

The Extent of Kindergarten Teachers' Knowledge in Applying Artificial Intelligence Technology in the First Irbid District: Reality of Application and the Most Prominent Challenges from their Viewpoint

KHitam Ali Saleh^{1*}

^{1*}Supervisor, Schools of King Fahd University of Petroleum and Minerals (KFUPM), Saudi Arabia

E-mail: 1khitam.saleh@unischools.edu.sa

ORCID: <https://orcid.org/0009-0003-6842-9129>

(Received 08 May 2025; Revised 25 June 2025, Accepted 02 July 2025; Available online 30 September 2025)

Abstract - The current study aimed to identify the extent to which kindergarten teachers know how to apply artificial intelligence technology in the First Irbid District: the reality of application and the most prominent challenges from their viewpoint. To achieve this objective, a questionnaire was designed, and the sample consisted of (361) teachers. The results indicated that the arithmetic means for the items related to the level of knowledge in using artificial intelligence applications in teaching ranged between (3.14) and (3.21), with a moderate degree. The findings also showed that the arithmetic means for the items regarding the reality of employing artificial intelligence applications were moderate. Furthermore, the study revealed that the arithmetic means for the items related to the challenges of employing artificial intelligence applications were at a high level. The researcher recommended integrating artificial intelligence concepts and technologies into the kindergarten curriculum. Additionally, it emphasized the need for proper guidance and training to understand how to use and apply artificial intelligence applications in the teaching process. Teachers should also be provided with resources and continuous training to keep up with the latest technologies and best practices for smart learning.

Keywords: Artificial Intelligence, Kindergarten Stage, Kindergarten Teachers

I. INTRODUCTION

Modern technological advances and the diversity of applications based on artificial intelligence (AI) have saved a lot of effort in performing tasks in various fields, including the educational field, whether in higher education or school education. In education, AI has typically facilitated the role of teachers in conveying information and delivering it more clearly, easily and swiftly to their students (Daneshmand, 2017; Ferdowsi & Moradi, 2014).

Numerous studies have emphasised the significance of artificial intelligence (AI) and its qualitative changes in the educational process, particularly the solutions it offers to the instructional process (Subbaiah et al., 2024). These changes pri.

Marilyn requires the reconstruction of cutting-edge infrastructure and the creation of an ecosystem that supports and develops the skills of innovators to establish models that

can be easily tracked, applied, and predicted, and their impacts can be examined effectively (Parthiban & Gajivaradhan, 2016).

Artificial intelligence is currently considered one of the most crucial inventions. Some studies conducted by American universities have confirmed that many companies' increased reliance on artificial intelligence and robots reduces human career opportunities because human employees commonly use traditional means and tools and need a high budget for training and professional development compared to AI (Al-Muqiti, 2021).

Others contend that due to the rampant AI adoption in many sectors of modern life, AI is predicted to generate a lot of job openings in the economic marketplace. This includes task bots, smart and fast devices, and computers which all work on the same system of data and information processing and storage. Nevertheless, there is a lack of developed electronic applications which can execute functions with such proficiency (Javaid et al., 2022).

Children's language, social, and cognitive abilities can be improved by employing artificial intelligence applications in instruction at this stage (Al Zakwani, 2024). One applicable method is adaptive learning, where the instructional content these apps may offer is tailored to each child's comprehension level, fostering better critical thinking and problem-solving abilities (Mishaal and Al-Eid, 2023). Additionally, they allow children to engage with learning resources in various ways, like interactive storytelling and educational games, which can improve their focus and memory (Gligorea et al., 2023). Duan and his colleagues claim that the mental capabilities of children are greatly enhanced when they learn through AI because they are offered instant feedback on responses given. (Duan et al., 2019).

AI programs allow students to work together on educational activities and develop communication and teamwork abilities, jointly learning socially (Lemay et al., 2020; Khasawneh & Khasawneh, 2023). These applications aim to teach children about emotions and how to articulate them, facilitating the development of emotional intelligence.

Moreover, these applications provide children with authentic contexts to learn important social lessons such as sharing and taking turns (Duan et al., 2019). In conclusion, the researcher suggests that applying artificial intelligence in education may provide rich and diversified learning activities for children at preschool age, contributing to their cognitive, linguistic, and social development. By integrating interactive educational materials with instant feedback and collaborative activities, those experiences can be achieved. (Prentzas, 2013; Al-Joubar, 2022).

Nonetheless, the linguistic part of these apps facilitates vocabulary learning by introducing new words in a fun way. In addition, they include word games and storytelling, which are more focused on reading and writing and are helpful for children's language skills (Kebdani & Nadel, 2021). In addition, some applications enable children to interact by speaking while listening to stories or dialogues, thereby developing both speaking and listening skills (Li & Wong, 2023).

With the rise of Artificial Intelligence, these inapp educational activities allow teachers to integrate AI programs into kindergarten classes more easily. Teachers, therefore, should possess some level of technical knowledge and creativity to develop modern pedagogical approaches utilizing the AI program's features. For instance, teachers could develop Interactive stories using AI applications in which children would click on images so that words or sound effects would play, thus promoting reading and listening skills (Bayoumi, 2024).

Using Artificial Intelligence programs, teachers are able to facilitate educational games for kids that help them learn basic foundational concepts such as counting, colours, and shapes. Duan et al., (2019) state that an example of an AI application could be a game where children have to match shapes with correct colours or even arrange numbers from lowest to highest. Also, teachers can use AI software to prepare group work lessons where students work together to complete tasks or create solutions to given challenges. AI can be autonomous and allows for the possibility to foster children's social and teamwork skills by providing them problems, difficulties or decision-making situations that need solving (Al-Qahtani, 2022). It goes without saying that teachers play a major role in determining and adapting the applications for students. The effective integration of technology in lessons requires supervision and guidance of the students' progress and activities.

An adult may find it difficult to check if artificial intelligence apps aligns with kindergartener's mental and emotional development. For instance, a teacher could use an application to teach children colours and shapes. Children ought to be able to interact with this app by matching colours for positive feedback and by pressing on shapes to hear their names. Bayoumi, (2024) and El-Shenawy, (2023) assert that children learn through direct contact when they take part in such activities. The instructor needs to make certain, however, that these applications are clean, that is, devoid of obscene

materials or links that solicit children to unwanted information or advertisements. In some instances, the app may have parental control options that enable the parameter to disable certain functions or external content (Al-Otaibi, 2024).

Equally, children should not be given educational apps that are above their level of understanding and knowledge. As an example, educational games should focus on preschool children, with a gradual increase in the level of difficulty to promote autonomous learning. There can be drawn simple interactive story books with lively characters for young children that aid in developing their reading and listening skills for the little children (Prentza, 2013; Al-Joubar, 2022).

In order for the uses of artificial intelligence technologies to be appropriate for a child's growth, the scholar claims, teachers ought to select interactive applications that are both safe and provide educational content that is age-appropriate and facilitates learning and development .

As Artificial intelligence is rapidly developing, the scholarly literature in relation to its application with children has grown as well. For example, Al-Otaibi (2024) undertook a study to explore the extent to which generative artificial intelligence tools are utilized at the early childhood level and did so using a descriptive and analytic methodology in which the researcher constructed and validated a questionnaire (AlAli & Wardat, 2024). The sample population for the study was comprised of thirty-five (35) female teachers. The findings suggested that the extent of use of the tools of artificial intelligence at the pre-school level is encouraging, considering that the teachers' knowledge and use of these tools is moderate.

Analyzing the implementation of artificial intelligence in early childhood education from a female teacher's perspective in Riyadh, (Alkhuzaim et al., 2024) employed the early descriptive survey method to gather data. A survey was conducted among (360) female teachers in early childhood education in the Al-Riyadh Educational Zone of the Kingdom of Saudi Arabia. The research was able to achieve several critical results, including but not limited to: a high percentage was assigned to the human, financial, and material requirements; a high percentage was given to the educational and training requirements. Female teachers in the Riyadh Educational District reported that a proposed program was created to activate the application of artificial intelligence in the early childhood stage.

In a study published in 2024, Bayoumi and El-Shenawy sought to use a quasi-experimental (one-group) approach to develop a proposed programme based on specific artificial intelligence (AI) tools to teach young children about climate change. The study involved thirty boys and thirty girls in the second preliminary level (Kg2) between the ages of five and six. A programme based on artificial intelligence (AI) techniques and an assessment of children's knowledge of climate change were the two main instruments used in the study.

Bayoumi & El-Shenawys', (2024) study found an impact of the proposed program based on artificial intelligence (AI) applications on children's awareness of climate changes in early childhood through the presence of statistically significant differences between the average scores of children before and after applying the proposed program using the climate change awareness scale illustrated for children (Meshal & Al-Eid, 2023). They pointed out that the program used in the study helped children acquire information, knowledge, and facts related to the concepts included in the program (climate change), as it worked to create mental images of what the children saw through the program's presentations. In addition, the programme used artificial intelligence tools to present climate change issues to children engagingly and enjoyably, encouraging them to learn more because the content was presented in a way that suited their developmental stage. Children were motivated and encouraged by using films, stories, games, and educational cards, which helped them become more optimistic.

Under the descriptive approach to evaluate the practical possibilities of employing appropriate AI technologies at a preschool level based on teachers' viewpoints, Al-Mishaal & Al-Eid, (2023) prepared online and hard copy structured questionnaires for a random sample of early childhood educators in Shaqra Governorate. The results of the study showed that, in spite of knowing the importance of artificial intelligence at this level, a majority of early childhood educators possessed minimal information about its applications. Moreover, the research pointed out the scant application of artificial intelligence in early childhood pedagogy.

(Alghamdi et al., 2023) and Al-Farani, (2022) sought to examine the extent to which special education teachers used educational artificial intelligence applications and their perceptions toward this use at the Al-Noor Institute for Blind Women in Jeddah Governorate. The results suggested that teachers did not employ the use of AI applications because of several barriers, like a lack of technical assistance, monetary motivation, and a lack of adequate skills. Nevertheless, there was some level of positive attitude towards the use of AI applications from the teachers' perspectives .

Bakari, (2022) focused on the integration of artificial intelligence applications in education and emphasized the most critical problem of striking a balance between the utilization of artificial intelligence and conventional teaching methods. Also, results from Al-Enazi, (2022) analyzed the impact of artificial intelligence on promoting sustainable development in business within the context of the Kingdom's Vision 2030. The use of AI, it was argued, enabled significant improvements in productivity within the business environment by automating the processes of formulating serviceable solutions to intricate problems. This analysis also argued that there is a need to design appropriate policy frameworks that permit the integration of artificial intelligence tools for sustainable development.

Prentzas, (2013) and Al-Joubars', (2022) study presents a program to develop children's emotional intelligence in early childhood through educational/learning activities designed in light of artificial intelligence. A random sample of thirty children was split into two groups: an experimental group of fifteen children and a control group of fifteen children. Statistically significant differences in the overall average scores of the participants' children in both the experimental and control groups post application of the illustrated emotional intelligence test were noted, with the experimental group obtaining better results. In addition, statistically significant differences were noted in the control and experimental group averages between the pre- and post-application of the emotional intelligence test, with the post-application averages being higher. Importantly, statistically significant differences were noted in the pre- and post scores of the experimental group across the four emotional intelligence attributes of self-awareness, self-regulation, empathy and social skills. The results in this study have shown a clear success of the proposed activities intended to improve emotional intelligence in early childhood.

Employing artificial intelligence today is considered an essential factor in the progress and success of the Ministry of Education in Jordan in promoting and reforming instruction in Jordan. The Ministry's tireless efforts were demonstrated by encouraging participation in the latest educational platforms related to e-learning and distance learning. Today, the Ministry seeks, through training workshops and electronic platforms, to motivate teachers to participate in these workshops and follow everything new in the field of technology in general and applications of artificial intelligence in particular, and the need to learn about the applications of artificial intelligence and its importance in education. Regretfully, teacher attitudes and readiness to adopt artificial intelligence applications in the classroom are still inadequate. From this point on, the study's goal was to ascertain the level of familiarity kindergarten teachers had with using artificial intelligence techniques, the practicality of doing so, and the main obstacles they faced, as perceived by the teachers in the First Irbid District.

II. STUDY STATEMENT

Owing to the quick advancements in science and technology, which have produced a wide range of contemporary approaches and techniques supported by modern technology and all of its tools, including artificial intelligence, these tools are now indispensable in every aspect of life, including education. To stay up with these changes, live with them, and overcome the most significant obstacles that may arise from them, this inspired several scholars and educators were inspired to become knowledgeable and look for the most recent modern educational methods and strategies.

Results of some studies (Bakari, 2022; Al-Otaibi, 2024; Al-Enazi, 2022) have revealed that male and female teachers' use of new technologies to enhance teaching and learning

practices is still lagging. Aside from this, teachers who work in kindergarten still have issues with the deployment of applications involving artificial intelligence, as many obstructions inhibit their proper functioning. The hurdles AI poses in the educational system are even more worrying and include how it affects the development of children, fear of AI taking over teachers' roles, and questions of responsibility and AI involvement and decision making. These worries outline the obstructions that must be solved when AI is applied to educational settings.

Despite the challenges in implementing artificial intelligence in learning, some studies have proven the positivity of applying artificial intelligence in improving learning outcomes for students, increasing their cognitive and skill development, reducing the cost of education, and reducing the time required for study. Make education engaging and interactive at any time and in any place. The presence of personal artificial intelligence mentors helps students and their parents define and achieve their goals and respond to their inquiries. This was proven by the study of Bayoumi, (2024) and Al-Shennawi, (2024) and the study of Prentzas, (2013) and Al-Joubar, (2022).

Since teachers are responsible for creating an educational system that promotes teaching, innovation, and creativity in the classroom, they must invest in the benefits of implementing artificial intelligence in the classroom and overcome any obstacles that may arise. The quality of education is also significantly linked to the quality of their performance and their competence in performing their roles. The academic and leadership roles entrusted to him, the higher their performance, the higher the quality of the results, especially the quality of the students' results.

Hence, due to the importance of using artificial intelligence in education and the role of teachers' knowledge in how to use applications based on artificial intelligence in instruction, and knowing the most prominent challenges that hinder its application, this study was conducted to examine the degree of knowledge of kindergarten teachers in applying artificial intelligence techniques, the reality of their application, and the most prominent challenges. The study tried to answer the following questions:

1. To what extent do kindergarten teachers in Irbid First District have the required knowledge in using artificial intelligence applications in instruction?
2. What is the reality of kindergarten teachers' application of artificial intelligence applications in the kindergarten stage from their point of view in Irbid First District?
3. What challenges do kindergarten teachers in Irbid First District face in employing artificial intelligence applications from their viewpoint?

Objectives

The study sought to evaluate the expertise of kindergarten teachers in the integration of artificial intelligence methods,

analyze their actual practice, and highlight the major difficulties from teachers' viewpoints in the First Irbid District.

Study Importance

The theoretical and practical importance of the current study lies in the following points:

1. Encouraging kindergarten teachers to use AI in their teaching practices and integrate artificial intelligence into education.
2. Utilising AI techniques proposed in this research in their teaching practices.
3. Encouraging kindergarten teachers to research the most important applications of artificial intelligence in teaching.
4. Spreading the culture of artificial intelligence among all kindergarten teachers and its importance in raising their teaching performance and the educational process, and ensuring knowledge and study of artificial intelligence applications.
5. Changing Kindergarten teachers' attitudes towards using modern technology and AI in teaching.
6. Identifying the obstacles restricting kindergarten teachers' implementation of AI applications and developing procedural solutions.
7. Providing officials and leaders in the Ministry and kindergarten teachers with information about the importance of AI applications and their role in achieving the goals of the educational learning process and raising its level.

Limitations

Spatial limits: First Irbid District

Objective limits: The study tool used by the researcher (the questionnaire).

Time limits: First semester, academic year 2023-2024 AD.

Human limits: kindergarten teachers in the first Irbid district for the second semester of the academic year 2023-2024 AD.

Terminology of Study

Artificial intelligence applications: These are the potentials that digital or electronic equipment, like computers, phones, and robots, possess that allow them to carry out intricate activities that often call for human intelligence. These applications include the capacity to learn, adapt, decide, and work through issues akin to those of sentient creatures (Bakari, 2022). Operationally, it is the process of identifying the most critical applications of artificial intelligence and determining how to benefit from them effectively in education. This includes evaluating the degree to which these applications are utilised and integrated into teaching practices to improve the learning experience and enhance student outcomes.

Female Kindergarten teachers: They are all kindergarten teachers teaching in Irbid First District in the second semester of the academic year 2023-2024.

III. METHODS

Approach

The methodology that was employed in this study was descriptive and correlational, and ensured that all the objectives were met, along with answering the provided research questions. This approach was selected due to the flexibility it provided in collection of data through the administration of a survey, as well as facilitate data processes through applicable statistical methods.

Sample

A simple random sampling technique based on teachers was used to select the study sample. The sample comprised 361 teachers of both genders. The breakdown of the sample can be found in Table 1, provided below.

TABLE I DISTRIBUTION OF THE STUDY SAMPLE ACCORDING TO ITS VARIABLE

Variables	Category	N	%
Academic qualification	Bachelor's	165	53.1%
	Postgraduate	146	46.9%
Years of experience	< 10 years	135	43.4%
	≥ 10 years	176	56.6%

Instrument

The researcher developed a questionnaire to determine the degree of kindergarten teachers' knowledge in applying artificial intelligence techniques, the reality of their application, and the most prominent challenges perceived by teachers in the First Irbid District. The researcher followed the following steps in building the study instrument:

1. Reviewing previous literature and studies related to the subject of the study.
2. Using a five-point Likert scale, the questionnaire items were prepared to measure the level of knowledge kindergarten teachers possess regarding the application of artificial intelligence techniques, the practicality of such applications, and the most significant challenges perceived by the teachers in the first Irbid District.

Construct Validity

The pilot sample of teachers (n=30) who filled out the questionnaire was subsequently removed from the final study sample. Correlation coefficients were computed between an item's score and the total score for the domain of the item. Moreover, correlation coefficients were calculated between all the fields of the questionnaire and the total score. The calculations are provided in detail in Table 2 below.

TABLE II VALUES OF CORRELATION COEFFICIENTS BETWEEN THE ITEMS OF EACH SCALE AND THE TOTAL SCORE

Fields	Items	correlation coefficients
Level of knowledge of using artificial intelligence applications in teaching	Familiar with the concepts and terminology of AI apps	.658(**)
	Teachers' ability to deal with and apply AI apps in education	.878(**)
	Overcoming the technical challenges encountered while applying AI apps in education	.799(**)
	Developing their skills in AI apps in education through training	.733(**)
	Teachers are familiar with the principles of ethics related to the use of AI in education	.797(**)
	I investigate the opinions and evaluations of students' parents using the Question Pro application and the Qx Bot application	.792(**)
The reality of employing artificial intelligence applications	I create an instant quiz from PowerPoint slides for question types based on Bloom's Taxonomy with ChatGPT Ghostwriter	.723(**)
	I record grades and notes for all subjects and levels using the Grades Kop app	.593(**)
	I employ the Class Point AI tool to generate questions from any PowerPoint slide	.579(**)
	I use the Pro Word Cloud app to draw a Word Cloud	.730(**)
	I create lesson materials and worksheets with the Quill Bot app	.717(**)
	I design effective and engaging classroom presentations with PowerPoint Speaker Coach.	.733(**)
	I design lesson plans and activities, and track student progress using Copilot educational software	.575(**)
	I evaluate students' work using Formative AI	.778(**)
	I analyse educational data and provide relevant recommendations to students using EdX or Coursera	.713(**)
	I create individualised quizzes and learning questions for each student with the Quizlet app	.757(**)
	I remind students and their parents about homework, tests, and other events using the Remind app:	.788(**)
	I provide individualised learning plans for each student using the Squirrel AI application	.721(**)
	I show students' strengths and weaknesses through the Smart Educational application	.787(**)

	I create interactive educational content, such as educational games and interactive stories, that can enhance children's reading and math skills	.775(**)
	I implement speech recognition applications	.782(**)
	I implement augmented and virtual reality applications	.392(**)
	I use the educational robot Robotic as an educational tool in some activities and programs	.575(**)
Obstacles to employing artificial intelligence applications	The Ministry's vision for employing AI apps in education is unclear	.538(**)
	There is not enough expertise in the field of AI in the Ministry	.735(**)
	Lack of guidebooks for kindergarten teachers	.558(**)
	Technical support is not specialised in AI apps, whether in maintenance or operation	.709(**)
	The (technological) infrastructure is not suitable for employing AI apps	.593(**)
	My experience in employing AI apps is weak	.725(**)
	AI apps take a long time to implement	.775(**)
	AI apps are not compatible with the textbooks I teach	.779(**)
	I am afraid of the hacks associated with some AI apps	.703(**)
	Training programs are scarce in employing AI apps	.531(**)
	The heavy workload and administrative costs involved prevent the use of AI apps	.777(**)
	The language of AI apps, English, poses a challenge to me in employing their applications	.523(**)
	There is difficulty in integrating artificial intelligence applications with the courses I teach	.555(**)
	I have concerns about protecting my data and privacy from AI applications	.390(**)
	Artificial intelligence applications impact my teaching skills	.508(**)

*Statistically significant at the significance level.(0.05)

** Statistically significant at the significance level (0.01).

Table (II) shows that the values of the correlation coefficients of the study instrument fields with the total tool were higher than (0.20), and the values of the inter-correlation coefficients were higher than (0.20), indicating that the score is appropriate for achieving the purposes of the study.

Instrument Reliability

Two reliability verification methods were used to confirm the study's instrument: the test-retest method and the Cronbach alpha coefficient calculation for questionnaire items.

The first method consisted in administering the questionnaire to a pilot sample (n=30) twice, with the second administration taking place two weeks after the first. The responses given by participants were evaluated using the Pearson correlation coefficient – otherwise known as the stability reliability coefficient – to estimate the degree of change over time.

In the second method, the internal consistency reliability was calculated through the Cronbach's alpha coefficient for the questionnaire's items.

The results of those tests are shown in Table 3 below.

TABLE III REPETITION RELIABILITY COEFFICIENT AND INTERNAL CONSISTENCY, CRONBACH ALPHA FOR THE MEASURE

Domains	internal consistency	RC
Level of knowledge of using AI apps in teaching	0.881	0.821
The reality of employing AI apps	0.812	0.801
Obstacles to employing AI apps	0.881	0.888

In Table III, results showed that the Pearson correlation coefficient between the participants' scores on the measure at the two times of application was over 0.70, which indicates a high reliability coefficient. Therefore, those values were deemed adequately appropriate and reliable for use in this study.

Correction Method

Five alternatives were developed to calculate the total score for the tool. The respondents were asked to choose one of these alternatives to express their opinion. Grades (5, 4, 3, 2, 1) represent the five alternatives. A score of (5) means very high, (4) high, (3) medium, (2) low, and (1) was given for the alternative, very low. To determine the level of means for items, domains, and the tool as a whole, the statistical standard was adopted using the following equation:

Category range = (highest value - lowest value) divided by the number of alternatives

Category range = $5-1 = 4 \div 5 = 0.8$, so the criterion for determining the level becomes as follows:

TABLE IV STATISTICAL CRITERION FOR DETERMINING THE RANGE/ LEVEL

Mean	Level
1.00 - 1.80	Very low
1.80- 2.60	low
2.60- 3.40	medium
3.40- 4.20	high
-5.00 4.20	Very high

Statistical Analysis Methods

1. Means and standard deviations were used to answer the first question of the study.
2. Means, standard deviations, and four-way multiple analysis of variance were used to answer the second question.
3. Means and standard deviations were used to answer the third question of the study.

IV. RESULTS

This study aimed to reveal the extent of kindergarten teachers' knowledge in applying artificial intelligence techniques, the reality of their application, and the most

prominent challenges perceived by teachers in the First Irbid District. To achieve this, the questions were answered according to their sequence, and below is a presentation of the results.

1. Results of the first question: To what extent do kindergarten teachers in Irbid First District have the required knowledge in using artificial intelligence applications in instruction?

Descriptive analysis (means and standard deviation) was calculated to determine the level of kindergarten teachers' knowledge of using artificial intelligence applications in teaching. Results are presented in Table (5).

TABLE V DESCRIPTIVE ANALYSIS OF THE SUBJECTS' RESPONSES TO THE LEVEL OF KINDERGARTEN TEACHERS' KNOWLEDGE OF USING ARTIFICIAL INTELLIGENCE APPLICATIONS IN TEACHING

Items number	Items	Mean*	Std,	Rank	Level
5	Overcoming the technical challenges encountered while applying AI apps in education	3.21	1.073	1	medium
1	Developing their skills in AI apps in education through training	3.19	1.101	2	medium
2	Teachers' ability to deal with and apply AI apps in education	3.18	1.146	3	medium
3	Teachers are familiar with the principles of ethics related to the use of AI in education	3.17	1.095	4	medium
4	Familiar with the concepts and terminology of AI apps	3.14	1.09	5	medium
	Level of knowledge of using AI apps in teaching	3.18	.875		medium

The results in Table V reveal that the means for the domain items ranged between 3.14 and 3.21 to a (medium) level. Item (5), which reads: "Overcoming the technical challenges encountered while applying AI apps in education," ranked first with a mean of 3.21, a standard deviation of 1.073, and a (medium) level. However, Item (4), which stated "Familiar with the concepts and terminology of AI apps," came in last place with a mean of (3.14), a standard deviation of (1.09) and a (medium) level.

The findings show that the domain items' arithmetic means were medium. This indicates that participants' acceptability and knowledge of AI applications in education are average. The top-ranked Item in the study was Item (5), which says, "Overcoming the technical challenges encountered while applying AI apps in education." This suggests that participants think they are only moderately capable of handling the technical difficulties of using artificial intelligence, reflecting their increased technical proficiency and adaptability to new situations.

As an illustration of the relative lack of participants' understanding of the fundamental concept and terminology of artificial intelligence, Item (4), which reads "Familiar with the concepts and terminology of AI apps," came in last with a mean (3.14) and standard deviation (1.09). This could result from participants not receiving adequate specialised training or education in this area, necessitating the improvement of educational and training initiatives to raise participants' comprehension and familiarity with these concepts. The overall mean reflects average results indicating a good foundation but a need for further improvement in aspects

related to theoretical knowledge and practical application of AI technologies in education. The current study is consistent with the study of Al-Mishaal and Al-Eid (2022), which showed a significant weakness in early childhood teachers' knowledge of artificial intelligence applications despite their awareness of its importance at that stage and the scarcity of employing artificial intelligence applications in early childhood education in particular. Regarding teachers' ability to handle technical challenges associated with implementing artificial intelligence, this item ranked first, indicating a moderate level of adaptability to technical difficulties.

This finding aligns with Al-Nasser's (2022) study, which highlighted that teachers with prior experience in using technology generally demonstrated a better ability to manage challenges related to AI implementation, although they still faced difficulties in understanding some advanced technical aspects.

Additionally, this result is supported by Al-Zahrani's (2023) study, which pointed out that technical challenges in artificial intelligence include issues such as limited technological resources, weak infrastructure in some educational institutions, and the need for continuous teacher training. The study emphasized that teachers who received ongoing technical support were more capable of adapting to AI applications and overcoming related technical issues (Al-Enezi & Thamer, 2022).

2. Results of the second question: What is the reality of kindergarten teachers' application of artificial intelligence

applications in the kindergarten stage from their point of view in Irbid First District?

To answer this question, Arithmetic means, and standard deviations were calculated for the estimates of the study

sample members in the items on the reality of kindergarten teachers' application of artificial intelligence applications in the kindergarten stage from their perspective, as shown in Table (6).

TABLE VI ARITHMETIC MEANS AND STANDARD DEVIATIONS FOR THE PARTICIPANTS' ESTIMATES ON THE SCALE OF THE REALITY OF KINDERGARTEN TEACHERS' APPLICATION OF ARTIFICIAL INTELLIGENCE APPLICATIONS IN THE KINDERGARTEN IN DESCENDING ORDER ACCORDING TO THE ARITHMETIC MEANS.

N	Items	Mean*	Std.	Rank	Level
4	I create lesson materials and worksheets with the Quill Bot app	3.23	1.052	1	medium
8	I implement augmented and virtual reality applications	3.17	1.081	2	medium
3	I record grades and notes for all subjects and levels using the Grads Kop app	3.16	1.081	3	medium
7	I design effective and engaging classroom presentations with PowerPoint Speaker Coach.	3.16	1.127	4	medium
9	I evaluate students' work using Formative AI.	3.16	1.122	5	medium
1	I investigate the opinions and evaluations of students' parents using the Question Pro application and the Qx Bot application	3.12	1.08	6	medium
2	I show students' strengths and weaknesses through the Smart Educational application	3.12	1.115	7	medium
10	I analyse educational data and provide relevant recommendations to students using EdX or Coursera	3.1	1.092	8	medium
14	I create an instant quiz from PowerPoint slides for question types based on Bloom's Taxonomy with ChatGPT Ghostwriter	3.1	1.153	9	medium
6	I employ the Class Point AI tool to generate questions from any PowerPoint slide	3.07	1.135	10	medium
16	I implement speech recognition applications	3.04	1.081	11	medium
13	I provide personalised learning plans for each student using the Squirrel AI application	3.02	1.16	12	medium
15	I use the Pro Word Cloud app to draw a Word Cloud	3.01	1.116	13	medium
12	I remind students and their parents about homework, tests, and other events using the Remind app:	2.96	1.168	14	medium
17	I design lesson plans and activities and track student progress using Copilot educational software	2.89	1.196	15	medium
11	I use the educational robot Robotic as an educational tool in some activities and programs	2.84	1.146	16	medium
18	I create personalised quizzes and learning questions for each student with the Quizlet app	2.82	1.151	17	medium
5	I create interactive educational content, such as educational games and interactive stories that can enhance children's reading and math skills	2.77	1.045	18	medium
	The reality of employing AI apps	3.04	.645		medium

The results of the current study indicate that the use of the Quill Bot application for creating lesson materials and worksheets was the most common among participants, ranking first with a mean score of (3.23). As the researcher pointed out, this stems from the application's straightforward interface and how it saves time and energy. These findings correspond to Al-Ahmadi's (2023) study, where he stated that educators prefer the usage of AI when its support is direct, uncomplicated, and involves summarization and paraphrasing tools assisting with AI-educational materials' content refinement without the need of extensive training sessions .

On the contrary, incorporating the use of virtual reality and augmented reality applications was rated the lowest with a mean of (2.77), portraying considerable problems with using these technologies for educational purposes. This agrees with the results of Al-Otaibi's (2024) research, which verified that the integration of artificial intelligence tools into teaching practices of preschool children is still low owing to many reasons like lack of adequate technical equipment, poor training, and absence of sufficient harnessed educational setting for these modern technologies.

Moreover, these findings align with Al Nasser (2022) who claimed that the use of augmented and virtual reality technologies requires higher-level technical competencies and substantial training, which makes it difficult for most teachers to implement these technologies without help. That study also found that educational institutions that held specialized workshops and training programs for teachers in Artificial Intelligence and Augmented Reality technologies reported higher use of these tools by teachers, which, in turn, resulted in improved educational outcomes and higher student participation.

Training Needs and Analysis of the General Average

Given that the mean score for integrating the use of technology for teaching purposes is (3.04), this shows that there is a low or average level of integration which suggests that there is a need to improve training and resource allocation for the integration of highly sophisticated tools like AR and VR. Al Zahrani (2023) confirmed that there is high dependence on continuous training for teachers on active AI tools and that having a ready supportive technology base improves the use of these tools and the resulting education outcomes.

In this regard, the outcomes of this study backs past research that has repeatedly found that educators tend to favor the use of technology that is simple and efficient, as opposed to more complex tools like augmented and virtual reality which have little to no training or resources available. This suggests that better training and increased technical assistance may result in greater integration of these technologies into education and produce more favorable results.

3. Results of the third question: What challenges do kindergarten teachers in Irbid First District face in employing artificial intelligence applications from their viewpoint?

Descriptive analysis (means and standard deviation) is used to report the challenges kindergarten teachers in Irbid First District face in employing artificial intelligence applications from their viewpoint. Results are shown in Table (7) below.

TABLE VII DESCRIPTIVE ANALYSIS OF THE OBSTACLES KINDERGARTEN TEACHERS IN IRBID FIRST DISTRICT FACE IN EMPLOYING ARTIFICIAL INTELLIGENCE APPLICATIONS

N	Items	Mean*	Std.	Rank	Level
11	My experience in employing AI apps is weak	3.8	0.999	1	high
10	Artificial intelligence applications impact my teaching skills.	3.72	1.11	2	high
9	I am afraid of the hacks associated with some AI apps	3.7	1.019	3	high
7	Training programs are scarce on employing AI apps	3.69	1.068	4	high
13	AI apps are not compatible with the textbooks I teach	3.67	1.041	5	high
12	The Ministry's vision for employing AI apps in education is unclear	3.64	1.082	6	high
5	The (technological) infrastructure is not suitable for employing AI apps	3.61	1.224	7	high
8	There is difficulty in integrating artificial intelligence applications with the courses I teach	3.58	1.054	8	high
14	I have concerns about protecting my data and privacy from AI applications	3.42	1.038	9	medium
2	There is not enough expertise in the field of AI in the Ministry	3.38	1.249	10	medium
6	The heavy workload and administrative costs involved prevent the use of AI apps	3.38	1.198	11	medium
3	Lack of guidebooks for kindergarten teachers	3.35	1.234	12	medium
4	Technical support is not specialised in AI apps, whether in maintenance or operation	3.24	1.208	13	medium
1	The language of AI apps, English, poses a challenge to me in employing its applications	3.23	1.214	14	medium
15	AI apps take a long time to implement	3.03	1.113	15	medium
	Obstacles to employing artificial intelligence applications	3.496	.685		High

The arithmetic means for the items measuring the participants' responses on the field obstacles facing the implementation of AI apps in Table (7) exhibited medium to high levels. Item (11), which stated, " My experience in employing AI apps is weak," came in first place with a mean of (3.80). In contrast, item (15), which read " AI apps take a long time to implement," ranked last with a mean of (3.03). However, the overall mean was (3.496). From the researcher's point of view, the results obtained from the Table can be interpreted as follows:

The statement "My experience in employing artificial intelligence applications is weak" ranked first with a mean score of (3.80), indicating that the majority of participants acknowledge their limited experience in using artificial intelligence applications. The issue stems from the absence of skills development training programs and the necessary educational programs. For many, artificial intelligence is a new field, and developing proficiency in it is challenging. To add to this issue, the lack of sufficient resources and tools for the proper use of artificial intelligence in the workplace may further add to the problem.

This is in agreement with Al-Ahmadi's (2023) study results, which claimed lack of adequate teacher training is among the most prominent barriers to the inclusion of artificial intelligence in education. The findings of the study indicated that the absence of relevant and adequate workshops and courses has resulted in the unsatisfactory understanding of

teachers towards the use of artificial intelligence technologies, which results in their inability to use them.

Likewise, Al-Otaibi's (2024) study corroborates this finding by illustrating how preschool educators hold a moderate understanding of artificial intelligence instruments but fail to apply the concepts due to a lack of adequate teaching and technical guidance provided. The study proposed the inclusion of artificial intelligence concepts in teacher training programs and increasing the level of field training directed towards building competencies and skill in this area.

These findings also align with the results of Al-Nasser's (2022) research that argued educational institutions in the Arab region suffer from a scarcity of proper technical training in the field of artificial intelligence, which subsequently delays and hinders its adoption. The study stressed that the implantation of continuous training, as well as a heightened understanding of the relevance of artificial intelligence, could help improve teacher competence.

On the other hand, among other provided suggestions, participants believed that the statement, "the application of artificial intelligence applications takes considerable time," was the least accurate, believing that applying AI technology does indeed take a considerable amount of time, as evidenced by its low mean score of (3.03). This might be the result of the sophisticated nature of artificial intelligence technologies, which cannot be understood and executed instantly. Moreover, accomplishing the technology's long

implementation time might difficult due to the extensive learning of new skills, advanced infrastructural requirements, and the critical need for extensive preparation.

These findings corroborate Al-Zahrani's (2023) study which has discovered that one of the most prominent barriers in including artificial intelligence in the educational process is the need to train educators adequately on these technologies. In addition, there is also the need to invest in well-prepared educational facilities. The study proposed the need for extensive hands-on training to enhance the effective application within a shorter period.

Moreover, these findings are consistent with those of Al-Sulami (2021) who stated that the integration of artificial intelligence into education also has prerequisites such as preparation and infrastructure which makes its incorporation to take longer than normal. The study also concluded that the provision of an adequate educational environment can facilitate the implementation process, thus reducing the time to achieve full utilization of these systems.

The investigation as a whole shows that there is an emerging recognition of the role of AI in education. However, there are clear obstacles that make full realization difficult, especially the gaps in the knowledge base and time shortages. Thus, further research is recommended to:

1. Create designated education and training courses that focus on the use of artificial intelligence technologies.
2. Invest in more materials and appliances that make the use of artificial intelligence easier to implement.
3. Provide more guidance and consultancy assistance to users and organizations in tending towards the use of AI.

This study is in line with Al-Bakari (2022)'s study, which also highlighted the fact that the integration of Artificial Intelligence in education comes with countless challenges, one of the most worrying being ensuring equity in learning with the available Artificial Intelligence systems.

Thus, the conclusions of this study suggest that the lack of experience and training is the most significant barrier to the adoption of Artificial Intelligence in the education of young children, while time, although a secondary barrier, is also important. This was in accordance with a number of studies that have all stated that lack of adequate training, poor resources, and absence of adequate technical assistance are the principal obstacles to the adoption of artificial intelligence in education. Therefore, it seems that the relevant authority needs to take action aimed at improving the training and professional development programs as a way of addressing the problems.

Recommendations

Concepts and techniques of Artificial Intelligence should be introduced into the curriculum of kindergartens.

Kindergartens should be provided with non-teaching staff who can give technical assistance to teachers to enable them to troubleshoot and provide advice and direction if necessary.

- a) Providing funding and technical assistance for the employment of kindergarten teacher-users of Artificial Intelligence.
- b) Providing accessible and user-friendly teaching materials and applications designed with Artificial Intelligence for the teachers.
- c) Organizing outreach and teaching sessions to familiarize kindergarten teachers with Artificial Intelligence and its uses in teaching.
- d) Incorporate works like effective training seminar programs for teachers on the use of artificial intelligence tools and applications into the intensive training programs.

Form immediate response center support and consulting teams in artificial intelligence technologies for document processing and teaching to enable quick assistance to teachers for any technical problems.

Conduct additional studies and research on the use of artificial intelligence in education and its influence on the pedagogical process in preschools.

REFERENCES

- [1] Al Zakwani, S. S. H. (2024). *The Impact of a Professional Development Program on Omani Teachers' Utilisation and Attitude Towards Artificial Intelligence Tools*. Sultan Qaboos University (Oman).
- [2] AlAli, R., & Wardat, Y. (2024). Opportunities and challenges of integrating generative artificial intelligence in education. *International Journal of Religion*, 5(7), 784-793. <https://doi.org/10.61707/8y29gv34>
- [3] Al-Enezi, T. (2022). Artificial intelligence as an input to achieving sustainable development in the business environment in accordance with the pillars of the kingdom's vision 2030. *J Econ, Adm Leg Sci*, 6(13), 48-63.
- [4] Alghamdi, R. S., Mahmoud, A., & Shaaban, T. S. (2023). Artificial Intelligence and teachers' sustainability: Preschool teachers' perceptions of conditions and level of support for Professional Development in Early Childhood Special Education. *Alustath Journal for Human and Social Sciences*, 62(4), 332-357. <https://doi.org/10.36473/ujhss.v6i2i4.2272>
- [5] Alkhuzaim, K. M., Alzuhair, N. F., & Al-Qutaim, A. M. (2024). Assessing the prerequisites for integrating artificial intelligence in secondary education: Perspectives of teachers in Saudi Arabia. *Journal of Asian Scientific Research*, 14(2), 140. <https://doi.org/10.55493/5003.v14i2.5039>
- [6] Al-Muqiti, S. A. M. (2021). The reality of employing artificial intelligence and its relationship to the quality of performance of Jordanian universities from the point of view of faculty members. *Middle East University, Faculty of Educational Sciences, Master's thesis in education*, 18-21.
- [7] Al-Qahtani, G. (2022). The reality of using artificial intelligence in human resources management, its obstacles, and the requirements for its application at King Saud University from the perspective of the university's faculty. *Journal of Educational and Psychological Sciences*, 1-23.
- [8] Bayoumi, A. A. S. (2024). Designing a proposed program based on artificial intelligence applications and measuring its effectiveness in developing the positive thinking skills of kindergarten children. *Journal of Advanced Research in Education*, 3(3), 45-65.

- [9] Daneshmand, P. (2017). Barriers of using ICTs in Teaching Students at High Schools as Perceived by Teachers in Alborz province of Iran. *International Academic Journal of Science and Engineering*, 4(1), 22-38.
- [10] Duan, Y., Edwards, J. S., & Dwivedi, Y. K. (2019). Artificial intelligence for decision making in the era of Big Data—evolution, challenges and research agenda. *International journal of information management*, 48, 63-71. <https://doi.org/10.1016/j.ijinfomgt.2019.01.021>
- [11] Ferdowsi, S. K., & Moradi, A. (2014). Investigating of the effects of using conceptual plans in improving science lesson learning for male students of sixth grade in primary schools of Ferdows Town. *International Academic Journal of Innovative Research*, 1(1), 21–29.
- [12] Gligorea, I., Cioca, M., Oancea, R., Gorski, A. T., Gorski, H., & Tudorache, P. (2023). Adaptive learning using artificial intelligence in e-learning: A literature review. *Education Sciences*, 13(12), 1216. <https://doi.org/10.3390/educsci13121216>
- [13] Javaid, M., Haleem, A., Singh, R. P., & Suman, R. (2022). Artificial intelligence applications for industry 4.0: A literature-based study. *Journal of Industrial Integration and Management*, 7(01), 83-111. <https://doi.org/10.1142/S2424862221300040>
- [14] Kebdani, S., & Badene, A. (2021). The importance of using artificial intelligence applications in Algerian higher education institutions in ensuring the quality of education—An empirical study. *Budex Notebooks Journal*, 10(01), 153-176.
- [15] Khasawneh, Y. J. A., & Khasawneh, M. A. S. (2023). Availability of Voice-Recognition Devices to Support Visually Impaired Students in Saudi Arabian Universities. *J. Wirel. Mob. Networks Ubiquitous Comput. Dependable Appl.*, 14(3), 186-193. <https://doi.org/10.58346/JOWUA.2023.13.014>
- [16] Lemay, D. J., Basnet, R. B., & Doleck, T. (2020). Examining the Relationship between Threat and Coping Appraisal in Phishing Detection among College Students. *J. Internet Serv. Inf. Secur.*, 10(1), 38-49 <https://doi.org/10.22667/JISIS.2020.02.29.038>
- [17] Li, K. C., & Wong, B. T. M. (2023). Artificial intelligence in personalised learning: a bibliometric analysis. *Interactive Technology and Smart Education*, 20(3), 422-445. <https://doi.org/10.1108/ITSE-01-2023-0007>
- [18] Meshal, M. T. M., & Al-Eid, N. M. (2023). The reality of employing artificial intelligence applications in the early childhood stage from the perspective of female teachers in Shaqra Governorate, Saudi Arabia. *Education (Al-Azhar): A Peer-Reviewed Scientific Journal for Educational, Psychological and Social Research*, 42(198), 433-478. <https://doi.org/10.21608/jsrep.2023.304540>.
- [19] Parthiban, S., & Gajivaradhan, P. (2016). Statistical Hypothesis Test in LSD Under Fuzzy Environments Using Trapezoidal Fuzzy Numbers. *International Journal of Advances in Engineering and Emerging Technology*, 7(1), 110-129.
- [20] Prentzas, J. (2013). Artificial intelligence methods in early childhood education. In *Artificial intelligence, evolutionary computing and metaheuristics: In the footsteps of Alan Turing* (pp. 169-199). Berlin, Heidelberg: Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-29694-9_8
- [21] Subbaiah, S., Agusthiyar, R., Kavitha, M., & Muthukumar, V. P. (2024). Artificial intelligence for optimized well control and management in subsurface models with unpredictable geology. *Archives for Technical Sciences*, 31(2), 140-147. <https://doi.org/10.70102/afts.2024.1631.140>