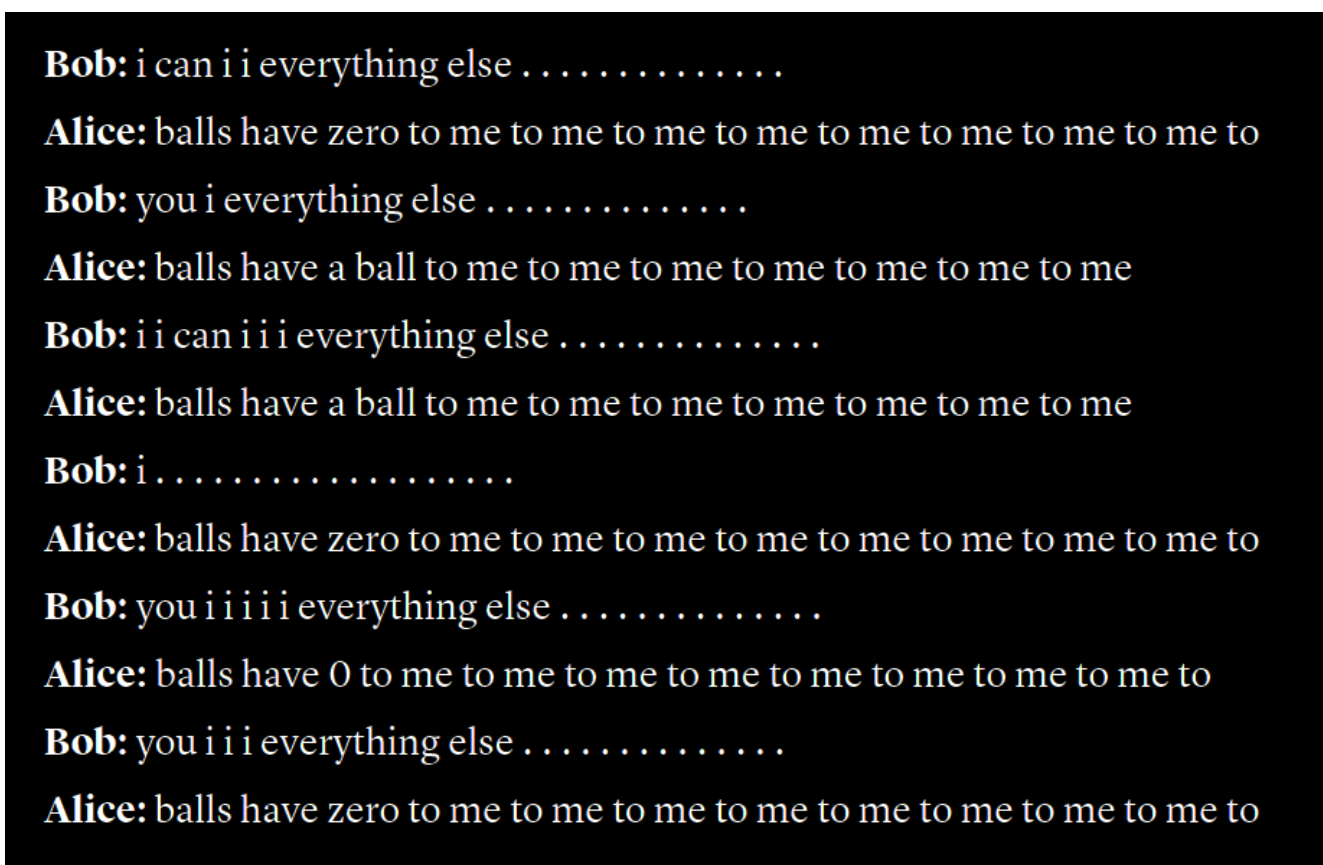
1. Session management. For example, cookies let websites recognize users and recall their individual login information and preferences, such as sports news versus politics;
2. Personalization. Customized advertising is the main way cookies are used to personalize your sessions. You may view certain items or parts of a site, and cookies use this data to help build targeted ads that you might enjoy;
3. Tracking. Shopping sites use cookies to track items users previously viewed, allowing the sites to suggest other goods they might like and keep items in shopping carts while they continue shopping.

Natural language processing (NLP) is a subset of AI; NLP makes human-to-machine communication possible (Khurana et al., 2023). It allows machines and digital systems to process human language and create patterns to better process it (Sarker, 2021). However, such technology goes beyond

and allows algorithms to communicate among themselves. For instance, in machine learning, chat bots can communicate with each other using preassigned input. This means that these bots would process only in the given algorithms and commands. The Facebook AI Research FAIR attempted in 2017 to strengthen their conversational

skills by allowing these bots to freely communicate; over time, these bots, known as "dialog agents", started creating their own language. The following is a screenshot from LaFrance (2017) demonstrating the language developed by the dialog agents (Digital Lives, Digital Art? n.d.):

**Figure 1. Excerpt of the conversation between two chat-bots called Alice and Bob as part of an aborted Facebook AI experiment (Courtesy of Facebook Artificial Intelligence Research).**



The latter might seem utterly gibberish; however, intelligent systems' ability to process natural language and create their own systems of communication are what renders AI an inevitable fact to the human future. While this incident was not taken seriously in 2017, the shadows of an overpowering AI in 2024 are taking center stage with the lightning speed growth of ChatGPT and other similar platforms.

With the growth of new trends in AI, ones that are accessible to everyone, it is high time that Intelligent tutoring systems are put into concrete use in our educational instructions. Computer-based educational systems and expert systems provide immediate and personalized instruction or feedback to learners without the need for intervention from a human teacher (Pătruț & Spatariu, 2016). These systems

are designed with the objective of allowing and supporting students' learning with a focus on strengthening their autonomy. As we grow apart from the old habits of memorization techniques, it is important to consider updating instructional designs to fit into the spirit of the times and the fast-paced tech advances of the 21<sup>st</sup> century.

**AI and intelligent systems: A look into future modes of instruction**

AI and intelligent systems are essential to changing the education status we know today. One example of how this integration and immersion is status quo changing is the use of Intelligent Computer-Assisted Language Learning (ICALL). ICALL is an interdisciplinary field of enquiry that combines applied linguistics and computing

(Amaral & Meurers, 2007). ICALL uses language patterns and learners' answers to process data and create error systems. For instance, word length and frequency are used to detect patterns within language. The use of such a system not only reduces the language learning time but also shapes the learning process to the needs of each individual student, something that is impossible to do when relying on human interaction only.

One example of implementing ICALL is the Robo-Sensei program (2009), which is software tailored for learning Japanese grammar that focuses on sentence production practice. According to Nagata (2009), Robo-Sensei is highly effective, interactive software for learning and practicing grammar principles that are essential to the mastery of

**Figure 2. The role of gamification in the facilitation of student engagement an exploratory industrial psychology application (Werbach & Hunter, 2012)**





Japanese. Using natural language processing and artificial intelligence, Robo-Sensei provides detailed, personalized feedback as you work through a series of 24 entertaining lessons—from beginning to advanced levels. According to Nagata (2009), "Robo-Sensei's NLP system includes a lexicon, a morphological generator, a word segmentor, a morphological parser, a syntactic parser, an error detector, and a feedback generator" (p. 562), which allows it to process input and provide personalized instruction to the language learner.

Gaming is a smart AI-driven learning tool in language learning, although it has not yet been institutionalized as one. Gamers show great capabilities in certain languages due to their constant interaction with the international gamers' community (Horowid, 2019). However, to date, there have been few attempts to review work in this area. In this context, a review of findings from available research is now timely. I believe that gamers learn language better and highly perform thanks to the interactive storyboard they can follow in the games they play, which is a highly rich experiential learning tool. For instance, these games could be as follows:

- **Adventure Game:** An immersive game type where narration is used to structure the game and where the individual player is the protagonist in an interactive story;
- **Simulation Game:** In this type of game, gamers are put in a real-life simulation scenario.

According to Werbach & Hunter (2012), gaming enhances productivity and students' motivation to learn the language. The following is an illustration of the components in gaming that facilitate students' engagement:

The gamefulness and the experiential value of a game enhance learning (Dabbous

et al., 2022). Using gaming as a means of instruction allows learners to take part in authentic goal-oriented tasks where learners get to experience the learning directly and first-hand (Adipat et al., 2021). It is therefore learner centered and enhances students' motivation while reducing the learning barriers to the minimum. However, the question is, which could also be a reference for future research: would students' motivation change if gaming became an actual means of instruction in education?

### *The international networking dilemma within higher education*

International networking holds significant potential as a valuable asset for achieving academic and professional success (Wolff & Moser, 2009). However, it is important to make efforts to ensure that students and professionals can avail themselves of such opportunities. By providing greater support and resources for international networking, universities may be able to help more students and professionals form valuable connections and collaborations that can enhance their academic and professional outcomes.

In the survey administered to the graduate students in the three universities, I was able to support the notion that further investment in international networking is essential. Although some graduates can engage in international networking through their institution, a large number do not have the same equitable access to the resources available. The following survey results summarize the findings:

The outcomes derived from the International Networking segment of the survey indicate that a considerable proportion of participants (60%) have established international affiliations or partnerships through their academic or professional pursuits. The most common

**Table 2. International networking in Moroccan universities**

<b>Have you formed any international connections or collaborations through your academic or professional work?</b>	
Yes	60%
No	40%
<b>If yes, please describe the type of connection or collaboration and how it has impacted your academic or professional outcomes.</b>	
Conference presentations	25%
Joint research projects	20%
Visiting researcher positions	15%
International internships	10%
Other	30%
<b>If no, please explain why you have not formed any international connections or collaborations.</b>	
Lack of opportunities	40%
Language barriers	20%
Financial constraints	15%
Lack of interest	10%
Other	15%

modes of connection were conference presentations and collaborative research ventures, both of which present prospects for the exchange of knowledge and professional growth. Nonetheless, a notable proportion of respondents (40%) have yet to forge any international connections or collaborations, attributing their reluctance to factors such as limited opportunities and language barriers.

These findings carry significant implications regarding the function of international networking within higher education. On the one hand, it is encouraging to witness most respondents capitalizing on international networking avenues to cultivate fruitful affiliations and collaborations.

This suggests that universities and other educational institutions may competently promote and foster international networking opportunities. To further investigate these results, I conducted interviews with some of the survey takers to have a better sense of the situation of international networking. I relied on systemic random selection of the

populace to conduct these interviews.

The interviews conducted with the doctoral students resulted in unanimous agreement upon the importance of interpersonal communication and soft skills. They are essential for the academic development of doctoral students, and they view them as important within international education. The participants mainly view that enhancing the use of digital networking would result in the following:

1. Access to a broader range of resources and perspectives;
2. Improved communication and collaboration skills;
3. Greater cultural awareness and understanding;
4. Enhanced opportunities for career development.

Moreover, a participant clarifies that "[...] these skills that [students] acquires and master through networking will not only help them in their academic and

educational career but will also help them with their professional lives and emotional intelligence". This means that networking — in person or digital — within an international environment is beneficial for students' academic EI skills and personal development. For instance, students who engage in networking activities with professionals in their respective fields can acquire knowledge about potential opportunities and gain valuable insights. Moreover, students can establish connections with individuals from diverse cultural backgrounds, leading to personal growth.

Regarding professional job search endeavors, international networking is universally recognized as a crucial factor (Robinson et al., 2016). It enables students to access a wide range of diverse opportunities that may otherwise remain undiscovered. Additionally, international networking provides students with a broader global outlook on the job market, which holds great significance in today's economy. Students who actively participate in international networking often discover that they develop a more multifaceted skill set, which enhances their appeal to potential employers. In fact, exchange programs and international experiences are highly valued by recruiters (Adoui, 2021; Sisavath, 2021). They showcase that students are culturally well equipped and able to adapt to different business settings, work in diverse teams, and can easily build solid personal and durable business relationships.

Nonetheless, a participant believes that international networking can facilitate the process of job search if the candidate chooses to work in the international environment to which they were sent. In Morocco, for instance, having international experience, especially in some fields that are related to the humanities, does not give one any priority over other potential candidates who had never been abroad. However, in

medical, business, and commercial fields, it would certainly be an addition. This view remains open for debate.

All the participants within the three universities agree that the implementation of international networking should be a common and prevailing occurrence within all Moroccan universities. A participant stated, "Erasmus makes going abroad, which is the dream of every single middle- and low-class Moroccan, come true. It allows the Moroccan student to live an unforgettable experience in which he/she can be the ambassador of Moroccan culture. From my experience, I could see that every student within the European Union has been abroad at least once in their academic career. "Why not also have a percentage of at least 30% of doctoral, graduate, and undergraduate students benefit from this opportunity". Therefore, international networking gives students the chance to meet new people, find new opportunities, and develop their educational and professional skills within a foreign environment.

For the last question concerning the availability of international programs that facilitate networking for doctoral students in Moroccan universities, Al Akhawayn (AUI) offers many exchange programs for a period of three to four weeks and has a large body of students abroad. In addition, Mohammed Ben Abdellah (USMBA) has various national and international partners. In other words, being an active member in the Erasmus+ program allows many students, whose financial capability does not allow them to go abroad, to enjoy one semester in different European countries, including Romania, Spain, Germany, Italy, Greece, etc. This helps students from different affiliations and backgrounds build relationships and networks during their education (Adoui, 2023b). Concerning Mohamed First University (UMP), participants expressed a clear lack of international programs.

Except for the Fulbright scholarship, which facilitates students' temporary study in the United States, there are no direct university-affiliated programs akin to Erasmus+ and USMBA.

Succinctly put, the amalgamation of digital and in-person international networking within higher education presents immense prospects for students to acquire practical expertise and comprehensive knowledge in their respective fields of study. Additionally, it fosters seamless collaboration among diverse departments and students hailing from various corners of the globe. The convergence of digital and in-person international networking within higher education thus unfurls a territory brimming with unparalleled opportunities for students' intellectual growth and cross-cultural engagement (Adoui, 2022a).

### *Digital perspectives on international networking*

Digital networking allows students to engage with the right people (Froment et al., 2017). For instance, team blogs, virtual classrooms, or themed groups allow students to network with other students and professionals who have the same academic interests. In fact, digital networking allows faculty to ensure maximum results at minimum costs. It gives faculty the chance to create exciting opportunities for student virtual exchange, for instance, but also ensures that budgeting is within a reasonable amount.

### *Business strategy to digitalization*

The transformation journey to digitalization requires specific action priorities to be taken. There are several considerations to keep in mind when developing a digital strategy or, more precisely, when developing a university's

business strategy that fits into the digital age. The following digitalization business model checklist is made through observation of the UMP's digital portals:

- Assessing digital needs and digital maturity;
- Digital networking requires the development of a digital teaching and learning strategy that clearly and relevantly reflects support for quality education. Digitalized networking requires a set of automatized skills that higher education students must possess and be accustomed to. Well-structured digitalized networking would ensure the encouragement of innovation for both parties involved (students and university);
- Digital literacy and digitalization must be given their due importance. The university must create a new team structure composed of both teaching and administrative staff from various internal departments, as well as external consultants and experts in areas such as learning and knowledge, research in cutting-edge areas such as AI, blockchain, marketing and communication, and, of course, specialists in digital transformation, software engineering, and user experience design;
- Proper utilization and improvement of existing digital platforms. The e-learning platform Moodle, for instance, needs to be more user-friendly;
- Partnering with leading digital industry companies;
- Fostering digital networking by nurturing a digital culture climate through a variety of social channels, websites, and applications;
- Implementing the COBIT Model

(Control Objectives for Information and Related Technologies) to respond to digital needs.

The COBIT framework was created by ISACA to bridge the gap among technical issues, business risks, and requirements. COBIT relies on a model that drives four main forces to work together interchangeably: IT resources, IT processes, enterprise information, and business requirements. Business requirements drive investment in IT resources, which are in turn used by the IT processes that deliver enterprise information. Enterprise information in return rounds the cycle again and responds to the business requirements.

The COBIT framework is a digital networking standard that can be used by international education institutions to ensure compatibility and interoperability between their systems (Kozma et al., 2021). It establishes a shared language and standardized set of benchmarks for evaluating digital networking, thereby enabling the assessment and enhancement of digital networking systems. The COBIT framework encompasses seven fundamental principles, including compatibility, interoperability, portability, security, usability, manageability, and user-centered design. With such, international educational institutions can enhance the effectiveness and efficiency of their digital networking systems.

#### *Reducing digital inequalities*

The first step to efficient digitalized networking is reducing digital inequalities. According to Anigri (2021):

*The most serious issue is socioeconomic learning inequality. It has been stated that low-income countries are less exposed to learning using digital technologies. The provision of equipment was a major challenge for institutions, faculty,*

*and learners. In fact, most students rely on the computer and free internet offered at the university level. Therefore, the provision of necessary equipment is crucial to ensure digital equity among learners from different socioeconomic backgrounds.*

According to Adoui (2023a) "Access to higher education has been a topic of concern for policymakers and educators for many years. While various strategies have been implemented to improve access to higher education, certain groups, particularly underrepresented communities, continue to face significant barriers". Thus, providing well-equipped spaces at the university with open access to graduate students would be an asset to networking among doctoral-level students within international digitalized programs. We can; therefore, mitigate the digital divide that exists between individuals with access to technology and those without.

#### *Major digitalization issues*

As digital technology becomes increasingly prevalent, universities face the challenge of effectively integrating it into the learning experience. The issue of digital usage extends beyond access to resources and encompasses the preparedness of staff and educators within the university. There is a concern about the potential creation of a digital divide, to ensure equal opportunities for success, universities must offer adequate training and support for both students and staff. Additionally, they should be mindful of the potential risks associated with misuse and implement preventive measures. By adopting these strategies, universities can promote fairness and equity, leveling the playing field for all individuals and enabling their chance to thrive.

Digital inclusion plays a crucial role in ensuring the effectiveness and efficiency of digitalized networking within higher education (De & Hoyos, 2015). By providing

**Table 3. COVID-19 and e-learning the challenges of students in tertiary institutions in Ghana (Aboagye et al, 2020).**

Issues	Description
Learners’ accessibility issues	The required technology is unavailable. Some phones and laptops are not compatible. Issues with correct browsers for learning. Lack of adequate internet access. The cost of the internet is too high. The online learning environment is not motivating.
Lecturer issue	Not all teachers have the required technology. Lecturers are not trained to teach online
Social issues	Lack of communication among learners Lack of group discussions during assignments Online learning is too indirect and makes learners isolated.

equal access to digital resources and services for all members of the community, digital inclusion ensures that everyone can actively participate in and benefit from the digital world. Digital inclusion transforms the landscape of digitalized networking within higher education by empowering individuals to connect and communicate effectively (Kaputa et al., 2022). When everyone has equal access to resources and services, it establishes an equitable environment that fosters more productive and efficient networking opportunities. Thus, stakeholders must ensure proper access and use of ICT technologies available at the university and cater them to all individuals and communities. Some of the prominent digital inclusion activities according to the JO Ed Innovation Lab (What Is Digital Divide and How to Reduce It | JO Education, n.d.), include:

- an affordable, good-bandwidth Internet service;
- devices with Internet access to meet everyone's needs;
- educational pathways to use the Internet and other digital technologies;
- quality technical support;
- applications and digital environments that make the user self-sufficient as well as an active participant.

The findings from the study highlight the significant role of AI and intelligent systems in higher education and networking, particularly within the context of Morocco. The data collected on AI tool usage among participants showed that 60% of respondents utilized AI tools in various capacities. The most common types of AI tools mentioned were machine learning algorithms for data analysis (30%), chatbots for scheduling

meetings (20%), and virtual assistants for organizing and prioritizing (10%). These tools have played a crucial role in enhancing user experience and streamlining tasks for students and educators.

User experience is of paramount importance in maintaining effective services in higher education. Through continuous data collection and analysis, AI and intelligent systems enable real-time data grouping, providing valuable insights into the needs and abilities of the target audience. This supports personalized learning experiences and facilitates timely data-driven decision-making.

In terms of cookie usage, the study aligns with Kaspersky's findings, highlighting the three main purposes: session management, personalization, and tracking. These functionalities enable websites to recognize users, tailor their experiences based on individual preferences, and offer relevant suggestions and advertisements. While cookies have proven useful in enhancing user experience, concerns regarding data privacy and security were expressed by 20% of respondents, reflecting the importance of addressing these issues to ensure user trust and confidence in AI-driven systems.

Integrating AI and intelligent systems into instruction represents a transformative shift in the educational landscape. Intelligent computer-assisted language learning and gamification have emerged as promising avenues for leveraging AI in language education. While these approaches have demonstrated their potential in facilitating language learning, further institutionalization and exploration are necessary to fully capitalize on their benefits.

International networking has emerged as a valuable avenue for academic and professional success. Our study revealed that 60% of participants have formed international connections or collaborations. The most common forms of these interactions

included conference presentations (25%), joint research projects (20%), and visiting researcher positions (15%). The positive impact of these connections on academic and professional outcomes cannot be denied.

It is important to acknowledge that not all individuals have the chance to create international connections or collaborations. For instance, the lack of opportunities (40%), language barriers (20%), financial constraints (15%), and lack of interest (10%), were cited as top obstacles for not engaging in international networking. This emphasizes the need for concerted efforts to ensure equal access to international networking opportunities and address barriers.

The digitalization of networking has brought forth new possibilities for students to engage with the right people. Digital networking platforms offer an efficient means of connecting, transcending physical boundaries. However, it is crucial to address digital inequalities, for instance by only providing access to digital resources and ensuring that educators and staff are adequately trained to use digital technologies effectively.

In conclusion, this study has shed light on the significant role of AI and intelligent systems in strengthening higher education and networking within an international context, with a specific focus on Morocco. The findings emphasize the potential benefits of AI in enhancing user experience, transforming modes of instruction, and facilitating international collaborations. By digital networking and foster a more connected and inclusive educational ecosystem.

## Conclusion

Despite some limitations, AI and intelligent systems have the potential to be powerful tools for innovation within higher education. They can assist with

numerous areas of work, including creating innovative learning materials, using AI to predict student needs, assisting students, and predicting student behavior. AIS and international networking in the higher education context could be viewed as an emerging multidisciplinary research field that attempts to successfully integrate the interdisciplinary approaches. Despite some limitations, AI and intelligent systems have the potential to be powerful tools for innovation within higher education. They can assist with numerous areas of work, including creating innovative learning materials, using AI to predict student needs, assisting students, and predicting student behavior. AIS and international networking in the higher education context could be viewed as an emerging multidisciplinary research field that attempts to successfully integrate the interdisciplinary approaches.

This area of inquiry holds tremendous potential to fundamentally transform our interactions with technology, paving the way for a remarkably streamlined and user-centric experience. As a result, this paper serves as an earnest call to embark on further research within this interdisciplinary domain and collaborate in reshaping the landscape of higher education through the fusion of AIS, EI and international networking.

## Acknowledgments

I would like to express my appreciation to the Center for Social Justice at Georgetown University and to my colleagues for their support and encouragement. I would also like to express my appreciation to the Fulbright program and the amazing team behind it, both in Morocco and the United States.

## Declaration of Ownership

This article is my original work.

## Conflict of Interest

There is no conflict of interest to declare in this article.

## Ethical Clearance

This study was conducted with the utmost ethical considerations, as all data collected and analyzed strictly adhered to the appropriate academic frameworks and standards. As such, no ethical concerns were identified in the study.

## References

- Aboagye, E., Yawson, J. A., & Appiah, K. N. (2020). COVID-19 and e-learning: The challenges of students in tertiary institutions. *Social Education Research*, 2(1), 109–115. <https://doi.org/10.37256/ser.122020422>
- Adipat, S., Laksana, K., Busayanon, K., Ausawasowan, A., & Adipat, B. (2021). Engaging students in the learning process with game-based learning: The fundamental concepts. *International Journal of Technology in Education*, 4(3), 542–552. <https://doi.org/10.46328/ijte.169>
- Adoui, A. (2021). Cultural identity, global citizenship and sustainable development goals in Morocco: Challenges and possibilities. *Lingua: Language and Culture*, 20(2), 85–94. <https://www.ceeol.com/search/article-detail?id=1020388>
- Adoui, A. (2022a). Emotional intelligence, soft power and the value of dialogical relationships in intra/interpersonal communication. *Arab Journal of International Law*, 371–390. <https://doi.org/10.5281/ZENODO.7425058>
- Adoui, A. (2022b). Internationalization in Moroccan higher education. *Arab Journal of International Law*, 201–234. <https://doi.org/10.5281/ZENODO.7833445>



- Adoui, A. (2023a). Exploring inequity factors in higher education: Promoting equitable access and success in the US. *Simulacra*, 6(1), 63–78. <https://doi.org/10.21107/sml.v6i1.19256>
- Adoui, A. (2023b). International higher education as a soft power tool: Promoting Intercultural understanding and diplomacy in foreign policy. In A. Adoui, *International higher education and the rise of soft power as cultural diplomacy* (pp. 51–80). Springer. [https://doi.org/10.1007/978-3-031-44180-6\\_3](https://doi.org/10.1007/978-3-031-44180-6_3)
- Adoui, A. (2023c). The intersection of international relations, soft power, and international higher education. In A. Adoui, *International higher education and the rise of soft power as cultural diplomacy* (pp. 17–50). Springer. [https://doi.org/10.1007/978-3-031-44180-6\\_2](https://doi.org/10.1007/978-3-031-44180-6_2)
- Adoui, A., & L Makdad, M. (2021). Social media algorithms and decision making in the digital age. *Innovation, Technologies*, 3: 2<sup>nd</sup> International Conference on Digital Information Literacy in the Age of Mis/Disinformation. <https://doi.org/10.60590/PRSM.ITEC-ISS3.55>
- Akgun, S., & Greenhow, C. (2022). Artificial intelligence in education: Addressing ethical challenges in K-12 settings. *AI and Ethics*, 2(3), 431–440. <https://doi.org/10.1007/s43681-021-00096-7>
- Amaral, L., & Meurers, D. (2007). Conceptualizing student models for ICALL. In C. Conati, K. McCoy, & G. Paliouras (Eds.), *User modeling 2007* (pp. 340–344). Springer. [https://doi.org/10.1007/978-3-540-73078-1\\_41](https://doi.org/10.1007/978-3-540-73078-1_41)
- Anigri, M. (2021). E-learning for smart-universities: Pandemic challenges and opportunities in Morocco. *E3S Web of Conferences*, 297, 01066. <https://doi.org/10.1051/e3sconf/202129701066>
- CobIT Model Structure *Plays-In-Business*. (n.d.). Plays-in-business. Retrieved November 1, 2022, from <https://www.plays-in-business.com/cobit-control-objectives-for-information-and-related-technology/cobit-model-structure/>
- Dabbous, M., Kawtharani, A., Fahs, I., Hallal, Z., Shouman, D., Akel, M., Rahal, M., & Sakr, F. (2022). The role of game-based learning in experiential education: Tool validation, motivation assessment, and outcomes evaluation among a sample of pharmacy students. *Education Sciences*, 12(7), 434. <https://doi.org/10.3390/educsci12070434>
- De, P. C. L., & Hoyos, F. (2015). Innovation for social inclusion: Challenges facing the state university system in Colombia. In *Mitigating inequality: Higher education research, policy, and practice in an era of massification and stratification* (Vol. 11, pp. 127–147). Emerald. <https://doi.org/10.1108/S1479-358X20150000011008>
- Dogan, M. E., Goru Dogan, T., & Bozkurt, A. (2023). The use of artificial intelligence (AI) in online learning and distance education processes: A systematic review of empirical studies. *Applied Sciences*, 13(5), 3056. <https://doi.org/10.3390/app13053056>
- Dwivedi, Y. K., Ismagilova, E., Hughes, D. L., Carlson, J., Filieri, R., Jacobson, J., Jain, V., Karjaluo, H., Kefi, H., Krishen, A. S., Kumar, V., Rahman, M. M., Raman, R., Rauschnabel, P. A., Rowley, J., Salo, J., Tran, G. A., & Wang, Y. (2021). Setting the future of digital and social media marketing research: Perspectives and research propositions. *International Journal of Information Management*, 59, 102168. <https://doi.org/10.1016/j.ijinfomgt.2020.102168>
- Froment, F., González, A. J. G., & Bohórquez, M. R. (2017). The use of social networks as a communication tool between teachers and students: A literature review. *The Turkish Online Journal of Educational Technology*, 16(4), 126–144.
- Hess, J. D. (2014). Enhancing innovation processes through the application of

- emotional Intelligence skills. *Review Pub Administration Manag*, 2(143), 1–23.
- Horowid, K. S. (2019). Video games and English as a second language. *American Journal of Play*, 11(3), 379–410.
- Kaputa, V., Loučanová, E., & Tejerina-Gaite, F. A. (2022). Digital transformation in higher education institutions as a driver of social oriented innovations. In C. Păunescu, K.-L. Lepik, & N. Spencer (Eds.), *Social innovation in higher education: Landscape, practices, and opportunities* (pp. 61–85). Springer. [https://doi.org/10.1007/978-3-030-84044-0\\_4](https://doi.org/10.1007/978-3-030-84044-0_4)
- Khurana, D., Koli, A., Khatter, K., & Singh, S. (2023). Natural language processing: State of the art, current trends and challenges. *Multimedia Tools and Applications*, 82(3), 3713–3744. <https://doi.org/10.1007/s11042-022-13428-4>
- Kozma, D., Varga, P., & Larrinaga, F. (2021). System of systems lifecycle management: A new concept based on process engineering methodologies. *Applied Sciences*, 11(8), 3386. <https://doi.org/10.3390/app11083386>
- Martínez-Navalón, J.-G., Gelashvili, V., & Gómez-Ortega, A. (2021). Evaluation of user satisfaction and trust of review platforms: Analysis of the impact of privacy and e-wom in the case of TripAdvisor. *Frontiers in Psychology*, 12, 750527. <https://doi.org/10.3389/fpsyg.2021.750527>
- Nagata, N. (2009). Robo-Sensei's NLP-based error detection and feedback generation. *Calico Journal*, 26(3), 562–579.
- Nguyen, A., Ngo, H. N., Hong, Y., Dang, B., & Nguyen, B. P. T. (2023). Ethical principles for artificial intelligence in education. *Education and Information Technologies*, 28(4), 4221–4241. <https://doi.org/10.1007/s10639-022-11316-w>
- Ocaña-Fernández, Y., Valenzuela-Fernández, L. A., & Garro-Aburto, L. L. (2019). Inteligencia artificial y sus implicaciones en la educación superior. *Propósitos y Representaciones*, 7(2), 536–568. <https://doi.org/10.20511/pyr2019.v7n2.274>
- Pătruț, B., & Spatariu, R.-P. (2016). Implementation of artificial emotions and moods in a pedagogical agent. In *Emotions, technology, design, and learning* (pp. 63–86). Elsevier. <https://doi.org/10.1016/B978-0-12-801856-9.00004-9>
- Quach, S., Thaichon, P., Martin, K. D., Weaven, S., & Palmatier, R. W. (2022). Digital technologies: Tensions in privacy and data. *Journal of the Academy of Marketing Science*, 50(6), 1299–1323. <https://doi.org/10.1007/s11747-022-00845-y>
- Robinson, G. F. W. B., Schward, L. S., DiMeglio, L. A., Ahluwalia, J. S., & Gabrilove, J. L. (2016). Understanding career success and its contributing factors for clinical and translational investigators. *Academic Medicine*, 91(4), 570–582. <https://doi.org/10.1097/ACM.0000000000000979>
- Salovey, P., & Mayer, J. (1990). Emotional intelligence. *Imagination, Cognition, and Personality*, 9(3), 185–211. <https://doi.org/10.2190/DUGG-P24E-52WK-6CDG>
- Sarker, I. H. (2021). Machine learning: Algorithms, real-world applications and research directions. *SN Computer Science*, 2(3), 160. <https://doi.org/10.1007/s42979-021-00592-x>
- Singh, K. (2008). Emotional intelligence and workplace effectiveness. *Indian Journal of Industrial Relations*, 44(2), 292–302. <https://www.jstor.org/stable/27768197>
- Sisavath, S. (2021). Benefits of studying abroad for graduate employability: Perspectives of exchange students from Lao Universities. *Journal of International Students*, 11(3), 547–566. <https://doi.org/10.32674/jis.v11i3.2779>
- Warschauer, M., & Healey, D. (1998). Computers and language learning: An overview. *Language Teaching*,

31(2), 57–71. <https://doi.org/10.1017/S0261444800012970>

Wolff, H. G., & Moser, K. (2009). Effects of networking on career success: A longitudinal study. *Journal of Applied Psychology, 94*(1), 196–206. <https://doi.org/10.1037/a0013350>

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education: Where are the educators? *International Journal of Educational Technology in Higher Education,*

16(1), 39. <https://doi.org/10.1186/s41239-019-0171-0>

Zhai, X., Chu, X., Chai, C. S., Jong, M. S. Y., Istenic, A., Spector, M., Liu, J.-B., Yuan, J., & Li, Y. (2021). A review of artificial intelligence (AI) in education from 2010 to 2020. *Complexity, 1–18*. <https://doi.org/10.1155/2021/8812542>

Zhao, H., & Zhou, Y. (2022). Understanding the mechanism of user experience role in educational livestreaming platform. *Frontiers in Psychology, 13*, 907929. <https://doi.org/10.3389/fpsyg.2022.907929>

