

## The Role of Kindergarten Teachers in Utilizing Artificial Intelligence Technologies to Develop Children's Health Awareness: A Descriptive Study

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### ABSTRACT

The current study aims to identify the role of kindergarten teachers in activating artificial intelligence techniques to develop health awareness in children. A descriptive approach was used, and the study was applied to 100 kindergarten teachers registered in government kindergartens in the city of Najran. The study used the following tools: - A questionnaire to measure the role of kindergarten teachers in activating artificial intelligence technologies to develop children's health awareness. It includes the following themes: The first theme is the role of kindergarten teachers in activating artificial intelligence technologies to develop children's health awareness. The second theme is the obstacles to using artificial intelligence technologies to developing health awareness in children. The study reached the following conclusions: Kindergarten teachers play a limited role in utilizing artificial intelligence technologies to develop health awareness in children, with a mean score of 2.53. while the theme of obstacles to the use of artificial intelligence technologies achieved a high average of (4.36), reflecting a high level of awareness among teachers of the existence of obstacles that hinder the use of these technologies. In light of the study's results, the researcher made several recommendations: Adopt continuous technical support and follow-up programs for teachers, providing a simplified guide that includes steps for integrating artificial intelligence into early childhood education units. Encourage the exchange of experiences among teachers through workshops and practical sessions highlighting successful experiences in using artificial intelligence to promote health awareness among children. Activate partnerships between kindergartens and health and technical agencies with the aim of enriching smart educational content and providing supportive initiatives to raise the readiness of the educational environment in terms of training and equipment.

**Keywords:** Artificial Intelligence Technologies, Health Awareness, Kindergarten Teachers, Early Childhood Education, Barriers to Technology Use.

### INTRODUCTION

The world is currently witnessing many successive changes in several areas, especially in the fields of culture and healthcare, which has forced countries to impose health policies that keep pace with the requirements of the times in terms of providing good services and focusing on the digital transformation of healthcare (WHO, 2019). Technology is developing rapidly and has a significant impact on various fields, including healthcare, and individuals are increasingly interested in health and fitness, which requires effective and influential technologies. Artificial intelligence is becoming increasingly prevalent in the healthcare industry (Mir et al, 2023).

A study by Ibrahim (2020) confirmed that health awareness is an individual's responsibility towards their own health and the health of those around them and includes two aspects: prevention and treatment. When developing health awareness in kindergarten children, the focus is on prevention to suit the understanding of kindergarten

children, while treatment is limited to forming positive attitudes towards taking medication, injections, and going to the doctor in case of illness, and isolating the sick from the healthy. This will ensure the health of future generations, who will in turn pass on what they have learned and acquired to subsequent generations. Studies have shown that the use of digital technology is associated with key health outcomes, underscoring the growing need for effective digital health approaches and awareness efforts (Hammad et al., 2024; Hammad, & Alqarni, 2021).

A study (Ghada Mahrous, 2018, 55) also confirmed that kindergarten teachers are required to provide children with a set of skills that qualify them for digital education to face the challenges and requirements of the digital transformation era. These skills include information and communication technology (ICT) skills for learning, which combine cognitive abilities and higher-order thinking skills with descriptive skills for using and managing ICT applications. In this context, some recent studies confirm that the intensive use of digital technologies, if not accompanied by sufficient health and educational awareness, may be reflected in some health indicators, which highlights the need to integrate health awareness within the digital and smart applications used with children (Hammad et al., 2024).

It is worth noting that artificial intelligence and its applications have recently emerged and attracted considerable attention from educators due to their ability to contribute to the achievement of desired educational goals and improve and develop various skills in children, as it complements and reinforces the perceptions that children acquire through their senses in the real world. These applications have thus become an integral part of the educational curriculum with its courses, related activities, and various training methods and techniques. Therefore, there has been increased interest in training on artificial intelligence applications in the educational process in various educational institutions at all stages and for all categories of children (Abdul Raouf Ismail, 2019).

Artificial intelligence technologies in education and kindergartens aim to develop children's abilities in a comprehensive and integrated manner in the mental, physical, motor, emotional, social, and creative domains, developing children's linguistic, numerical, and artistic skills through individual and group activities, in addition to developing their social and healthy upbringing in terms of community values and principles, meeting their specific growth needs and demands, and increasing their ability to express themselves clearly verbally (Al-Hammadi, 2019).

One of the most important modern technologies in the field of education and kindergartens is the electronic pen or digital pen. This pen stores everything you write on paper so that you can later transfer it to your personal computer. It also allows you to see everything you write at the same time on the computer and can be used as an eraser in drawing programs.

An electronic book is a book that is available in digital form and programmed into the memory of various information that we can see on a desktop or laptop computer. (Omran, 2021)

In recent years, the world has witnessed a rapid and successive digital and information revolution, the effects of which have been felt in all areas of life, such as the spread of knowledge, the emergence of advanced technology, and the use of artificial intelligence and its applications. This has led to the emergence of some challenges facing kindergarten teachers in terms of performing their functional and educational roles within the kindergarten, which are considered the cornerstone of achieving the kindergarten's goals, given their distinctive role in preparing children for the future. They are therefore responsible for shaping their personalities, refining their talents, and investing in their knowledge, enabling them to prepare for the digital future with its various changes and mechanisms.

Early childhood teachers derive the importance of their role from the specificity of the stage they deal with. If we ensure that kindergarten teachers are prepared using future-oriented methods and rely on self-qualification and continuous professional development, while highlighting their current and future roles, their work will be in line with the standards of technological development and its far-reaching effects around us and will be of high quality, contributing to their professional development, thereby raising the quality of the educational and pedagogical process and contributing to the achievement of the desired educational goals. If kindergarten teachers are the cornerstone for achieving these goals, they are now required to master the skills of artificial intelligence applications and use them functionally in the field of child education. This requires us to review the roles performed by kindergarten teachers to ensure that they are aware of the changes taking place around them, understand them, and interact with them so that they can perform the future roles imposed on them by the current technological era. (Shaima Al-Alqami, 2021).

Kindergarten teachers are considered the maestros who lead the educational process and guide children. They deal with children at an age that will shape their future lives, so their role is one of monitoring and guidance (Al-Khudairi, 2013). A study by Ahmed (2015) that kindergarten teachers are the key element in the development of digital technology in kindergarten, as this requires them to perform different roles to achieve the educational goals of kindergarten children. Even a kindergarten equipped with the latest teaching methods and the most advanced capabilities cannot achieve its goals without a specialized teacher who is scientifically and educationally qualified in professional, academic, cultural, and technological fields. These teachers cannot perform their roles and tasks optimally unless they are able to employ digital technology in education and are familiar with its various fields in

an optimal manner. In light of the above, we can emphasize that the importance of artificial intelligence technology and its use as an educational strategy in early childhood is highly compatible with the future needs of children, the importance of the role played by teachers in developing children's health awareness, and the need to develop the tasks of kindergarten teachers to keep pace with modern technological developments. Based on this, the research question can be formulated.

### **Statement of the Problem**

The problem of the current study stems from my work as a supervisor of early childhood students in practical education. I noticed some behaviors that indicate a low level of awareness among children of the health concepts necessary to protect them from health risks and problems, in addition to the reliance of teachers on traditional methods and techniques in developing these concepts in them. Furthermore, after reviewing previous studies that addressed the development of health concepts in kindergarten children, most of them confirmed that the level of health awareness in kindergartens is low as a result of using traditional methods in developing health concepts in kindergarten children, which has had a negative impact on their level of health concepts. The results of a study (2020, Pippi et al) also recommended the need to promote health awareness among kindergarten children. Several conferences have also recommended the need to employ innovative educational technologies in the field of learning and teaching and to focus on ways to develop them to help achieve the desired educational goals. Among the most prominent of these conferences was the Fourth International Conference on E-Learning and Distance Education in Riyadh (2015). With technological advances and recent developments, it is necessary to develop the tasks of kindergarten teachers to keep pace with recent developments, as confirmed by a study by Druin, & Fast, (2018). With technological advances, kindergarten teachers find themselves in a different position from their traditional role of providing activities and dealing with a new electronic environment. Therefore, they must understand how to deal with this digital environment, their roles, and how they differ from the traditional methods they used in a traditional activity environment. This poses a new challenge that requires them to update their knowledge and skills to deal with information and communication technology and the latest developments in artificial intelligence applications (Druin & Fast, 2018). These indicators support the need to develop health awareness practices that are consistent with the growing reality of digital use; some studies indicate that addiction to digital media/platforms is linked to psychological and health indicators, which necessitates more effective awareness interventions (Hammad & Awed, 2023).

A study by Ali (2021) also recommended moving away from traditional methods of teaching children and utilizing digital learning and its various tools due to their effective impact on the success of the kindergarten educational program and their ability to help children transfer facts and concepts in ways that enable them to keep pace with the technology of the digital age. Attention should be paid to digital learning and its applications in kindergartens. Several studies, such as those by Nafla (2019) and Al-Barqi (2019), have confirmed that (Al-Harbi, 2021) have confirmed that there are shortcomings in the performance of kindergarten teachers with regard to future educational and technological roles related to the use of educational media, technology learning management, the development of technological activities and experiences, the use of digital learning strategies with children, and the evaluation of children's technological performance. In light of the foregoing, the research problem of the present study is crystallized in the following main research question:

What is the role of kindergarten teachers in activating artificial intelligence technologies to develop children's health awareness, and what are the obstacles that limit the use of these technologies?

To further clarify this research problem, the following sub-questions are formulated:

1. What is the role of kindergarten teachers in activating artificial intelligence technologies to develop children's health awareness?
2. What are the obstacles to using artificial intelligence technologies to develop children's health awareness?

## **METHODS**

### **Participants**

The study population consisted of kindergarten teachers working in government kindergartens affiliated with the Early Childhood Education Department in Najran. A simple random sample of 100 kindergarten teachers was selected to ensure adequate representation of the study population and enhance the reliability of the results. The study was conducted during the second semester of the academic year 2015/2016.

### **Study Design**

The current study relied on a descriptive design, as it was appropriate for the nature of the research objectives, which sought to describe and analyze the role of kindergarten teachers in activating artificial intelligence techniques

to develop children's health awareness, as well as to identify the obstacles that limit the use of these techniques in the educational environment of kindergartens. This design is suitable for studies that aim to diagnose the current reality and analyze educational phenomena as they are without interfering with their variables. The study data was collected using a questionnaire specifically designed to achieve the research objectives, after reviewing the educational literature and previous studies related to the topic of artificial intelligence technologies in education and health awareness development in early childhood. The questionnaire was distributed to the sample individuals according to organized procedures, explaining the objectives of the study and how to answer the questions, and emphasizing the confidentiality of the information and its use for scientific research purposes only. The study obtained ethical approval from the Deanship of Scientific Research at Najran University in Saudi Arabia before proceeding with data collection. Ethical standards for scientific research were also adhered to by informing participants of the study's objectives, ensuring voluntary participation, maintaining data confidentiality, and using the data for scientific purposes only.

### Data Analysis

The study data were analyzed using descriptive and inferential statistical methods appropriate to the nature of the research objectives and tools. Frequencies and percentages were calculated to describe the distribution of the research sample's responses to the questionnaire items, along with arithmetic means and standard deviations to determine the level of teachers' responses on the study axes and measure their degree of dispersion. The relative weights of each statement in the first axis were also calculated to determine the degree of agreement with each statement and rank them according to their relative importance from the sample's perspective. This contributed to providing an accurate picture of the role of kindergarten teachers in activating artificial intelligence techniques to develop children's health awareness. To verify the significance of the differences in the responses of the sample individuals, the chi-square ( $\chi^2$ ) test was used to detect statistically significant differences between the observed and expected frequencies of the sample individuals' responses to the first axis statements, thereby enhancing the accuracy of the interpretation of the results and contributing to answering the study questions.

### Instrument

A questionnaire to measure the role of kindergarten teachers in activating artificial intelligence technologies to develop children's health awareness and obstacles to using artificial intelligence technologies to develop children's health awareness

*Purpose of the questionnaire:* This tool was developed to identify the role of kindergarten teachers in activating artificial intelligence technologies to develop children's health awareness and obstacles to the use of artificial intelligence technologies to develop health awareness in children. The researchers relied on the following sources to develop the research tool: research and studies that addressed early childhood, its philosophies, artificial intelligence, and health awareness. The tool consists of two axes. The first axis includes statements to identify the role of kindergarten teachers in activating artificial intelligence technologies to develop health awareness in children and consists of 12 statements. The second axis includes statements to identify the obstacles to using artificial intelligence technologies to develop children's health awareness and consists of 8 statements. The total number of statements in the two axes is 20, and teachers answer them by choosing a five-point scale (strongly agree – agree – Neutral – Disagree – Strongly disagree). The questionnaire is corrected in this way: if the teacher chooses Strongly agree, they receive 5 points; if they choose Agree, they receive 4 points; if they choose Neutral, they receive 3 points; and if they choose Disagree, they receive 2 points. If they select Strongly disagree, they receive 1 point. The total score for the questionnaire is 100. The questionnaire instructions are explained to the teachers before they begin, explaining the concept of the scale in the simplest way possible, how to answer the questions, and giving an example of how to answer the questionnaire questions.

To verify the validity of the initial version of the scale, the researchers verified the validity of the initial version of the scale by calculating the psychometric properties of the scale and its items through: Calculating the validity and reliability of the study tool Kindergarten teachers' role in activating artificial intelligence techniques to develop children's health awareness

### Validity And Reliability Results of the Research Tool

Apparent validity (judges' validity):

The researcher confirmed the apparent validity of the questionnaire

by presenting it to a group of nine reviewers with expertise and experience in the field of study, with the aim of confirming its validity and reliability in measuring what it seeks to measure, and to express their observations on the extent to which: After reviewing the title, questions, and objectives of the study, the reviewers were asked to express their opinions and observations on the suitability of the questionnaire items for measuring the role of kindergarten teachers in activating artificial intelligence techniques to develop children's health awareness in terms

of: the clarity and appropriateness of the questionnaire wording, the clarity of the questionnaire instructions, and the clarity and appropriateness of the answer options. Consistency between the statements of each axis of the questionnaire and what it measures, modifying, deleting, or adding what is necessary. The researchers made the necessary modifications according to the opinions of the judges, and the questionnaire became final.

Statistical treatments used:

**Internal Consistency Validity**

The internal consistency validity of the questionnaire was verified by calculating the correlation coefficient between the scores of each statement in the questionnaire and the total scores of the axis to which the statement belongs. The results were as follows:

**Table 1.** Shows The Correlation Coefficients Between the Scores of Each Statement and the Total Scores of the Axis to Which the Statement Belongs.

Axis	Item No.	Correlation Coefficient	Significance Level
Axis One (Teachers' Role)	1	0.81	0.01
	2	0.79	0.01
	3	0.73	0.01
	4	0.87	0.01
	5	0.74	0.01
	6	0.67	0.01
	7	0.69	0.01
	8	0.72	0.01
	9	0.74	0.01
	10	0.58	0.01
	11	0.74	0.01
	12	0.75	0.01
Axis Two (Obstacles)	13	0.66	0.01
	14	0.75	0.01
	15	0.86	0.01
	16	0.84	0.01
	17	0.83	0.01
	18	0.75	0.01
	19	0.81	0.01
	20	0.82	0.01

All correlation coefficients are statistically significant at the 0.01 level.

Table (1) shows that there is a statistically significant correlation between the scores of each statement in the questionnaire and the total scores of the axis to which the statement belongs, with correlation coefficients ranging from (0.58 – 0.87), indicating that the questionnaire statements are valid for what they were designed to measure.

**Construct Validity**

The construct validity of the questionnaire was verified by calculating the correlation coefficient between the scores of the questionnaire axes and the total scores of the questionnaire. The results are shown in Table (2):

**Table 2.** Shows the correlation coefficients between the scores of each axis of the questionnaire and the total scores of the questionnaire.

Axis	Correlation Coefficient	Significance Level
Axis One (Teachers' Role)	0.82	0.01
Axis Two (Obstacles)	0.69	0.01

Table (2) shows that there is a statistically significant correlation between the scores of the two axes of the questionnaire and the total scores of the questionnaire, which were (0.82 and 0.69) respectively, indicating the validity and consistency of the axes of the questionnaire.

Results of the stability of the questionnaire and its axes.

The stability of the questionnaire and its axes was verified using Cronbach's alpha coefficient and the Spearman-Brown split-half method. The results are shown in Table (3):

**Table 3.** Stability Coefficients for the Questionnaire and its Axes.

Axis	Number of Items	Cronbach's Alpha	Split-Half Reliability
Axis One (Current Situation)	12	0.92	0.90
Axis Two (Obstacles)	8	0.91	0.95
Total Questionnaire	20	0.89	0.93

Table 3 shows the stability coefficients for the questionnaire and its axes, which reached (0.92, 0.91) respectively, and for the questionnaire as a whole (0.89). Using the split-half method, the coefficients for the axes were (0.90, 0.95) respectively, and for the questionnaire as a whole (0.93). These stability values are considered acceptable, which reassures the researcher about the results of applying the questionnaire.

## RESULTS AND DISCUSSION

Answer to the first research question:

The first question states, "What is the role of kindergarten teachers in activating artificial intelligence techniques to develop health awareness in children, from the perspective of the research sample?"

To answer this question, the arithmetic mean, standard deviation, relative weight, degree of agreement, and ranking were calculated, and "Ka2" was selected for each statement of the first axis and for the overall evaluation of the axis. The results were as follows:

First axis: The role of kindergarten teachers in activating artificial intelligence techniques to develop health awareness in children:

**Table 4.** Frequencies, Arithmetic Means, Standard Deviations, Relative Weights, Degree of Agreement, and Chi-Square Test Results for the Responses of the Research Sample to the Statements of the First Axis.

No.	Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Std. Deviation	Relative Weight	Level of Agreement	Rank	Chi-square ( $\chi^2$ )
1	The teacher uses artificial intelligence applications to present simplified health information appropriate to children's age.	13	15	18	36	18	2.69	1.29	53.80%	Neutral	4	16.90*
2	The teacher employs AI-based educational programs to promote healthy behaviors among children.	7	9	20	42	22	2.37	1.13	47.40%	Disagree	8	38.90*

No.	Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Std. Deviation	Relative Weight	Level of Agreement	Rank	Chi-square ( $\chi^2$ )
3	The teacher allows children to interact with robots or intelligent assistants to learn about healthy habits.	18	22	34	23	3	3.29	1.10	65.80%	Neutral	1	25.10*
4	The teacher uses AI-based educational games to encourage children to practice healthy behaviors.	8	13	21	23	35	2.36	1.30	47.20%	Disagree	9	21.40*
5	The teacher uses AI-powered audio or video generation applications to explain concepts related to personal hygiene.	9	11	13	26	41	2.21	1.33	44.20%	Disagree	10	36.40*
6	The teacher relies on intelligent programs that help children assess their understanding of health and preventive skills.	10	15	22	23	30	2.52	1.33	50.40%	Disagree	5	11.90*
7	The teacher uses artificial intelligence to monitor children's progress in acquiring healthy behaviors.	4	12	12	31	41	2.07	1.17	41.40%	Disagree	12	47.30*

No.	Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Std. Deviation	Relative Weight	Level of Agreement	Rank	Chi-square ( $\chi^2$ )
8	The teacher integrates traditional classroom activities with artificial intelligence tools to enhance health awareness.	11	13	16	25	35	2.40	1.37	48.00%	Disagree	7	19.80*
9	The teacher uses intelligent simulation models to illustrate the risks of unhealthy behaviors and their consequences.	14	19	38	24	5	3.13	1.09	62.60%	Neutral	2	30.10*
10	The teacher encourages children to use smart applications that help them remember handwashing or toothbrushing times.	20	6	18	48	8	2.82	1.28	56.40%	Neutral	3	56.40*
11	The teacher regularly develops digital health educational content using artificial intelligence tools.	8	12	26	22	32	2.42	1.27	48.40%	Disagree	6	19.60*
12	The teacher employs artificial intelligence technologies to promote cooperative learning among	7	11	14	23	45	2.12	1.29	42.40%	Disagree	11	46.00*

No.	Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Std. Deviation	Relative Weight	Level of Agreement	Rank	Chi-square ( $\chi^2$ )
	children on health-related topics.											

Statistically significant at the 0.01 level.

Table 4 shows statistically significant differences between the responses of the research sample to the statements of the first axis (the role of kindergarten teachers in activating artificial intelligence techniques to develop health awareness in children), where the “Ka2” values for all statements of this axis were statistically significant. The responses ranged between “neutral” and “disagree,” and the arithmetic mean values for the statements in this axis ranged between 2.52 and 3.29, with relative weights ranging between 50.40% and 65.80%. The arithmetic mean of the overall evaluation of the first axis was 2.53 with a relative weight of 50.60% and a “disagree” rating, indicating the weak role of kindergarten teachers in activating artificial intelligence techniques to develop children's health awareness.

The statements in this axis were ranked according to their arithmetic mean, in descending order, as follows: Statement No. (3), which states, “The teacher allows children to interact with robots or smart assistants to learn about healthy habits,” came in first place. Statement No. (9), which states, “Uses smart simulation models to illustrate the dangers of unhealthy behaviors and their effects,” came in second place. In second place was statement No. (10), which states, “The teacher encourages the child to use smart applications that help him remember when to wash his hands or brush his teeth.” In third place was statement number (1), which states, “The teacher uses artificial intelligence applications to display simplified health information appropriate for the child's age.” In fourth place was statement number (6), which states: “The teacher relies on smart programs that help children assess their understanding of health and preventive skills.”

In fifth place is statement number (11), which states, “The teacher periodically develops digital health education content using artificial intelligence tools.” In sixth place came statement No. (8), which states, “The teacher integrates traditional classroom activities with artificial intelligence tools to promote health awareness.” In seventh place was statement No. (2), which states, “The teacher uses AI-based educational programs to promote healthy behaviors in children.” In eighth place was statement number (4), which states that “the teacher uses educational games based on artificial intelligence to encourage children to practice healthy behavior.” In ninth place was statement number (5), which states, “The teacher uses voice or video generation applications to explain concepts related to personal hygiene.” In tenth place was statement number (12), which states, “The teacher uses artificial intelligence technologies to promote collaborative learning among children on health topics.” In eleventh place is statement number (7), which states, “Teachers employ artificial intelligence to monitor children's progress in acquiring healthy behaviors.” In twelfth and last place among the statements in the first theme.

From the above, the results of the theme of the role of kindergarten teachers in activating artificial intelligence technologies to develop health awareness among children in Najran showed a low level of application, with a mathematical average of (2.53) on a five-point scale, indicating that kindergarten teachers make poor use of artificial intelligence technologies in activities offered to children in the field of health awareness. This weakness reflects the limited transition from traditional use of technology to smart use based on interaction, personalization, and data utilization to enrich children's health experiences. Some recent studies indicate that the absence of conscious educational guidance in the use of digital technologies may lead to ineffective or impulsive usage patterns, which limits the achievement of the desired educational and health goals of these technologies, and confirms the need to employ them within organized and interactive educational frameworks (Hammad & Al-Shahrani, 2024). This is consistent with the study by Omran (2021) , which aimed to identify the role of kindergarten teachers in the development of children's digital technology skills, and concluded that the role of kindergarten teachers in the development of children's digital technology skills was moderate, in addition to the lack of awareness among kindergarten teachers of enrichment activities that develop children's abilities and the lack of teaching children concepts using technology. Studies by Al-Bousafi (2021) and Othman (2021) (2021, Mamaeva & Natalya) found deficiencies in the performance of kindergarten teachers with regard to future educational technology roles related to the use of educational media, technology learning management, the development of technological activities and experiences, the use of digital learning strategies with children, and the assessment of children's technological performance. Modern literature also confirms that the effectiveness of employing modern technologies is not only related to the tools themselves, but also to the supportive educational environment and positive social interaction, due to its role in promoting psychological and behavioral health. This highlights the importance of the teacher's role in building a digital educational environment that supports health awareness among children (Al-Harathi, Hammad, & Awad, 2025).

**Answer to the Second Research Question:**

The second question states, “What are the obstacles to using artificial intelligence technologies to develop children's health awareness, from the perspective of the research sample?”

To answer this question, the arithmetic mean, standard deviation, relative weight, degree of agreement, and ranking were calculated, and “Ka2” was selected for each statement in the second axis and for the overall evaluation of the axis. The results were as follows:

Second axis: Obstacles to the use of artificial intelligence technologies to develop health awareness in children:

**Table 5.** Frequencies, arithmetic means, standard deviations, relative weights, degree of agreement, and chi-square test results for the responses of the research sample to the statements of the second axis.

No.	Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Std. Deviation	Relative Weight	Level of Agreement	Rank	Chi-square ( $\chi^2$ )
13	Lack of adequate training for teachers on employing artificial intelligence technologies in the educational process.	71	20	6	2	1	4.58	0.78	91.60 %	Strongly Agree	2	174.10** *
14	Limited availability of artificial intelligence programs suitable for early childhood education.	59	26	8	5	2	4.35	0.97	87.00 %	Strongly Agree	5	112.50** *
15	Weak technical infrastructure and support resources within kindergartens.	48	33	14	3	2	4.22	0.94	84.40 %	Strongly Agree	6	80.10***
16	Difficulty in classroom management when using tools based on intelligent interaction with children.	76	13	8	2	1	4.61	0.80	92.20 %	Strongly Agree	1	200.70** *
17	Limited time within the daily schedule,	63	24	6	5	2	4.41	0.95	88.20 %	Strongly Agree	4	130.50** *

No.	Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Std. Deviation	Relative Weight	Level of Agreement	Rank	Chi-square ( $\chi^2$ )
	which hinders the activation of smart health-related activities.											
18	Lack of digital health content for children based on artificial intelligence technologies.	52	21	15	9	3	4.10	1.14	82.00%	Agree	8	73.00***
19	Poor internet availability negatively affects continuous use of smart health applications.	63	26	5	3	3	4.43	0.95	88.60%	Strongly Agree	3	134.40** *
20	Educational concerns regarding children's excessive reliance on technology at the expense of real-life activities.	49	30	11	7	3	4.15	1.07				

Statistically significant at the 0.01 level.

Table 5 shows statistically significant differences between the responses of the research sample to the statements of the second axis (barriers to the use of artificial intelligence technologies to develop health awareness in children), where the “Ka2” values for all statements of this axis were statistically significant. The responses ranged from “strongly agree” to “agree,” and the arithmetic mean values for the statements in this axis ranged from 4.10 to 4.61, with relative weights ranging from 82.00% to 92.20%. The arithmetic mean of the overall evaluation of the second axis was 4.36 with a relative weight of 87.20% and a rating of “strongly agree,” indicating that there are obstacles to the efficient use of kindergarten teachers' artificial intelligence techniques to develop children's health awareness. The statements in this axis were ranked according to their arithmetic mean, in descending order, as follows:

Statement No. (16), which states “Difficulty managing the class when using tools that rely on intelligent interaction with children,” came in first place, followed by statement No. (13), which states “Lack of adequate training for teachers on the use of artificial intelligence technologies in the educational process.” In second place was statement No. (19), which states that “poor internet availability affects the continuous use of smart health applications.” In third place was statement No. (17), which states that “limited time within the daily schedule hinders the implementation of smart health-related activities.” In fourth place was statement No. (14), which states that “the limited availability of artificial intelligence programs suitable for early childhood.” In fifth place was statement No. (15), which states that “poor technical infrastructure and support facilities in kindergartens.” In sixth place was statement number (20), which states, “Educational concerns about children becoming overly

dependent on technology at the expense of real-world activities.” In seventh place was statement number (18), which states, “Lack of digital health content for children based on artificial intelligence technologies.” In eighth and last place

From the above, it is clear that the focus on obstacles to the use of artificial intelligence technologies was high, with an average of 4.36, reflecting significant barriers that prevent the maximum benefit from these technologies. This result may indicate a lack of training, poor technical equipment, or limited intelligent content specializing in child health awareness, in addition to the lack of guidelines or technical support to help teachers effectively activate artificial intelligence in kindergarten classrooms. The comparison between the two axes reveals a clear inverse relationship; A high level of obstacles corresponds to a noticeable decrease in the actual role of teachers in implementation, indicating an urgent need in the field to develop their digital capabilities, improve technical infrastructure, and provide smart educational applications that support health awareness in a practical and interactive way. Therefore, enhancing training and support and providing kindergartens with appropriate resources are essential steps to raise the level of activation and utilize the potential of artificial intelligence in building children's health awareness. This is consistent with a 2017 study by Hou, which aimed to identify the most important technological training that kindergarten teachers need to practice their profession effectively and the extent to which they implement and practice it. The study found that there were no statistically significant differences in the extent to which teachers employed these competencies due to the variable of specialization. The study made a number of recommendations, most notably that teachers should be enrolled in courses to activate the use of technological competencies in education. Al-Hussein's study (2019) recommended that the Ministry of Education hold competitions and activate follow-up indicators for young children's production in the field of technological activities, and that the Ministry of Education open a special section in the Department of Education and Kindergartens for technological guidance that contributes to the spread of e-learning, and develop technological activities to suit contemporary technological developments by providing modern technological environments and activities after analyzing programs, environments, and electronic games to employ them in increasing the effectiveness and enrichment of these programs.

Study recommendations: Based on the findings, the researcher recommends the following:

Organize specialized training programs for kindergarten teachers on how to use artificial intelligence in daily health activities, with a focus on design and technical classroom management skills.

1- Provide kindergartens with appropriate technical systems such as high-quality internet, smart devices, simplified health education applications, and platforms that utilize artificial intelligence in early learning.

2 Prepare child-oriented digital health content that includes interactive stories, educational games, simulations, and awareness clips enhanced with artificial intelligence to build health awareness and preventive behavior.

3 Adopt continuous technical support and follow-up programs for teachers, providing a simplified guide that includes steps for integrating artificial intelligence into early childhood education units.

4 Encourage the exchange of experiences among teachers through workshops and practical sessions highlighting successful experiences in using artificial intelligence to promote health awareness among children.

5- Activate partnerships between kindergartens and health and technical authorities with the aim of enriching smart educational content and providing supportive initiatives to raise the readiness of the educational environment in terms of training and equipment.

6- Include health awareness development among the priorities of digital curricula so that it becomes a constant focus within AI-supported classroom activities, rather than a secondary or complementary use.

Study Recommendations

1- Conducting a study on the use of artificial intelligence in the development of linguistic concepts in early childhood.

2- Conducting a study on the impact of the use of artificial intelligence on the development of scientific concepts in early childhood.

3. Conducting a study on the effectiveness of using artificial intelligence technology in the development of concepts.

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