



## Artificial Intelligence Techniques and Their Role in Enhancing the Competitive Advantage of Palestinian Schools

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

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### Abstract:

This study aimed to identify artificial intelligence (AI) technologies and their role in enhancing competitive advantage in Palestinian schools. Researchers used a sequential explanatory design, conducting unstructured interviews with experts to develop the questionnaire, followed by structured interviews to interpret the results. A simple random sample of 272 teachers from the Al-Hussein Educational Cluster in Hebron was selected. The study revealed a statistically significant relationship between AI technologies and competitive advantage in the schools. Key areas for improvement included the quality of educational services, creativity, innovation, responsiveness to teachers' needs, and efficiency. Recommendations included increased investment in digital infrastructure, teacher training, and specialized AI research and development programs. The study also emphasized strategic planning, data protection, stakeholder cooperation, and clear ethical policies. Effective use of AI was concluded to significantly enhance the competitiveness and quality of education in Palestinian schools. This study is a valuable scientific contribution in the field of enhancing competitive advantage. Its results indicate the importance of artificial intelligence technologies in enhancing competitive advantage in Palestinian schools.

**Keywords:** *Artificial Intelligence, Competitive Advantage, Palestinian Schools.*

## تقنيات الذكاء الاصطناعي ودورها في تعزيز الميزة التنافسية في المدارس الفلسطينية

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### ملخص:

هدفت هذه الدراسة إلى التعرف على تقنيات الذكاء الاصطناعي ودورها في تعزيز الميزة التنافسية في المدارس الفلسطينية. استخدم الباحثون المنهج التفسيري المتتابع (Explanatory Sequential Design)، حيث تم إجراء مقابلات غير مهيكلة مع خبراء ومختصين لإعداد الاستبانة، تلاها مقابلات مهيكلة من أجل تفسير النتائج. تم اختيار عينة عشوائية بسيطة مكونة من (272) معلم في منطقة عنقود الحسين التعليمية في مدينة الخليل. أشارت نتائج الدراسة إلى وجود علاقة ذات دلالة إحصائية بين تقنيات الذكاء الاصطناعي ودورها في تعزيز الميزة التنافسية في مدارس منطقة عنقود الحسين التعليمية. كما أشارت الدراسة إلى وجود مستوى عالٍ من الميزة التنافسية بين المدارس الفلسطينية، مع تحديد مجالات جودة الخدمة التعليمية والإبداع والابتكار والاستجابة لاحتياجات المعلمين والكفاءة المتميزة كمجالات رئيسية لمزيد من التحسين. أوصى الباحثون بضرورة زيادة الاستثمار في البنية التحتية الرقمية، وتدريب المعلمين، والحرص على توفير البرامج البحثية والتطويرية المتخصصة في مجال الذكاء الاصطناعي. بالإضافة إلى ذلك، أكدت الدراسة على أهمية التخطيط الاستراتيجي، وإجراءات حماية البيانات، علاوة على التعاون مع أصحاب المصلحة، ووضع سياسات أخلاقية واضحة. خلصت الدراسة إلى أنه من خلال الاستفادة الأكثر فاعلية للذكاء الاصطناعي يمكن للمدارس الفلسطينية المضي قدماً نحو تعزيز القدرة التنافسية والارتقاء بجودة التعليم. تُعدّ هذه الدراسة إسهاماً علمياً قيماً في مجال تعزيز الميزة التنافسية. وتُشير نتائجها إلى أهمية تقنيات الذكاء الاصطناعي في تعزيز الميزة التنافسية في المدارس الفلسطينية.

الكلمات المفتاحية: الذكاء الاصطناعي؛ الميزة التنافسية؛ المدارس الفلسطينية.

## 1. Introduction

The current technological revolution fueled by advancements in artificial intelligence is transforming various aspects of life, including the education sector. Palestine, like other countries, recognizes the importance of these technologies in enhancing the quality of education and strengthening its capabilities, especially in light of the challenges facing the Palestinian education system. Since the dawn of the technology age to the current era characterized by artificial intelligence, the world has witnessed tremendous transformations that impact people's lives and improve their quality, prompting them to explore more effective means to enhance their lives. Artificial intelligence represents a qualitative leap in this transformation, as it can bring about radical changes in multiple fields, including education.

AI applications in education offer innovative solutions to the key challenges facing the Palestinian education system. By personalizing learning for each student, enhancing the quality of educational content, and strengthening students' 21st-century skills, AI can significantly contribute to the development and efficiency of education. However, there are challenges that need to be overcome to ensure the full benefit of AI in Palestinian education, such as the lack of digital infrastructure, the need to train teachers to use these technologies effectively, ensuring student data privacy and security, and addressing financial challenges. By investing efforts in overcoming these challenges and fully utilizing the potential of AI, Palestine can achieve significant improvements in its education system and empower its students to excel in an era of rapid change and continuous transformation.

Possessing a competitive advantage enhances an organization's overall competitiveness, thereby expanding its options for service delivery and expansion, fostering relative stability and longevity. Additionally, competitive advantages provide resilience against sudden changes such as economic fluctuations or the entry of powerful new competitors. Moreover, holding competitive advantages strengthens an organization's bargaining power with suppliers and enables it to offer its services or products with relative stability (Abd Alghafoor, 2015). AI technologies represent modern strategic techniques that focus on knowledge production through acquisition, storage, processing, interpretation, and utilization in problem-solving and novel service offerings. They strive to enhance efficiency and create new opportunities for gaining a competitive edge. Organizations can accomplish tasks more efficiently through the support of AI's advanced decision-making applications, particularly in administrative settings. To fully capitalize on AI's potential, organizations require expertise in designing and managing AI solutions on a large scale. AI projects demand more than just hiring a data scientist; organizations play a crucial role in implementing the processes, tools, and management strategies that ensure AI's successful achievement of organizational goals (Mutiri, 2019).

### 1.1 Research Problem

Palestinian schools play a pivotal role in enhancing the quality of their educational services to achieve student satisfaction, which in turn fosters their distinctive aspects and ensures future competitiveness through the adoption of AI technologies. On the other hand, Palestinian education faces significant challenges that hinder its ability to compete on an international level. Among the most prominent of these challenges are the scarcity of financial and human resources in schools, which negatively impacts the quality of education provided to students. Additionally, overcrowded classrooms and the lack of teacher skills in using technology are pressing problems that hinder the educational process. Based on these challenges, the main research problem emerges: How can AI technologies be enabled to contribute to strengthening the competitive advantage of Palestinian schools? Can these

technologies provide effective solutions to improve educational performance and enhance intelligent interaction between students and teachers?

### 1.2 Research Questions

Based on the foregoing, the research aims to answer the following questions:

1. Is there a statistically significant effect of using AI technologies and their role in enhancing the competitive advantage of Palestinian schools?
2. What is the current status of AI technology usage in Palestinian schools?
3. What is the current state of competitiveness in Palestinian schools?

### 1.3 Significance of the Study

The significance of this study lies in the following aspects:

- **Practical Significance:** This study holds practical significance at various levels. One of the researchers holds a Bachelor's degree in Computer Systems Engineering, works as an Information Technology teacher in the Hussein Cluster Educational Area in Hebron, and has a Master's degree in Business Administration with managerial experience. The other researchers include a Ph.D. holder in Human Resources Management with academic expertise in the administrative field and experience in administrative positions at the university, and an Assistant Professor in Management and Accounting who serves as the Assistant Dean of Graduate Studies. The practical importance of this study is evident in the significance of artificial intelligence, which has become a pressing necessity amid the rapid technological advancements in all fields, especially education. Given the importance of the digital reality in which all organizations operate, the application of artificial intelligence techniques and their role in enhancing the competitive advantage in Palestinian schools is crucial. This study serves as a valuable tool for decision-makers and educational officials in making informed decisions and, on the other hand, contributes to enhancing the skills of both students and teachers.

- **Scientific Significance:** Its significance is evident in measuring the role of artificial intelligence techniques in enhancing the competitive advantage in Palestinian schools and the developmental opportunities that arise from this application, which contribute to improving the quality of education and increasing the competitiveness of the schools. Additionally, it addresses the knowledge gap in the Arabic research library due to the lack of sufficient studies on the use of artificial intelligence techniques and their role in enhancing competitive advantage in the context of Palestinian schools—as far as the researchers are aware. Furthermore, the study contributes to enhancing innovation in the educational field by stimulating creativity and providing innovative solutions to the challenges faced by Palestinian education. Thus, the study aids in achieving sustainable development goals, particularly the goal related to quality education for all.

### 1.4 Research Terminology

**Artificial Intelligence (AI) Technologies:** A Collection of Tools and Techniques that Leverage Computing and Intelligent Analytics to Model and Augment Human Intelligence. These technologies are employed across a wide spectrum of fields, including education, medicine, commerce, and industry, to enhance efficiency and drive data-driven decision-making. For a deeper understanding of AI technologies, please refer to numerous scientific references (Norvig & Russell, 2021).

**Researchers define AI technologies operationally** is a set of computer-based technologies that have the capability of decision-making and machine learning based on scientific algorithms. These technologies aim to improve performance, increase efficiency, enhance competitiveness, and keep up with changes and continuous improvement that relies on feedback.

**Competitive Advantage:** The term "competitive advantage" refers to the distinction or superiority that an organization or company possesses over its rivals in a specific market, which contributes to

achieving better performance or attaining specific goals more effectively. This distinction may be related to quality, cost, excellence in products or services, innovation, or any other aspect that makes the organization stand out and excel in its market (Michael, 1980).

**Researchers define competitive advantage** It is the advantage that the educational institution gains over its competitors in the same market, leading to superiority for students, teachers, and parents alike. This advantage depends on the institution's ability to adapt to the rapid technological developments in the needs of students, teachers, and the community.

## 2. Research Framework

Artificial intelligence (AI) technologies represent a collection of tools and techniques that can play a pivotal role in enhancing the competitive advantage of Palestinian schools. These technologies rely on the utilization of data and intelligent analytics to refine learning and teaching processes, and develop assessment and follow-up methodologies. One of the most significant benefits of employing AI technologies in schools is the improvement of the learning experience for students. Educational resources can be effectively personalized to cater to the individual needs of each student. Additionally, these technologies contribute to enhancing the efficiency of administrative operations within schools, thereby augmenting the productivity of the teaching staff and bolstering the quality of education provided. Consequently, AI technologies play an instrumental role in strengthening the competitive edge of Palestinian schools both locally and internationally.

### 2.1 Artificial Intelligence Techniques

The rapid advancements in the technological realm have given rise to numerous modern sciences that serve a wide range of fields and specialties. Among the most prominent of these sciences is artificial intelligence (AI), which is, in essence, the culmination of human experiences, expertise, and intelligence translated into programs and devices that serve individuals, such as conducting scientific research experiments, or serve economic institutions in carrying out various activities. Artificial intelligence stands as one of the most captivating subjects of study in recent times, particularly in light of technological and cognitive developments. As AI increasingly mimics human intelligence, it warrants significant attention. Despite the skepticism expressed by some scholars regarding the potential of AI to transcend its role as an expert system that rivals human intelligence and evolve into sophisticated systems that can be employed in various institutions, particularly educational institutions that are currently striving to achieve a high level of competitiveness (JabaAllah et al., 2021). Artificial intelligence (AI) has emerged as a pivotal discipline within the realm of the digital economy, transcending its initial confines in healthcare, electronic gaming, and science fiction films to permeate the educational landscape. As various institutions increasingly recognize the transformative potential of AI, its integration into the educational sector is gaining momentum. Amidst the intensifying competition across diverse fields, numerous institutions are embracing expert systems to navigate decision-making processes, highlighting the inextricable link between AI and an institution's competitive edge (Rowais, 2021).

Despite its relatively recent emergence in the mid-20th century, the roots of artificial intelligence (AI) and its underlying concepts can be traced back millennia. As early as 400 BC, philosophers laid the groundwork for AI by conceptualizing the mind as akin to a machine that processes encoded information using an internal language, suggesting that this mechanism could be harnessed to reach sound decisions. In 1956, the Dartmouth Summer Research Project on Artificial Intelligence marked a pivotal moment in the field's history, introducing the term "artificial intelligence" coined by John McCarthy. That same year, Herbert Gelernter presented the "Geometry

Theorem Solver," a groundbreaking program capable of proving the validity of complex mathematical theorems. This marked the beginning of a surge of advancements in robotics and neural networks, paving the way for the modern AI landscape (AbdAlNoor, 2015).

Researchers have struggled to establish a single, universally accepted definition for artificial intelligence (AI). Despite this ongoing debate, various attempts have been made to articulate the core concepts of this field. AI is often described as a relatively recent discipline within computer science that focuses on developing and designing intelligent computer systems capable of mimicking human intelligence. These systems are designed to perform tasks that would typically require human intervention, emulating human functions and capabilities through the utilization of qualitative properties and logical and computational relationships (Jozi & Bouzid, 2022).

Kurzweil's definition of AI aligns with the concept of AI as the art of creating machines that can perform tasks that typically require human intelligence. This definition emphasizes the ability of AI systems to mimic human cognitive abilities and perform tasks that would otherwise require human intervention (Fadli, 2018). While Dan w Patterson's definition of AI aligns with the concept of AI as a branch of computer science that focuses on creating intelligent computer systems. This definition emphasizes the ability of AI systems to exhibit intelligent behavior, solve problems, and understand natural language (Hajira, 2018).

The characteristics of artificial intelligence and its application in educational programs are distinguished by several important aspects. The most prominent of these characteristics include using AI to solve presented problems, the ability to think and perceive, acquiring and applying knowledge, learning and understanding from past experiences, and using trial and error to explore different matters. Additionally, AI is characterized by its ability to respond quickly to new situations and conditions, handle difficult and complex cases, deal with ambiguous situations in the absence of information, discern the relative importance of elements in the presented cases, and visualize, innovate, understand, and perceive visual matters. AI also provides information for making administrative decisions. These characteristics make the use of AI technologies in educational programs significantly contribute to improving learning processes and developing students' skills (Rowais, 2021).

Despite the significant benefits that artificial intelligence offers in the field of education, it also faces several drawbacks and challenges. One of the main disadvantages is the high cost of implementing AI applications in education, which restricts access for some educational institutions. Additionally, there is the potential for increased unemployment among teaching staff as intelligent applications may replace some teachers. AI robots and applications are also susceptible to hacking and self-replicating viruses, posing a threat to data privacy and system integrity. Excessive focus on technology can lead to a lack of social interaction and reduced personal communication and collaboration among students. Over-reliance on machines can also result in a decline in students' desire to learn and a lack of motivation for independent learning. Furthermore, robots face difficulties in certain situations, particularly in delicate human interactions such as understanding emotions and non-verbal expressions. Smart technology can negatively impact human behavior, including decreased levels of concentration and natural social interaction due to constant engagement with devices and intelligent software (Fahimirad & Kotamjani, 2018).

## **2.2 The Competitive Advantage**

It is well known among academic professionals that new terms and concepts often emerge in the fields of industry, trade, and economics, and gradually transition into the field of education. Similarly, the concept of competitive advantage has begun to make its way into education. Competitive

advantage in education can be defined as the ability of a school to provide high-quality educational and research services, which positively impacts the level of its graduates and faculty members, endowing them with competitive skills and advantages. At the same time, this reflects the community's trust in and cooperation with the institution, and increases student enrollment (Said, 2015).

Many researchers and specialists have attempted to define the concept of competitiveness precisely, but they have encountered difficulties, leading to diverse opinions and perspectives on this concept. According to (Rowais, 2021), competitive advantage enables an educational institution to discover new, more effective methods than those used by competitors and to implement these discoveries practically, embodying a process of innovation in its broadest sense. (JabaAllah et al., 2021) view it as an institution's ability to formulate and implement strategies that place it in a better competitive position compared to other institutions operating in the same field. This involves balancing cost control, differentiation, and creating value for customers, as well as the ability to withstand competitors, aiming to achieve profitability, growth, expansion, success, and renewal.

Given that competitiveness is linked to internal capabilities to face external challenges, it is essential for this capability to possess several vital characteristics that form the necessary conditions for achieving effective competitiveness. These characteristics include flexibility, which represents the ability to adapt to environmental changes in a way that enhances competition and strengthens an advanced competitive position. Productivity is another critical trait, defined as the ability to utilize resources efficiently to achieve the highest levels of productivity at the lowest possible cost, thus enhancing superiority over others. Additionally, value is crucial, as the source of competitiveness must have tangible and inspiring value. Differentiation is also important, signifying the ability to create unique and non-imitative competitive advantages that contribute to achieving superiority and distinction in the market. Decisiveness means that the competitive ability has the capacity to excel and overcome competitors. Rarity and defensibility are also essential, indicating the ability to maintain its superiority and the difficulty for others to imitate. Lastly, continuity and dynamism ensure the sustained superiority and ongoing development to meet changing market requirements (Qarni, 2017).

The importance of competitive capability for organizations is evident in the numerous strategic benefits and advantages it provides. These benefits include achieving a lasting and continuous relative advantage by reducing production costs and improving product quality. Competitive capability also serves as a strategy that surpasses other strategies such as differentiation, focus, or overall cost leadership. Additionally, it adds distinctive value through the value chain of primary and support activities within the sector in which it operates. Moreover, developing competitive capability enhances the organization's progress in key production areas, strengthening its connection to the productive environment and its ability to meet market needs effectively (Abed, 2017).

Acquiring competitive capabilities requires a deep understanding of their sources, enabling efforts to be directed toward specific goals and achieving savings in time, effort, and money. Two primary sources of competitive capability can be distinguished. The first source focuses on strategic thinking as a means to build strong competitive capabilities, based on general competitive strategies. The second source relates to resources as a primary entry point, where tangible and intangible resources and competencies are considered the foundation of competitive advantages that are difficult to imitate, thereby enhancing the sustainability of superiority over competitors (JabaAllah et al.,

2021).

### 3. Literature Reviews

Toul and Bakar (2023) conducted a study aimed at understanding the impact of using artificial intelligence systems on improving product quality and creating a competitive advantage from the perspective of engineers and employees at CERAM Ghazouat. The study found a statistically significant impact relationship between the use of artificial intelligence systems and creating a competitive advantage. However, it indicated that there is no significant impact relationship between the use of artificial intelligence systems and improving product quality.

Al-Muraikhi's (2023) study aimed to determine the current state of administrative performance quality among secondary school principals in Hafar Al-Batin Governorate in light of artificial intelligence requirements. It also sought to examine the impact of variables such as specialization, qualification, type of school, and experience on the principals' responses, as well as the influence of artificial intelligence on improving the principals' performance. The researcher recommended implementing a flexible incentive system for those excelling in artificial intelligence, equipping schools with the necessary infrastructure to utilize AI programs, and providing specialists in this field. Additionally, the study proposed conducting complementary research on the subject.

The study by Almalki (2023) aimed to elucidate the role of AI applications in bolstering educational strategies in higher education, as well as exploring the strategic benefits that educational institutions can reap from integrating AI into their operations. One of the key findings of the study was that AI plays a significant role in empowering teachers, enhancing student performance, and making the learning process more efficient. The study also concluded that there is an urgent need to raise awareness among educational stakeholders regarding the importance of utilizing AI applications in educational strategies and to ensure that challenges do not hinder its adoption.

While the study by Mohammed (2020) sought to measure and analyze the impact of AI-powered administrative applications on the competitive advantage of business organizations, with a focus on commercial bank branches in the city of Mansoura, Egypt. The study concluded that there is a positive correlation between AI and competitive advantage, and it also indicated that AI has a positive significant impact on various dimensions of competitive advantage.

Study Al Dhahouri (2022) aimed to investigate the impact of artificial intelligence on performance in universities through a field study on theoretical and applied colleges at Ain Shams University. The study adopted a descriptive-analytical approach. The study found a significant relationship between artificial intelligence and performance improvement in Ain Shams University colleges. The results also demonstrated that the university utilizes artificial intelligence to provide systems and programs that facilitate connecting various university units, enabling information and data sharing. Another study by Rowais (2021) aimed to highlight the essential requirements of artificial intelligence and the importance of its different models and systems in developing the educational process. It discussed the relationship between AI and the competitiveness of educational institutions, emphasizing AI's significance in the education sector and its impact on enhancing outcomes. The study concluded that AI significantly contributes to enhancing the competitive advantage of educational institutions and advancing education through AI applications used in intelligent content, smart learning systems, virtual reality, and augmented reality. However, it stressed the importance of aligning technological advancements with wisdom and rationality to mitigate potential negative consequences that educational institutions may face.

The study by JabaAllah et al. (2021) aimed to understand the role of artificial intelligence in various systems in enhancing competitive capability within an economic institution. The study



targeted a sample from Condor Corporation. The study found a significant positive impact relationship between artificial intelligence and competitive capability. It also observed that Condor Corporation applies artificial intelligence to enhance competitive capability by supporting the adoption of modern AI applications in economic institutions.

The reviewed studies have yielded a wealth of findings and recommendations across various domains, illuminating the relationship between AI implementation and its role in fostering competitive advantage. Additionally, these studies have highlighted numerous challenges and obstacles that hinder the effective adoption of AI and its impact on competitive advantage, providing valuable insights for researchers to refine their studies, define and articulate the research problem, design questionnaires, and formulate survey questions. The reviewed studies exhibit a diversity of approaches in addressing the research topic, reflecting the unique perspectives of each researcher. Each study stems from a distinct research problem, prompting the researcher to pursue specific findings. This divergence in approaches serves as a strength, offering researchers a rich tapestry of knowledge and ideas to enhance the theoretical underpinnings of the study.

## 4. Methodology of Research

### 4.1 Study Design

In this study, the researchers employed the explanatory sequential design (Explanatory Sequential Design (Creswell, 2016) to investigate the relationship between AI implementation and competitive advantage. This mixed-methods approach involves collecting and analyzing data using both qualitative and quantitative methods.

### 4.2 Population and Sampling

The study's population encompassed all teachers in the Al-Hussein Educational Cluster in Palestine, totaling 399 teachers according to the statistics of the Palestinian Ministry of Education. A simple random sampling technique was employed to select participants. The sample size was 272, representing 68.2% of the study population.

Table 1: Distribution of sample members according to demographic variables (gender, age, years of experience, educational qualification, specialization, Use of Artificial Intelligence Techniques)

Variables	Category	No. of items	Percentage
Gender	Male	179	65.8%
	Female	93	34.2%
	<b>Total</b>	<b>272</b>	<b>100.0</b>
Age	Less than 35 years	64	%23.5
	Between (35-50) years	144	%52.9
	More than 50 years	64	%23.6
	<b>Total</b>	<b>272</b>	<b>100.0</b>
Experience	Less than 5 years	88	%32.4
	Between (5-10) years	184	%67.6
	More than 10 years	0.0	%0.0
	<b>Total</b>	<b>272</b>	<b>100.0</b>
Qualification	Master or higher	46	%16.9
	Bachelor's	77	%28.3
	Diploma	149	%54.8
	<b>Total</b>	<b>272</b>	<b>100.0</b>
Specialization	Scientific	160	%58.8
	Literary	112	%41.2
	<b>Total</b>	<b>272</b>	<b>100.0</b>
Use of Artificial Intelligence Techniques	Yes	176	%64.7
	No	96	%35.3
	<b>Total</b>	<b>272</b>	<b>100.0</b>

### 4.3 Study Tools

To achieve the study objectives, the researchers developed a questionnaire constructed and refined using theoretical literature and previous studies. The questionnaire comprised 32 items distributed across the following dimensions: the role of artificial intelligence techniques and enhancing competitive advantage. The role of artificial intelligence techniques was divided into the following domains: curriculum and teaching quality, decision-making, distance learning, and training, totaling 16 items. Additionally, enhancing competitive advantage included 16 items divided into the following domains: excellent performance, creativity and innovation, educational service quality, and responsiveness to teachers' needs.

### 4.4 Inter-Rater Reliability

Prior to data collection, the study instruments were subjected to a rigorous review process involving six experts. Their feedback was carefully considered, and necessary modifications, additions, and deletions were made to enhance the clarity, relevance, and effectiveness of the instruments. To assess the statistical validity of the instruments, Pearson's correlation coefficients were calculated between each item and the total score for the respective scale. The results, presented in the following table, indicate strong correlations between individual items and their corresponding scales, providing evidence of internal consistency and supporting the overall validity of the instruments.

Table 2: Results of the Pearson Correlation Coefficient between each item of the study and the total score

Item Number	Correlation coefficient (R)	Statistical significance	Item Number	Correlation coefficient (R)	Statistical significance
<b>Role of AI Techniques</b>					
1	0.661**	0.00	9	0.564**	0.00
2	0.616**	0.00	10	0.696**	0.00
3	0.586**	0.00	11	0.654**	0.00
4	0.686**	0.00	12	0.640**	0.00
5	0.576**	0.00	13	0.741**	0.00
6	0.666**	0.00	14	0.704**	0.00
7	0.766**	0.00	15	0.734**	0.00
8	0.614**	0.00	16	0.765**	0.00
<b>Enhancing Competitive Advantage</b>					
17	0.576**	0.00	25	0.596**	0.00
18	0.586**	0.00	26	0.662**	0.00
19	0.555**	0.00	27	0.437**	0.00
20	0.459**	0.00	28	0.443**	0.00
21	0.655**	0.00	29	0.444**	0.00
22	0.508**	0.00	30	0.544**	0.00
23	0.654**	0.00	31	0.693**	0.00
24	0.676**	0.00	32	0.560**	0.00

\*\* Statistically significant at  $(0.01 \geq \alpha)$

Table (2) indicates that all values of the correlation matrix of the domain items with the total score of the domain are statistically significant, which indicates the strength of the internal consistency of the scale items, and this therefore expresses the validity of the tool items in measuring what it was formulated to measure.

### 4.5 Reliability

Table 3: Cronbach's Alpha Reliability Coefficients

Variables	Item Numbers	Cronbach alpha Reliability Coefficients
Role of AI Techniques	16	0.936
Enhancing Competitive Advantage	16	0.946
<b>Total Degree</b>	<b>32</b>	<b>0.937</b>

The data presented in Table (3) indicate that the Cronbach's alpha coefficient values for all scale

dimensions and the overall scale score were high. The Cronbach's alpha values for the Role of AI Techniques dimension ranged from 0.936 to 0.946, and the overall Cronbach's alpha value was 0.937. These high values suggest that the scale has a high degree of internal consistency, indicating that it is reliable and suitable for measuring the intended concepts.

#### 4.6 Statistical Processing

The researchers analyzed the study data after applying the tools to the sample individuals using the statistical software package for social sciences. This involved extracting frequencies and relative weights, calculating means, standard deviations, Cronbach's alpha test, Pearson correlation coefficient, t-test, and one-way analysis of variance.

### 5. Results and Discussion

#### 5.1 Results of the first question

Is there a statistically significant effect of using AI technologies and their role in enhancing the competitive advantage of Palestinian schools?

To answer the first research question, Pearson's Correlation Coefficient was employed to examine the relationship between AI techniques and their role in enhancing the competitive advantage of Palestinian schools. The results are presented in Table (4).

Table 4: Pearson's Correlation Coefficients for AI Techniques and Competitive Advantage

	Relations	Pearson's Correlation Coefficients	Statistical Significance
Enhancing Competitive Advantage	Quality of curricula and teaching	0.263**	0.000
	Decision making	0.282**	0.000
	Distance Learning	0.226**	0.000
	Training	0.209**	0.000
	Artificial Intelligence Techniques	0.271**	0.000

**\*\*Statistically significant at the level of significance ( $\alpha \leq 0.01$ ), \*Statistically significant at the level of significance ( $\alpha \leq 0.05$ )**

The data presented in Table 4 indicate a statistically significant relationship between AI techniques and their role in enhancing the competitive advantage of Palestinian schools. The significance value (p-value) is 0.000, which is less than the commonly used significance level of 0.05. This suggests that the observed relationship is unlikely to have occurred by chance. Additionally, the correlation coefficient (r) is 0.271, indicating a positive association between AI techniques and competitive advantage.

#### 5.2 Results of the second question

What is the current status of AI technology usage in Palestinian schools?

To answer the second question, arithmetic means and standard deviations were extracted for the level of application of artificial intelligence techniques in Palestinian schools, as shown in Table (5).

Table 5: Arithmetic means and standard deviations for the level of application of artificial intelligence techniques in Palestinian schools, arranged in descending order: (n=272)

The Dimension	Paragraph	Mean	Standard Deviation	Importance level
Quality of curricula and teaching	Building smart training programs that determine student learning styles and methods	3.18	0.71	Medium
	Providing the appropriate educational environment for the use of artificial intelligence technologies in education	3.17	0.92	Medium
	Providing specialized programs and courses based on artificial intelligence that suit the needs of students according to their performance and skills	2.59	0.85	Medium
	Teachers rely on artificial intelligence to make academic decisions	2.35	0.84	Medium
<b>Composite Score for the Domain</b>		<b>2.82</b>	<b>0.59</b>	<b>Medium</b>
Decision making	Artificial intelligence applications contribute to solving problems and saving time and effort	4.18	0.71	High
	The school provides smart technology used in decision making	3.24	1.00	Medium
	The school provides smart databases for use in decision making	2.88	1.02	Medium
	The school provides training to students and teachers on artificial intelligence techniques in the field of decision-making	2.65	1.24	Medium
<b>Composite Score for the Domain</b>		<b>3.23</b>	<b>0.71</b>	<b>Medium</b>
Distance Learning	Provides a service for downloading grades and calendars on students' phones	3.53	1.15	Medium
	The school provides an effective website for distance teaching and student evaluation	3.06	1.21	Medium
	The school provides opportunities to provide electronic assessments while imposing monitoring systems subject to artificial intelligence	2.65	1.24	Medium
	Providing an electronic library that meets students' needs of books and references to develop e-learning	2.53	1.09	Medium
<b>Composite Score for the Domain</b>		<b>2.94</b>	<b>1.00</b>	<b>Medium</b>
Training	Training students to prepare research and projects using artificial intelligence techniques	2.65	1.08	Medium
	Providing self-training programs based on artificial intelligence that encourage innovation among students	2.65	1.14	Medium
	Training students to use artificial intelligence techniques to carry out the routine administrative procedures that students need at school	2.59	1.24	Medium
	The school provides grants and sends students for training in leading centers and universities in the field of applying artificial intelligence techniques in the field of education	2.12	1.02	Medium
<b>Composite Score for the Domain</b>		<b>2.50</b>	<b>1.06</b>	<b>Medium</b>
<b>Composite Score</b>		<b>2.87</b>	<b>0.74</b>	<b>Medium</b>

The data shown in Table (5) indicate that the level of application of artificial intelligence techniques in Palestinian schools was average, as the arithmetic mean of the total score was (2.87) with a standard deviation of (0.74).

It is clear from Table (5) that the field of decision-making occupied first place with an arithmetic average of (3.23) with a standard deviation of (0.71), and the field of distance learning came in second place with an arithmetic average of (2.94) with a standard deviation of (1.00). The third field is the quality of curricula and teaching, with a mean of (2.82) with a standard deviation of (0.59), and fourth place came in the field of training, with a mean of (2.50) with a standard deviation of (1.06).

### 5.3 Results of the third question

What is the current state of competitiveness in Palestinian schools?

To answer the third question, arithmetic means and standard deviations were extracted for the level of enhancing competitive advantage in Palestinian schools, as shown in Table (6).

Table 6: Arithmetic means and standard deviations for the level of enhancing competitive advantage in Palestinian schools, arranged in descending order: (n=181)

The Dimension	Paragraph	Mean	Standard Deviation	Importance level
Outstanding efficiency	The use of artificial intelligence technologies in school demonstrates the excellence of the educational process	3.88	0.90	High
	Artificial intelligence technologies increase the efficiency of the educational process	3.71	0.96	High
	The tools and information provided by artificial intelligence technologies contribute to the student assessment process	3.29	0.75	High
	Artificial intelligence technologies contribute to increasing coordination between parties in the educational process	3.06	1.16	High
	<b>Composite Score for the Domain</b>	<b>3.48</b>	<b>0.62</b>	<b>Medium</b>
Creativity and innovation	Artificial intelligence technologies contribute to developing my skills	3.94	0.80	High
	Artificial intelligence technologies enable self-learning	3.94	0.73	High
	Artificial intelligence technologies help develop the spirit of creativity and innovation	3.94	0.87	High
	Artificial intelligence techniques solve many administrative and educational problems in schools	3.71	0.67	High
	<b>Composite Score for the Domain</b>	<b>3.88</b>	<b>0.67</b>	<b>High</b>
Quality of educational service	Artificial intelligence technologies contribute to shortening a lot of time to complete tasks	4.24	0.81	High
	Artificial intelligence technologies allow access to educational material anywhere	4.00	0.91	High
	Artificial intelligence technologies allow access to educational material at any time	3.94	0.87	High
	Artificial intelligence technologies contribute to reducing the cost of educational services	3.88	0.76	High
	<b>Composite Score for the Domain</b>	<b>4.01</b>	<b>0.75</b>	<b>High</b>

Responding to teachers' needs	The teacher can provide students with a variety of sources to enrich the educational material through artificial intelligence techniques	3.76	0.81	High
	The various means provided by artificial intelligence technologies facilitate the delivery of information to students	3.71	0.96	High
	Artificial intelligence techniques take into account the needs of teachers	3.65	0.84	High
	Artificial intelligence technologies reduce administrative burdens on teachers	3.59	0.98	High
<b>Composite Score for the Domain</b>		<b>3.67</b>	<b>0.84</b>	<b>Medium</b>
<b>Composite Score</b>		<b>3.76</b>	<b>0.65</b>	<b>Medium</b>

The data shown in Table (6) indicate that the level of enhancing competitive advantage in Palestinian schools was high, as the arithmetic mean of the total score reached (3.76) with a standard deviation of (0.65).

It is clear from Table (6) that the field of educational service quality ranked first with a mean of (4.01) with a standard deviation of (0.75), and the field of creativity and innovation came in second place with a mean of (3.88) with a standard deviation of (0.67). The third is the field of responding to teachers' needs, with a mean of (3.67) with a standard deviation of (0.84), and fourth place came in the field of distinguished competence, with a mean of (3.48) with a standard deviation of (0.62).

## 6. Conclusion

This research paper delves into the relationship between the utilization of artificial intelligence (AI) techniques and the enhancement of Palestinian schools' competitiveness in the educational landscape. Using a sequential explanatory mixed-methods approach, the study combines qualitative and quantitative data collection and analysis tools. The findings provide valuable insights into the potential of AI in empowering Palestinian schools to excel.

The study establishes a positive and statistically significant correlation between the implementation of AI techniques and the competitive advantage of Palestinian schools. It reveals that the overall level of AI implementation in Palestinian schools is moderate, with decision-making, distance learning, curriculum and teaching quality, and training identified as priority areas for AI application. Additionally, the study finds that the overall level of competitive advantage among Palestinian schools is high, with service quality, creativity and innovation, responsiveness to teacher needs, and distinguished efficiency being the priority areas for enhancement.

The current study's findings align with previous research examining the impact of AI on competitiveness in various contexts. For instance, Toul & Bakar found a positive relationship between AI system utilization and competitive advantage creation. Al-Muraikhi emphasized the role of AI in improving school administration performance, while Almalki highlighted AI applications' role in strengthening educational strategies in higher education. Mohammed (2020) demonstrated AI's positive impact on the competitive advantage of commercial banks, and Al Dhahouri confirmed the positive association between AI and university performance. Rowais underscored AI's contribution to enhancing the competitive advantage of educational institutions, and JabaAllah et al. found that AI positively influences the competitive capacity of economic enterprises.

The research paper provides evidence that artificial intelligence techniques play a significant role in enhancing the competitive advantage of educational institutions, especially Palestinian schools. By optimally utilizing artificial intelligence techniques in the educational process,

Palestinian schools can achieve a strategic competitive advantage and lead the competitive landscape in education. Moreover, the findings offer valuable guidance to decision-makers in various administrative positions within schools to leverage artificial intelligence to enhance competitiveness and the quality of Palestinian education.

## 7. Recommendations

Based on the study's results, the researchers recommend the necessity of allocating sufficient budgets for developing the technological infrastructure of schools, providing artificial intelligence labs, and the necessary software for applying AI techniques. Additionally, investing in training administrative and teaching staff on efficiently and effectively using these technologies in various aspects of the educational process, along with supporting research and development programs in collaboration with different research centers and universities. There should be a focus on applying AI techniques in decision-making, distance learning, improving curriculum quality and the educational process, while exploring intelligent applications like personalized learning, student assessment, and support for special needs. Strategic plans should be developed to enable the implementation of AI techniques in schools with clear and measurable objectives, regular progress monitoring, continuous evaluation, and necessary adjustments. On the other hand, encouraging knowledge exchange and involving parents and the local community in the implementation process is important. Additionally, clear ethical policies should be established to regulate the use of AI techniques in schools, ensuring the privacy of students and teachers and protecting information. This research paper provides strong evidence that AI techniques play a significant role in enhancing the competitive advantage of Palestinian schools and enhance their ability to lead the educational excellence scene. Through these recommendations, Palestinian schools can effectively benefit from the advantages of AI technologies in enhancing their competitive position in the Palestinian educational context and improving the quality of education and its outcomes.

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