SCIENTIFIC CULTURE

www.sci-cult.com

SCIENTIFIC CULTURE, Vol. 12, No. 4, (2026), pp. 7454-7466
Open Access. Online & Print

DOI: 10.5281/zenodo.12426754

THE IMPACT OF EMPLOYING ARTIFICIAL INTELLIGENCE SYSTEMS IN PROMOTING INTELLECTUAL OPENNESS AMONG STUDENTS (GRADES 10-12) IN THE SULTANATE OF OMAN

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Received: 10/09/2025
Accepted: 07/04/2026

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ABSTRACT

This study aimed to examine the impact of employing artificial intelligence systems on enhancing intellectual openness among students aged (10–18) in the Al Dakhiliyah and South Al Sharqiyah governorates in the Sultanate of Oman from their perspectives. The study adopted a descriptive analytical approach and used a questionnaire as a data collection tool. The instrument consisted of two main dimensions: artificial intelligence systems and intellectual openness. The study sample consisted of (464) male and female students from grades (10–12) in the Al Dakhiliyah and South Al Sharqiyah governorates, representing (49%) of the total population, and they were selected using simple random sampling. The results indicated that the use of artificial intelligence systems contributes positively to enhancing students' intellectual openness. The findings also showed that there were no statistically significant differences in the level of intellectual openness based on gender or governorate. Furthermore, the results revealed that educational environments that integrate artificial intelligence technologies in a balanced manner help students develop critical and creative thinking skills and promote openness to diverse ideas and cultures.

Introduction

Considering the rapid transformations driven by the digital revolution, the integration of artificial intelligence (AI) systems in educational institutions has become an effective approach to enhancing intellectual openness. These systems provide access to diverse sources of knowledge, facilitate interaction with different cultures and ideas, and support the development of students' creativity and critical thinking skills. Intellectual openness has thus emerged as a fundamental pillar in shaping students' personalities, enabling them to engage with contemporary changes, accept others, appreciate cultural diversity, and promote values of dialogue and moderation (Oweidat & Al-Mustafa, 2021).

Educational research has highlighted the importance of intellectual openness in fostering coexistence and acceptance of differing viewpoints within learning environments. Previous studies indicate that higher levels of intellectual openness contribute to more constructive dialogue between students and teachers, while also promoting values of tolerance and positive interaction (Mlouh & Hijazi, 2022).

Furthermore, prior experiences within Arab educational contexts have demonstrated that artificial intelligence can bring about a qualitative shift in educational practices. This transformation extends beyond facilitating access to knowledge to creating interactive learning environments that enhance students' cognitive, emotional, and aesthetic dimensions (Al-Humaidi, 2012). In this context, the integration of AI in education represents a strategic choice corresponding with Oman Vision 2040, which emphasizes innovation and sustainable learning as key pillars of human and societal development.

Accordingly, there is a growing need to examine the impact of these emerging technologies within the Omani context, where the educational system seeks to balance authenticity with modernity, and national identity with global openness. The use of artificial intelligence in education is not limited to developing technical and cognitive skills; rather, it extends to reinforcing intellectual openness and building well-rounded individuals capable of coexistence, creativity, and positive engagement with local and global transformations.

Therefore, this study represents an academic attempt to explore the role of artificial intelligence systems in enhancing the dimensions of intellectual openness among students in the Sultanate of Oman, contributing to national development goals and Oman Vision 2040.

Problem Statement

The educational system in the Sultanate of Oman is witnessing rapid transformations to keep pace with the requirements of the Fourth Industrial Revolution, where artificial intelligence represents one of the most prominent tools that can be employed to enhance the quality of education and achieve outcomes capable of interacting with contemporary changes. Despite the efforts made to integrate modern technology into education, there are still ongoing questions regarding the extent to which these technologies, particularly artificial intelligence systems, contribute to developing students' intellectual openness, as it is considered as a fundamental pillar in preparing a generation capable of coexisting with cultural and intellectual diversity (Oweidat & Al-Mustafa, 2021).

Some studies have shown that intellectual openness contributes to the development of critical thinking abilities and promotes the values of dialogue and tolerance within the school environment. However, traditional educational practices may not provide students with sufficient opportunities to express their opinions or to engage with different cultures and ideas (Mlouh & Hijazi, 2022). In contrast, educational literature has indicated that the use of artificial intelligence may provide richer learning environments capable of supporting interaction and diversity in knowledge sources, which enhances the values and skills associated with intellectual openness (Al-Humaidi, 2012).

Addressing the impact of employing artificial intelligence systems in enhancing intellectual openness among Omani students contributes to providing scientific knowledge that enables educational decision-makers to build innovative educational strategies based on integrating modern technology with the development of values such as tolerance and creativity. From this perspective, this study comes to fill a research gap related to identifying the relationship between intelligent technologies and the development of an open and flexible mindset capable of keeping pace with rapid global changes.

Accordingly, the research problem is represented in the existence of a knowledge gap concerning the extent to which artificial intelligence systems can enhance the dimensions of intellectual openness among students in the Sultanate of Oman, especially considering national directions that emphasize building an innovative and open-minded citizen capable of contributing to achieving the goals of Oman Vision 2040. Therefore, there is a need for a scientific study that investigates students'

perspectives on the impact of these systems in developing their intellectual openness, in a way that contributes to providing practical evidence that can be utilized in developing educational policies.

Research Questions

This study seeks to answer the following questions:

- Is there an effect of employing artificial intelligence systems on enhancing education and intellectual openness among school students in the Al Dakhiliyah and South Al Sharqiyah governorates in the Sultanate of Oman from their perspectives?
- Are there statistically significant differences attributable to variables such as gender and educational directorate in the level of intellectual openness resulting from the use of artificial intelligence systems among school students in the Al Dakhiliyah and South Al Sharqiyah educational directorates in the Sultanate of Oman from their perspectives?

Objectives of the Study

The study aims to:

- Determine whether there is an effect of employing artificial intelligence systems on enhancing education and intellectual openness among school students in the Al Dakhiliyah and South Al Sharqiyah governorates in the Sultanate of Oman from their perspectives or not.
- Identify the level of intellectual openness resulting from the use of artificial intelligence systems attributed to variables such as grade level or gender among school students in the Al Dakhiliyah and South Al Sharqiyah governorates in the Sultanate of Oman from their perspectives.

Significance of the Study

Theoretical Significance

- Contributes to enriching educational literature on the relationship between artificial intelligence and intellectual openness, a topic that remains limited in Arab research.
- Provides a scientific framework that clarifies the dimensions of intellectual openness considering employing modern technologies.
- Presents a research model that can be built upon in future studies addressing artificial intelligence in different educational fields.
- Supports research trends that link human values (tolerance and coexistence) with digital technologies.
- Opens avenues for other researchers to investigate new variables related to artificial intelligence and intellectual openness.

Practical Significance

- Provides educational decision-makers in the Sultanate of Oman with scientific evidence regarding the role of artificial intelligence in enhancing students' intellectual openness.
- Offers practical suggestions for integrating artificial intelligence applications into curricula in alignment with Oman Vision 2040.
- Enables schools to build more interactive learning environments based on respect for diversity and acceptance of others.
- Enhances societal awareness of the role of artificial intelligence not only in technical aspects but also in instilling human and aesthetic values among students.

Delimitations of the Study

- **Subject delimitation:** The study was limited to examining whether there is an effect of employing artificial intelligence systems on enhancing intellectual openness among students in grades (10–12) in the Sultanate of Oman from their perspectives or not.
- **Spatial delimitation:** The study was conducted in schools affiliated with the educational directorates of Al Dakhiliyah and South Al Sharqiyah.
- **Temporal delimitation:** The study was conducted during the academic year 2025/2026.
- **Human delimitation:** The study was limited to a sample of male and female students in grades (10–12) in government schools in the Al Dakhiliyah and South Al Sharqiyah educational directorates in the Sultanate of Oman.

Operational Definitions

The study addressed a set of key terms as follows:

Artificial Intelligence

Al-Habsiyah (2024) defined artificial intelligence as "the ability of a system to correctly interpret external data, learn from such data, and then use that knowledge to achieve specific goals and tasks through flexible adaptation" (p. 125).

Operationally, it is defined in this study as a set of digital systems and technologies employed within the educational environment in the Sultanate of Oman to enable students to engage in self-directed and interactive learning, develop their critical and creative thinking abilities, and enhance human and ethical interaction in educational situations

Intellectual Openness

Al-Anzi (2023) defined intellectual openness as "the intellectual and scientific benefit derived from

others' ideas, cultures, and technologies without compromising the core beliefs, values, and principles of society" (p. 4).
Operationally, it is defined in this study as the ability of the students in the Sultanate of Oman to accept diverse ideas, analyze them objectively, and engage with them in a spirit of respect and tolerance, while maintaining authentic cultural and social values.

Critical Thinking
Paul (2019) defined critical thinking as "the art of analyzing and evaluating thinking with a view to improving it. It is self-directed, self-disciplined, self-monitored, and self-corrective thinking. It requires rigorous standards of excellence and conscious control of their use" (p. 2).
Operationally, it is defined in this study as the ability of the students to analyze and evaluate ideas and educational situations objectively by employing skills such as observation, inference, comparison, and interpretation, to reach fair and rational judgments that reflect knowledge awareness based on evidence and logic.

Theoretical Framework and Previous Studies
First: The Theoretical Framework
The Use of Artificial Intelligence Systems in Education
The world has witnessed rapid transformations in recent decades because of significant advances in information and communication technologies, which have clearly affected various aspects of life, particularly the educational field. These transformations have contributed to the emergence of new educational patterns that rely on the use of modern digital technologies to support teaching and learning processes and improve the quality of educational outcomes. In this context, artificial intelligence has emerged as one of the most prominent technologies that can contribute to developing the educational environment and enhancing the effectiveness of student learning.
The rapid development of artificial intelligence technologies has expanded its applications across various sectors, as intelligent systems have become capable of analyzing data, processing information, and making decisions based on advanced algorithms that simulate certain human cognitive abilities. This has contributed to employing these technologies in developing educational systems, improving teaching methods, and providing more flexible and interactive digital learning environments (Mansour, 2024; Ghoneimy, 2021).
In the educational field in particular, artificial intelligence has become one of the modern tools that contribute to developing digital learning environments by providing adaptive educational content tailored to learners' needs, and by analyzing learning data in a way that helps to improve students' performance and develop teaching strategies. Recent literature indicates that the use of artificial intelligence in education can enhance the efficiency of the educational process, support personalized learning, and develop learners' thinking skills (Al-Rifai, 2023; Holmes, Bialik, & Fadel, 2019).
Artificial intelligence also represents one of the main pillars of digital transformation in contemporary educational institutions, as educational systems seek to employ these technologies in developing interactive learning tools and improving educational knowledge management. This reflects the importance of artificial intelligence in supporting innovation in education and providing more effective learning opportunities that meet the requirements of the digital age (Al-Habsiyah, 2024; Salih, 2024).

Applications of Artificial Intelligence in Education
The applications of artificial intelligence in education are diverse, as intelligent systems are increasingly used to design digital learning environments which will be capable of supporting teaching and learning processes with more interactive and efficient ways. These applications allow for the analysis of learners' data and the provision of educational content tailored to their individual needs, which contributes to improving the quality of learning and enhancing the effectiveness of the educational process (Holmes, Bialik, & Fadel, 2019).
Artificial intelligence applications in education also include adaptive learning systems and intelligent tutoring systems that help students understand educational content according to their abilities and different levels. These applications contribute to enhancing self-directed learning among learners and providing more flexible learning opportunities, in addition to supporting teachers in monitoring students' progress and improving teaching methods (Al-Rifai, 2023; Ghoneimy, 2021).

Dimensions of Artificial Intelligence
Artificial intelligence includes several dimensions, as follows:

Ethical Dimension

The ethical dimension of employing artificial intelligence systems in education refers to the necessity of considering educational values and principles when using intelligent technologies within the educational environment. This includes adherence to the responsible use of technology, respect for learners' privacy, and ensuring the security of educational data, which contributes to employing artificial intelligence in a manner that supports educational goals and preserves ethical values in the educational process (Al-Rifai, 2023; Ghoneimy, 2021).

This dimension also focuses on the importance of developing clear ethical frameworks that regulate the use of artificial intelligence in educational institutions, ensuring educational equity and equal opportunities among learners. Recent literature indicates that the use of intelligent technologies in education should take place within a framework of ethical responsibility that preserves students' rights and promotes the conscious use of technology in the educational environment (Holmes, Bialik, & Fadel, 2019).

Cognitive Dimension

The cognitive dimension of employing artificial intelligence in education refers to the role played by intelligent technologies in supporting knowledge construction among learners and developing their abilities to acquire and analyze information. Artificial intelligence applications contribute to providing diverse learning resources that help students access knowledge in a more flexible and organized manner, which enhances their understanding and comprehension within digital learning environments (Al-Rifai, 2023; Ghoneimy, 2021).

Artificial intelligence also helps in developing students' cognitive processes through intelligent educational systems that analyze learning environments and provide content tailored to learners' needs and individual abilities. This supports personalized learning and enhances students' ability to think and analyze, in addition to enabling teachers to design more effective learning experiences based on the use of digital technologies in knowledge construction (Mansour, 2024).

Innovative Dimension

The innovative dimension of employing artificial intelligence in education is associated with the ability of intelligent technologies to develop learning methods and enhance creativity among learners. These technologies allow the design of interactive learning environments that help students explore and produce knowledge in new ways, contributing to the development of innovative thinking skills and the generation of non-traditional ideas within the educational environment (Tiagi & Al-Salmi, 2018).

Artificial intelligence also contributes to supporting educational innovation by providing advanced educational tools such as intelligent systems and digital learning platforms that help students analyze information and use it to build new ideas and solutions. Literature indicates that integrating these technologies in education enhances students' ability to innovate and experiment and encourages active participation in the learning process (Elias, Fathi, & Thanoon, 2025).

Human Dimension

The human dimension of employing artificial intelligence in education refers to the importance of using intelligent technologies in a way that supports human interaction within the educational environment, such these technologies enhance communication between the teacher and the learner rather than replacing it. Researchers emphasize that artificial intelligence should be used as a supportive tool for the educational process that helps improve the learning experience while maintaining the teacher's educational role in guiding students and developing their intellectual abilities (Holmes, Bialik, & Fadel, 2019; Sheninger, 2022).

This dimension is also linked to promoting human values associated with the use of technology in education, such as respecting learners' privacy and ensuring the responsible use of digital technologies. Recent studies indicate that the success of employing artificial intelligence in education does not depend solely on the technical aspect, but also requires consideration of human and social aspects that contribute to building a safe educational environment that supports student learning and personality development (Elias, Fathi, & Thanoon, 2025).

Intellectual Openness

The contemporary world is witnessing rapid cognitive and cultural transformations driven by scientific and technological development and the expansion of communication and interaction channels among societies, leading to an increasing flow of ideas, perspectives, and knowledge across different cultures. In this changing context, intellectual openness has become one of the fundamental values that contribute to enhancing individuals' ability to understand knowledge diversity and deal with intellectual plurality in a

conscious and balanced manner, enabling positive interaction with new knowledge without compromising cultural identity or societal values.

Intellectual openness is considered as a concept associated with the development of knowledge societies, as it relates to an individual's ability to accept different ideas and discuss them rationally based on dialogue and critical thinking. It also contributes to developing cognitive flexibility and enhances individuals' ability to reconsider their beliefs and ideas considering evidence and new knowledge, making it a fundamental pillar in developing critical thinking and knowledge construction in modern societies (Cormier et al., 2025).

Importance of Intellectual Openness

The importance of intellectual openness is reflected in its role as a fundamental pillar in developing critical thinking among individuals, as it enhances their ability to analyze different ideas and evaluate them objectively, away from bias and intellectual rigidity. It also helps individuals to deal with contemporary issues with cognitive awareness that enables them to understand multiple perspectives and interact with them rationally, which supports the development of a knowledgeable personality capable of making evidence-based and logical decisions (Cormier et al., 2025).

In the educational context, intellectual openness plays an important role in developing students' learning and thinking skills, as it encourages them to ask questions, discuss different ideas, and engage with new knowledge critically. This contributes to fostering learning environments based on dialogue and intellectual collaboration, supporting the development of 21st century skills such as critical thinking, creativity, and knowledge communication among learners (Darbellay, Moody, & Lubart, 2023).

Characteristics of Open Thinking

Open thinking is characterized by a set of cognitive traits that reflect an individual's readiness to deal with new ideas with mental flexibility and acceptance of different viewpoints. One of the most prominent characteristics is the willingness to revise previous beliefs considering new evidence and information, which helps develop critical thinking and broaden an individual's knowledge horizons, and reduces cognitive biases that may affect judgments about ideas or positions (Evans & Arab, 2020).

Open thinking is also associated with the ability to listen to different viewpoints and evaluate them objectively, which requires a level of intellectual humility that enables the individual to acknowledge the possibility of error in some of their beliefs. This trait is considered one of the fundamental characteristics of critical thinking, which aims to analyze ideas rationally, setting aside preconceived notions or intellectual biases (Haber, 2020).

Another important characteristic of open thinking is the ability to view issues from multiple perspectives, which helps individuals to understand the complexity of many intellectual or social issues. This type of thinking contributes to developing the ability to compare and analyze different ideas more deeply, enhancing reasoning and logical thinking skills among individuals (Dobelli, 2019).

Dimensions of Intellectual Openness

Intellectual openness includes several dimensions, as follows:

Value Dimension

The value dimension of intellectual openness refers to the set of values and principles that guide an individual's interaction with different ideas and viewpoints, based on respect for intellectual and cultural diversity and appreciation of differences. This dimension contributes to enhancing constructive intellectual dialogue within educational communities and helps individuals to deal with intellectual issues with tolerance and mutual respect (Al-Anzi, 2023).

It is also associated with developing cultural awareness among individuals, as it helps them to understand intellectual and cultural plurality and encourages them to accept and positively engage with different ideas, contributing to building a balanced personality that combines openness to new knowledge with the preservation of cultural and social values (Snow, 2018).

Rational Dimension

The rational dimension of intellectual openness refers to the cognitive abilities that enable individuals to deal with different ideas rationally through analysis and reasoning. It reflects the individual's readiness to reconsider their ideas considering evidence and new information, contributing to the development of critical thinking and objective evaluation of ideas (Evans & Arab, 2020).

It is also linked to the use of logical and inferential thinking skills in understanding and analyzing intellectual issues, helping individuals to avoid cognitive biases that may affect judgment (Haber, 2020).

Creative Dimension

The creative dimension of intellectual openness is related to the individual's ability to generate new ideas and deal with knowledge in innovative ways that go beyond traditional patterns of thinking. Exposure to diverse ideas contributes to developing creativity by allowing individuals to benefit from multiple perspectives and generate new solutions (Darbellay, Moody, & Lubart, 2023).

Intellectual openness also broadens thinking by encouraging individuals to explore unfamiliar ideas and connect different concepts, enhancing creativity and innovation (Dobelli, 2019).

Aesthetic Dimension

The aesthetic dimension of intellectual openness refers to the individual's ability to appreciate the aesthetic aspects of ideas and knowledge and interact with them in a reflective and appreciative manner. It enhances the individual's relationship with knowledge through recognizing the aesthetic value of creative ideas and intellectual models (Darbellay, Moody, & Lubart, 2023).

It is also linked to the appreciation of creativity in human knowledge, enabling individuals to go beyond purely cognitive understanding toward valuing innovative and distinguished intellectual outputs, which contribute to developing intellectual taste and strengthening engagement with knowledge and creativity (Snow, 2018).

Second: Previous Studies

There are many previous studies that have addressed the topics of artificial intelligence and intellectual openness, among which the following may be highlighted:

Studies on Artificial Intelligence

May's study (2024) aimed to explore the importance of managing artificial intelligence technologies in the educational process and the challenges facing education. A questionnaire was used to collect data from a study sample of (119) male and female students, representing 5% of the study population. The study employed the descriptive analytical method. The results indicated that the management of artificial intelligence technologies has a significant and positive effect on improving the quality of education, and pointed to the existence of several challenges that hinder the application of this technology.

Al-Zahrani's study (2022) aimed to identify the role of artificial intelligence in education in the Arab world over the past five years through a review of the literature and studies published in this field. The study used the analytical approach based on a systematic review of the literature and relied on the analysis of studies published in the Scholar, ERIC, and IEEE databases. The study sample consisted of (29) scientific studies selected from a total of (436) studies related to artificial intelligence in education. The results showed that artificial intelligence contributes to improving the teaching and learning process, developing teaching strategies, and enhancing digital learning. The findings also indicated that its applications in the Arab world are still in their early stages and require further research, support, infrastructure, and training to be employed more effectively in educational institutions.

The study by Al-Shaboul et al. (2025) aimed to explore the role of artificial intelligence in supporting Arabic language learning, translation, and speech recognition. The study used the mixed-method approach and relied on questionnaires, interviews, and focus groups. It was applied to a sample of (51) participants from Lebanon and Saudi Arabia. The results showed that artificial intelligence tools contribute to improving vocabulary learning, pronunciation, and translation, but still face challenges in understanding complex linguistic structures and Arabic dialects.

The study by Eid and Ismail (2024) aimed to explore the role of AI-supported learning in improving personalized learning among Arab students in the Middle East and North Africa region. The study adopted the mixed-method approach using questionnaires and interviews on a sample of (40) university students from Egypt and Lebanon. The results showed a positive trend toward the use of artificial intelligence in adaptive learning and the personalization of learning experiences, while some challenges related to language, privacy, and data security remained.

David et al.'s study (2023) aimed to explore secondary school students' attitudes toward the use of artificial intelligence in English writing. The study employed the qualitative method and relied on an open-ended question through a questionnaire to collect data. The sample consisted of (67) students from four secondary schools in Hong Kong. The results showed that most students had positive attitudes toward the use of artificial intelligence in writing and idea generation, despite some challenges such as the limited logic of artificial intelligence and some students' preference to rely on their own expressions.

Studies on Intellectual Openness

Al-Shayea's study (2025) aimed to identify the level of digital citizenship and its relationship to intellectual security among female public education students in Al-Ghat Governorate. The study used the explanatory sequential mixed-method approach and relied on questionnaires and interviews as data collection tools from a random sample of (250) female students. The results showed that the level of digital citizenship and intellectual security was high, with a statistically significant correlational relationship between them and no differences attributable to school stage.

Al-Ghafri's study (2023) aimed to identify the role of school administration in enhancing intellectual security among students in grades (11–12) in Sohar, Sultanate of Oman. The study used the descriptive approach and a questionnaire on a sample of (381) male and female students. The results showed that the level of enhancing intellectual security was moderate, with differences in favor of females.

Al-Azmi's study (2022) aimed to examine the role of the school in enhancing intellectual security among government secondary school students in Mubarak Al-Kabeer Governorate in the State of Kuwait. The study used the descriptive analytical method and relied on a questionnaire as a data collection tool. The sample consisted of (301) male and female teachers. The results showed that the school's role in enhancing intellectual security was high in the areas of school policies, curricula, school culture, student activities, and cooperation with the local community, with differences in favor of females in some areas.

Al-Harbi's study (2020) aimed to identify the role of the physical education teacher in enhancing intellectual security among secondary school students in Riyadh. The study used the descriptive survey method and applied a questionnaire to a sample of (150) teachers. The results showed that the physical education teacher plays a high role in enhancing intellectual security among students by supporting positive behaviors, encouraging competition based on ethical values, and linking sports activities to religious values. The most prominent obstacles were the lack of training courses and the weak preparation of teachers in the field of intellectual security.

Commentary on Previous Studies

In Terms of Objective

Previous studies have shown clear interest in the topic of artificial intelligence and its role in education, as reflected in the studies of May (2024), Al-Zahrani (2022), Al-Shaboul et al. (2025), Eid and Ismail (2024), and David et al. (2023). In contrast, other studies focused on intellectual openness, such as those conducted by Al-Shayea (2025), Al-Ghafri (2023), Al-Azmi (2022), and Al-Harbi (2020). The current study is distinguished by its focus on the relationship between the use of artificial intelligence systems and the enhancement of intellectual openness among students in grades (10–12) in the Sultanate of Oman.

In Terms of Sample

The current study is consistent with the studies of May (2024), Eid and Ismail (2024), and David et al. (2023) in selecting students as the study sample. However, it differs from the studies of Al-Azmi (2022) and Al-Harbi (2020), which selected teachers as their sample.

In Terms of Methodology

Most previous studies are consistent with the current study in using the descriptive or analytical approach, such as the studies of May (2024), Al-Ghafri (2023), Al-Azmi (2022), and Al-Harbi (2020). In contrast, some studies adopted mixed or qualitative approaches, such as Al-Shaboul et al. (2025), Eid and Ismail (2024), and David et al. (2023).

In Terms of Instrument

Most previous studies relied on the questionnaire as a data collection tool, which is also adopted in the current study. However, the studies of Al-Shaboul et al. (2025) and Eid and Ismail (2024) used additional tools such as interviews and focus groups.

Methodology and Procedures

First: Research Methodology

The study adopted the descriptive approach to achieve its objectives and to identify the impact of employing artificial intelligence systems on enhancing intellectual openness among students in grades (10–12) in the Sultanate of Oman from their perspective.

Second: Study Population

The study population consisted of all students in grades (10–12) in government schools in the Al Dakhiliyah and South Al Sharqiyah governorates in the Sultanate of Oman, totaling (95,589) male and female students.

Study Sample

The study sample was selected using simple random sampling to ensure representation of the population. The sample consisted of (464) male and female students from the Al Dakhiliyah and South Al

Sharqiyah governorates, representing (49%) of the total population. The following table shows the distribution of the sample according to gender and educational directorate:

Table (1): Distribution of the Sample by Gender and Educational Directorate

No	Gender	Directorate		Total
		Al Dakhiliyah	South Al Sharqiyah	
1	Male	129	68	197
2	Female	194	73	267
Total		323	141	464

Research Instrument

After reviewing the literature addressing artificial intelligence and intellectual openness, a questionnaire was designed to collect data from the study sample, and its items were formulated based on studies such as May (2024), Al-Bairat et al. (2025), Al-Rashidi and Al-Rahili (2025), and Al-Saeedi et al. (2024).

The questionnaire consisted of four sections. The first section included demographic data and independent variables, namely (gender and educational governorate). The second section addressed artificial intelligence and consisted of (24) items distributed across four dimensions: (ethical, cognitive, innovative, and human dimensions).

The third section focused on intellectual openness and consisted of (24) items distributed across four dimensions: (value, cognitive, creative, and aesthetic dimensions). A five-point Likert scale was adopted as follows: strongly agree (5), agree (4), neutral (3), disagree (2), and strongly disagree (1), to respond to the questionnaire items.

Validity and Reliability

a) Face Validity

The initial version of the questionnaire was presented to a group of (6) experts and specialists in the fields of statistics and educational administration, working in universities and various educational institutions within the Sultanate of Oman. The questionnaire was revised based on their feedback.

b) Item Validity

Item validity was examined by calculating Pearson correlation coefficients to determine the relationship between each item and the dimension to which it belongs. Additionally, the correlation coefficient for each dimension with the total score of the scale was calculated, as presented in Table (2).

Table (2): Pearson Correlation Coefficients between Each Item and the Total Score of Its Corresponding Dimension

First axis: Artificial Intelligence scale														
Distance	Paragraph number	Paragraph link to		Distance	Paragraph number	Paragraph link to		Distance	Paragraph number	Paragraph link to		Distance	Paragraph number	Paragraph link to	
		In the distance	Totally			In the distance	Totally			In the distance	Totally			In the distance	Totally
The moral dimension	1	0.81	0.84	The cognitive dimension	7	0.79	0.81	The innovative dimension	13	0.81	0.83	The human dimension	19	0.78	0.80
	2	0.82			8	0.77			14	0.80			20	0.76	
	3	0.84			9	0.83			15	0.82			21	0.79	
	4	0.79			10	0.81			16	0.84			22	0.77	
	5	0.83			11	0.80			17	0.83			23	0.82	
	6	0.80			12	0.82			18	0.81			24	0.80	
Second axis: The intellectual openness scale															
Distance	Paragraph number	Paragraph link to		Distance	Paragraph number	Paragraph link to		Distance	Paragraph number	Paragraph link to		Distance	Paragraph number	Paragraph link to	
		In the distance	Totally			In the distance	Totally			In the distance	Totally			In the distance	Totally
The value dimension	1	0.82	0.83	The mental dimension	7	0.80	0.82	The creative dimension	13	0.79	0.84	The aesthetic dimension	19	0.78	0.81
	2	0.85			8	0.78			14	0.81			20	0.79	
	3	0.80			9	0.81			15	0.83			21	0.77	
	4	0.78			10	0.80			16	0.82			22	0.80	
	5	0.81			11	0.82			17	0.84			23	0.82	
	6	0.79			12	0.79			18	0.80			24	0.81	

The results presented in Table (2) indicate that the Pearson correlation coefficients between the scale items and the total scores of the dimensions in the artificial intelligence scale ranged between (0.76–0.84). These are high correlation coefficients, indicating good internal consistency between the items and their respective dimensions. Additionally, the correlations between the dimensions and the total score of the scale were also high, reflecting the strength of the internal structure of the scale.

The results of the intellectual openness scale also showed that the correlation coefficients between the items and their dimensions ranged between (0.77–0.85), which are high values indicating a strong relationship between the items and their corresponding dimensions. Furthermore, the correlations between the dimensions and the total score of the scale were high, confirming that the scale possesses an adequate level of internal consistency and is suitable for application in the study.

Reliability of the Scale

To verify the reliability of the study instrument and its domains, correlation coefficients were calculated between the study domains on the one hand, and between the instrument components on the other hand, as illustrated in Table (3).

Table (3) Values of Cronbach's alpha coefficients for the artificial intelligence axis

Axis	Measurement fields	Number of paragraphs	Cronbach's alpha	Axis	Measurement fields	Number of paragraphs	Cronbach's alpha
Artificial intelligence hub	The moral dimension	6	0.86	The focus of intellectual openness	The value dimension	6	0.85
	The cognitive dimension	6	0.84		The mental dimension	6	0.84
	The innovative dimension	6	0.85		The creative dimension	6	0.86
	The human dimension	6	0.83		The aesthetic dimension	6	0.83
the total		**24**	0.88	**the total**		**24**	0.87

The results presented in Table (3) indicate high reliability coefficients across all dimensions. The reliability values for the artificial intelligence scale ranged between (0.83–0.86), with an overall value of (0.88). Similarly, the intellectual openness scale showed reliability values ranging between (0.83–0.86), with an overall value of (0.87). These high values indicate that the instrument demonstrates a high level of internal consistency and reliability, confirming its suitability for field application.

Study Procedures

Relevant studies related to the current research were reviewed, and the study instrument was developed in its initial form. It was then presented to a group of experts for validation. Subsequently, it was administered to a pilot sample to ensure its validity and reliability. After its final approval, the instrument was applied to the study sample, data were collected, analyzed, and the research findings were derived.

Statistical Analysis

After data collection, the data were coded and statistically analyzed using the Statistical Package for the Social Sciences (SPSS). To answer the first research question, simple linear regression analysis was used, while an independent samples t-test was employed to answer the second question.

Scoring Criteria of the Study Instrument

The following scale was adopted to analyze the results by calculating the class interval. This was done by subtracting the lowest value from the highest value (5 – 1 = 4). To determine the class interval, the range was divided by the number of levels (4 ÷ 5 = 0.8). The resulting value (0.8) was then added to the lowest scale value to determine the upper limit of the first category (1 + 0.8 = 1.8). Accordingly, the remaining values were calculated to define all levels of the questionnaire. The scale presented in Table (4) was adopted for interpreting the study results.

Table (4) Criteria for judging the interpretation of the results of the study instrument items

Lower and upper limits of the five-point Likert scale	
Arithmetic average	Degree
4.20 - 5	Very high
4.19 - 3.40	High
3.39 - 2.60	Medium
2.59 - 1.80	Low
1.79 - 1	Very low

Results and Discussion

To answer the first research question: *Is there an effect of employing artificial intelligence systems on enhancing education and intellectual openness among school students in the Al Dakhiliyah and South Al Sharqiyah governorates in the Sultanate of Oman from their perspective?*—and in order to obtain a model that explains the effectiveness of the independent variable (artificial intelligence) on the dependent variable (intellectual openness) among students in grades (10–12) in the Al Dakhiliyah and South Al Sharqiyah governorates in the Sultanate of Oman, simple linear regression analysis was used, as shown in Table (5).

Table (5) Results of the simple regression analysis of the effect of artificial intelligence on intellectual openness

Dependent variable	Model summary		Regression model				Regression coefficients			Statistical significance
	Correlation coefficient	Determination coefficient	Degree of freedom		Value F	Level of meaning	Regression coefficients		قيمة اختبار T	
Intellectual openness	0.62	0.38	Regression	1	60.06	< 0.01	The constant	2.15	6.32	significant
			The rest	160			artificial intelligence	0.62	7.75	significant

The results presented in Table (5) indicate that the use of artificial intelligence is positively and significantly associated with intellectual openness. The regression coefficient (0.62) indicates that each one-unit increase in the use of artificial intelligence leads to an increase of (0.62) units in intellectual openness, and this effect is statistically significant at the (0.01) level.

Furthermore, the value of $R^2 = 0.38$ indicates that 38% of the variance in intellectual openness can be explained using artificial intelligence. The F value (60.06), along with the T-test results, indicates the validity of the regression model and the strength of the effect of the independent variable.

To answer the second research question: *Are there statistically significant differences attributable to gender and educational directorate in the level of intellectual openness resulting from the use of artificial intelligence systems among school students in the Al Dakhiliyah and South Al Sharqiyah educational directorates in the Sultanate of Oman from their perspective?*—an independent samples t-test was conducted, as shown in Table (6).

Table No. (6) Results of the t-test for differences in the degree of intellectual openness resulting from the effect of employing artificial intelligence systems according to the gender variable

	Average	Sd	Value T	Df	sig
Males	3.50	0.982	0.664	0.462	0.885
Females	3.44	0.986			

The results presented in Table (6) show that the mean level of intellectual openness among males was (3.50) with a standard deviation of (0.982), while the mean for females was (3.44) with a standard deviation of (0.986). Although the mean score for males is slightly higher than that of females, the difference between the two groups is not statistically significant. The t-value was (0.664) at a significance level of (sig = 0.885), which is greater than (0.05), indicating that there are no statistically significant differences in the level of intellectual openness between males and females.

This result may be attributed to the fact that both males and females in the Omani educational environment are exposed to similar educational and technological opportunities, which reduces the likelihood of gender-based differences in intellectual tendencies and attitudes related to artificial intelligence.

Table No. (7) Results of the t-test for differences in the degree of intellectual openness resulting from the effect of employing artificial intelligence systems according to the educational directorate variable

	Average	Sd	T	Df	Sig
Interior	3.44	1.000	0.998	0.462	0.649
South Sharqiya	3.54	0.945			

The results presented in Table (7) indicate that the mean level of intellectual openness among participants from Al Dakhiliyah Governorate was (3.44) with a standard deviation of (1.000), while the mean for participants from South Al Sharqiyah Governorate was (3.54) with a standard deviation of (0.954). Although the mean for participants from South Al Sharqiyah is slightly higher than that of their counterparts in Al Dakhiliyah, the difference between the two groups is not statistically significant. The t-value was (0.998) at a significance level of (sig = 0.649), which is greater than (0.05), indicating that there are no statistically significant differences in the level of intellectual openness between students in Al Dakhiliyah and South Al Sharqiyah governorates.

This may be attributed to the fact that educational programs and policies in the Sultanate of Oman aim to ensure cognitive and technological equity, resulting in similar opportunities and resources related to smart learning and the use of artificial intelligence across different educational governorates.

Recommendations

- Employ artificial intelligence applications in school education.
- Integrate values of intellectual openness into digital educational activities.
- Train teachers to employ artificial intelligence using pedagogically sound approaches.
- Provide interactive digital learning environments.

Proposed Future Research

- The impact of using generative artificial intelligence applications on developing critical thinking among students in grades (10–12) in the Sultanate of Oman.
- The effectiveness of AI-based interactive learning environments in developing creativity among students in grades (10–12) in schools in the Sultanate of Oman.
- The impact of a training program based on the use of artificial intelligence on developing teachers' practices that support intellectual openness among students in grades (10–12) in the Sultanate of Oman.
- The relationship between the use of artificial intelligence systems and the level of cognitive flexibility and intellectual independence among school students in the Sultanate of Oman.

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