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Artificial intelligence technologies in Emirati private universities: challenges and effectiveness in improving the quality of education

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Abstract: This study aimed to explore the effectiveness of using artificial intelligence (AI) technologies in improving the quality of education in Emirati private universities. It also explored the challenges hindering the use of AI technologies in Emirati private universities. It aimed to offer suggestions to handle such challenges. The researcher adopted the qualitative, quantitative and descriptive analytical approach. He used two data collection methods which are: a questionnaire and an interview. He shared the questionnaire on several WhatsApp groups that target faculty members in five Emirati private universities. 164 faculty members filled in the questionnaire. Thus, they were chosen purposively. The researcher conducted interviews with thirteen (13) faculty members chosen purposively from the latter universities. SPSS software was used to process the collected data. Based on the analysis, it was found that using AI technologies improves the quality of education in in Emirati private universities. Such use reduces the students' dependency on faculty members for acquiring knowledge and improves the teaching methods used by faculty members. Based on the interviews, it was found that such challenges include: having concerns about the security of data and facing difficulty in developing special AI software and applications for students and faculty members. Regarding the implications of this study, the results of this study contribute to improving the quality of education in Emirati private universities because they encourage the developers of curricula in such universities to add AI-based activities to those curricula.

Keywords: *Artificial intelligence (AI), Challenges, Effectiveness, Emirate, Emirati private universities, Learning, Quality of education, Teaching.*

1. Introduction

The term (quality of education) has been receiving much attention by the management and staff in educational institutions, especially in the higher education institutions. It can be defined as the ability of the educational institutions to deliver educational services that meet the demands of students in alignment with the pre-set standards of the quality of education. Such demands are represented in providing students with the needed knowledge, and skills that enabling them to succeed in their personal lives and career later on [19, p. 717].

The quality of education standards in higher educational institutions can be categorized into several types. For instance, Alomari [23] categorized such standards into the standards that are either related to planning, teaching, classroom management, mastering the academic material, assessment, use of teaching aids, or professional development.

According to Taweel [29], the quality of higher education standards can be categorized as standards that are either related to faculty members, academic programs, teaching methods, curricula, or research. In terms of faculty members, they include: having adequate number of full time faculty members, and assessing the performance of faculty members regularly. In terms of academic programs,

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they include: investigation of the alignment between each academic program and the goals of the university and having a detailed plan for each academic program. In terms of teaching methods, they include: providing faculty members with training on teaching methods and conducting studies for assessing the effectiveness of instructional methods. In terms of curricula, they include: assessment of the content of the curricula by the university management and the creation of committees for improving the content of the curricula. In terms of research, they include: offering faculty members opportunities to attend conferences [29]

In this study, the researcher targets the quality of the education delivered by universities due to the significance of such quality. For instance, offering high quality of higher education shall contribute to achieving sustainable development through providing the society with competent and specialized labour force in all areas [20]. It shall contribute to meeting the educational goals of universities which are mainly represented in providing students with the skills and knowledge needed in their areas of specialization. That shall contribute to enabling those students to achieve success in their lives later on [19].

In addition, offering high quality of higher education shall contribute to improving the world ranks of the universities offering such education. That shall enable those universities to compete with global universities and attract students from numerous countries. In addition, offering high quality of higher education shall contribute to improving the research skills of university students and faculty members. That shall enable those universities to provide people with studies that address the problems faced by society effectively [19].

According to Alomari [23], delivering high quality of higher education shall develop university students in spiritual, psychological, social, cognitive, physical and academic areas. It shall improve the performance levels of faculty members. It shall enable the management to analyse the problems it faces effectively and address them. It shall contribute to improving the outcomes of the teaching-learning process. It shall allow using the human and tangible resources in the universities efficiently and optimally [23]

In this regard, it should be noted that the role of artificial intelligence (AI) technologies in improving the quality of higher education has been receiving much attention by the management, faculty members and students in universities. AI technologies can be defined as computer systems that are capable of doing tasks that usually require using human intelligence. Such tasks include: learning from data, pattern recognition, and decision-making. AI technologies are usually used to analyse large volume of data and patterns very fast [9].

AI technologies have been playing a crucial role in improving the quality of education in universities in various areas due to their numerous features. Such features include: the ability to process large volume of data and make calculations very fast. That shall contribute to saving the time and effort of academic staff and students. Such features also include: having the ability to show high accuracy in doing tasks and generate accurate results when analysing data. They include: having the ability to diagnose problems and solve them (including complex problems). They include: the ability to practice ongoing learning in the aim of improving the current level of performance. They include: the ability to interact effectively with humans and recognize images and sounds. They include: the ability to set well-designed plans and implement them effectively. They can practice deductive thinking [30]

Furthermore, AI technologies allow providing faculty members with ongoing training to develop their teaching skills. That allows faculty members to keep developing themselves. AI technologies allow recruiting the best faculty members. They contribute to setting standards for assessing the faculty members' performance. They contribute to setting unified standards for assessing all students with taking the individual differences into consideration. In addition, they develop students' skills in using technologies through offering them knowledge. In addition, they enable students to meet the demands of the labour market through offering them the latest knowledge. They provide students with access to e-services. They provide students with feedback about their performance in an ongoing manner. That shall enable students to identify the gaps in their knowledge [18].

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AI technologies allow assessing curricula in an ongoing manner through analysing the feedback obtained about them. They enable students to access the curricula through the online platforms, because they allow uploaded electronic books. They allow faculty members to attend the conferences related to curricula and their development. That shall enable them to identify the way of improving curricula [18].

According to Almasri [22], AI technologies allow the university management to take the best academic decisions through analysing the data in the database. They enable university employees to address the problems facing them and save time and effort. That's because AI technologies enable those employees to retrieve data about problems from thousands of files fast to analyse them automatically and recommend solutions. In addition, AI technologies provide students with access to references and enable them to practice self-learning. That shall reduce students' reliance on their instructors and colleagues [22].

AI technologies enable students to access the electronic academic material and curricula and upload them regardless of time or place. They allow students to do the routine administrative tasks instead of spending hours doing them through using pen and paper. They train students on the way of doing research on problems facing society. That contributes to making students play an active role in helping their society. In addition, AI technologies can improve the instructional and assessment services delivered to students, due to providing instructors with knowledge on the latest technology-based instructional and assessment strategies. It is because AI technologies allow assessing students through using a variety of methods objectively and fairly and without having the results affected by the evaluator's emotions. In addition, AI technologies allow providing feedback to students about their strengths and weaknesses. That shall enable them to work on such weakness to become competent in their specialization [22].

According to Ismail and Amreya [25], AI technologies can improve the quality of the evaluation process through allowing students to take electronic self-evaluation tests and adaptive quizzes. Such adaptive quizzes allow taking into consideration the differences between students when evaluating them.

Due to the benefits of using artificial intelligence (AI) technologies in universities, the researcher believes that more awareness must be promoted among the administrative and academic staff in universities about such benefits. He also believes that more studies must be conducted about the attitudes of students and faculty members towards using AI technologies in improving the quality of education and learning outcomes in universities. That shall enable decision makers to identify how effective AI is in improving the quality of higher education. Hence, this study explored the effectiveness of using artificial intelligence (AI) technologies in improving the quality of education in Emirati private universities.

2. Objectives

This study aimed to

- Explore the effectiveness of using artificial intelligence (AI) technologies in improving the quality of education in Emirati private universities.
- Explore the challenges hindering the use of AI technologies in Emirati private universities
- Offer suggestions for handling such challenges.

3. Questions

This study aimed to answer the questions presented below:

Q.1. What is the effectiveness of using artificial intelligence (AI) technologies in improving the quality of education in Emirati private universities?

Q.2. What are the challenges hindering the use of AI technologies in Emirati private universities?

Q.3. What suggestions can the sampled faculty members offer to handle such challenges?

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4. Significance of the Study

This study is significant due to the reasons below:

- As far as the researcher knows, this research work is the first one to explore the effectiveness of using artificial intelligence (AI) technologies in improving the quality of education in Emirati private universities and the challenges hindering such use.
- This study promotes awareness among the leaders and managers in Emirati private universities about the significance and benefits of using AI technologies in improving the higher education.
- This study provides decisions makers in Emirati ministries with knowledge about the challenges hindering the use of AI technologies in Emirati private universities. That shall enable them to make information-based decisions to handle such challenges effectively.
- This study encourages the developers of curricula for Emirati universities to embed AI-based learning activities in such curricula.

5. Limits

- Temporal limits: The required data were collected from the sampled faculty members during the academic year of 2023 / 2024 / second semester.
- Spatial limits: The study targets Emirati private universities

6. Definitions

- AI technologies: They refer to IT systems which can sense, comprehend, act and learn. They may involve computer vision, audio processing and sensor processing features. They can analyse and understand the collected information. They can represent knowledge, make informed decisions and recommend an action based on the available data. They can learn from experiences. They may involve smart systems, machines, programs, computers, and applications [14]. They can simulate human intelligence, because they are programmed to think like humans and mimic their acts [11]
- AI technologies (operational definition): They refer to smart systems, machines, programs, computers, and applications that simulate human intelligence. They can be used in Emirati private universities.
- Quality of education: (theoretical definition): It refers to the ability of educational institutions to deliver educational services that meet the demands of students in alignment with the pre-set standards of the quality of education. Such demands are represented in providing students with the needed knowledge, and skills that enabling them to succeed in their personal lives and career [19. 717].
- Quality of education: (operational definition): It refers to the ability of Emirati private universities to deliver educational services that meet the demands of students in alignment with the pre-set standards of the quality of education.

7. Theoretical Framework

7.1. The Meaning of the Term (AI Technologies)

AI refers to IT systems which can sense, comprehend, act and learn. It may involve computer vision, audio processing and sensor processing. It can analyse and understand the collected information. It can represent knowledge, make informed decisions and recommend an action. It can learn from prior experiences [14]

AI technologies may involve smart systems, machines, programs, computers, and applications [14]. They simulate human intelligence, because they are programmed to think like humans and mimic their actions [11]. They may be used to manage data and files [7]. They may be used to analyse large volume of data and patterns [9]

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7.2. The Uses of AI Technologies

AI technologies can be used for meeting many goals in universities. For instance, they can be used by students to practice self-evaluation. That shall enable students to identify their achievement levels without relying on the instructors. AI technologies provide students with feedback about their performance. That allows students to identify the gaps in their current knowledge. AI technologies allow students to choose the questions they want to answer in the quiz. Thus, they offer flexibility in the assessment process. In addition, they allow assessing students' written works and projects without having the instructor spending hours analysing the answer sheets [25]. They can be used for assessing students in simple and complex tasks in an accurate and objective manner. That's because AI technologies eliminates the interference of emotional aspects in the assessment process [17].

AI technologies can be used in universities for allowing instructors to manage and organize their tasks. That's because AI technologies offer auto-scheduling features which allow one to identify the duration needed for each task. To add more, AI technologies can be used by instructors to gain knowledge about the students' performance, because they can send automatic reports about each student's record. That shall enable instructors to identify the things that are difficult for each student to understand [12].

AI technologies can be used by instructors to recommend them resources and teaching strategies. That shall enable instructors to identify which teaching strategies should be used in accordance with the type of the lesson and course. In addition, AI technologies can be used to identify the probabilities of having each student falling behind or dropping out. That shall allow the instructors to interfere and take measures for offering students support when needed. Furthermore, AI technologies can be used for making educational services and e-curricula accessible by a wide number of students. For instance, there are students who live in the countryside and face difficulty in travelling to get the academic material or attend lectures. Thus, AI technologies allow those students to attend lectures, and download the material at their homes. Fortunately, AI technologies can be used for providing students with personalized learning experiences, such as: providing each student with a customized academic material or quiz. That shall make each student feel satisfied with his/her learning process [12].

AI technologies can be used for grading students in tests, and assignments and letting instructors identity the academic achievement of each student separately. That shall contribute to saving instructors' time and effort in analysing the answers of each student in his/her tests and assignments. Furthermore, AI technologies can be used by students with disabilities for learning due to their features (e.g. speech-to-text and text-to speech features) [12]

AI technologies can be used for engaging students in the teaching-learning process through using digital games, virtual teachers, and immersive simulations. That shall make the learning process an interesting and motivating process. Furthermore, AI technologies can be used to achieve alignment between the difficulty of the academic material and the student's performance level. That is represented in offering each student additional exercises on the parts deemed difficult by him/her. AI technologies can be used for making digital experiments and testing theories. That shall enable students to avoid the risks associated with doing real experiments in labs [12]

AI technologies can be used for processing and analysing images and videos without having to ask experts to analyse them. They allow students to extract information from numerous academic materials and texts and summarize them. That shall allow students to dedicate more time to studying and acquire knowledge with less effort and time. Furthermore, AI technologies allow students and instructors to make informed academic decisions because they are capable of analysing complex data, and interpreting them to assess the effectiveness of each decision [12].

AI technologies can be used for designing training courses that develop the faculty members professionally. Such courses shall be based on the information in the latest conferences, and recently published books and studies. Furthermore, AI technologies can be used for improving the implementation of active learning strategies in class, because they allow students to engage in discussions with an AI virtual tutor. They can be used for providing each student with

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recommendations on the way of improving his/her academic achievement level. Such recommendations are offered by AI after analysing the academic record of each student [21].

AI technologies can be used by students for correcting their errors and providing them with guidance while learning. That shall allow students to identify the gaps in their knowledge without consulting their colleagues or instructor much. Furthermore, AI technologies offer students more practices and exercises to reach the intended learning goals. That shall allow students to implement their information or skill several times till mastering it. AI technologies can be used to provide each student with an individualized academic material. That shall enable each student to learn from a material that fits with his academic needs [27].

7.3. Advantages of Using AI Technologies in Education

Using AI technologies in the field of education offers all the relevant parties many advantages. For instance, it allows identifying the gifted students, such as: the students gifted in math. For instance, using neural network models and expert systems allows identifying the gifted students through analysing their answers and scores [26]. In addition, using AI technologies in the educational field allows students to learn at any place and time. Thus, it allows disabled students at home and the students in remote areas to learn with relying on themselves.

In addition, using AI technologies allows instructors to identify which part of the curriculum is deemed difficult for each student to understand, because AI technologies can analyse the answer sheet of each student in alignment with the targeted curriculum. Furthermore, it motivates students to learn and engage actively in the teaching-learning process, because AI technologies provide students with multimedia-based interactive material. It's because AI technologies allow students to see places and landmarks they have never been seen before, such as: well-known mountains, libraries and museums. In addition, using AI technologies allows each student to learn based on the learning pattern that fits with his interests and needs. For example, it allows blind students to learn through using audio lessons only. Another example, it allows deaf students to learn through using images and visual illustrations only without using audio illustrations [28].

Using AI technologies in the teaching-learning process enhances the individualized learning experience of students, because such technologies offer each student individualized materials and quizzes. It also allows students to learn at their own learning pace and repeat the illustrations several times. In addition, it allows students and faculty members to process large volume of data once to convert them into knowledge. In addition, it reduces the students' dependency on faculty members for acquiring knowledge. That shall make students become active learners and capable of learning without having the faculty member present [7].

Using AI technologies encourages students to cooperate and communicate with their colleagues due to offering a connected digital campus. Such encouragement is attributed to the ability of AI technologies in translating, typing and editing the messages sent to colleagues. Furthermore, using AI technologies allows instructors to manage students' files and organize their tasks effectively. That's attributed to offering instructors auto-scheduling features [7]

Using AI technologies improves the students' learning experience because it allows employing a variety of instructional strategies by the AI tutor based on the needs of the targeted student. It allows students to access their grades, fill in academic records, and choose the courses they want to enrol in. That shall enable students to gain information from their academic records from home. Furthermore, using AI technologies allows university staff and students to draft articles and reports professionally through providing them with writing guidelines, checking their compliance with the language rules, and detecting repetition. That shall contribute to developing the writing skills of the university staff and students. Furthermore, AI technological can assist university staff and students in doing routine tasks, such as: filling the routine forms. Such forms include: the registration and promotion forms [27]

AI technologies provide students and instructors with answers to their questions, illustrations for the material, and well-written notes fast. They enable students and instructors to find reliable references

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for learning and conducting research. That's because AI technologies are connected to digital libraries and journals. Furthermore, AI technologies can make schedules for instructors and students to manage their time effectively and remind them of the tasks to be carried out [27]

7.4. Challenges Hindering the Use of AI Technologies

There are various challenges hindering the use of AI technologies in universities. Such challenges include: the lack of specialists in AI in universities. They include: poor skills of many students to use AI software effectively. Handling this challenges require providing students with intensive training. AI technologies include: the high cost of using AI technologies. That requires dedicating a special budget for AI technologies [28]

Other challenges include: the possibility of facing hackers and viruses. Handling this challenge require developing special anti-viruses to protect the systems and data. Other challenges include: having students who feel bored and unmotivated to learn through AI technologies. That is because those students believe that AI programs lack social interaction [28]

In addition, having problems in the programming of AI technologies shall lead to having errors in the outcomes of such technologies. That shall affect the accuracy of such technologies in correction, detection of plagiarism and etc.. [7]. Furthermore, using AI technologies in education is associated with risks related to the privacy and data of security. That is because a hacker may access the data to damage or share them. Handling this challenge requires having AI specialists exerting ongoing effort to maintain the security of the data [12]

According to Almalki [21], the most prominent challenges hindering the use of AI technologies in universities include: the poor internet services and IT infrastructure. That requires concluding contracts with good internet companies and taking measures to improve IT infrastructure. Other challenges include: the lack of awareness among decision makers in universities about the benefits of using AI technologies. That requires holding lectures to promote such awareness among those decision makers. Other challenges include: the lack of attention by the managements of universities to training their staff on the way of using AI technologies [21].

Such challenges include the belief of some decision makers that using AI may obviate the need for recruiting instructors. Thus, that shall lead to raising the unemployment rate among academics. However, that's not true, because AI technologies can't be used without having human supervision or control to regulate their use. Other challenges include: the preference of some students to learn through the use of the conventional teaching methods rather than using AI-based instructional methods. However, this challenges informing students about the benefits of using the latter methods [21].

It should be noted that AI technologies aren't capable of recognizing the religious, cultural and social backgrounds of each student like human do. Thus, AI technologies can't adapt themselves with such backgrounds. Furthermore, there are risks associated with manipulating with the data administered to AI technologies and using such data for carrying out fraud-related acts. In addition, it is difficult to have the AI technologies monitored and controlled 24H by a competent authority. Thus, AI technologies may commit a major mistake without detecting it in the right time. It is also difficult to ensure that the AI technologies shall protect the copyrights of each student over his/her work or design. For instance, the student's work may be accessed by others in his/her class. In addition, using AI technologies may lead to having much reliance on technologies in doing tasks, and searching for information. That shall make students inactive in doing their homework [27].

8. Previous Studies

The researcher carried out a systematic literature review. A literature review refers to the process of identifying, evaluating and interpreting several available studies to address a specific research question, area, or phenomenon of interest [13]. The reviewed studies are listed below:

Ismail and Amreya [25] explored the effectiveness of evaluating students through using AI applications in improving the quality of higher education. They adopted a descriptive analytical

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approach. Data were obtained from 48 faculty members working at the College of Education in Rustaq in Oman. A survey was used to collect the latter data. SPSS Version.26 was used for analysing the latter data. It was found that evaluating students through using AI applications is effective in improving the quality of higher education. For instance, using AI applications can provide students with electronic feedback. It contributes to achieving the targeted learning outcomes and raising students' achievement levels. It improves the teamwork and dialogue skills of students. It allows taking the electronic achievement file of each student into consideration when evaluating him/her. It allows identifying the strengths and weaknesses of students and allows assessing students' cognitive skills effectively.

Hamed [24] aimed to explore the effectiveness of using AI technologies in the inclusive schools in Egypt in improving the quality of education. She adopted a descriptive approach. Data were obtained from 33 decisions makers in inclusive schools in Cairo through surveying their opinions. It was found that using AI technologies in such schools improves the quality of education. For instance, such use supports the process of meeting the academic goals with showing accuracy. It allows assessing students effectively and develops the higher thinking skills of students. It enables students to do tasks fast. As for the challenges hindering such use, they include: poor internet network, the high cost of electronic devices, and the poor infrastructures in schools. They include: the failure of some students to master the use of AI applications and not providing students and teachers with adequate training about the way of using AI technologies.

Zakareya [31] explored the effectiveness of using AI applications in developing art education curricula in Egypt. She adopted a descriptive analytical approach. She used a survey as a mean for collecting data from forty (40) art education teachers and supervisors in Asyoot, Egypt. It was found that using AI applications improves the art education curricula in Egypt. Using AI applications promotes creativity and innovation among students in art courses. It improves the teaching methods and activities. It allows assessing students' art skills effectively and raises students' motivation to learn. It improves the faculty members' skills in interaction and communication with students.

Sa'd [28] explored the significance of using AI technologies in the teaching-learning process in Lebanese universities and the challenges hindering such use. She adopted a descriptive approach. She surveyed thirty three (33) MA students in the faculty of education at the Lebanese University in Lebanon. SPSS was used. It was found that using AI technologies is effective for improving the teaching-learning process. Such use allows instructors to take the individual differences between students into consideration when teaching them. It provides students and instructors with instant feedback. It makes the students engaged actively in the teaching-learning process. It enables students to make effective academic decisions. It allows identifying the achievement of each student accurately. It allows each student to learn through using the learning style that fits with his needs, and interests. It increases the students' motivation to learn and engage in the learning process.

9. Methodology

9.1. Approach

The researcher adopted quantitative and descriptive analytical approach. He also adopted qualitative approach. The quantitative approach was used for analysing the data gained through using the questionnaire. The qualitative approach was used for analysing the data gained through conducting interviews.

According to Doyle et al. [10] and Alderbashi and Tawdrous [3], the descriptive analytical approach is usually used for describing the views, or experiences of respondents about the topic under investigation. According to Renjith et al. [15], the quantitative approach is used for recording, interpreting, and analysing non-numeric data in the aim of identifying a deeper meaning for certain human experiences or behaviours. According to Barroga et al. [8], the quantitative approach is usually to describe a specific phenomenon based on its quantitative, statistical, and numerical aspects.

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9.2. Population and Sample

The population is represented in all the faculty members who were working in Emirati private universities during the academic year 2023 – 2024 / second semester. The researcher passed through WhatsApp groups the questionnaire to faculty members in five Emirati private universities. 164 faculty members filled in the questionnaire. Thus, they were chosen purposively. The researcher conducted interviews with thirteen (13) faculty members chosen purposively from the latter universities.

Data about the surveyed respondents are shown below:

Table 1.
Characteristics of the respondents who filled in the questionnaire.

Variable	Category	Frequency	Percentage (%)
Gender	Male	94	57.31707
	Female	70	42.68293
Academic rank	Lecturer	15	9.146341
	Assistant professor	65	39.63415
	Associate professor	73	44.5122
	Professor	11	6.707317
Emirate	Dubai	43	26.21951
	Abu Dhabi	40	24.39024
	Umm Al Quwain	35	21.34146
	Sharjah	25	15.2439
	Ajman	21	12.80488

Note: N=164 faculty members.

Based on Table 1, 164 faculty members were surveyed. 57.31% of the surveyed respondents are males and 42.68% of the surveyed respondents are females. 9.14% of the surveyed respondents are lecturers. 39.63% of the surveyed respondents are assistant professors. 44.51% of the surveyed respondents are associate professors. 6.70% of the surveyed respondents are professors. 26.21% of the surveyed respondents work in Dubai. 24.39% of the surveyed respondents work in Abu Dhabi. 21.34% of the surveyed respondents work in Umm Al Quwain. 15.24% of the surveyed respondents work in Sharjah. 12.80 % of the surveyed respondents work in Ajman.

Data about the interviewees are shown below:

Table 2.
Characteristics of the respondents who were interviewed.

Variable	Category	Frequency	Percentage
Gender	Male	9	69.23077
	Female	4	30.76923
Academic rank	Lecturer	1	7.692308
	Assistant professor	4	30.76923
	Associate professor	6	46.15385
	Professor	2	15.38462
Emirate	Dubai	3	23.07692
	Abu Dhabi	3	23.07692
	Umm Al Quwain	2	15.38462
	Sharjah	2	15.38462
	Ajman	3	23.07692

Note: N=13.

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Based on Table 2, 13 faculty members were interviewed. 69.23 % of the interviewed respondents are males. 30.76% of the interviewed respondents are females. 7.69 % of the interviewed respondents are lecturers. 30.76% of the interviewed respondents are assistant professors. 46.15% of the interviewed respondents are associate professors. 15.38% of the interviewed respondents are professors. 23.07 % of the interviewed respondents work in Dubai. 23.07% of the interviewed respondents work in Abu Dhabi. 15.38% of the interviewed respondents work in Umm Al Quwain. 15.38 of the interviewed respondents work in Sharjah. 23.07 % of the interviewed respondents work in Ajman.

9.3. Instrument

The researcher designed a questionnaire and drafted the interview questions. In terms of the questionnaire, it consists from two major parts. The first part collects data on place of work, academic rank and gender. The second part collects data on the respondents' attitudes towards the impact of AI technologies on the quality of education.

The questionnaire was developed based on the works of Amreya [25], Kenchakkanavar [12], Abdelmawlah, and Sulaiman [18], Sa'd [28] Ramadhan [27], Al-Tkhayneh, and Alghazo [7] and Zakareya [31] and Taweel [29].

Regarding the interview questions, they are two questions. They are listed below:

Q.1. What are the challenges that hinder the use of AI technologies in Emirati private universities in the aim of improving the quality of education?

Q.2. What suggestions can you offer to handle such challenges?

9.4. Validity of the Instruments

To check the validity of the questionnaire and the interview questions, both instruments were sent in their initial versions to three faculty members working in a private university in UAE. The latter faculty members have much expertise in the field of teaching methods. They were asked to carry out an evaluation for the questionnaire and the interview questions based on how clear they are, and how related they are to the study's objectives. They were asked to provide the researcher with recommendations, and make changes were needed. They added that both instruments are well-written, and clear and enable the researcher to meet the goals.

9.5. Reliability of the Questionnaire

The Cronbach alpha value was calculated to check the reliability of the questionnaire. It reflects the degree to which the questionnaire is deemed reliable. In this work, it is 0.735. It is classified as a high value, because it is higher than 0.70 as Salehi & Farhang [16] added in their study.

9.6. Data Analysis

To analyse the data obtained through the interview method, the researcher conducted a qualitative analysis for the answers of the interviewees.

To analyse the data obtained through the questionnaire, a program called SPSS program was used to process such data in a statistical manner. Through the use of this program, the researcher was able to use the following statistical means to reach results:

- Standard deviations and means
- Frequencies and percentages
- The reliability coefficient value (i.e. Cronbach alpha)

For classifying the means in this research work into moderate, low, or high means, a set of criteria were used. Such criteria are shown below [6], [5].

Table 3.

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The criteria that was adopted for having the calculated means classified into three categories.

Range	Level	Attitude
2.33 or less	Low	Negative
2.34-3.66	Moderate	Neutral
3.67 or more	High	Positive

Source: *Alderbashi [6] and Alderbashi [5].

The five point Likert scale was employed in the study's questionnaire. It consists of five main categories for identifying the nature of the attitude. Those categories are displayed below.

Table 4.
The categories and scores of the Likert scale.

Category	Score
Strongly agree	5
Agree	4
Neutral	3
Disagree	2
Strongly disagree	1

Source: Al-Derbashi and Moussa [2], Al-Derbashi & Abed [1], and Alderbashi [4].

9.7. The Study's Variables

- Independent variable: using artificial intelligence (AI) technologies in Emirati private universities.
- Dependent variable: The quality of education in the aforementioned universities.

10. Results and Discussion

10.1. First Question

Q.1. What is the effectiveness of using AI technologies in improving the quality of education in Emirati private universities?

The researcher used means and standard deviations for identifying the effectiveness of using AI technologies in improving the quality of education in the targeted universities

Table 5.
The respondents' attitudes towards the effectiveness of using artificial intelligence (AI) technologies in improving the quality of education in Emirati private universities.

No.	Statement	M.	Std.	Level
1.	AI allows me to identify the exact academic achievement level of each student accurately.	4.93	0.48	High
2.	AI allows me to identify the strengths and weaknesses of each student.	4.82	0.2	High
3.	AI allows me to take the individual differences between students into consideration when assessing them.	4.9	0.32	High
4.	AI guarantees providing each student with effective electronic feedback and comments on their achievement.	4.86	0.39	High
5.	AI allows me to identify which part of the curricula/material is deemed difficult for each student to understand.	4.83	0.81	High
6.	AI allows providing students with reliable and accurate answers to their questions about the material	4.73	0.43	High
7.	AI provides students with effective guidance and training on the way of writing articles and reports professionally.	4.75	0.66	High
8.	AI allows each student to learn based on the learning pattern and style	4.69	0.55	High

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	that suit him/her.			
9.	AI allows me to identify the learning pattern and style of each student.	4.78	0.88	High
10.	AI reduces the students' dependency on me for acquiring knowledge.	4.59	0.59	High
11.	AI improves the teaching methods I use.	4.57	0.69	High
12.	AI allows me to take the individual differences between students into consideration during the teaching-learning process.	4.88	0.76	High
13.	AI makes the students engaged actively in the teaching-learning process.	4.5	0.95	High
14.	AI enhances the enjoyment of learning for students.	4.53	0.52	High
15.	AI makes it easy and fast for students to access and upload courses' materials.	4.62	0.71	High
16.	AI allows me to manage students' academic files and data effectively and easily.	4.65	0.65	High
17.	AI allows students to manage knowledge by themselves.	4.67	0.93	High
18.	AI allows me to identify the talented and gifted students.	2.22	0.33	Low
19.	AI allows me to make effective academic decisions.	4.33	0.54	High
	Overall	4.57	0.59	High

The overall mean is 4.57 which is high. That indicates that the use of AI technologies has a major positive impact on the quality of education in the targeted universities. It indicates that the respondents have positive attitudes towards such use. This result is in agreement with the finding reached by Ismail and Amreya [25]. It may be attributed to the fact that AI technologies offer virtual and interactive learning opportunities. Such opportunities make positive transformations to the teaching-learning process.

It was found that using AI technologies allows faculty member to identify the exact academic achievement level of each student accurately, because the mean of item No. 1 is 4.93. The latter finding is in agreement with the finding of Kenchakkanavar [12]. It may be attributed to offering auto-correction features by AI technologies. It was found that the use of AI technologies allows the faculty members to identify the strengths and weaknesses of each student, because the mean of item No. 2 is 4.82. The latter finding is in agreement with the finding of Ismail and Amreya [25]. That may be attributed to the ability of AI programs to carry out an analysis for the mistakes and correct the answers of each student to make a record of his/her strengths and weaknesses.

It was concluded that the use of AI technologies enables faculty members to take the individual differences between students into consideration when assessing them and during the teaching-learning process, because the means of items No. 3 and No. 12 are 4.90 and 4.88 respectively. The latter findings are in agreement with the finding of Abdelmawlah, and Sulaiman [18]. They may be attributed to the ability of AI programs to offer smart adaptive exams and customized academic materials and AI tutor.

It was concluded that the use of AI technologies guarantees providing each student with effective electronic feedback and comments on his/her achievement, because the mean of item No. 4 is 4.86. The latter finding is in agreement with the finding of Sa'd [28]. That may be attributed to the ability of AI technologies to provide each student with instant feedback that is based on a systematic and automatic analysis for the student's work.

It was found that the use of AI technologies allows faculty members to identify which part of the curricula/material is deemed difficult for each student to understand, because the mean of item No. 5 is 4.83. The latter finding is in agreement with the finding of Kenchakkanavar [12]. That may be attributed to the ability of AI technologies to analyze the mistakes of each student in accordance with the targeted material. That shall enable faculty members to offer students additional illustrations on the difficult material.

It was found that the use of AI technologies allows providing students with reliable and accurate answers to their questions about the material, because the mean of item No. 6 is 4.73. The latter finding

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is in agreement with the finding of Ramadhan [27]. That may be attributed to the ability of AI technologies to access electronic encyclopedias, journals, and books and get answers instantly from them.

It was found that the use of AI technologies can provide students with effective guidance and training on the way of writing articles and reports professionally, because the mean of item No. 7 is 4.75. The latter finding is in agreement with the finding of Ramadhan [27]. That may be attributed to the fact that such technologies can offer student access to free writing courses and exercises.

It was found that the use of AI technologies allows each student to learn based on the learning pattern and style that suit him/her, because the mean of item No. 8 is 4.69. The latter finding is in agreement with the finding of Sa'd [28]. That may be attributed to the fact that such technologies are capable of recognizing the learning pattern and style of each student through analyzing the input data offered by each student. That shall make the learning process customized based on the academic file of each student. It shall make each student satisfied with his/her learning process.

It was found that the use of AI technologies reduces the students' dependency on faculty members for acquiring knowledge, because the mean of item No. 10 is 4.59. The latter finding is in agreement with the finding of Al-Tkhayneh, and Alghazo [7]. That may be attributed to the fact that such technologies provide students with information and answers to their questions through accessing reliable electronic books, encyclopedia and studies.

It was found that the use of AI technologies improves the teaching methods used by faculty members, because the mean of item No. 11 is 4.57. The latter finding is in agreement with the finding of Zakareya [31] and Tawee [29]. That may be attributed to the fact that such technologies offer faculty members access to free professional development courses. It may be attributed to the fact that such technologies offer faculty members summaries for the results of the latest studies on instructional strategies.

It was found that the use of AI technologies makes the learning process more enjoyable for students, because the mean of item No. 14 is 4.53. The latter finding is in agreement with the finding of Al-Tkhayneh, and Alghazo [7]. That may be attributed to the fact that such technologies provide students with smart educational games and ability to visit far places and landmarks, such: famous museums

It was found that the use of AI technologies allows faculty members to manage students' academic files and data effectively and easily and allows students to manage knowledge by themselves, because the means of item No. 16 and No. 17 are 4.65 and 4.67 respectively. The latter findings are in agreement with the finding of Al-Tkhayneh, and Alghazo [7]. That may be attributed to the fact that such technologies offer data management features. Such features include: automatic analysis, categorization and organization for data.

It was found that the use of AI technologies allows faculty members to make effective academic decisions, because the mean of item 19 is 4.33. The latter finding is in agreement with the finding of Al Sa'd [28]. That may be attributed to the fact that such technologies are capable of collecting data about the targeted issue, and analyses the available data about it to recommend the best decision.

Despite such advantages, it was found that AI technologies play a negative role in enabling faculty members to identify the talented and gifted students, because the mean of item 18 is 2.22. The latter finding is not in agreement with the finding of Al Sa'd [28]. That may be attributed to the fact that detecting some type of gifts and talents requires using human experience and aesthetic taste. Such talents include: the talent of drawing or writing novels.

10.2. Second Question

Q.2. What are the challenges hindering the use of AI technologies in Emirati private universities?

The researcher presented below the most prominent challenges mentioned by the respondents:

1- Lack of awareness among decision makers about the advantages of AI software and applications

Two faculty members added that many decision makers in universities don't realize the numerous advantages and benefits of using AI technologies. One of them added: *''Decision makers don't realize the*

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advantages of AI software and applications. For instance, AI technologies offer unlimited benefits for the academic and administrative staff, students and the ones who want to enrol in such universities''. This result is in agreement with the finding of Almalki [21].

2- The lack of specialists in AI in Emirati private universities

Two the faculty members added that the targeted universities don't have AI specialists.

3- The poor skills of students and faculty members in using AI software and applications

Based on the answers of six faculty members, the poor skills of students and faculty members in using AI software and applications shall hinder the use of such software and applications effectively. One of them added: *''Many students and faculty members have poor skills in using computer applications and software. Thus, the use of AI programs shall be difficult for them too''*. This result is in agreement with the finding of Sa'd [28]

4- Having concerns about the security of data

Five faculty members added that it's challenging to protect the data saved in AI software. For instance, one of them added: *''There are many hackers who may hack the system and access the data saved in AI software and applications"*. Another instructor added: *''There are many viruses that may hit the system and make the data accessible by unauthorized people'''*. This result is in agreement with the finding of Kenchakkanavar [12].

5- The difficulty in developing special AI software and applications for students and faculty members

Four faculty members added that developing special AI software and applications by the targeted universities is a complex and difficult process. They added that this process requires dedicating much funds, developing systematic plans, and forming specialized committees. One of them added: *''Developing special AI software requires exerting much effort, and dedicating much time and funds''*

10.3. Third Question

Q.3. What suggestions can the sampled faculty members offer to handle such challenges?

The researcher presented below the most important suggestions offered by the respondents to handle such challenges:

1- Promoting awareness among decision:
   Two faculty members recommended promoting awareness among decision makers in universities about the advantages of using AI software and applications. Such awareness can be promoted through lectures, courses and brochures.
2- Recruiting AI specialists
   Two faculty members recommended recruiting AI specialists as full time employees in universities. Such specialists shall be responsible for developing the AI software and applications and fixing their problems in a regular manner.
3- Offering training:
   Six faculty members recommended providing students and faculty members with training on the way of using AI software. One of them added that such training must be provided in a regular manner to keep up with the latest developments.
4- One of the faculty members recommended using well-designed and effective anti-virus programs. He added that such use shall protect the privacy and security of data.
5- One of the faculty members recommended forming special committees consisting of several AI specialists and programmers to design AI software and applications

11. Conclusion

It was found that using AI applications and software in Emirati private universities raises the quality of education in the latter universities. For instance, such use allows faculty members to identify the exact academic achievement level of each student accurately and the strengths and weaknesses of each student. That's attributed to offering faculty members automatic analysis features.

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It was found that using AI applications guarantees providing each student with effective electronic feedback and comments on his/her achievement. In addition, such use allows faculty members to identify which part of the curriculum/material is deemed difficult for each student to understand. That shall enable faculty members to provide every student with further illustrations on this part. Furthermore, using AI technologies enables students to access and upload the academic material/curricula easily and fast and manage knowledge by themselves. It allows faculty members to manage students' academic files and data effectively and easily.

In terms of the challenges hindering the use of AI technologies, they include: the lack of specialists in AI in universities and the poor skills of students and faculty members in using AI software and applications. They include: having concerns about the security of data and facing difficulty in developing special AI software and applications for students and faculty members. The suggestions presented in this study allows increasing the use of AI technologies in universities.

12. Implications

The results of this study contribute to improving the quality of education in Emirati private universities because they encourage the developers of curricula in such universities to add AI-based activities to those curricula. In addition, they encourage managers in Emirati private universities to increase the integration of AI technologies in the teaching-learning process at those universities. That shall contribute to improving the competency of students in Emirati private universities in using AI technologies.

13. Recommendations

The researcher recommends:

- Embedding AI-based activities to the curricula of Emirati private universities
- Encouraging faculty members in Emirati universities to use AI in the teaching, planning and assessment processes.
- Encouraging students to use AI applications and programs to search for academic references.

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Appendix 1.
Request for research ethics clearance form.

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City University Ajman

Appendix (3-A)

Request for Research Ethics Clearance Form

1. Principal Researcher Details

Research Proposal Title	**Artificial intelligence technologies in Emirati private universities: Challenges and effectiveness in improving the quality of education.**
Name of Principal Researcher (PR)	Dr. Khaled Younis Alderbashi
Rank/ Position of the PR	Associate Professor
Department	Professional Postgraduate Diploma in Teaching, City University Ajman
e-mail of PR	k.derbashi@cu.ac.ae

2. Research Project Related Details

2.1 Briefly (not more than 60 words), explain the nature of the proposed research project.
This study aimed to explore the effectiveness of using artificial intelligence (AI) technologies in improving the quality of education in Emirati private universities. It also explored the challenges hindering the use of AI technologies in Emirati private universities. It aimed to offer suggestions to handle such challenges.

2.2 Does this Research project involve human beings or animals as participants or subjects of the research?

Yes ☑ No ☐

2.3 If Yes, please state the nature and level of involvement.
The participants are required to respond to a survey.

2.4 Does this project represent risk or harm to the participants or subjects?

Yes ☐ No ☑

2.5 If Yes, please indicate the level of risk as per the following categorization (tick the appropriate box):

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☑ No Risk ☐ Minimal Risk ☐ Moderate Risk ☐ High Risk

2. Decision of RIRB

☑ The research project described above conforms to the terms of the Research Ethics Policy and therefore was given clearance to "go ahead" with the project.

☐ The research project described above partially conforms to the terms of the Research Ethics Policy and therefore the principal researcher was advised to modify the research to adhere to the research Ethics Policy.

☐ The research project described above does not conform to the terms of theResearch Ethics Policy. The RIRB exercises its discretion to refuse granting the clearance for the proposed project.

The RIRB has approved the ethical clearance form, issuing it the ethical clearance number 052024-3.

Signature: 6/5/2024

Dean of College of Dentistry

Date: ____

Signature: 7-5-24

Dean of College of Humanities

Date: ____

D. Holz Arfi

Signature:

Director of Research

Date: 6/5/2024

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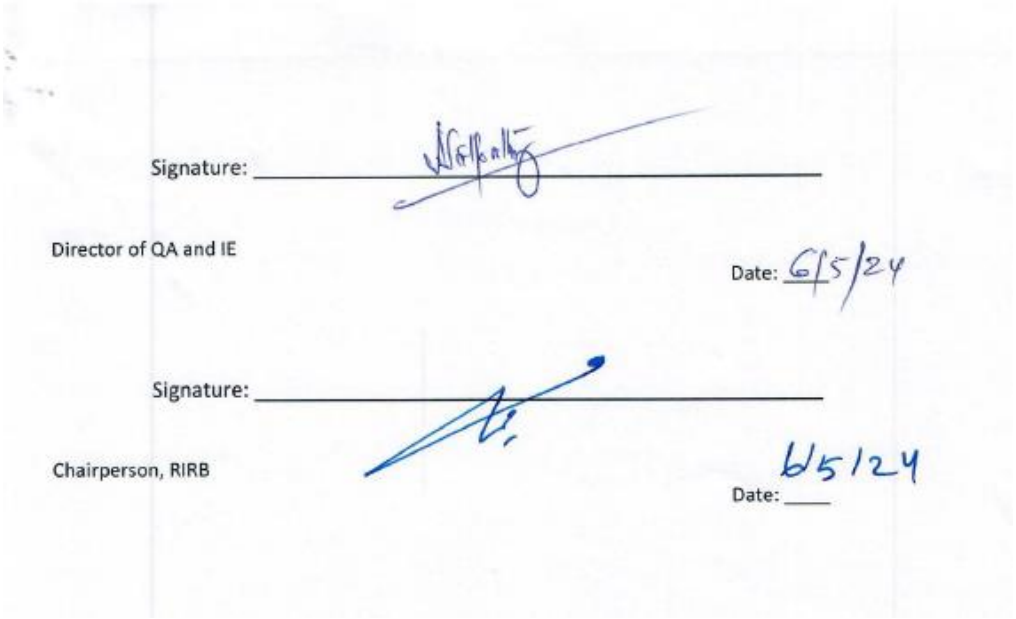

Appendix 2.
The questionnaire form questionnaire.

Respected Faculty members:

I would like you to kindly answer the following questions that benefit from the research prepared by Dr. Khaled Younis Alderbashi, department of Professional Postgraduate Diploma in Teaching, City University Ajman entitled:

Artificial intelligence technologies in Emirati private universities: Challenges and effectiveness in improving the quality of education

Given our awareness of the importance of your participation in this study, we hope that you will kindly answer the questions of this questionnaire, knowing that your opinions in this study will form a basis for evaluating the role of artificial intelligence in the educational field within the higher institutions. Note that this questionnaire will be strictly confidential and will only be used within the framework of this study. By completing this questionnaire, you agree to participate in this research study.

Please, read the definitions below before filling in the questionnaire:

- AI technologies: They refer to IT systems which can sense, comprehend, act and learn. They may involve computer vision, audio processing and sensor processing. They can analyse and understand the collected information. They can represent knowledge, make informed decisions or recommend an action. It can learn from experiences. They may involve smart systems, machines, programs, computers, and applications (Kolbjornsrud et al., 2017)[1]. They can simulate human intelligence, because they are programmed to think like humans and mimic their acts (2023) [2].
- Quality of education: It's the ability of the educational institutions to deliver educational services that meet the demands of students in alignment with the pre-set standards of the quality of education (Al-Alawy, 2023, 717)[3]

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Please, fill in the items below:
Part one:
1)- Gender:
☐ Male
☐ Female

2)- Academic rank
☐ Lecturer
☐ Assistant professor
☐ Associate professor
☐ Professor
☐ Other

3)- Emirate:
☐ Abu Dhabi
☐ Dubai
☐ Sharjah
☐ Ajman
☐ Umm Al Quwain
☐ Other
Part two: Please, answer the items below:

	Using artificial intelligence (AI) technologies in Emirati private universities					
No.	**Statement**	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
		-1	**-2**	**-3**	**-4**	**-5**
1.	AI allows me to identify the exact academic achievement level of each student accurately.					
2.	AI allows me to identify the strengths and weaknesses of each student.					
3.	AI allows me to take the individual differences between students into consideration when assessing them.					
4.	AI guarantees providing each student with effective electronic feedback and comments on their achievement.					
5.	AI allows me to identify which part of the curricula/Material is deemed difficult for each student to understand.					

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No.	Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
		-1	-2	-3	-4	-5	
6.	AI allows providing students with reliable and accurate answers to their questions about the material						
7.	AI provides students with effective guidance and training on the way of writing articles and reports professionally.						
8.	AI allows each student to learn based on the learning pattern and style that suit him/her.						
9.	AI allows me to identify the learning pattern and style of each student.						
10.	AI reduces the students' dependency on me for acquiring knowledge.						
11.	AI improves the teaching methods I use.						
12.	AI allows me to take the individual differences between students into consideration during the teaching-learning process.						
13.	AI makes the students engaged actively in the teaching-learning process.						
14.	AI enhances the enjoyment of learning for students.						
15.	AI makes it easy and fast for students to access and upload courses' materials.						
16.	AI allows me to manage students' academic files and data effectively and easily.						
17.	AI allows students to manage knowledge by themselves.						
18.	AI allows me to identify the talented and gifted students.						
19.	AI allows me to make						

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	effective academic decisions.						

Any other comments:

_____

_____

_____

_____

_____

Thank you very much

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