

The Degree to Which Public School Principals in Jordan Practice Their Leadership Roles in Light of the Utilization of Artificial Intelligence Applications

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The current study aimed to identify the degree to which public school principals in Jordan practice their leadership roles in light of utilizing artificial intelligence (AI) applications from their perspective, and to know the effect of variables including sex, educational qualification, educational stage, and years of service in that degree. To achieve the study objectives, a descriptive survey method was used, and a questionnaire was applied to a stratified random sample of school principals working in the Marka District Education Directorate, totaling (115) participants. The study found that the degree of principals' practice of their leadership roles in light of AI applications was moderate. The results also indicated no statistically significant differences in principals' perceptions of their leadership practice attributable to the study variables: gender, educational qualification, educational stage, or years of

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service. Based on the findings, a set of recommendations was developed, the most prominent of which is the need for the Ministry of Education to adopt a clear and integrated national framework for the utilization of artificial intelligence applications in public schools. It should establish the roles, responsibilities and procedures of implementation and evaluation while clearly outlining a process from "old" practice towards a systematic and effective institutionalisation of these technologies, thereby improving the efficiency of school performance and the needs of digital transformation in the context of education.

Keywords: Degree of Practice, Artificial Intelligence Applications, School Principals, Leadership Roles, Public Schools in Jordan, Marka District Education Directorate.

Introduction and Theoretical Framework

The text discusses how rapid digital changes, especially AI applications, have transformed leadership and management, including education. Schools must adopt forward-looking administrative and leadership approaches, with principals playing a central role in developing innovation and educational quality. However, AI's rapid expansion has outpaced laws and regulations, raising concerns about data privacy, pedagogical appropriateness, and ethics. International bodies call for urgent regulatory measures, human-centred policies, and capacity building (Holmes & Miao, 2023). Digital competence among educational leaders is now essential for successful technology-enhanced education (European Commission, 2022).

AI use in schools requires redefining principals' roles from administrative managers to digital leaders who analyse learning data, support evidence-based decisions, and build innovative school cultures. Success depends on digital leadership practices and a change-friendly culture (Luckin et al., 2016). AI is no longer just a tool but an influential player in decision-making, organizational efficiency, and education quality (Fullan et al., 2024). Leaders need advanced competencies such as digital strategic thinking, change management, and ethical engagement (DeMatthews et al., 2026). Challenges include unclear guidelines, weak

institutional readiness, limited capacity, and fragmented leadership visions (Sposato, 2025). Effective AI use requires integrated digital strategies, flexible learning spaces, teacher engagement, and sustainable learning outcomes (Pietsch & Mah, 2025).

Jordan's Ministry of Education has promoted digital transformation, but school leaders' readiness remains unclear. Therefore, this study examines public school principals' leadership practices in light of AI applications in Jordan, focusing on strategic, administrative, educational, and technical/digital dimensions.

Previous studies:

- **Tyson (2020):** Qualitative interviews with 7 U.S. principals showed AI positively impacts educational technology leadership, decision-making, and error reduction; specialized training is needed.
- **Berkovich (2025):** Survey of 302 educational leaders found nearly half were in the early majority stage of AI adoption; instructional leadership was most affected.
- **Dogan & Arslan (2025):** Literature review found AI aids decision-making, personalized learning, and administrative efficiency, but raises bias, privacy, digital divide, and transparency concerns; clear regulations and ongoing training are needed.

- **Kafa (2025):** Qualitative study of 43 Cyprus school leaders found digital tools improve communication and administration; leaders recognize AI's potential but face weak infrastructure, limited understanding, and lack of specialized training and support.
- **Kumar & Sarkar (2026):** Review found AI most used in relational communication, with potential in administrative and strategic dimensions; risks include epistemic dependence and equity concerns.
- **Lipsou et al. (2026):** PRISMA review of 50 studies found AI improves administrative efficiency, decision-making, and resource allocation; ethical and legal issues include algorithmic bias, lack of transparency, unclear responsibilities, and need for better monitoring and training.

Research gap: Most studies focus on teachers' and students' attitudes or AI effectiveness, while few examine principals' leadership roles, especially in Jordan, where digital skills and infrastructure have specific characteristics. This study addresses that gap by quantifying AI-related leadership practices in Jordanian public schools.

Commentary on Previous Studies

After a brief analysis of the previous studies, it is clear that most of the studies were either qualitative involving interviews and exploring the reality of using AI in school leadership, or literature-based studies in which educational leaders were analyzed in general. They also explored the opportunities and challenges of using AI in School Administration, Decision making, and Communication. The studies, however, lacked a focus on quantifying the extent to which public school principals exercise their leadership functions through specific and well-defined dimensions (educational, administrative, strategic, technical/digital) and in the presence of using AI applications in the context of Jordan. This is the novelty of the current study, which aims to fill this gap by quantifying the extent of practicing these roles

in the public schools in Jordan and measuring them directly to ensure a more accurate and realistic picture of the degree of the use of AI in school leadership practice. The researchers benefited from previous studies in enriching the theoretical framework, identifying the research problem, determining the areas of the study instrument and formulating its items, as well as in discussing the results by indicating points of agreement and disagreement between their findings and the results of the current study. The authors of those studies helped them to have access to the sources and references related to their study topic.

Study Problem and Questions

The study problem stems from the rapid global digital revolution, which has made AI applications a key factor in developing educational systems. This has expanded the school principal's role from mere administration to acting as an agent of digital transformation, promoting digital innovation, and using modern technologies to support teaching and learning.

Literature confirms the importance of school leadership in successfully implementing modern technologies in education. Fullan (2016) stressed school leaders' innovation and change leadership; Hallinger (2011) identified school leadership as key to enhancing performance amid technological change; Zawacki-Richter et al. (2019) called for more research on leadership and organizational aspects of AI in education; and Holmes et al. (2019) emphasized empowering educational leaders to use AI for better decision-making and educational environment development.

However, most studies have focused on teachers' and students' attitudes or on the effectiveness of AI applications, while few have examined principals' leadership roles—especially in Jordanian society, where digital skills and infrastructure have particular characteristics that require further in-depth research.

Accordingly, the problem of the study is identified in identifying the degree to which

public school principals in the Marka District in Jordan practice their leadership roles in light of employing artificial intelligence applications, thereby contributing to filling a knowledge gap and supporting the development of educational policies and school leadership preparation programs, aligning with the requirements of digital transformation in education. This is achieved by answering the following two questions:

1. What is the degree to which public school principals in the Marka District in Jordan practice their leadership roles in light of employing artificial intelligence applications from their perspectives?
2. Are there statistically significant differences at the significance level ($\alpha \leq 0.05$) between the mean estimates of public school principals in the Marka District in Jordan regarding the degree of their practice of leadership roles in light of employing artificial intelligence applications attributable to variables (gender, educational qualification, educational stage, and years of service)?

Study Objectives

- To identify the degree to which public school principals in the Marka District in Jordan practice their leadership roles in light of employing artificial intelligence applications from their perspectives, for the purpose of diagnosing the actual reality of leadership practices associated with employing AI applications within schools, and determining the level of these practices to provide a database that can be relied upon in developing leadership performance.
- To reveal whether there are statistically significant differences at the significance level ($\alpha \leq 0.05$) between the mean estimates of school principals regarding the degree of their practice of leadership roles in light of employing AI applications according to variables (gender, educational qualification, educational stage, and years of service), to understand the extent of the impact of these variables on the level of school

principals' practice of their leadership roles, and to explain the variance among them, thereby supporting the development of training programs based on their demographic and professional characteristics.

Significance of the Study

The significance of this study is represented as follows:

Theoretical Significance: The theoretical significance of this study stems from its contribution to enriching the Arabic and international educational literature related to employing artificial intelligence in school leadership, a field that is still in the development stage, especially in the Arab society, particularly in Jordan. It is hoped that the study will provide a scientific conceptualization of the reality of school principals' practice of their leadership roles in light of employing AI applications, clarifying the nature of the interaction between educational leadership and digital transformation, and contributing to deepening the theoretical understanding of how to integrate modern technologies into school administration. Additionally, the theoretical framework constructed by the study may serve as a reference that can be utilized in future studies related to digital leadership and smart technologies in education.

Practical Significance:

The practical significance of the study is manifested in the possibility of benefiting from its results by several educational entities, as follows:

- **Decision-makers in the Jordanian Ministry of Education:** By employing the results in developing policies and training programs that support the use of AI applications in school leadership, thereby raising the efficiency of administrative performance.
- **Educational Supervisors:** By benefiting from the results in improving supervision methods and providing professional support to schools in the field of employing modern technologies.

- **School Principals (Male and Female):** By enhancing their awareness of the level of their leadership practices and developing their methods in employing AI, which reflects positively on the quality of school administration.
- **Teachers and Students:** As effective school leadership contributes to providing a more supportive and innovative educational environment, which reflects on improving the quality of teaching and learning.
- **Researchers and Graduate Students:** By providing data that can be built upon in subsequent studies addressing digital educational leadership and AI applications in education.

Definition of Study Terms

Artificial Intelligence: Russell & Norvig (2021, p. 4) defined it as: "A branch of computer science aimed at designing systems capable of performing tasks that typically require human intelligence, such as learning, problem-solving, decision-making, understanding and translating language, and effective communication, through developing algorithms that enable machines to learn from data and experiences, adapt to different environments, and gradually improve their performance, thereby supporting teaching and learning processes and contributing to the development of their methods."

Artificial intelligence in this study refers to: The set of digital applications and tools used in the school environment, which rely on data analysis, process automation, and decision support, which public school principals in the Marka District employ in practicing their leadership roles. This is measured through their responses on the study instrument (questionnaire) prepared for this purpose, reflecting the degree of their employment of these applications in administrative and educational fields.

Leadership Roles of School Principals: Kumar & Sarkar (2026, p. 38) defined them as: "The set of leadership practices and responsibilities performed by the school

principal within four main dimensions including instructional leadership, organizational management, strategic planning, and building professional relationships, thereby contributing to enhancing school effectiveness and keeping pace with the requirements of employing artificial intelligence in education."

Leadership roles of school principals in this study refer to: The set of practices performed by public school principals (male and female) in the Marka District, represented by the strategic leadership role, the administrative leadership role, the educational leadership role, and the technical/digital leadership role, in light of their employment of artificial intelligence applications. They were measured through the total score obtained by the sample members on the study instrument (questionnaire) prepared to measure the degree of their practice of these roles.

Study Limitations

- **Subject Limitation:** It is limited to identifying the degree to which public school principals in the Marka District practice their leadership roles in light of employing artificial intelligence applications.
- **Human Limitation:** The study was confined to a sample of public school principals (male and female) working in the Directorate of Education for the Marka District in Jordan.
- **Spatial Limitation:** The study was applied in public schools in the Marka District in Jordan.
- **Temporal Limitation:** The study was applied during the second semester of the academic year 2025-2026.

Study Delimitations

The generalization of the study results depends on the objectivity and seriousness of the responses of the study sample members, and on the validity and reliability of the study instruments.

Method and Procedures

Study Methodology

This study adopted the descriptive survey method, as it is appropriate for the nature and objectives of the study.

Study Population

The study population consisted of all public school principals (male and female) in the Directorate of Education for the Marka District in Jordan, totaling (162) principals; including (48) male principals and (114) female principals, distributed across the two educational stages (basic and secondary), according to the statistics of the Educational Planning Department in the Directorate for the academic year 2025/2026.

Study Sample

The study sample was selected from the study population using the proportional stratified

random sampling method, totaling (115) male and female principals. This ensured the sample's representation of the various categories of the study population from which it was drawn, based on the Krejcie and Morgan (1970) table. The population was divided into strata according to the gender variable (male, female). The sample was then proportionally distributed across these strata according to the size of each category, taking into account the variables of educational qualification, educational stage, and years of service. Subsequently, sample members were randomly selected from each stratum, which helps reduce bias and enhance the reliability and generalizability of the results. Table (1) shows the distribution of the study sample members according to their variables.

Table (1): Distribution of Study Sample Members According to Variables

Variable	Levels / Categories	Frequency	Percentage
Gender	Male	34.00	29.60
	Female	81.00	70.40
	Total	115	100.00
Educational Qualification	Higher Diploma	50.00	43.50
	Master's or above	65.00	56.50
	Total	115	100.00
Educational Stage	Basic	73.00	63.50
	Secondary	42.00	36.50
	Total	115	100.00

Variable	Levels / Categories	Frequency	Percentage
Years of Service	Less than 10 years	38.00	33.00
	10 years or more	77.00	67.00
Total		115	100.00

their opinions on the questionnaire items regarding clarity of meaning, linguistic formulation, suitability for the domain they belong to, and any modifications or observations they deemed appropriate.

The observations agreed upon by 80% or more of the reviewers were adopted, which were limited to modifying the linguistic formulation of items (7, 10, 15, 16, 18, 23, 25). Thus, the instrument remained composed of (25) items in its final form, distributed equally across the four domains, with (5) items per domain.

To respond to the items of the study instrument measuring the degree to which school principals practice their leadership roles in light of employing artificial intelligence applications, a five-point Likert scale was adopted as follows: (Very Large = 5 points, Large = 4 points, Moderate = 3 points, Small = 2 points, Very Small = 1 point).

Construct Validity of the Instrument

The instrument was applied to a pilot sample of (30) male and female principals working in public schools in the Marka District in Jordan, excluding the target study sample. This was done to calculate the Pearson correlation coefficients for the relationship of the items with the instrument and with the domains they belong to. Table (2) shows these results.

Study Instrument

To achieve the study's objectives, the researchers referred to the theoretical literature and previous studies relevant to the current study's topic, such as studies by: (Fullan et al., 2024); (Karakose & Tülübas, 2024); (Kumar & Sarkar, 2026); (Lipsou et al., 2026). This was done to develop the study instrument. A questionnaire was developed, consisting initially of (25) items distributed across four domains as follows: Strategic Leadership Role domain (5 items), Educational Leadership Role domain (5 items), Technical/Digital Leadership Role domain (5 items), and Humanitarian/Ethical Leadership Role domain (5 items). To verify the validity and reliability indicators of the study instrument, the researchers followed these procedures:

Content Validity: To verify the content validity of the study instrument, its initial version was presented to a panel of experts and specialists in the fields of educational administration, educational foundations, measurement and evaluation, curriculum and instruction from Yarmouk University, Amman Arab University, Irbid National University, University of Nizwa in the Sultanate of Oman, and the Islamic University of Minnesota, in addition to a number of experts, specialists, and educational supervisors working in the educational field, totaling (10) reviewers. The aim was to solicit

Table (2): Pearson Correlation Coefficients of Items with their Respective Domain and with the Overall Instrument (N=30)

Domain	Item No.	Item	Correlation with:	
			Domain	Overall
Strategic Leadership Role	1	I use AI applications to support the school's strategic planning.	**0.81	**0.60
	2	I utilize intelligent systems to analyze school data for evidence-based decision-making.	**0.77	**0.75
	3	I employ AI technologies to anticipate future challenges for the school.	**0.86	**0.56
	4	I utilize AI applications to follow up on the implementation of the school plan.	**0.88	**0.65
	5	I strive to align school goals with the directions of digital transformation supported by AI.	**0.76	**0.61
Administrative Leadership Role	6	I use AI applications to organize daily administrative tasks in the school.	**0.69	**0.59
	7	I benefit from AI applications in improving the efficiency of school time management.	**0.77	**0.76
	8	I benefit from intelligent systems in managing (student and teacher) affairs.	**0.81	**0.78
	9	I use intelligent data analysis	**0.82	**0.84

Domain	Item No.	Item	Correlation with:	
		reports to improve the distribution of school resources.		
	10	I employ AI to reduce traditional administrative burdens within the school.	**0.82	**0.75
Educational Leadership Role	11	I use AI applications to support the educational process within the school.	**0.84	**0.77
	12	I encourage teachers to employ AI tools to improve teaching methods.	**0.58	**0.56
	13	I benefit from AI technologies in following up on students' academic performance.	**0.77	**0.64
	14	I employ AI applications in diagnosing learning loss and suggesting solutions for it.	**0.79	**0.78
	15	I invest AI in enhancing the quality of teaching and learning processes in the school.	**0.89	**0.85
Technical/Digital Leadership Role	16	I employ basic skills in using AI applications in school administration.	**0.90	**0.65
	17	I work on preparing the school environment for the effective employment of AI applications.	**0.94	**0.87
	18	I follow up on technical	**0.86	**0.85

Domain	Item No.	Item	Correlation with:	
		developments related to AI in the educational field.		
	19	I support digital transformation initiatives based on AI within the school.	**0.80	**0.59
	20	I contribute to training teachers on using appropriate smart applications for school work.	**0.83	**0.75
Humanitarian/Ethical Leadership Role	21	I consider ethical aspects when employing AI applications in the school.	**0.85	**0.60
	22	I am keen to protect the privacy of student and teacher data when using intelligent systems.	**0.94	**0.75
	23	I promote the responsible use of AI within the school community.	**0.76	**0.77
	24	I balance between employing AI and the human dimension in school leadership.	**0.88	**0.73
	25	I consistently work to raise awareness of AI ethics among school staff.	**0.93	**0.77
**Significant at the statistical significance level ($\alpha \leq 0.05$)				

In addition to the above, Pearson correlation coefficients were calculated for the relationship of the domains with the overall instrument, as well as the inter-correlation values between the domains themselves, as shown in Table (3).

The results in Table (2) show that the Pearson correlation coefficient values for the instrument items with their domains ranged between (0.58–0.94), and with the overall instrument ranged between (0.56–0.87). These values are statistically acceptable according to Al-Kilani & Al-Sharifin (2011, p. 431). Accordingly, no items were deleted from the instrument.

Table (3): Pearson Correlation Coefficients for the Relationship of Domains with the Overall Instrument, and Inter-correlation Values between Domains

Relationship	Statistic	Strategic Leadership Role	Administrative Leadership Role	Educational Leadership Role	Technical/Digital Leadership Role
Administrative Leadership Role	Correlation Coefficient	**0.75			
	Statistical Significance	0.00			
Educational Leadership Role	Correlation Coefficient	**0.65	**0.87		
	Statistical Significance	0.00	0.00		
Technical/Digital Leadership Role	Correlation Coefficient	**0.42	**0.68	**0.66	
	Statistical Significance	0.02	0.00	0.00	

Relationship	Statistic	Strategic Leadership Role	Administrative Leadership Role	Educational Leadership Role	Technical/Digital Leadership Role
Overall Instrument	Correlation Coefficient	**0.44	**0.55	**0.57	**0.75
	Statistical Significance	0.01	0.00	0.00	0.00

**Significant at the statistical significance level ($\alpha \leq 0.05$)

Instrument Reliability

To verify the internal consistency reliability of the scale measuring the degree of school principals' practice of their leadership roles in light of employing AI applications and its domains, Cronbach's Alpha coefficient was used, based on the data from the single application on the pilot sample, as shown in Table (4).

It can be observed from the results in Table (3) that the Pearson correlation coefficient values for the domains of the degree of school principals' practice of their leadership roles in light of employing AI applications with the overall instrument ranged between (0.44–0.75), while the inter-correlation coefficients between the domains ranged between (0.42–0.87). These values are appropriate for achieving the study's purposes according to Al-Kilani & Al-Sharifin (2011, p. 431).

Table (4): Cronbach's Alpha Internal Consistency Reliability Coefficients for the Scale Measuring the Degree of School Principals' Practice of their Leadership Roles in Light of Employing AI Applications and its Domains

Instrument and its Domains	Internal Consistency Reliability	Number of Items
Strategic Leadership Role	0.93	5
Administrative Leadership Role	0.91	5
Educational Leadership Role	0.91	5

Instrument and its Domains	Internal Consistency Reliability	Number of Items
Technical/Digital Leadership Role	0.92	5
Humanitarian and Ethical Leadership Role	0.93	5
Overall Instrument	0.89	25

Criterion for Judging the Degree of Estimation

To make judgments on the arithmetic means of the study instrument, its domains, and their respective items, the researchers used the five-point scale for judging the degree of practice. This was done by dividing the range of scores (1-5) into five categories to obtain the range for each level (i.e., $(5-1)/5 = 0.80$). Accordingly, the levels are as follows (Tekin, 1996):

It can be observed from the results in Table (4) that the internal consistency reliability value for the scale measuring the degree of school principals' practice of their leadership roles in light of employing AI applications reached (0.89), and for its domains ranged between (0.91) and (0.93). These values are considered acceptable for the purposes of this study (Al-Kilani & Al-Sharifin, 2011, p. 431).

Degree of Practice	Arithmetic Mean Range
Very Large	4.20 – 5.00
Large	3.41 – 4.20
Moderate	2.61 – 3.40
Small	1.81 – 2.60
Very Small	1.00 – 1.80

- **Educational Stage:** with two categories (Basic, Secondary).

- **Years of Service:** with two categories (Less than 10 years, 10 years or more).

Second: Dependent Variable, including:

- The degree to which public school principals in the Marka District practice their leadership roles in light of employing artificial intelligence applications.

Study Variables

The study included the following variables:

First: Independent Variables, including:

- **Gender:** with two categories (Male, Female).
- **Educational Qualification:** with two levels (Higher Diploma, Master's or above).

- To answer the first question, arithmetic means and standard deviations were calculated for the responses of the study sample members.
- To answer the second question, a four-way analysis of variance (ANOVA) was used to detect differences in the responses of the study sample members on the scale measuring the degree to which school principals practice their leadership roles in light of employing artificial intelligence applications.

5. Presentation and Discussion of Study Results

5.1 Results Related to the First Research Question

The first research question stated: "What is the degree to which public school principals in the Marka District in Jordan practice their leadership roles in light of employing artificial intelligence applications from their perspectives?"

To answer the first research question, arithmetic means and standard deviations were calculated for the degree to which public school principals in the Marka District practice their leadership roles in light of employing AI applications from their perspectives, with domains ranked descending according to their overall arithmetic means, as shown in Table (5).

Table (5): Arithmetic Means and Standard Deviations for the Degree to which Public School Principals in the Marka District Practice their Leadership Roles in Light of Employing AI Applications from their Perspectives, with Domains Ranked Descending by their Arithmetic Means

Rank	Domain No.	Instrument and its Domains	Arithmetic Mean	Standard Deviation	Degree of Practice
1	5	Humanitarian and Ethical Leadership Role	2.99	0.92	Moderate
2	3	Educational Leadership Role	2.88	0.97	Moderate

Study Procedures

The researchers carried out the following procedures:

- Reviewed educational literature and previous studies relevant to the current study's topic.
- Determined the number of individuals in the study population and the target sample.
- Developed the initial version of the study instrument after reviewing the educational literature and related studies.
- Verified the validity and reliability indicators of the study instrument to produce its final version.
- Applied the final version of the study instrument to the target study sample members at the specified time.
- Collected, verified, computerized, and statistically processed the questionnaires to answer the study's questions.
- Presented and discussed the results, and formulated appropriate recommendations based on the study's findings.

Statistical Treatments

To answer the study's questions, the following statistical treatments were used:

Rank	Domain No.	Instrument and its Domains	Arithmetic Mean	Standard Deviation	Degree of Practice
3	1	Strategic Leadership Role	2.87	1.01	Moderate
4	4	Technical/Digital Leadership Role	2.65	0.95	Moderate
5	2	Administrative Leadership Role	2.55	0.94	Small
Overall Degree of Practice			2.79	0.87	Moderate

institutional and technical support; without these, adoption remains partial. The shift also requires transforming educational leadership styles, which explains the moderate overall practice level.

For further information, the arithmetic means and standard deviations of the study sample members' estimates for the items of each domain were calculated separately, as follows:

1. Humanitarian and Ethical Leadership Role Domain

The arithmetic means and standard deviations were calculated for the estimates of public school principals (male and female) in the Marka District regarding the degree of their practice of leadership roles in light of employing AI applications on the items of the Humanitarian and Ethical Leadership Role domain, ranked descending according to their overall arithmetic means. Table (6) shows this.

Table (5) shows that the overall degree to which public school principals in the Marka District practice leadership roles in light of AI applications was moderate, with a mean of (2.79) and SD of (0.87). Domains ranked as follows: Humanitarian and Ethical Leadership first (mean 2.99, SD 0.92, moderate); Educational Leadership second (mean 2.88, SD 0.97, moderate); Strategic Leadership third (mean 2.87, SD 1.01, moderate); Technical/Digital Leadership fourth (mean 2.65, SD 0.95, moderate); and Administrative Leadership fifth (mean 2.55, SD 0.94, small).

This overall moderate level indicates a transitional state between principals' awareness of AI's importance and its limited actual employment in schools. AI integration remains in its early stages due to weak specialized training, limited digital infrastructure, and daily administrative burdens. As literature notes, effective AI adoption requires capacity building,

Table (6): Arithmetic Means and Standard Deviations of Estimates of Public School Principals (Male and Female) in the Marka District regarding the Degree of their Practice of Leadership Roles in Light of Employing AI Applications on the Items of the (Humanitarian and Ethical Leadership Role) Domain, Ranked Descending by Arithmetic Means

Rank	Item No.	Item	Arithmetic Mean	Standard Deviation	Degree of Practice
1	21	I consider ethical aspects when employing AI applications in the school.	3.25	0.95	Moderate
2	22	I am keen to protect the privacy of student and teacher data when using intelligent systems.	3.01	1.11	Moderate
3	25	I consistently work to raise awareness of AI ethics among school staff.	2.97	1.06	Moderate
4	24	I balance between employing AI and the human dimension in school leadership.	2.90	1.19	Moderate
5	23	I promote the responsible use of AI within the school community.	2.81	1.12	Moderate
Overall for the Humanitarian and Ethical Leadership Role Domain			2.99	0.92	Moderate

indicates these aspects are not yet advanced in AI implementation, likely due to the novelty of AI use and the absence of clear ethical guidelines in schools.

The highest item was (21): “I consider ethical aspects when using AI in the school,” with a mean of (3.25), SD (0.95), and a moderate level. This focus is tied more to principals’ general understanding of the school’s educational role than to clear codified policies. Next was item (22): “I am keen to protect the privacy of student and teacher data when using intelligent systems,” with a mean of (3.01), SD (1.11), and a moderate level. Awareness exists, but practice

Table (6) shows that public school principals’ estimates in the Marka District for the Humanitarian and Ethical Leadership Role domain ranged from (2.81) to (3.25). All five items fell within a moderate practice level. The overall mean was (2.99), with a standard deviation of (0.92), indicating a moderate level. This suggests principals believe they consider humanitarian and ethical aspects when using AI to an acceptable degree, due to the value-based nature of educational work, such as justice, transparency, and respect for student privacy. This domain ranked relatively higher because it relies more on daily practices than advanced technical skills. However, the moderate level

2. Educational Leadership Role Domain

The arithmetic means and standard deviations were calculated for the estimates of public school principals in the Marka District regarding the degree of their practice of leadership roles in light of employing AI applications on the items of the Educational Leadership Role domain, ranked descending according to their overall arithmetic means. Table (7) shows this.

may depend on individual efforts without specialized training or secure data management mechanisms. The lowest item was (23): "I promote the responsible use of AI within the school community," with a mean of (2.81), SD (1.12), and a moderate level. This lower level is likely due to limited awareness, guidance, and training around responsible AI use, as well as the novelty of these applications.

Table (7): Arithmetic Means and Standard Deviations of Estimates of Public School Principals in the Marka District regarding the Degree of their Practice of Leadership Roles in Light of Employing AI Applications on the Items of the (Educational Leadership Role) Domain, Ranked Descending by Arithmetic Means

Rank	Item No.	Item	Arithmetic Mean	Standard Deviation	Degree of Practice
1	12	I encourage teachers to employ AI tools to improve teaching methods.	3.20	1.17	Moderate
2	15	I invest AI in enhancing the quality of teaching and learning processes in the school.	2.95	1.15	Moderate
3	14	I employ AI applications in diagnosing learning loss and suggesting solutions for it.	2.83	1.07	Moderate
4	13	I benefit from AI technologies in following up on students' academic performance.	2.79	1.34	Moderate
5	11	I use AI applications to support the educational process within the school.	2.61	1.18	Moderate
		Overall for the Educational Leadership Role Domain	2.88	0.97	Moderate

rather than organized plans or systematic training. Next was item (15): “I invest AI in improving the quality of teaching and learning processes in the school,” with a mean of (2.95), SD (1.15), and a moderate level. Awareness exists, but use is narrow, partial, and occasional, with limited planning and follow-up. The lowest item was (11): “I use AI applications to support the educational process within the school,” with a mean of (2.61), SD (1.18), and a moderate level. This reflects low direct use, as principals’ responsibilities are more organizational and supervisory, and they lack technical and practical expertise and training in AI.

3. Strategic Leadership Role Domain

The arithmetic means and standard deviations were calculated for the estimates of public school principals (male and female) in the Marka District regarding the degree of their practice of leadership roles in light of employing AI applications on the items of the Strategic Leadership Role domain, ranked descending according to their overall arithmetic means. Table (8) shows this.

Table (7) shows that public school principals’ estimates in the Marka District for the Educational Leadership Role domain ranged from (2.61) to (3.20). All five items fell within a moderate practice level, with an overall mean of (2.88), SD (0.97), and a moderate level. The close values indicate relative consistency, but still non-advanced AI application in educational aspects. This is due to the need for specialized professional and technical skills and a supportive school environment for structured integration into teaching and learning, which may be insufficient. Frequent administrative tasks and the novelty of AI use also constrain broad use, making it fragmental rather than institutionalized. This reflects a transitional moment: principals understand AI’s value but have not yet experienced it comprehensively and systematically.

The highest item was (12): “I encourage teachers to use AI tools to enhance teaching methods,” with a mean of (3.20), SD (1.17), and a moderate level. This reflects principals’ supervisory role, but encouragement is often general guidance

Table (8): Arithmetic Means and Standard Deviations of Estimates of Public School Principals (Male and Female) in the Marka District regarding the Degree of their Practice of Leadership Roles in Light of Employing AI Applications on the Items of the (Strategic Leadership Role) Domain, Ranked Descending by Arithmetic Means

Rank	Item No.	Item	Arithmetic Mean	Standard Deviation	Degree of Practice
1	5	I strive to align school goals with the directions of digital transformation supported by AI.	3.42	1.29	Large
2	4	I utilize AI applications to follow up on the implementation of the school plan.	2.83	1.22	Moderate
3	2	I utilize intelligent systems to analyze school data for	2.77	1.22	Moderate

Rank	Item No.	Item	Arithmetic Mean	Standard Deviation	Degree of Practice
		evidence-based decision-making.			
4	3	I employ AI technologies to anticipate future challenges for the school.	2.70	1.21	Moderate
5	1	I use AI applications to support the school's strategic planning.	2.65	1.11	Moderate
		Overall for the Strategic Leadership Role Domain	2.87	1.01	Moderate

school plan,” followed with a mean of (2.83), SD (1.22), and a moderate level, indicating limited use of AI in strategic monitoring and evaluation; monitoring still relies mainly on traditional methods. The lowest item was (1): “Use AI applications to assist with the school’s strategic planning,” with a mean of (2.65), SD (1.11), and a moderate level. This weak employment is due to the advanced data analysis skills, specialized tools, and practical experience required, which may not be sufficiently available among some principals.

4. Technical/Digital Leadership Role Domain

The arithmetic means and standard deviations were calculated for the estimates of public school principals in the Marka District regarding the degree of their practice of leadership roles in light of employing AI applications on the items of the Technical/Digital Leadership Role domain, ranked descending according to their overall arithmetic means. Table (9) shows this.

Table (8) shows that public school principals’ estimates in the Marka District for the Strategic Leadership Role domain ranged from (2.65) to (3.42). Items (1–4) had a moderate practice level, while item (5) had a large practice level. The overall domain mean was (2.87) with a standard deviation of (1.01), indicating a moderate level. This suggests that strategic AI use in schools is still transitional, with principals focused mainly on daily tasks rather than strategic planning. AI-based school vision and strategy development requires high-level planning, technical skills, and institutional support, which may be insufficient in public schools.

The highest item was (5): “I work to design the objectives of schools in accordance with the directions of digital transformation supported by AI,” with a mean of (3.42), SD (1.29), and a large practice level. This reflects principals’ awareness of linking digital transformation and AI to school goals, possibly due to current education policies. Item (4): “I use AI applications to track implementation of the

Table (9): Arithmetic Means and Standard Deviations of Estimates of Public School Principals in the Marka District regarding the Degree of their Practice of Leadership Roles in Light of

**Employing AI Applications on the Items of the (Technical/Digital Leadership Role) Domain,
Ranked Descending by Arithmetic Means**

Rank	Item No.	Item	Arithmetic Mean	Standard Deviation	Degree of Practice
1	18	I follow up on technical developments related to AI in the educational field.	2.88	1.08	Moderate
2	16	I employ basic skills in using AI applications in school administration.	2.77	1.10	Moderate
3	19	I support digital transformation initiatives based on AI within the school.	2.63	1.10	Moderate
4	17	I work on preparing the school environment for the effective employment of AI applications.	2.59	1.21	Small
5	20	I contribute to training teachers on using appropriate smart applications for school work.	2.40	1.16	Small
Overall for the Technical/Digital Leadership Role Domain			2.65	0.95	Moderate

Table (9) shows that the estimates of public school principals in the Marka District regarding their with AI applications, the availability of appropriate digital infrastructure, continued reliance on traditional methods, and limited practical experience and training in the digital field.

The highest item was (18): “I follow up on technical developments related to AI in the educational field,” with a mean of (2.88), a standard deviation of (1.08), and a moderate practice level. This reflects relative attention to AI developments, but follow-up is not regular

practice of the Technical/Digital Leadership Role in light of using AI applications had arithmetic means ranging from (2.40) to (2.88). Items (16, 18, 19) fell within a moderate practice level, while items (17 and 20) fell within a small practice level. The overall mean for the domain was (2.65), with a standard deviation of (0.95), indicating a moderate practice level. This suggests that digital employment in schools is still at a non-advanced stage of actual application. It is attributed to the need for specialized technical competencies in dealing

smart applications requires high technical knowledge, organized training programs, time, and institutional support. Therefore, this aspect is the least employed, indicating a greater need for others or external entities to carry out such training in schools.

5. Administrative Leadership Role Domain

The arithmetic means and standard deviations were calculated for the estimates of public school principals in the Marka District regarding the degree of their practice of leadership roles in light of employing AI applications on the items of the Administrative Leadership Role domain, ranked descending according to their overall arithmetic means. Table (10) shows this.

or systematic and may depend on individual efforts or personal interest rather than institutional professional development plans. Next was item (16): "I use simple skills to work with AI tools for school administration," with a mean of (2.77), a standard deviation of (1.10), and a moderate practice level. This means principals have basic skills, but their use is limited and non-advanced; it requires continuous hands-on training, broader technical knowledge, and institutional support.

The lowest item was (20): "I contribute to the training of teachers in the use of suitable smart applications for school work," with a mean of (2.40), a standard deviation of (1.16), and a low level of practice. This is because training on

Table (10): Arithmetic Means and Standard Deviations of Estimates of Public School Principals in the Marka District regarding the Degree of their Practice of Leadership Roles in Light of Employing AI Applications on the Items of the (Administrative Leadership Role) Domain, Ranked Descending by Arithmetic Means

Rank	Item No.	Item	Arithmetic Mean	Standard Deviation	Degree of Practice
1	8	I benefit from intelligent systems in managing (student and teacher) affairs.	2.80	1.15	Moderate
2	6	I use AI applications to organize daily administrative tasks in the school.	2.60	1.11	Small
3	7	I benefit from AI applications in improving the efficiency of school time management.	2.49	1.07	Small
4	9	I use intelligent data analysis reports to improve the distribution of school resources.	2.48	1.22	Small
5	10	I employ AI to reduce traditional administrative burdens within the school.	2.41	1.12	Small

Rank	Item No.	Item	Arithmetic Mean	Standard Deviation	Degree of Practice
		Overall for the Administrative Leadership Role Domain	2.55	0.94	Small

area of administration. This is due to the fact that in comparison with other administrative activities, student and teacher affairs are one of the most easy-to-digitalize areas. This use, however, is not comprehensive or integrated; it is done through specific applications or tools, not a complete shift to advanced intelligent systems, hence this use is not at the high level of practice. This was followed by item (6): "I use AI applications to organise everyday administrative work in the school," which had an arithmetic mean of (2.60), a standard deviation of (1.11), and a low level of practice. This is interpreted as principals' use of AI applications to organize everyday administrative work was limited, which is a weakness in using AI within the school's everyday operational procedures. This is due to the high amount of reliance on traditional administrative arrangements in the organization of daily tasks, as well as the lack of integrated digital systems and technical skills to support the processes in an automatic and efficient way in the current school environment, resulting in a low level of practice for this item. However, the lowest mean was for item (10): "I use AI to cut down on traditional administrative tasks in the school", with an arithmetic mean of (2.41), a standard deviation of (1.12) and a low practice level. It is seen that principals are using AI to ease the burden of the traditional administrative tasks are at their lowest, suggesting low actual benefits derived from AI tools in terms of easing routine tasks in the school. This is due to the use of traditional administrative processes to complete their work as well as the need for more integrated digital transformation within school systems to reach this objective, including the availability of smart tools that can automate the

It can be observed from the results in Table (10) that the arithmetic means of the estimates of public

school principals in the Marka District regarding the degree of their practice of leadership roles in light of employing AI applications on the items of the Administrative Leadership Role domain ranged between (2.41) and (2.80). Items (6, 7, 9, 10) fell within a **small** practice level, while item (8) fell within a **moderate** practice level. The overall arithmetic mean for the domain was (2.55) and the standard deviation was (0.94) with a small practice level. This is due to the continued reliance on traditional processes and routines for school administration, whereas the actual integration of AI tools in planning, organizing, and administrative follow-up is still very limited. Moreover, these applications in the administration context need integrated digital systems, advanced technical and administrative skills, and specialized training to effectively use them, that may not have been readily available in the public school context based on the sample members' viewpoints. It is clear that there is a disparity between the need for digital transformation in school administration and the current level of AI application usage, as is reflected in this low overall domain level.

The highest was for item (8): "I benefit from intelligent systems in managing (student and teacher) affairs", and it had an arithmetic mean of (2.80), a standard deviation of (1.15), and a moderate practice level, ranking first. It is understood that principals are using intelligent systems to manage student/staff affairs relatively sparsely, and using more of some digital tools in this management aspect than the remainder of the domain's items, suggesting a partial benefit from some digital tools in this

attributable to variables (gender, educational qualification, educational stage, and years of service)?"

To answer this question, the arithmetic means and standard deviations were calculated for the degree to which public school principals in the Marka District practice their leadership roles in light of employing AI applications from their perspectives according to the study variables (gender, educational qualification, educational stage, and years of service), as shown in Table (11).

administrative procedures, and the technical skills to use those tools.

Results Related to the Second Research Question

The second research question stated: "Are there statistically significant differences at the significance level ($\alpha \leq 0.05$) between the mean estimates of public school principals in the Marka District in Jordan regarding the degree of their practice of leadership roles in light of employing artificial intelligence applications

Table (11): Arithmetic Means and Standard Deviations for the Degree to which Public School Principals in the Marka District Practice their Leadership Roles in Light of Employing AI Applications from their Perspectives and its Domains According to the Study Variables

V a r i a b l e	Categ ory / Level	Statistic	Strat egic Lead ershi p Role	Adm inist rative Lead ershi p Role	Educ ation al Lead ershi p Role	Techni cal/Dig ital Leaders hip Role	Humanit arian/Et hical Leadershi p Role	Ov eral l Pra ctic e De gre e
G e n d e r	Male	Arithmeti c Mean	2.81	2.49	2.84	2.74	3.06	2.79
		Standard Deviation	1.12	1.09	1.06	1.15	1.04	1.02
	Fema le	Arithmeti c Mean	2.90	2.58	2.89	2.62	2.96	2.79
		Standard Deviation	0.96	0.88	0.93	0.86	0.87	0.81
E d	High er	Arithmeti	2.88	2.58	2.85	2.63	2.93	2.77

V a r i a b l e	Categ ory / Level	Statistic	Strat egic Lead ershi p Role	Adm inist rative Lead ershi p Role	Educ ational Lead ershi p Role	Techni cal/Dig ital Leaders hip Role	Humanit arian/Et hical Leadershi p Role	Ov eral l Pra ctic e De gre e
u c a t i o n a l Q u a l i f i c a t i o n	Diplo ma	c Mean						
		Standard Deviation	1.05	1.03	1.03	1.03	0.95	0.95
	Maste r's or above	Arithmeti c Mean	2.87	2.54	2.90	2.67	3.03	2.80
		Standard Deviation	0.98	0.88	0.93	0.90	0.90	0.82
E d u c	Basic	Arithmeti c Mean	2.83	2.55	2.87	2.56	2.92	2.75

V a r i a b l e	Categ ory / Level	Statistic	Strat egic Lead ershi p Role	Adm inist rative Lead ershi p Role	Educ ational Lead ershi p Role	Techni cal/Dig ital Leaders hip Role	Humanit arian/Et hical Leadershi p Role	Ov eral l Pra ctic e De gre e
a ti o n a l S t a g e		Standard Deviation	1.01	0.94	0.98	0.91	0.92	0.88
	Seco ndary	Arithmeti c Mean	2.94	2.56	2.89	2.80	3.10	2.86
		Standard Deviation	1.02	0.96	0.96	1.02	0.92	0.88
Y e a r s o f S e r v i c	Less than 10 years	Arithmeti c Mean	2.94	2.64	2.95	2.70	2.96	2.84

Variable	Category / Level	Statistic	Strategic Leadership Role	Administrative Leadership Role	Educational Leadership Role	Technical/Digital Leadership Role	Humanitarian/Ethical Leadership Role	Overall Practice Degree
e		Standard Deviation	1.01	0.92	0.90	0.97	0.96	0.89
	10 years or more	Arithmetic Mean	2.84	2.51	2.84	2.63	3.00	2.76
		Standard Deviation	1.01	0.96	1.01	0.95	0.90	0.87

apparent differences between the means, a four-way analysis of variance (ANOVA) was conducted for the degree to which public school principals in the Marka District practice their leadership roles in light of employing AI applications from their perspectives according to the study variables (gender, educational qualification, educational stage, and years of service). Table (12) shows this.

It can be observed from the results in Table (11) that there are apparent differences between the arithmetic means of the scale measuring the degree to which public school principals in the Marka District practice their leadership roles in light of employing AI applications from their perspectives, and its sub-domains, resulting from differences in the levels of the study variables. To verify the significance of these

Table (12): Results of Four-Way Analysis of Variance (Without Interaction) for Sample Members' Estimates of the Degree to which Public School Principals in the Marka District Practice their Leadership Roles in Light of Employing AI Applications According to the Variables

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F Value	Statistical Significance	Effect Size
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Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F Value	Statistical Significance	Effect Size
Gender	0.003	1	0.003	0.003	0.95	0.00
Educational Qualification	0.004	1	0.004	0.005	0.94	0.00
Educational Stage	0.457	1	0.457	0.581	0.45	0.01
Years of Service	0.247	1	0.247	0.314	0.58	0.00
Error	86.567	110	0.787			
Total	87.278	114				

- practices depend more on daily administrative experience and practical application than on theoretical academic level.

- Educational Stage:** No significant differences; basic and secondary school principals work within a similar administrative framework, and AI use does not differ substantially between stages.

- Years of Service:** No significant differences; AI application is still relatively new, so experience length has not yet created clear differences in practice.

Recommendations:

- Conduct applied training courses and workshops for principals on using AI in school administration and education, with a practical focus.
- Provide necessary infrastructure and technical equipment in public schools.
- Include AI employment in school development plans to move from individual, unorganized use to systematic, institutional use.

Table (12) shows no statistically significant difference at the significance level ($\alpha \leq 0.05$) between the arithmetic means of teachers' estimates regarding the degree to which public school principals in the Marka District practice their leadership roles in light of employing AI applications, attributable to gender, educational qualification, educational stage, or years of service. The effect sizes for these variables were low: (0.00, 0.00, 0.01, 0.00), respectively. Since no significant differences appeared according to Hotelling's Trace and Box's Test, the researchers limited their analysis to a four-way ANOVA on the total degree.

Variable Discussion:

- Gender:** No significant differences; male and female respondents gave highly similar estimates, likely because school work follows uniform administrative and educational procedures.
- Educational Qualification:** No significant differences; AI-related leadership

- Conduct qualitative studies on principals' experiences and challenges in employing AI.
- Study the effectiveness of training programs in developing school leaders' AI competencies and improving actual practice.
- Investigate the relationship between AI employment and the quality of school administrative performance, including planning, organization, and decision-making.
- Encourage principals to support teachers in using AI tools in the classroom.
- Organize awareness programs on ethical and responsible AI use.
- Develop clear regulatory policies and guidelines for AI use in schools, with gradual and organized follow-up.

Research Proposals:

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