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The Role of Artificial Intelligence in Enhancing Risk Management and its Impact on the Effectiveness of School Crisis Response among Middle School Principals in Kuwait

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ABSTRACT

This study aimed to explore the role of artificial intelligence in enhancing risk management and its impact on the effectiveness of addressing school crises among middle school principals in Kuwait. The focus was particularly on understanding how the integration of artificial intelligence technologies can improve risk management strategies, thereby assisting school leaders in making more informed and effective decisions during critical times. To achieve the study's objectives, a descriptive analytical approach was employed, applied to a random sample of 75 middle school principals in Kuwait. Data was collected through carefully designed questionnaires aimed at exploring the levels of artificial intelligence usage, the effectiveness of risk management practices, and the principals' capabilities in confronting school crises. The results showed that the levels of artificial intelligence usage, risk management, and crisis confrontation among middle school principals were rated at a moderate level, indicating a significant role for artificial intelligence in enhancing risk management. Additionally, it was found that there were no statistically significant differences in the responses of the sample members based on the variables of gender, academic qualification, and years of experience, suggesting that these factors do not markedly influence the use of artificial intelligence in this context. In light of these results, it is recommended to focus efforts on increasing awareness of the concept of artificial intelligence and its benefits in the context of middle school management.

Keywords: Artificial intelligence, risk management, school crises. (239)

INTRODUCTION

Artificial intelligence (AI) offers innovative solutions to complex problems, changing the way societies interact with technology. It enables them to quickly analyze big data, which enhances intelligent decision-making. This field also opens new horizons in several fields, from healthcare to education, where intelligent systems can learn and adapt to user needs. Thanks to AI, we can envision a future characterized by efficiency and creativity, where humans and machines collaborate to achieve unprecedented achievements (Alamäki, 2021).

AI also contributes to the transformation of education, providing innovative tools that contribute to improving the learning experience. It also allows teachers to accurately analyze student performance, helping to customize curricula to meet each individual's needs (Basheer, 2023). These intelligent systems also contribute to providing interactive educational resources, enhancing students' understanding of academic subjects. Their use enables students to learn in a flexible environment, where they can access information anytime, anywhere, opening up new horizons of knowledge (Bodiaf, 2020). School crises are a major challenge that directly impacts the educational process. These crises vary between health crises, such as disease outbreaks, and natural crises, such as earthquakes

or floods, in addition to psychological and social crises. To confront these crises, it is necessary to have clear emergency plans, including training the teaching staff and students on how to act in emergency situations. An effective response also requires continuous communication with parents and the local community to ensure the exchange of information and build trust. By enhancing awareness and preparedness, schools can reduce the effects of crises and maintain the safety and well-being of students (Juwayan, et al., 2020).

Risk management in education is essential to ensuring a safe and effective learning environment. This process involves identifying and assessing potential risks and developing strategies to mitigate them. Risk management also helps educational institutions prepare to face challenges, such as natural disasters or epidemics, ensuring the continuity of the educational process (Sharif & Subaiee, 2023). Schools and universities can enhance their ability to respond quickly by developing emergency plans and training educational staff, thus protecting students and ensuring the smooth and safe achievement of educational goals (Enezan, 2013). A study by Marekhy (2023) titled "Improving the Administrative Performance of Secondary School Principals in Hafar Al-Batin Governorate in Light of Artificial Intelligence Requirements" revealed a positive impact of AI requirements on improving the administrative performance of female principals. This relationship was represented by strong correlation coefficients indicating a clear link between AI requirements and improving the performance of female principals. Meanwhile, the results of a study by Sardia & Miqdady (2022) titled "The Degree of Use of Artificial Intelligence Applications by School Principals in Mafraq Governorate and Its Relationship to the Quality of Administrative Decision-Making" also showed a significant positive relationship between school principals' use of AI applications and the quality of their administrative decision-making. The results of a study by Sharary (2021) titled "The Impact of Artificial Intelligence on the Quality of Administrative Decisions from the Perspective of Secondary School Leaders in Al-Jouf Educational Region" also showed a high and statistically significant impact of AI dimensions, which include management capacity, user behavior, training and development, and the availability of experts, on the quality of administrative decisions among school leaders. Also, the results of the study did not show any statistically significant differences in the respondents' assessment of AI based on gender and experience variables. Based on the results, It is recommended that educational administration offices pay special attention to the concept of artificial intelligence and related technologies, and that they strengthen directives and measures that increase awareness among those working in the educational field of its importance. Thus, the researcher will realize from the above the importance of conducting this current study.

Artificial intelligence (AI) is considered one of the most prominent technological innovations that profoundly impacts many areas of life, including education. It represents several advanced technologies that enable machines to mimic human behavior, opening new horizons for improving the quality of education and providing personalized learning experiences (Mofiaz & Otaiby, 2023). AI also demonstrates tremendous potential for enhancing the effectiveness of learning and interaction between teachers and students in light of the increasing challenges facing educational institutions (Ali, 2022).

Definition of AI

Griffin (2023) defines AI as: "A technological field that enables machines to perform tasks that typically require human intelligence, such as learning, understanding, analyzing, and making decisions based on available data. This involves the use of advanced algorithms and machine learning techniques, enabling systems to improve their performance over time."

Types of Artificial Intelligence

Artificial intelligence is divided into two main types (Badawy & Qahtany, 2022):

1. ***Narrow AI:*** Focuses on performing precisely defined tasks, such as voice or image recognition, and is most common in current applications, such as smart assistants.
2. ***General AI:*** Seeks to comprehensively simulate human thinking and incorporates multiple capabilities such as learning and critical thinking.

Applications and Benefits of Artificial Intelligence in Education

AI technologies are used in smart learning systems, providing tools for analyzing student data and providing personalized recommendations. These applications include adaptive learning, which allows students to learn at their own pace and level, enhancing the learning experience (Mahthor, 2021). Smart systems can also analyze student performance and identify strengths and weaknesses, helping teachers customize curricula to each student's needs. AI also helps teachers improve teaching strategies by providing accurate reports on student performance, which contributes to personalized curricula and achieving better results. AI can also provide tools for self-assessment, encouraging students to actively engage with educational content. This use of AI is also considered a tool for promoting continuous learning and developing the skills needed to meet future challenges (Hijia & SHaieb, 2020).

The researcher believes that AI shows tremendous potential in enhancing education, which is a fundamental step toward improving risk management in schools. The quality of education and interaction between teachers and students can be improved by integrating these technologies, contributing to a more effective and innovative learning environment.

Risk Management

Risk management is a critical factor in ensuring the safety of students and staff in educational institutions. This process requires assessing potential risks and developing effective mitigation strategies, which contributes to the stability of the educational environment. Risk management has become an urgent necessity to ensure the continuity of the educational process in light of the changing circumstances facing schools (Abbasy and Morgan, 2015).

Definition of Risk Management

Risk management is defined as: "The systematic process of identifying and assessing potential risks that educational institutions may face, developing mitigation strategies, and improving the educational community's response to them" (Absy, 2023).

Stages of Risk Management and its Tools

Risk management includes several main stages (Maalawy and Bocreca, 2021):

1. ***Risk Identification:*** This stage involves identifying potential risks that may affect the school environment, such as health crises or natural disasters.
2. ***Risk Assessment:*** This stage analyzes the impact of risks and their likelihood of occurrence. This analysis helps determine priorities and direct efforts toward the most impactful risks.
3. ***Mitigation Strategies:*** This includes developing plans to reduce the impact of risks, such as implementing preventive measures and training educational staff to deal with crises.

Risk management tools include advanced techniques such as data analysis, which helps in continuously monitoring and assessing risks. These tools are used to design effective risk management strategies, such as early warning systems and developing crisis response plans. Through these tools, schools can improve their ability to respond to crises and maintain the safety of the educational environment.

Challenges in Risk Management in Schools

School administrations face multiple challenges, such as a lack of resources and insufficient awareness of the importance of advance planning. These challenges can lead to weak implementation of risk management strategies, increasing potential risks. It is essential for schools to invest in developing training programs and raising awareness of the importance of risk management (Abbasy and Morgan, 2015).

The researcher believes that risk management is an essential element in enhancing the educational environment. It contributes to reducing the negative effects of crises and ensuring the smooth continuity of the educational process. Therefore, it is essential for schools to invest in developing effective risk management strategies, which enhance the safety and stability of the educational environment.

School Crises

School crises pose significant challenges that impact the educational environment. These crises require a rapid and organized response to ensure the protection of students and staff and the continuity of education. In a changing world, preparedness to confront crises is vital to maintaining the safety of the school community (Maalawy and Bocreca, 2021).

Definition of School Crises

School crises are defined as: "Unexpected events that negatively impact the educational environment, such as health crises, natural disasters, or social crises. These crises can cause significant disruptions to the educational process, requiring an effective and rapid response from all stakeholders (Saed, 2024)."

Causes of School Crises

The causes of crises include internal factors, such as psychological stress, and external factors, such as natural or social events. These factors are pivotal to understanding how crises arise and providing an appropriate response. It is important for schools to recognize these causes and be prepared to address them proactively (Anddraws, 2020).

School Crisis Response

Schools' response to crises requires effective strategies, including advance planning, developing emergency plans, and effective communication with parents and the community. These plans must be flexible and adaptable to changing circumstances, contributing to mitigating the impact of crises and ensuring the continuity of education (Bodiaf, 2020).

The Role of Technology in Crisis Response

Technology, including artificial intelligence, can enhance the effectiveness of school crisis response by providing the necessary data and analysis to improve decisions. Smart applications are used in crisis management to monitor the situation and provide immediate notifications, facilitating quick and effective decision-making (Ali and others, 2020).

The researcher believes that school crises are an integral part of the educational landscape, and schools must be prepared to effectively respond to them to maintain the stability of the educational environment. Employing technology in this context is an important step in achieving a rapid and effective crisis response.

Fourth: The Relationship Between Artificial Intelligence and Risk Management

The fields of artificial intelligence and risk management are increasingly intertwined, as artificial intelligence contributes to improving risk management strategies in schools. This integration is essential for more effective crisis response and improved educational safety. AI enhances the effectiveness of risk management by providing advanced analytical tools that help identify risks and anticipate crises before they occur. Schools can use these systems to improve immediate response, reducing the negative impacts of crises. The use of AI also improves schools' response to crises, reducing negative impacts and enhancing the safety of students and staff. These improvements are a result of the accurate analytics provided by AI, enabling schools to make informed decisions (Abu Hamdan, 2021).

The researcher believes that the relationship between AI and risk management enhances the effectiveness of school crisis response, which is an important step towards improving the educational environment and ensuring the continuity of the educational process in a safe and effective manner. By integrating AI into risk management strategies, schools can achieve better outcomes and improve the safety of students and staff.

Research Problem and Questions

Artificial intelligence plays a pivotal role in enhancing risk management in educational institutions, contributing to data analysis and detecting patterns that may indicate potential risks (Chen, 2004). By using machine learning techniques, schools can predict crises before they occur, such as health or behavioral crises, allowing them to take early preventative measures. Artificial intelligence also contributes to improving emergency plans by providing accurate analyses that help evaluate different scenarios (Hale, 2022). Thanks to these technologies, schools can enhance the effectiveness of their crisis response, ensuring the safety of students and staff and reducing disruptions to the educational process (Ali and others, 2020). Through his work, the researcher observed a clear decline in the level of risk management and the effectiveness of school crisis response among middle school principals in Kuwait. By reviewing a number of previous studies, it was also evident that artificial intelligence plays a role in enhancing risk management and increasing the effectiveness of school crisis response among these principals. Some studies have recommended the use of artificial intelligence in education in general, such as the study by Hajely and Farrany (2020) and the study by Lucien (2021), whose results showed a positive evaluation of the use of artificial intelligence applications in education. Therefore, the current study sought to identify the role of artificial intelligence in enhancing risk management and its impact on the effectiveness of school crisis response among middle school principals in Kuwait.

The study problem includes the following questions:

1. What is the level of artificial intelligence use among middle school principals in Kuwait?
2. What is the level of risk management among middle school principals in Kuwait?
3. What is the level of school crisis response among middle school principals in Kuwait?
4. Are there statistically significant differences in the study sample members' estimates of the role of artificial intelligence in enhancing risk management and its impact on the effectiveness of school crisis management among middle school principals in Kuwait, attributable to the variables (gender, academic qualification, years of experience)?

Significance of the Study

The current study has two significant implications:

Theoretical Significance:

1. The current study contributes to enriching the academic literature on the role of artificial intelligence in risk management in education.
2. The current study may help develop new crisis management models based on artificial intelligence techniques, enhancing theoretical understanding of these phenomena.
3. The current study provides theoretical foundations for understanding how artificial intelligence impacts risk management strategies in educational settings.

Applied Significance:

1. The current study provides practical methods for school administrations to enhance the effectiveness of their crisis response through the use of artificial intelligence.
2. The current study helps guide educational policies toward integrating modern technologies into risk management.
3. The researcher expects the current study to reinforce the need to train educational and administrative staff on the use of artificial intelligence tools in daily practices, contributing to an improved educational work environment.
4. The importance of this study stems from its expected future benefits, the potential returns that educational institutions could achieve, and the implications for society if its findings and recommendations are implemented.

Study Limits and Definiteness's

The study was conducted within the following limits:

- ***Objective Limit:*** The study will examine the role of artificial intelligence in enhancing risk management and its impact on the effectiveness of school crisis management among middle school principals in Kuwait.
- ***Spatial Limit:*** Middle schools in the State of Kuwait.
- ***Temporal Limit:*** The second semester of the 2024-2025 academic year.
- ***Human Limit:*** This study will be applied to a sample of middle school principals in the State of Kuwait.
- ***Study Limits:*** The study limits include the availability of validity and reliability indicators in the study instrument, the extent to which the study sample represents the community from which it was drawn, and the objectivity of the respondents to the study instrument's items.

Definition of Study Terms

The study included the following definitions:

1. ***Artificial Intelligence:*** "A set of systems and technologies that enable machines to simulate human behavior and thinking, including learning, analysis, and decision-making, using advanced algorithms and data processing (Azcona, 2019)."
   It is operationally defined as: "The use of advanced technological systems to analyze data and improve the educational process in middle schools in Kuwait. This includes tools that help principals and teachers customize curricula according to student needs and provide recommendations for improving academic performance, enhancing the effectiveness of schools' response to potential crises and increasing the efficiency of educational administration."
2. ***Risk Management in Educational Institutions: "***The systematic process of identifying and assessing potential risks that may face an educational institution and developing strategies to mitigate their effects, ensuring the safety of students and staff and the smooth continuity of the educational process" (Andraws, 2020).
   Procedurally defined as: "A set of systematic processes undertaken by middle school principals in Kuwait, which aim to analyze and evaluate potential risks and develop plans and strategies to reduce the impact of these risks on the school, thus contributing to enhancing safety and stability in their schools."
3. ***School Crises:*** "Unexpected events or emergency circumstances that negatively impact the educational environment, such as health, natural, or social crises, requiring an immediate response by the school administration to ensure the safety of individuals and the continuity of education" (Saed, 2024).
   It is operationally defined as: unexpected situations that lead to disruptions in the educational environment, such as security incidents, natural disasters, or psychological crises, which require an immediate and organized response from the educational administration of intermediate schools in Kuwait to protect everyone and ensure the continuity of the educational process in those schools.

STUDY METHOD AND PROCEDURES

Study Methodology:

Given the nature and objectives of the study, the researcher adopted a descriptive and analytical approach, which aims to identify the role of artificial intelligence in enhancing risk management and its impact on the effectiveness of school crisis management among middle school principals in Kuwait. The descriptive approach is defined as a method for describing the subject to be studied using a sound scientific methodology and presenting the results obtained in expressive digital forms that can be analyzed and interpreted (Mahmody, 2019).

Study Population and Sample:

The study population consists of all middle school principals in Kuwait, numbering (288). The sample size for the statistical study reached (75) principals. An electronic questionnaire was distributed to the principals, resulting in (81) male and female principals responding to the electronic questionnaire. The study sample consisted of (75) complete questionnaires. The study sample members are distributed according to the following table:

Table (2) Distribution of study sample individuals

Percentage %	Number	Personal Data	
54.7	41	Male	**Gender**
45.3	34	Female	
%100	75	Total	
82.7	62	Bachelor	**Academic Qualifications**
6.7	5	Master	
10.7	8	PhD	
%100	75	Total	
16	12	5years or less	**Years of Experience**
18.7	14	6-10 years	
12	9	11-15 years	
53.3	40	16years or older	
%100	75	Total	

Study Tool

The researcher reviewed the literature, studies, and previous research related to the subject of his study. He then designed a questionnaire based on the study's topic, objectives, questions, and the nature of the data and information required. He then presented it to the arbitrators, and conducted validity and reliability tests, detailing the questionnaire as follows:

The final form of the questionnaire included (30) paragraphs, consisting of (10) paragraphs distributed across three axes (the role of artificial intelligence, risk management, and school crisis management). Each paragraph was assigned a weight based on a five-point scale (strongly agree, agree, neutral, disagree, strongly disagree). The following weights were assigned: (1, 2, 3, 4, 5).

A- Validity of the Questionnaire:

1- Validity from the arbitrators' perspective: The questionnaire was presented to (4) experienced and specialized arbitrators to verify the soundness of the linguistic formulation, the clarity of the questionnaire instructions, the affiliation of the axes and paragraphs, and its suitability for measuring the objectives. All arbitrators' comments were adhered to. 2- Internal consistency validity: The internal consistency validity of the questionnaire items was determined by finding (Pearson correlation coefficients) for the questionnaire items, as shown in the following table:

Table (4) Internal consistency and validity of the questionnaire's paragraphs

Axis	Sig Value	Correlation Coefficient	Paragraph	Axis	Sig Value	Correlation Coefficient	Paragraph
Risk Management	0.000	**0.910	16	Artificial Intelligence	0.000	**0.795	1
Risk Management	0.000	**0.902	17	Artificial Intelligence	0.000	**0.773	2
Risk Management	0.000	**0.902	18	Artificial Intelligence	0.000	**0.844	3
Risk Management	0.000	**0.920	19	Artificial Intelligence	0.000	**0.863	4

Risk Management	0.000	**0.913	20	Artificial Intelligence	0.000	**0.822	5
Dealing with school crises	0.000	**0.830	21	Artificial Intelligence	0.000	**0.799	6
Dealing with school crises	0.000	**0.856	22	Artificial Intelligence	0.000	**0.849	7
Dealing with school crises	0.000	**0.894	23	Artificial Intelligence	0.000	**0.881	8
Dealing with school crises	0.000	**0.912	24	Artificial Intelligence	0.000	**0.827	9
Dealing with school crises	0.000	**0.864	25	Artificial Intelligence	0.000	**0.682	10
Dealing with school crises	0.000	**0.812	26	Risk Management	0.000	**0.909	11
Dealing with school crises	0.000	**0.785	27	Risk Management	0.000	**0.903	12
Dealing with school crises	0.000	**0.895	28	Risk Management	0.000	**0.936	13
Dealing with school crises	0.000	**0.892	29	Risk Management	0.000	**0.872	14
Dealing with school crises	0.000	**0.790	30	Risk Management	0.000	**0.869	15

The previous table shows that the significance level values are less than (0.05), meaning that all items have statistically significant validity coefficients and meet the objectives of the thesis.

B- Questionnaire Reliability:

1- ***Reliability using Cronbach's Alpha Equation***: The questionnaire's reliability was verified by calculating the correlation coefficient using Cronbach's alpha equation, as shown in the following table:

Table (5) Correlation coefficient using Cronbach's alpha equation for the questionnaire

Correlation Coefficient	Axis
0.943	Artificial Intelligence
0.975	Risk Management
0.958	Dealing with school crises

The previous table shows that the correlation coefficient using Cronbach's alpha equation is a statistically significant reliability coefficient, fulfilling the study's purposes.

2- Split-Half Reliability: The questionnaire's reliability was verified using the split-half correlation coefficient, as shown in the following table:

Table (6) Split-Half Correlation Coefficient for the Questionnaire

After	Correlation Coefficient Before	Axes
0.947	0.899	Artificial Intelligence
0.964	0.931	Risk Management
0.922	0.861	Dealing with school crises

The previous table shows that the correlation coefficient using the split-half method is a statistically significant reliability coefficient, fulfilling the study's objectives.

STUDY RESULTS AND DISCUSSION

First: Results of the Study Questions

• The first question states the following: What is the level of use of artificial intelligence among middle school principals in Kuwait?

This question was answered using a one-sample t-test, as shown in the following table:

Table (11) Data Analysis for the Artificial Intelligence Axis

Approval score	Ranking	Relative weight	Standard deviation	Arithmetic mean	axis	#
Average		%65.4	1.000	**3.273**	**Artificial intelligence**	

The previous table shows that the level of AI use among middle school principals in Kuwait accounted for a relative weight of (65.4%), representing a moderate degree of agreement.

The researcher attributes this to several influential factors. The moderate level of AI use is attributed to the lack of awareness and training among principals, which hinders their ability to effectively utilize these technologies. Additionally, the lack of appropriate technological resources hinders the implementation of AI in schools. Hesitation to change traditional methods and adapt to technological changes may contribute to reducing reliance on these modern solutions. The cultural and organizational environment may also play an important role, as resistance to change may reinforce the lack of AI use in educational administration.

• The second question states the following: What is the level of risk management among middle school principals in Kuwait? This question was answered using a one-sample t-test, as shown in the following table:

Table (12) Data Analysis for the Risk Management Axis

Approval score	Ranking	Relative weight	Standard deviation	Arithmetic mean	axis	#
Average		%64	1.125	3.200	**Risk management**	

The previous table shows that risk management among middle school principals in Kuwait had a relative weight of (64), representing a moderate degree of agreement.

The researcher attributes this to several factors. The moderate level of risk management is attributed to a lack of sufficient knowledge of modern risk management methods and techniques. The lack of specialized training for principals in this field may also limit their ability to implement effective strategies. Additionally, schools may face a lack of resources to develop risk management plans, which affects their ability to accurately identify and assess risks.

• The third question states: What is the level of school crisis management among middle school principals in Kuwait?

This question was answered using a one-sample t-test, as shown in the following table:

Table (12) Data Analysis for the School Crisis Management Theme

Approval score	Ranking	Relative weight	Standard deviation	Arithmetic mean	axis	#
Average		%67.7	1.048	3.388	**Dealing with school crises**	

The previous table shows that the level of school crisis management among middle school principals accounted for a relative weight of (67.7%), representing a moderate degree of agreement.

The researcher attributes this to several factors. The average level of school crisis management is attributed to the development of some effective strategies by principals, but there are still areas for improvement. This level may be a result of insufficient specialized training in crisis management, which limits principals' ability to make quick and effective decisions in critical times. The pressure resulting from daily burdens may also affect their focus on strategic planning for crisis management, leading to insufficient preparedness to deal with crises comprehensively. The institutional culture in schools may contribute to enhancing or diminishing the effectiveness of principals' responses, as the lack of support from senior management may negatively impact their readiness to face challenges.

Second: Results of the Study Hypotheses

• The first hypothesis states the following: Artificial intelligence plays a role in enhancing risk management among middle school principals in Kuwait.

The hypothesis was verified by finding (Pearson's correlation coefficients), as shown in the following table:

Table (13) Pearson's correlation coefficients between artificial intelligence and enhancing risk management

Risk Management	Axis
**0.909	**Artificial Intelligence**

The previous table shows a direct relationship between artificial intelligence and risk management. This demonstrates the role of artificial intelligence in enhancing risk management.

The researcher explains that the effective use of artificial intelligence can help principals analyze data faster and more accurately, enabling them to make informed decisions about how to manage risks. Artificial intelligence also enhances schools' ability to predict potential risks and develop preventive strategies, which contributes to improving the overall effectiveness of risk management.

• The second hypothesis states the following: Artificial intelligence has an impact on the effectiveness of school crisis management among middle school principals in Kuwait.

The researcher relied on simple linear regression analysis to demonstrate the impact of artificial intelligence on the effectiveness of school crisis management.

Table (18) Simple Linear Regression Analysis (Dependent Variable: School Crisis Management Effectiveness)

significance level at (0.05)	**p-value, sig**	**T value**	**standardized regression coefficients Beta value**	**standard error**	**regression coefficients**	**Independent variables**
significant	0.037	2.129		0.175	0.373	Constant
significant	0.000	17.306	0.897	0.449	0.856	Artificial intelligence
ANOVA analysis of variance						
0.000	p-value		299.493		F-test value	
0.000	p-value		0.897		Adjusted coefficient of explanation (R^2)	
0.801					Model correlation coefficient	

The results of the stepwise multiple regression test showed the following:

- The final regression model, using the Enter method, shows that the effectiveness of school crisis management, which represents the dependent variable, is fundamentally and statistically significantly affected by the independent variable, artificial intelligence, according to the Beta regression coefficients.
- The results of the analysis of variance showed that the coefficient of determination (explained variance) was 0.897. This means that 89.7% of the effectiveness of school crisis management is due to the influence of the independent variable (artificial intelligence), while the remaining 10.3% is due to other factors affecting the dependent variable (school crisis management effectiveness). The correlation coefficient for the model was 0.801, which represents a strong correlation. The researcher explains that artificial intelligence enhances principals' ability to make quick and effective decisions during crises, leading to improved school response. The results of the analysis of variance indicate that 89.7% of the effectiveness of school crisis response can be attributed to the influence of artificial intelligence, underscoring the importance of integrating it into school management strategies. The strong correlation coefficient (0.801) reflects the positive relationship between the two variables, reinforcing the need to invest in artificial intelligence technologies to improve performance in crisis response.
- The third hypothesis states the following: There are no statistically significant differences in the responses of middle school principals in Kuwait attributable to the variable (gender, educational qualification, years of experience). To answer this hypothesis, several sub-hypotheses were derived:
  - The first sub-hypothesis states: "There are no statistically significant differences in the responses of middle school principals in Kuwait attributable to the variable gender."

To answer this hypothesis, the researcher used the T-Test, as shown in the following table:

Table (14) Averages, standard deviations, and the "T" value for the questionnaire attributed to the gender variable

Significance Level	**Significance Value**	**T-value**	**Standard Deviation**	**Mean**	**Number**	**Gender**	**Dimension**
Not Statistically Significant	0.795	1.231	1.002	3.402	41	**Male**	**Artificial Intelligence**
			0.991	3.117	34	**Female**	
Not Statistically Significant	0.808	2.272	1.057	3.463	41	**Male**	**Risk Management**
			1.138	2.882	34	**Female**	
Not Statistically Significant	0.452	0.770	1.104	3.473	41	**Male**	**School Crises**
			0.983	3.258	34	**Female**	

The previous table shows no statistically significant differences in the responses of middle school principals in Kuwait attributable to the gender variable.

The researcher attributes this to the fact that awareness of the importance of technology and artificial intelligence is usually equal between the sexes in this context. The educational and training environment in middle schools in Kuwait may contribute to shaping the views of all principals equally toward these technologies. The lack of a significant difference may also reflect the absence of significant gender disparities in understanding and appreciation of smart technologies and their impact on school administration.

The second sub-hypothesis states: "There are no statistically significant differences in the responses of middle school principals in Kuwait attributable to the educational qualification variable."

To answer this hypothesis, the researcher used the one-way ANOVA method, as shown in the following table:

Table (16) One-way ANOVA for the questionnaire attributable to the educational qualification variable.

Significance Level	Significance Value	F Value	Mean Square	Degrees of Freedom	Sum of Squares	Source of Variance	Dimension
			0.112	2	0.223	Between Groups	
			1.026	72	73.904	Within Groups	
Not Statistically Significant	0.897	0.109		74	74.127	Total	**Artificial Intelligence**
			0.520	2	1.040	Between Groups	
			1.288	72	92.740	Within Groups	
Not Statistically Significant	0.669	0.404		74	93.780	Total	**Risk Management**
			0.572	2	1.144	Between Groups	
			1.114	72	80.195	Within Groups	
Not Statistically Significant	0.604	0.514		74	81.339	Total	**School Crises**

It is clear from the above that there are no statistically significant differences in the responses of middle school principals in Kuwait attributable to the variable of educational qualification.

The researcher attributes this result to the fact that all middle school principals in Kuwait possess a high understanding of artificial intelligence techniques, despite their varying academic qualifications. This is due to their urgent and ongoing need to keep pace with scientific developments in artificial intelligence in an era characterized by the rapid use of technology.

The third sub-hypothesis states: "There are no statistically significant differences in the responses of middle school principals in Kuwait attributable to the variable of years of experience."

To answer this hypothesis, the researcher used the one-way ANOVA method, as shown in the following table:

Table (16) One-way ANOVA for measures attributable to the variable of years of experience.

Significance Level	Significance Value	F Value	Mean Square	Degrees of Freedom	Sum of Squares	Source of Variance	Dimension
			0.691	3	2.074	Between Groups	
			1.015	71	72.053	Within Groups	
Not Statistically Significant	0.566	0.681		74	74.127	Total	**Artificial Intelligence**
			1.000	3	3.000	Between Groups	
			1.279	71	90.780	Within Groups	
Not Statistically Significant	0.508	0.782		74	93.780	Total	**Risk Management**

			1.030	3	3.091	Between Groups	
Not Statistically			1.102	71	78.248	Within Groups	
Significant	0.428	0.935		74	81.339	Total	**School Crises**

It is clear from the above that there are no statistically significant differences in the responses of middle school principals in Kuwait attributable to the variable of years of experience.

The researcher attributes this result to the fact that all categories of principals are equally likely to use artificial intelligence. This is because they have acquired knowledge about its importance and usefulness in building a sound principal's personality, their methods for dealing with crises and risks, and their ability to innovate through deepening their academic experience and the expertise they have acquired throughout their administrative careers.

SUMMARY OF STUDY RESULTS

The study reached the following results:

1. It was found that the level of artificial intelligence use among middle school principals in Kuwait had a relative weight of (65.4%), representing a moderate degree of approval.
2. It was found that the level of risk management among middle school principals in Kuwait had a relative weight of (64%), representing a moderate degree of approval.
3. It was found that the level of school crisis management among middle school principals had a relative weight of (67.7%), representing a moderate degree of approval.
4. There is a direct relationship between artificial intelligence and risk management, demonstrating the role of artificial intelligence in enhancing risk management.
5. It was found that the effectiveness of school crisis response is fundamentally and statistically significantly affected by the independent variable of artificial intelligence.
6. There were no statistically significant differences in the responses of middle school principals in Kuwait due to gender.
7. There were no statistically significant differences in the responses of middle school principals in Kuwait due to educational qualifications.
8. There was no statistically significant difference in the responses of middle school principals in Kuwait due to years of experience.

STUDY RECOMMENDATIONS

The study concluded with a set of recommendations, the most important of which were:

1. Direct efforts toward raising awareness of the concept of artificial intelligence and its benefits in the field of middle school management. Workshops and training courses can be organized for school principals to enhance their understanding and effective use of artificial intelligence technologies.
2. Develop the skills of data and digital information analysis among school principals, particularly regarding artificial intelligence technologies. Training courses can be offered to teach them how to better use data in decision-making processes.
3. Integrate artificial intelligence concepts into specific educational curricula for principals. Educational lessons and courses can be designed to help them understand the applications of artificial intelligence in school management.
4. Enhance cooperation between schools, universities, and research institutions to work on joint research projects in the field of using artificial intelligence technologies in school management.
5. Support education in developing advanced educational programs in the field of artificial intelligence and school management. Scholarships and educational opportunities can be provided to principals to enhance their level of specialization and knowledge in this field.

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APPENDIX

Study Tool (Final Form of the Questionnaire)

Subject / Participation in a Scientific Research

Greetings,

I extend my sincere appreciation and respect to you and request your cooperation in completing this study entitled: "The Role of Artificial Intelligence in Enhancing Risk Management and Its Impact on the Effectiveness of School Crisis Response among Middle School Principals in Kuwait." Therefore, I kindly ask you to respond to the questionnaire, noting that it is intended for scientific research purposes only and will be treated with complete confidentiality.

Please note that the key to your responses will be as follows:

Strongly disagree	Disagree	Neutral (no opinion)	Agree	Strongly agree

With great respect and appreciation

First: Personal data

() Female	() Male	**Gender**
() Master ()	() Bachelor	**Academic Qualification**
	PhD ()	
() 5 to 10 years	() Less than 5 years	**Years of Experience**
() More than 16 years	() 11 to 15 years	

Disagree	Strongly Disagree	Neutral	Agree	Strongly Agree	Axis 1: Artificial Intelligence	
					My school uses big data analytics techniques to improve student achievement, such as analyzing test results to identify weaknesses.	1
					I rely on machine learning systems to customize learning plans so that each student receives content tailored to their level, which has helped my students make significant progress.	2
					My school provides applications such as self-assessment, which helps teachers accurately track student progress, such as providing weekly performance reports.	3
					We use intelligent predictive tools to anticipate academic problems, allowing us to intervene in a timely manner, such as organizing support sessions for students at risk of failing.	4
					My school enhances educational experiences by offering interactive content powered by AI technologies, such as educational games that make learning more engaging.	5
					We provide training for teachers on how to use AI programs to improve teaching methods, which has increased the effectiveness of lessons and learning activities.	6
					My school relies on systems to monitor student behavior, which helps provide the necessary support to improve performance, such as reinforcing positive behaviors.	7
					We use AI technologies to improve communication between teachers, students, and	8

					parents, facilitating the effective exchange of important information.	
					Augmented learning tools at my school contribute to achieving educational goals by improving the quality of teaching, as we have observed an improvement in student outcomes.	9
					AI applications help promote active student engagement in the educational process, making them more engaged during classes.	10
Second Topic: Risk Management						
					My school relies on data analytics systems to identify potential risks that may face the educational process, such as identifying students who may face difficulties.	1
					We use AI tools to periodically evaluate the effectiveness of risk management strategies, helping us continually improve them.	2
					Advanced analytics technologies at my school help develop rapid response plans for emergencies, such as school disaster insurance.	3
					Staff at my school are trained on how to use AI programs to manage risks effectively, increasing their preparedness.	4
					AI systems contribute to promoting a culture of risk management among all faculty members, as we regularly discuss risks.	5
					We use AI to monitor rapid changes in the school environment, helping us develop effective preventative strategies.	6
					My school relies on student behavior analysis tools to identify behavioral risks that may arise, which aids in early intervention.	7
					Smart analytics improve communication with parents about risk management, as we regularly share information with them.	8
					My school's risk management plans are updated based on accurate data collected and analyzed, increasing their effectiveness.	9
					My school believes that integrating AI technologies into risk management enhances the safety of the educational environment, making schools a safer place.	10
Third Theme: School Crises						
					My school relies on AI systems to develop effective plans to deal with potential crises, such as public health crises.	1
					Advanced analytics technologies help assess the impact of crises on the educational process, enabling us to adjust our plans appropriately.	2
					We use AI to identify potential crises and develop proactive strategies, such as organizing workshops for teachers.	3

					AI applications contribute to enhancing internal communication among teachers during crises, facilitating coordination and reducing chaos.	4
					We rely on data analysis tools after crises to improve performance and future plans, examining what happened and how we can improve	5
					AI provides accurate information that contributes to quick and effective decision-making during crises, increasing the effectiveness of our response.	6
					AI helps train students to deal with crises by simulating realistic scenarios, raising their awareness.	7
					My School views crises as an opportunity to improve educational strategies using AI analytics, as we learn from each experience.	8
					We evaluate My School's response to crises using AI techniques, enhancing our ability to continuously improve.	9
					AI-based crisis management strategies contribute to enhancing the stability of the educational environment, making schools a safer and more comfortable place.	10