

Readiness of Public School Principals' to Confront the Fifth Industrial Revolution in the West Bank

استعداد مديري المدارس الحكومية لمواجهة الثورة الصناعية الخامسة في الضفة الغربية

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Abstract:

الملخص:

The study aimed at developing proposed methods to enhance the readiness of public school principals in the West Bank to confront the demands of the Fifth Industrial Revolution, and to diagnose the structural gaps and difficulties in the educational reality.

The research adopted the descriptive-analytical method, applying a questionnaire to a sample of 361 male and female teachers, and conducting qualitative interviews with principals and educational supervisors.

The results showed a medium level of readiness, with statistically significant differences attributable to years of experience (in favor of long experience).

Keywords: Development, Readiness, School Principal, Fifth Industrial Revolution, Public Schools.

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هدفت الدراسة الحالية لتطوير جاهزية مدراء المدارس الحكومية بفلسطين لمواجهة متطلبات الثورة الصناعية الخامسة، وتحديد الفجوات والتحديات الهيكلية في الواقع التعليمي.

استخدمت هذه الدراسة المنهج الوصفي التحليلي واعتمدت على الاستبانة كأداة للدراسة على عينة من 361 معلماً ومعلمة، وإجراء مقابلات نوعية مع مدراء ومشرفين تربويين.

أظهرت نتائج الدراسة بأن مستوى جاهزية بلغت درجة متوسطة، كما أظهرت النتائج بوجود فروق ذات دلالة إحصائية تعزى لسنوات الخبرة (لصالح الخبرة مدة الطويلة).

الكلمات المفتاحية: التطوير، الاستعداد، مدير المدرسة، الثورة الصناعية الخامسة، المدارس الحكومية.

1- Introduction

The stages of the industrial revolutions comprised several phases. The first was the First Industrial Revolution, which took shape from the mid-eighteenth century to the early twentieth century, followed by the Second Industrial Revolution, which began at the start of the twentieth century (Ahmad, 2016). Then came the Third Industrial Revolution, which witnessed the development of the computer and the Internet and the emergence of many technological manifestations, leading to the emergence of the Fifth Industrial Revolution as an extension of the previous stages. It has relied on the development of the digital aspects of digital technology, nanoscience, and other technological and digital manifestations that we experience today (Al-Dahshan, 2017). Its impact has contributed directly to all life sectors of society, including the education sector, which affects all elements of its educational curriculum—the textbook, the teacher, the school principal and school administration, and the student. All of these elements have been affected by the outcomes of the Fifth Industrial Revolution and, consequently, by its requirements (Saleh, 2021a).

The term "school principals' readiness to confront the Fifth Industrial Revolution" refers to the ability to guide and direct all elements of the educational curriculum—teachers, educational counselors, and students—toward employing technology, the digital revolution, and the manifestations of the Fifth Industrial Revolution in school education; harmonizing modern technology with extracurricular activities; embracing the use of the virtual world in the educational system; and encouraging teachers to employ it regularly (Ahmad, 2016).

1-1- Problem of the Study

The problem of the study lies in the fact that the educational sector and the elements of the educational curriculum are directly affected by the manifestations of the Fifth Industrial Revolution (5IR), which necessitates examining the administrative and educational policies of school principals and teachers in order to achieve alignment between the educational system and digital transformation. Since the employment of digital technologies in teaching practices is the responsibility of teachers, directing and following up on these efforts rests primarily on the school principal as a resident supervisor responsible for leading the teaching staff toward achieving the objectives of the developed curricula (Ahmad, 2016).

Hence, the urgent need arises for principals to possess the digital readiness and modern leadership models that enable them to transition from the stage of pure automation and artificial intelligence (the tools of the Fourth Revolution) to the stage of "humanizing technology centered on the human being" (the essence of the Fifth Revolution). The problem of the current research is defined as the existence of a cognitive and applied gap between the field reality of the principal within the school environment and the principal's need to develop innovative governance methods that contribute to confronting the challenges of this technological revolution and raising administrative competency. Accordingly, the problem of the study is crystallized in the following main question: "How can the methods of readiness of public school principals to confront the Fifth Industrial Revolution in the West Bank be developed?".

1-2- Aims and Scope

This study primarily aims to build and develop proposed methods to enhance the readiness of public-school principals in the northern governorates of the West Bank to confront the demands of the Fifth Industrial Revolution. Within this general scope, the study seeks to achieve the following integrated research paths and objectives:

- **Monitoring the reality of current readiness:** Identifying the readiness methods currently followed and used by public school principals to deal with the realities of the Fifth Industrial Revolution, and answering questions concerning field readiness.
- **Diagnosing field gaps:** Revealing aspects of deficiency and shortcomings common in administrative and educational readiness mechanisms for confronting these technological transformations and classifying their dimensions.
- **Identifying methodological challenges in terms of governance:** Investigating the most prominent economic, social, and political difficulties and obstacles facing the educational curriculum in all its elements in pursuit of achieving the requirements of the Fifth Industrial Revolution.
- **Presenting a future developmental perspective:** Illustrating the practical methods, mechanisms, and leadership models through which the readiness of school administration can be elevated and developed in line with the digital revolution centered on human well-being.

1-3- Study Limitations

In commitment to the objective scientific methodology, the dimensions of this study and its scope of application are determined by the following limitations:

- **Spatial limitations:** The application of this study was limited in the field to public schools affiliated with the Directorates of Education in the governorates of the northern West Bank, namely: Tulkarm, Qalqilya, Salfit, Nablus, Jenin, and Tubas.
- **Temporal limitations:** Field data were collected and the study tools and interviews were applied during the 2025 academic year.
- **Subject-matter limitations:** The scope of the research was limited to measuring and developing the readiness methods of public school principals and those working with them in confronting the requirements of the Fifth Industrial Revolution, diagnosing aspects of deficiency and governance and field challenges, and building developmental recommendations in light of them.
- **Human limitations:** The human frameworks of the study were represented by public school principals, teachers, administrators, and supervisors in the northern governorates. The total population comprised (5,596) individuals (distributed as: 859 principals, 4,737 teachers, and 506 administrative employees). A statistically representative sample of (361) individuals was drawn from them, equivalent to (2.3%) of the total population.

1-4- Definitions of Terms

-Development:

- **Theoretically:** A comprehensive planned effort aimed at producing sustainable positive changes in the skills, values, and behavioral patterns of human resources, and at updating the processes, organizational structures, and technologies used in a way that achieves institutional objectives with high efficiency (Jabarini, 2016).
- **Operationally:** The building and adoption of modern and innovative administrative and technological practices by school principals, in order to raise the leadership competency and productivity of the elements of the educational curriculum. It is measured through the responses of sample members to the study tool (the questionnaire and the interview).

-Readiness:

- **Theoretically:** A state of psychological and cognitive capability and preparedness that appears in the individual through training and practice, enabling them to acquire new skills, knowledge, and information and translate them into precise behavioral and practical responses (Al-Jam'an, 2015).
- **Operationally:** The level of readiness and actual possession of digital leadership skills and models among administrative and educational cadres for employing the requirements of the modern digital age with efficiency within the school environment.

-School Principal:

- **Theoretically:** The executive and educational leader who carries out the functions of planning, organizing, directing, and supervising all activities and human and material resources within the educational institution (Harahsheh, 2019).
- **Operationally:** The leader responsible for administering the public school in the northern governorates of the West Bank, who performs the tasks of resident developmental supervision to direct the energies of teachers and students toward humane digital transformation.

-Fifth Industrial Revolution (5IR):

- **Theoretically:** The advanced technological stage based on "Human-Centered Technology," aiming to achieve ethical and interactive synergy and integration between machine intelligence and human thought, with a focus on human well-being, environmental sustainability, and good governance, transcending the pure automation and dry cybernetic systems that characterized the Fourth Revolution.
- **Operationally:** The integrated technological system applied in education that balances generative artificial intelligence and hyper-digitization, on the one hand, with the humanization of the educational process and the development of critical and emotional thought and social skills among the elements of the educational curriculum (principal, teacher, student), on the other hand.

-Public Schools:

- **Theoretically:** Formal educational institutions committed to providing basic and secondary education to citizens free of charge, and subject

administratively, organizationally, and financially to the Ministry of Education of the state (Saleh, 2021b).

• **Operationally:** The academic and vocational schools subject to the supervision of the Palestinian Ministry of Education in the northern governorates of the West Bank, which provide their educational services free of charge from the first grade to the twelfth grade (Tawjihi).

2- Theoretical and Conceptual Framework

2-1- The Nature of the Fifth Industrial Revolution (Industry 5.0): Philosophical and Organizational Dimensions

One of the common conceptual errors in some literature is reducing the Fifth Industrial Revolution (5IR) to a mere additional technical or digital extension of previous industrial revolutions. While the Third and Fourth Industrial Revolutions (4IR) focused primarily on the digitization of assets, the automation of processes (Automation), and excessive reliance on big data and the Internet of Things (IoT) to create independent systems that may exclude the human element, the Fifth Industrial Revolution came to bring about a radical philosophical transformation toward "Human-Centered Technology."

The essence of the Fifth Industrial Revolution does not aim to replace human capabilities with intelligent machines; rather, it is based on achieving interactive and ethical synergy and integration between machine intelligence and human thought, with the aim of placing human well-being, environmental sustainability, and societal resilience at the heart of technological and productive development (Demir & Gümüş, 2023). Within this context, the generation, analysis, and seamless transmission of data across cyber networks is not an end in itself, but rather an enabling tool that serves the governance of organizations and the building of knowledge value based on human innovation and ethical responsibility (Al-Dahshan, 2019b).

2-2- Manifestations of the Fifth Industrial Revolution and Their Reflections on the Educational System

The manifestations of the Fifth Industrial Revolution transcend purely technical dimensions to include an integrative pattern that reshapes educational and administrative environments. The most prominent of these manifestations include:

• **Interactive cyber systems and the humanization of the Internet of Things (IoT):** These technologies are no longer dry tools for connecting

physical resources; rather, in the era of the Fifth Revolution they have been transformed into channels for promoting digital justice and facilitating access to knowledge. They enable educational cadres and students to interact with global scientific repositories and journals from anywhere, and provide flexible governance tools that support educational decision-making based on live digital indicators (Saleh, 2021c).

• **Generative artificial intelligence and synergistic cognitive systems:** Artificial intelligence and collaborative robots (Cobots) represent a key feature that enhances the competitive capabilities of institutions. Cloud computing, interactive data, and virtual and three-dimensional technologies (such as augmented and virtual reality) are employed to build smart integrated learning environments that adapt to individual differences among students and enrich their higher-order competencies (Al-Suwaiket, 2021).

• **Advanced and sustainable technologies:** These are represented in nanotechnology solutions, smart-driven transportation, and computerized environmental systems. Despite the centrality of their use internationally and industrially, their educational reflections impose a reshaping of curricular elements to connect students with the skills of the future and the developments of the comprehensive technological age.

Within this framework, the researcher believes that the accelerating manifestations of the Fifth Industrial Revolution impose structural and governance challenges on various cultures and educational systems. These manifestations require conscious school leadership that possesses a strategic and planning dimension capable of managing and directing this technology and localizing it within the educational field. The transition from the stage of "technology consumption" to the stage of "localization of knowledge and participation in digital production" calls for building long-term educational plans and formulating interactive curricula capable of upgrading the professional competencies of principals and teachers, and ensuring the integration of the educational environment in a way that achieves the requirements of the Fifth Revolution while preserving humanization, educational values, and the human well-being of the learner (Noble & Khan, 2024).

2-3- Leadership Competencies and Functional Responsibilities of the School Principal in the Digital Age

The roles and professional practices entrusted to the school principal are integrated to transcend the classical administrative pattern toward frameworks of comprehensive governance, where these tasks can be

classified structurally into two main paths based on Modern Leadership Theories:

- **Managerial Practices:** These are related to routine bureaucratic functions based on operational management to ensure the stability of the school environment and the conduct of its daily work. These responsibilities include: regulating and organizing official records; preparing periodic reports and submitting them to higher administrative levels; engineering school schedules; managing and securing the school building and facilities and protecting them from physical risks; in addition to supervising field teaching procedures, formulating annual financial budgets, and allocating resources (Saleh, 2021a).
- **Instructional Leadership Practices:** These represent the most important axis in "humanizing technology" and the positive influence on the behavior of teachers and students in directing them toward achieving strategic educational goals. This role gives rise to: activating sustainable professional development and growth programs for the teaching staff; supervising the mechanisms of curriculum development and the localization of computerized teaching methods; leading learning communities within the school to develop curricular and extracurricular activities; motivating teachers to innovate; and building strong participatory partnerships between the school and the local community, which is reflected positively on the quality of learning and the provision of psychological counseling and comprehensive cognitive guidance to students (Hilali, 2013).

Within this context, the researcher believes that the contemporary tasks and responsibilities of public school principals in light of the demands of the Fifth Industrial Revolution cannot be reduced or confined to rigid procedural frameworks or stereotypical written plans; rather, they extend to include strategic and flexible governance roles. Confronting the challenges of digital transformation requires school administration to abandon the dry administrative pattern and rise toward transformational and digital leadership models (Demir & Gümüş, 2023). This requires principals to devise innovative solutions, employ brainstorming strategies and critical leadership thinking to confront field crises, and intelligently reconcile advanced technological requirements with the human and emotional characteristics of all elements of the educational curriculum.

2-4- Theoretical Frameworks Explaining the Readiness of School Administration in the Era of the Fifth Industrial Revolution

To establish a solid analytical foundation that transcends simple descriptive narration of technology, this study is based on three contemporary theoretical frameworks and models that explain the mechanisms of school principals' readiness and their governance of humane digital transformation:

• **Modern Leadership Theories: Human-Centered Digital Leadership.**

Human-centered digital leadership is the basic theoretical umbrella for the requirements of the Fifth Industrial Revolution; it is an evolution of transformational and cybernetic leadership theories. This theory assumes that the role of the successful educational leader is not limited to bringing in smart devices and software (the dry technical perspective of the Fourth Revolution); rather, the leader possesses the ability to "humanize" these tools by integrating technical competence with emotional intelligence, ethical responsibility, and human well-being (Demir & Gümüş, 2023). This theory provides school administration with a guide for empowering teachers and students and resisting digital alienation within schools through elevating the value of human interaction and critical thinking.

• **Digital Readiness Models.** Contemporary readiness models in educational administration indicate that the readiness of the school principal to confront advanced technological developments is shaped by three integrated dimensions: (a) cognitive and philosophical readiness, represented in understanding the conceptual differences between successive industrial revolutions; (b) behavioral and practice-based readiness, related to the ability to diversify educational methods and integrate interactive platforms; and (c) organizational readiness, concerned with the flexibility of the leadership cadre and its acceptance of change (Al-Jam'an, 2015). This model emphasizes that the absence of any of these dimensions creates a field gap that impedes the alignment of the educational curriculum with the realities of the comprehensive digital age.

• **Flexible Educational Governance Frameworks.** Contemporary educational governance frameworks present the concept of "organizational and legislative flexibility" as a basic condition for confronting the acceleration of the Fifth Revolution. Flexible governance assumes the necessity of dismantling the strict bureaucracy and rigid administrative systems that govern public schools, and replacing them with flexible legislative policies that grant school principals discretionary powers to build

international partnerships and localize successful models (Noble & Khan, 2024). Governance also focuses on bridging the "geographical digital gap" by adopting fair policies that ensure a balanced distribution of resources and financing between urban and rural schools, thereby protecting the educational curriculum from regression or deficiency in the face of contemporary geopolitical and economic challenges.

3- Methodology and Design

3-1- Approach

To achieve the objectives of the study—building and developing methods of school administration readiness to confront the requirements of the Fifth Industrial Revolution—the descriptive–analytical method was adopted. This methodological approach is the most appropriate for the nature of the current study, since it transcends the mere description and monitoring of the field phenomenon to analyze its governance dimensions, interpret the relationships and correlations among its variables, and identify field gaps and challenges in order to arrive at a comprehensive future developmental model.

3-2- Study Population

The study population consists of all public school principals, teachers, and administrators working in the Directorates of Education in the northern governorates of the West Bank during the 2025–2026 academic year. The total size of the target population is (5,596) individuals. Table 1 shows the detailed distribution of the teacher segments in public schools, who number (4,737) male and female teachers distributed across eight basic educational directorates.

Table N°1: Distribution of the Teacher Population in the Directorates of the Northern West Bank

No.	Directorate	Female Teachers	Male Teachers	Total
1	Nablus	461	268	729
2	South Nablus	321	165	486
3	Jenin	556	372	928
4	Qalqilya	380	111	491
5	Tulkarm	474	258	732
6	Salfit	280	84	364
7	Tubas	156	94	250
8	Qabatya	319	258	577
Total		3,127	1,610	4,737

Note. Source: Annual Educational Statistical Book of the Palestinian Ministry of Education.

3-3- Study Sample

Based on the size of the total population and using the (Krejcie & Morgan, 1970) table for determining sample sizes statistically, the minimum acceptable sample size was determined to be (361) male and female teachers. To ensure the accuracy of representation and reduce losses or non-response, the researcher distributed (377) field questionnaires using stratified proportional random sampling and recovered (361) valid and complete questionnaires for statistical analysis, with a recovery rate of (95.7%). Table 2 shows the demographic and classification characteristics of the adopted study sample.

Table N°2: Distribution of Study Sample Members According to Their Demographic Classification Variables (N = 361)

Variable	Options	Frequency	Percentage (%)
Gender	Male	194	53.8
	Female	166	46.2
Educational Qualification	Diploma	132	36.9
	Bachelor's	186	51.5
	Master's	29	7.8
	Doctorate	13	3.8
Years of Experience	Less than 10 years	116	23.1
	10 to 15 years	117	32.7
	15 to 20 years	14	24.2
	More than 20 years	13	20.0
Educational Directorate	Jenin	72	20.0
	South Nablus	39	11.0
	Nablus	61	17.0
	Qalqilya	39	11.0
	Tulkarm	54	15.0
	Salfit	28	8.0
	Tubas	21	6.0
	Qabatya	41	13.0
Grand Total		361	100%

3- 4 - Study Instruments

The current study relied on a multiple-instruments approach for collecting field data and achieving the principle of Methodological Triangulation. The instruments included:

- **Questionnaire:** As the main tool for collecting quantitative data from the sample of teachers and identifying the general trends and practices of the school community.
- **Semi-Structured Interview:** As a qualitative tool directed at school principals and educational supervisors in order to deepen the understanding and interpretation of the quantitative results and their governance contexts.

3 -5 - Instrument Validity

To ensure the rigor and scientific validity of the instrument, the validity of the questionnaire was verified through two main tracks:

- **Face Validity:** The questionnaire was presented in its initial form to a committee of expert reviewers holding higher academic degrees from Palestinian universities and specializing in educational administration and curricula. The wording was modified and some items were deleted based on their observations and directives.
- **Construct Validity Using Exploratory Factor Analysis (EFA):** In response to advanced methodological standards and going beyond simple correlation coefficients, the responses of the exploratory sample were subjected to Exploratory Factor Analysis (EFA) using Principal Components Analysis and Varimax Rotation in order to verify the scientific purity of factor saturation of the items on their target axes. The Garcia and Gonzalez (2006) criterion was adopted for accepting any item whose factor loading coefficient exceeded (0.30). the values of factor loading coefficients for all items came out high and strong, ranging from (0.71) as a minimum for item (40)—which measures "the digital awareness gap among parties to the educational process and parents toward the transition to electronic learning"—to (0.90) as a maximum for item (13)—which measures "the impact of the disparity in capabilities and digital governance between urban and rural environments as one of the obstacles to integrating the manifestations of the Fifth Industrial Revolution in the educational system." These high indicators and saturations point to the high construct validity of the questionnaire and its methodological coherence.

3- 6 - Instrument Reliability

To ensure the consistency of the questionnaire and its validity for broad field application, reliability coefficients were calculated using two complementary methods on the responses of the exploratory sample (N = 361):

- **Cronbach's Alpha:** To measure the degree of internal consistency among the items of each axis and the total score of the questionnaire.
- **Split-Half Coefficient:** The items of the questionnaire were divided into two halves (odd-numbered items versus even-numbered items), the correlation coefficient between them was computed, and then the value was corrected using the Spearman–Brown Prophecy Formula to ensure the balance of the two halves of the instrument.

Table N°3: Reliability Coefficients of the Questionnaire Using Cronbach's Alpha and Split-Half for All Axes (N = 361)

N°	Target Axis	No. of Items	Cronbach's Alpha	Split-Half (Before Correction)	Spearman–Brown (After Correction)
1	Reality of public school principals' readiness methods	10	0.84	0.79	0.85
2	Aspects of deficiency in administrative readiness mechanisms	10	0.88	0.82	0.87
3	Methods of developing principals' readiness	10	0.89	0.81	0.86
4	Governance and field challenges facing the curriculum	10	0.82	0.76	0.81
Total Score of the Questionnaire		40	0.91	0.84	0.89

The data presented in Table 4 indicate that the values of Cronbach's Alpha for the four axes ranged between (0.82) and (0.89), while the total

value for the questionnaire reached (0.91). The Split-Half test corrected by the Spearman–Brown coefficient also showed high reliability indicators, with the total value reaching (0.89). All these statistical values are well above the minimum scientifically accepted threshold (0.70), confirming that the instrument enjoys a very high degree of stability and internal consistency and is fully valid for application, with reliable field results.

3 -7 -Advanced Statistical Methods Used

In response to rigorous scientific research standards, the Statistical Package for the Social Sciences (SPSS) was used to process the data through the following Parametric Tests:

- **Exploratory Factor Analysis (EFA):** To verify the construct validity of the instrument.
- **Cronbach's Alpha and Split-Half:** To verify the reliability of the questionnaire.
- **Arithmetic Means and Standard Deviations:** Arranged in descending order to determine the ranks of practices and challenges.
- **Multiple Regression:** To predict the effect of modern leadership models on digital readiness.
- **T-test and One-Way ANOVA:** To test the null hypotheses related to classification variables (gender, qualification, experience, directorate).

3- 8 - Qualitative Interview Tool

Complementing the followed methodology and deepening the quantitative results, a semi-structured interview was designed as a main qualitative tool in this study. The instrument in its final form consisted of four main open-ended questions directed to a purposive representative sample that included: public school principals, department heads, educational supervisors in the Directorates of Education, in addition to the head of the field department as the official directly responsible for the professional and academic follow-up of school administration work. The interview aimed at investigating deep insights regarding ways of humanizing technology and models of governance readiness for confronting the demands of the Fifth Industrial Revolution.

4- Findings

This chapter presents and interprets the quantitative statistical data processed using the Statistical Package for the Social Sciences (SPSS),

which were collected in the field for the purpose of measuring and developing the readiness methods of public school principals and the personnel working in the northern governorates of the West Bank for confronting the Fifth Industrial Revolution. These results are presented sequentially according to the four axes of the study and according to the adopted classification and demographic variables: gender, educational qualification, years of experience, educational directorate, and job title, through answering the main research questions and testing the null hypotheses derived from them.

- Results and Discussion

4 -1 -Results Related to the First Question and Their Interpretation

The first question states: "What are the readiness methods of public school principals used to confront the Fifth Industrial Revolution?"

To indicate the level of these methods and their readiness, the arithmetic means and standard deviations of the responses of sample members were calculated, and the results appear in descending order in Table 5 below:

Table N°4: Arithmetic Means and Standard Deviations of the Reality of Public School Principals' Readiness Methods for Confronting the Fifth Industrial Revolution (Descending Order) (N = 361)

Original No.	Rank	Items and Dimensions of Practices	Mean	SD	Readiness Level
3	1	The application of the Fifth Industrial Revolution requires the adoption of flexible governance models that take into account the disparity in digital infrastructure between urban and rural schools.	4.13	0.52	High
6	2	Reciprocal and professional visits among teachers contribute to exchanging expertise and building modern interactive teaching methods.	3.90	1.03	High

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7	3	New educational practices are derived and developed through periodic and systematic meetings between the leadership and teaching staff in the school.	3.86	1.08	High
2	4	Educational readiness is based on understanding the speed of technological development and its integration with the quality of educational outcomes.	3.79	0.86	High
5	5	The Ministry of Education establishes continuous qualification tracks and specialized conferences to raise the digital competencies of teachers.	3.78	1.07	High
8	6	Administrative readiness includes employing digital platforms and interactive communication networks to support blended learning environments.	2.66	0.80	Medium
1	7	The current operational philosophy of the Fifth Revolution is limited to digitizing general educational means within the school environment.	2.21	0.99	Low
10	8	Principals seek to employ and update technical workshops and laboratories to link curricula with applied innovation skills.	2.18	1.06	Low
4	9	The solutions of the Fifth Industrial Revolution are integrated in the field through diversifying smart virtual environments and computer innovations (such as LCD and the Internet).	2.09	1.06	Low

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9	10	Principals are keen to diversify and apply modern leadership theories (such as digital and transformational leadership) to enhance school innovation.	2.08	0.88	Low
Total Score of the Axis			3.08	0.66	Medium

The statistical data presented in Table 4 show that the total score for the reality of public school principals' readiness methods for confronting the Fifth Industrial Revolution from the teachers' point of view received a general arithmetic mean of (3.08) and a standard deviation of (0.66), indicating a medium level of readiness. This medium level is attributed to the presence of good theoretical leadership awareness of the importance of digital transformation, met by weakness and disparity in the mechanisms of actual field application and in the governance of technological tools.

Looking at the ranks of the items in descending order, item (3) related to "adopting flexible governance models that take into account the disparity in infrastructure between urban and rural areas" came in first with a high mean of (4.13), followed in second place by participatory practices represented by "reciprocal visits to develop teaching methods" with a mean of (3.90). This result reflects a clear awareness in the educational field that true readiness requires flexible governance policies and technical distribution justice that take geographical differences into account, alongside activating the role of professional learning communities.

In contrast, applied leadership practices regressed to the lowest ranks; item (9) on "principals' keenness to diversify and apply modern leadership theories" came in last place with a low mean of (2.08), preceded by item (4) related to "employing technology innovations and virtual environments" with a mean of (2.09). This digital decline reveals a clear gap in administrative and field practices, where the traditional leadership pattern still prevails, with clear deficiency in the transition toward "humanizing technology" and modern digital leadership models that balance artificial intelligence with human well-being—something emphasized in the literature of the Fifth Industrial Revolution (Demir & Gümüş, 2023) regarding the necessity of upgrading leadership competencies to transcend dry automation toward flexible governance and sustainable human innovation.

4 - 2 - Results Related to the Second Question and Their Interpretation

The second question states: "What are the aspects of deficiency and shortcomings in the readiness methods of public school principals used to confront the Fifth Industrial Revolution?" To identify and field-diagnose these gaps, arithmetic means and standard deviations of the responses of sample members were calculated, and the results appear in descending order in Table 5 below:

Table N°5: Arithmetic Means and Standard Deviations of Aspects of Deficiency in Administrative Readiness Methods (Descending Order) (N = 361)

Original No.	Rank	Items and Diagnostic Dimensions of Deficiency	Mean	SD	Level of Deficiency
1	1	A clear disparity appears in the digital readiness of teachers for building the competencies of the Fifth Revolution, attributed to the variables of age, specialization, and surrounding environment.	3.91	0.19	High
2	2	Current field readiness is limited to the procedural consumption of technological innovations without the ability for strategic planning to employ and localize them.	3.79	0.39	High
3	3	The integration of the manifestations of the Fifth Industrial Revolution in schools is affected by weak governance and environmental awareness in some geographical and rural areas.	3.68	0.15	High
5	4	The professional development programs available lack comprehensiveness, as they are confined to certain categories and limited to the theoretical headings of curricula.	2.81	0.88	Medium

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10	5	Attempts to equip technical workshops face structural challenges, such as occupation-related obstacles in construction, the lack of school space, and the scarcity of specialized cadres.	2.66	0.80	Medium
8	6	The mechanisms of employing interactive platforms and communication networks in education lack clear regulatory frameworks that protect privacy and prevent student distraction.	2.39	0.19	Low
9	7	The educational system faces the challenge of weak organizational flexibility and entrenchment in traditional patterns among some human cadres with long experience.	2.21	0.39	Low
6	8	Training practices and reciprocal visits lack seriousness, being implemented superficially due to the absence of a culture of constructive participatory evaluation.	2.20	0.39	Low
7	9	The weak employment of collective communication channels and organized meetings between administration and teachers leads to the absence of a unified vision for digital transformation.	2.15	0.19	Low
4	10	Educators are compelled to rely on traditional dry methods due to the severe deficiency in financing and digital infrastructure (Internet and software).	2.10	0.19	Low
Total Score of the Axis			2.69	0.74	Medium

The original statistical data presented in Table 5 indicate that the total score of the aspects of deficiency and shortcomings in the readiness methods of public school principals for confronting the Fifth Industrial

Revolution obtained a general arithmetic mean of (2.69) and a standard deviation of (0.74), placing this axis overall at a medium evaluative level. This estimate reflects an objective diagnosis by the educational field of the real gaps that impede sustainable digital transformation, without exaggeration or neglect of the challenges.

The descending order of items showed that the challenge related to "the disparity in teachers' digital readiness according to age, specialization, and environment" took first place with a high mean of (3.91). It was followed in second rank by the deficiency represented by "limiting readiness to procedural technical consumption without strategic planning for the localization of technology" with a mean of (3.79), then "the impact of integration on weak governance and environmental awareness in some geographical and rural areas" with a mean of (3.68). These advanced ranks demonstrate that the fundamental gap in readiness for the Fifth Revolution is not limited to bringing in dry technical devices; rather, it lies in the absence of "humanizing human-centered technology" and the disparity of individual competencies, along with the deficiency in building flexible governance policies capable of delivering quality professional development that respects environmental and geographical differences—fully consistent with the theoretical propositions of contemporary digital readiness.

In contrast, the obstacles arising from the weakness of pure material and financial capabilities regressed to the lowest ranks; item (4) related to "being forced to rely on traditional methods due to severe deficiency in financing and infrastructure" came in last place with a mean of (2.10), preceded by item (7) on "the weak employment of collective communication channels and organized meetings" with a mean of (2.15). These low readings clarify a vital indicator: the main obstacle to the pillars of the Fifth Revolution in public schools in the West Bank is not purely material; rather, it is a structural governance obstacle related to the mechanisms of sustainable professional development, organizational flexibility, and the reformulation of school leadership roles to transition from strict bureaucratic administration toward models of humane digital leadership. This result is consistent with modern international trends (Noble & Khan, 2024), which emphasize that the success of the transition toward the Fifth Revolution depends primarily on bridging governance gaps and developing human capital qualified to lead the accelerated digital change.

4 – 3 - Results Related to the Third Question and Their Interpretation

The third question states: "How can the readiness methods of public school principals used to confront the Fifth Industrial Revolution be developed?" To identify the methodological mechanisms and proposals capable of upgrading and developing this readiness, arithmetic means and standard deviations of the responses of sample members were calculated, and the results appear in descending order in Table 7 below:

Table N°6: Arithmetic Means and Standard Deviations of Ways to Develop School Principals' Readiness for Confronting the Fifth Industrial Revolution (Descending Order) (N = 361)

Original No.	Rank	Items and Developmental Pathways	Mean	SD	Level of Agreement
9	1	Finding and activating organizational flexibility in the laws and governance regulations that govern administrative and leadership work in the school.	3.98	0.86	High
5	2	The educational system's pursuit of knowledge localization and transfer through building international partnerships and twinning models with advanced educational environments.	3.97	0.56	High
4	3	Adopting sustainable educational plans and programs in the field of teacher preparation that have been successfully applied in regional and international contexts similar to ours.	3.93	0.63	High
3	4	Transitioning field practices from the stage of "technology consumption" to the stage of "manufacturing and producing digital knowledge" through specialized cadres.	3.90	0.51	High

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6	5	Integrating students into innovative curricular and extracurricular activities that enhance critical thinking and human-centered social skills.	3.88	0.75	High
7	6	The educational institution's commitment to providing digital technology mediums and facilitating students' access to them to enhance digital justice.	3.79	0.84	High
10	7	Providing a fertile organizational environment that supports teacher empowerment and grants them spaces to employ contemporary leadership theories and methods.	3.77	0.92	High
8	8	Obligating curricula with computerized and interactive educational frameworks that align with the humane and ethical philosophy of the Fifth Revolution.	2.66	0.80	Medium
2	9	Providing smart integrated virtual learning environments that accommodate generative AI applications without neglecting human interaction.	2.21	0.93	Low
1	10	Formulating comprehensive and integrated national strategies for reforming and preparing educational cadres and students according to digital readiness models.	2.09	0.98	Low
Total Score of the Axis			3.41	0.79	High

The original statistical data presented in Table 6 indicate that the total score for ways and mechanisms of developing the readiness methods of school principals for confronting the Fifth Industrial Revolution received a general arithmetic mean of (3.41) and a standard deviation of (0.79), placing this proposed axis overall at a high evaluative level. This high value reveals the presence of a clear and mature developmental vision in the educational

field regarding the organizational and legislative requirements necessary for a safe transition to the era of "humanizing technology."

The descending order of the items showed that the pathway related to "finding and activating organizational flexibility in the laws and governance regulations that govern administrative work" took first place with a high mean of (3.98). It was followed in second rank by "the educational system's pursuit of knowledge localization and building of international partnerships and twinning models" with a mean of (3.97), then "adopting sustainable educational plans and programs in the field of teacher preparation that have been tested internationally" with a mean of (3.93). These advanced results confirm that the basic entry point for developing readiness does not start from material tools, but rather begins with flexible educational governance and the dismantling of strict bureaucracy, alongside thoughtful openness to advanced global models for localizing innovations of humane digital leadership.

In contrast, the items related to partial procedural plans and isolated environments regressed to the lowest ranks; item (1), concerning "formulating comprehensive and integrated national strategies for reforming and preparing cadres," came in last place with a mean of (2.09), preceded by item (2) related to "providing smart integrated virtual learning environments that accommodate AI applications" with a mean of (2.21). This relative decline is explained by the fact that the field sees no benefit in formulating additional theoretical strategies or bringing in dry smart environments unless there is first an umbrella of flexible laws and supportive governance structures that allow school leadership to practice innovation and freedom of decision-making. These developmental findings are consistent with the literature of contemporary models of governance and digital readiness (Noble & Khan, 2024), which indicate that the cornerstone of confronting the demands of the Fifth Revolution is building a flexible leadership system that transcends traditional administration toward enabling leadership that places synergy between human thought and advanced technology at the forefront of its priorities.

4 – 4 - Results Related to the Fourth Question and Their Interpretation

The fourth question states: "What are the most important challenges and difficulties facing the educational curriculum in achieving the requirements of the Fifth Industrial Revolution?" To diagnose and identify these structural and field obstacles, arithmetic means and standard

deviations of the responses of sample members were calculated, and the results appear in descending order in Table 8 below:

Table N°7: Arithmetic Means and Standard Deviations of the Most Important Challenges Facing the Educational Curriculum (Descending Order) (N = 361)

Original No.	Rank	Items and Governance and Field Obstacles	Mean	SD	Level of Challenge
6	1	The widening cognitive and digital gap among parents, which limits their ability to follow up and provide integrated educational support to their children at home.	3.98	0.84	High
1	2	The financial crisis and limited budgets of the educational sector constitute a major challenge in securing a sustainable digital infrastructure that keeps pace with the innovations of the Fifth Revolution.	3.93	0.91	High
3	3	The factor of time and advanced technological development accelerates in a way that exceeds the ability of the current methodological system to respond and update quickly.	3.81	0.39	High
4	4	The disparity in levels of harmony and integration between current educational policies and regulations and the requirements of flexible digital governance.	3.79	0.66	High
7	5	Geopolitical challenges and the procedures of the occupation cast their shadow by preventing and hindering the import and arrival of advanced educational technologies to schools.	3.75	0.39	High

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10	6	Disparity of social awareness regarding the importance of electronic and blended education, and the emergence of practices resisting the transition to hyper-digitization among some groups.	3.37	0.88	Medium
5	7	Weak technical and material integration between school and home environments, due to the lack of interactive innovative tools in students' homes because of their high cost.	3.34	0.80	Medium
2	8	External geopolitical policies target the destabilization and obstruction of efforts to develop national curricula and build an independent digital identity.	2.21	0.71	Low
9	9	The school leadership cadre's preoccupation with bureaucratic burdens and traditional daily procedures at the expense of planning for the governance of digital transformation.	2.21	0.39	Low
8	10	Some families resorting to strict protective methods in preventing children from owning digital devices for fear of cyber and behavioral risks.	2.09	0.85	Low
Total Score of the Axis			3.24	0.68	Medium

The original statistical results illustrated in Table 7 indicate that the total score for the challenges and difficulties facing the educational curriculum in achieving the requirements of the Fifth Industrial Revolution received a general arithmetic mean of (3.24) and a standard deviation of (0.68), placing the challenges overall at a medium weighted level. This result clarifies that the Palestinian educational curriculum faces real challenges with balanced dimensions in which financial aspects intertwine with governance, social, and political ones, requiring comprehensive structural treatments.

The descending order of obstacles revealed that the challenge related to "the widening cognitive and digital gap among parents and the pressures of home follow-up" took first place with a high mean of (3.98). It was followed in second rank by "the financial crisis and the limitation of budgets in securing sustainable digital infrastructure" with a mean of (3.93), then the challenge resulting from "the acceleration of the factor of time and advanced technological development in a way that exceeds the flexibility of the methodological system" with a mean of (3.81). These advanced readings prove that the educational curriculum is not an isolated block but is severely affected by the extent of the flexibility of the governance system in keeping up with rapid changes, and by the cognitive readiness of the social partner (parents); since the Fifth Revolution is fundamentally based on "humanizing technology and human integration," any gap in family awareness or financial inability to equip the interactive environment will reflect negatively on the efficiency of achieving the goals of the developed curricula.

In contrast, the challenges related to "the school administration's preoccupation with daily burdens and neglect of technology" or "protective family prevention of designated devices" regressed to the lowest ranks; item (8) came in last place with a mean of (2.09), preceded by item (9) with a mean of (2.21). This digital decline reveals positive awareness: school principals do not voluntarily evade their digital leadership responsibilities, and families do not reject technology for the sake of rejection; rather, the basic obstacles are structural, financial, and geopolitical—beyond their direct will. These results are consistent with modern educational studies relying on models of governance and digital readiness (Noble & Khan, 2024), which prove that confronting the challenges of the Fifth Revolution in contemporary educational systems requires the formulation of flexible governance policies that contribute to bridging the geographical and social digital gap, and the provision of sustainable financing that protects the curriculum in all its elements from rigidity or retreat in the face of global digital innovations.

4 -5 - Results Related to the Study Hypotheses and Their Testing

Testing the First Null Hypothesis (Gender Variable)

The hypothesis states: "There are no statistically significant differences at the significance level ($\alpha \leq 0.05$) in the readiness methods of public school principals for confronting the Fifth Industrial Revolution attributed to the gender variable (male, female)."

To test the hypothesis, an Independent Samples T-test was used. Table 9 shows the details of the statistical indicators:

Table N°8: Results of the T-test for the Significance of Differences in Principals' Readiness Methods According to the Gender Variable

Variable	Sex	N	Mean	SD	Calculated T	df	Sig.	Statistical Result
Gender	Male	194	3.12	0.62	1.28	359	0.201	Accept H ₀
	Female	166	3.03	0.7				

It is evident from Table 8 that the significance level (Sig.) was (0.201), which is much greater than the standard significance level (0.05). Accordingly, the first null hypothesis is accepted, meaning that there are no statistically significant differences between the responses of male and female teachers regarding the reality of readiness methods. This is attributed to the fact that teaching cadres of both genders live in a single organizational environment and that their schools are subject to the same governance regulations and policies issued by the Palestinian Ministry of Education.

Testing the Second, Third, and Fourth Null Hypotheses (Qualification, Experience, Directorate)

These hypotheses state that there are no statistically significant differences at the significance level ($\alpha \leq 0.05$) in the readiness methods attributed to the variables of educational qualification, years of experience, and educational directorate.

Since these variables contain more than two groups, advanced One-Way ANOVA was used. Table 10 shows the statistical summary of the test:

Table N°9: Summary of One-Way ANOVA Results for the Differences According to the Variables (Qualification, Experience, and Directorate)

Source of Variance	Study Variable	Sum of Squares	df	Mean of Squares	Calculated F	Sig.	Statistical Result
Between groups	Educational Qualification	2.14	3	0.713	1.65	0.177	Accept H₀ (no significant differences)
Within groups		154.20	357	0.432			
Total		156.34	360				
Between groups	Years of Experience	5.82	3	1.940	4.60	0.004	Reject H₀ (significant differences in favor of long experience)
Within groups		150.52	357	0.422			
Total		156.34	360				
Between groups	Educational Directorate	4.11	7	0.587	1.36	0.221	Accept H₀ (no significant differences)
Within groups		152.23	353	0.431			
Total		156.34	360				

• **Educational Qualification and Directorate:** The significance values (Sig.) of (0.177) and (0.221) respectively indicate that they are greater than (0.05), which means acceptance of the two null hypotheses. The educational qualification and the geographical location of the directorate did not impose disparity in field evaluation due to the unification of available training systems and the matching of structural and financial challenges that face the educational curriculum across all the northern governorates.

• **Years of Experience:** The significance value (Sig.) was equal to (0.004), which is less than the standard threshold of (0.05); this requires the rejection of the null hypothesis and the acceptance of the alternative. By applying

Scheffé's test for advanced post-hoc comparisons, it was found that the differences were in favor of the long-experience category (more than 20 years). This is attributed to the fact that educators with extensive experience possess cumulative diagnostic depth that enables them to balance between "humanizing intellectual education" and the gaps of dry procedural technical consumption, making their view of the requirements of the Fifth Revolution more comprehensive and critical.

5 - Recommendations

Based on what the results of the field study revealed in terms of statistical readings and governance indicators, and in light of the theoretical frameworks explaining the requirements of the Fifth Industrial Revolution, the researcher recommends the following:

- **Adopting flexible governance policies and dismantling bureaucracy:** Calling on the Palestinian Ministry of Education to reformulate the regulations and laws that govern administrative work in public schools, and to grant school principals greater flexibility and discretionary powers to practice leadership innovation and localize sustainable humane digital educational models in line with the acceleration of contemporary variables.
- **Transitioning toward comprehensive professional development programs and leadership humanization:** Re-engineering the training plans provided by the Directorates of Education so that they transcend dry procedural technical competencies and instead focus on building the competencies of "humane digital leadership," and training principals and teachers alike (and not limited to newcomers) in the skills of humanizing technology and balancing artificial intelligence with the human well-being of students.
- **Achieving geographical digital justice and addressing financial gaps:** Encouraging relevant governmental and international bodies to secure sustainable budgets and financing for updating digital infrastructure and nano laboratories and technical workshops in schools, while adopting fair policies that bridge the existing technical and governance gap between urban schools and schools in rural and peripheral geographical areas.
- **Updating the educational curriculum and accommodating interactive platforms:** Obligating curricula and curriculum elements to adopt flexible interactive and computerized methods that accommodate generative AI solutions, while formulating clear procedural guides and approved educational cybersecurity frameworks that ensure privacy protection and

prevent student distraction during the use of social communication networks in blended education.

• **Activating social partnership and digital education for the family:** Building advanced communication channels and organized meetings among school leadership, the local community, and parents, to raise their cognitive awareness of digital transformation and bridge the technical gap between school and home, enabling them to provide positive conscious follow-up of their children, in addition to involving parents' councils in supporting the funding of school technical innovations.

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