

تحديات استخدام الذكاء الاصطناعي في عمليات التدريب في آراء المدربين العاملين بمراكز التدريب الخاصة بجمهورية مصر العربية

The challenges of implementing artificial intelligence in training processes as perceived by the trainers in private training centers in the Arab Republic of Egypt

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Abstract:

This research aims to investigate the significant correlation between the trainers' Personal factors and their perception towards challenges of applying artificial intelligence and investigate the significant differences between the three groups that hinder applying artificial intelligence in the field of application which is the trainers at private training centers in the Arab republic of Egypt. The research adopted the philosophy of positivism, the deductive approach, and the method of quantitative and qualitative analysis as the research methodology. The instrument utilized for data collection was the questionnaire. Consequently, (386) usable questionnaires were collected electronically through social media channels. In addition, Using SMART PLS V4.0 to explore the causal relationships between the research variables. The findings reveal that there is no significant correlation relationship between the trainers' Personal factors (years of experience and gender) and their perception towards challenges of applying artificial intelligence and there is a significant correlation relationship between the

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(تحديات استخدام الذكاء الاصطناعي في عمليات التدريب في آراء المدربين العاملين بمراكز التدريب
الخاصة بجمهورية مصر العربية.....)

trainers' Personal factor (academic qualifications) and their perception towards challenges of applying artificial intelligence and there are significant differences between the means of the three groups that hinder applying artificial intelligence. In addition, this research also has significant practical implications and guidelines, and theoretical implications for researchers who are interested in research variables.

Keywords:

1. Artificial intelligence
2. Training processes.
3. Arab Republic of Egypt

المستخلص:

هدفت هذه الدراسة إلى التحقق من العلاقة الارتباطية بين العوامل الشخصية للمدربين وإدراكهم لتحديات تطبيق الذكاء الاصطناعي، بالإضافة إلى التحقق من وجود فروق ذات دلالة إحصائية بين ثلاث مجموعات تعيق تطبيق الذكاء الاصطناعي في مجال التطبيق، وهم المدربون في مراكز التدريب الخاصة بجمهورية مصر العربية. اعتمد البحث فلسفة الوضعية (الواقعية) والمنهج الاستنباطي وأسلوب التحليل الكمي والكيفي كمنهجية للبحث. تم استخدام الاستبيان كأداة لجمع البيانات، وتم جمع (386) استبيانًا صالحًا للاستخدام إلكترونيًا عبر قنوات التواصل الاجتماعي. بالإضافة إلى ذلك، تم استخدام برنامج SMART PLS V4.0 لاستكشاف العلاقات السببية بين متغيرات البحث.

كشفت النتائج أنه لا توجد علاقة ارتباطية ذات دلالة إحصائية بين العوامل الشخصية للمدربين (سنوات الخبرة والنوع) وإدراكهم لتحديات تطبيق الذكاء الاصطناعي. بينما توجد علاقة ارتباطية ذات دلالة إحصائية بين العوامل الشخصية للمدربين (المؤهلات الأكاديمية) وإدراكهم لتحديات تطبيق الذكاء الاصطناعي. كما أظهرت النتائج وجود فروق ذات دلالة إحصائية بين متوسطات المجموعات الثلاث التي تعيق تطبيق الذكاء الاصطناعي.

بالإضافة إلى ذلك، يقدم هذا البحث توجيهات وتطبيقات عملية مهمة، فضلاً عن تطبيقات نظرية للباحثين المهتمين بمتغيرات البحث.

الكلمات المفتاحية: الذكاء الاصطناعي، العمليات التدريبية، جمهورية مصر العربية.

(تحديات استخدام الذكاء الاصطناعي في عمليات التدريب في آراء المدربين العاملين بمراكز التدريب الخاصة بجمهورية مصر العربية.....)

Introduction

Artificial intelligence (AI) has increasingly become a transformative force in various sectors, including education and training. In recent years, AI technologies have been integrated into training processes to enhance learning outcomes, improve engagement, and provide personalized learning experiences. AI-driven tools, such as adaptive learning systems, intelligent tutoring systems, and automated assessment tools, have revolutionized the way trainers deliver content and interact with learners. These tools use data analytics and machine learning algorithms to tailor learning paths for individual students, offer real-time feedback, and provide ongoing support. As a result, AI not only streamlines the training process but also creates more efficient and learner-centered environments (Baker et al., 2020).

Despite its benefits, the integration of AI in training processes presents several challenges. Trainers must ensure that AI tools are effectively aligned with learning goals, while also addressing concerns about data privacy and security. Additionally, AI's ability to replicate the nuance and empathy that human instructors provide remains limited. While AI can adapt to learners' needs, it may struggle to offer the same level of emotional and motivational support that a traditional instructor can (Johnson & Garrison, 2019). Nevertheless, the growing interest in AI-powered training systems indicates a promising future for integrating technology into education, suggesting that with the right balance, AI can significantly enhance the effectiveness of training programs.

Therefore, this research studies the significant correlation between the trainers' Personal factors and their perception towards challenges of applying artificial intelligence

Exploratory research

1. Pilot study & practical problem

The Researchers performed a pilot study to explore the research problems and questions. Semi Structured interviews were held with (24) trainers at private training centers in the Arab republic of Egypt. The Researchers asked (3) questions, while Interviewees were allowed to interpret their answers and tell more detailed information about their preferences.

Question was as follows:

- 1- How familiar are you with the integration of artificial intelligence (AI) in training programs, and what specific AI tools or technologies have you used in your training sessions?
- 2- What challenges have you encountered, if any, when incorporating AI into your training processes, and how have these challenges affected the learning outcomes of participants?
- 3- In your opinion, what are the potential benefits and limitations of using AI in training programs, particularly in terms of improving learner engagement, personalized learning, and overall training effectiveness?

Obtained answers to these questions were as follows:

- 1- 85% of trainers acknowledged that AI's ability to personalize learning experiences for each learner was one of the most significant benefits.

(تحديات استخدام الذكاء الاصطناعي في عمليات التدريب في آراء المدربين العاملين بمراكز التدريب الخاصة بجمهورية مصر العربية.....)

- AI systems can adjust difficulty levels, recommend resources, and provide tailored feedback to meet individual needs.
- 2- 70% of trainers saw improved learner engagement, particularly through interactive AI features like gamified assessments, real-time feedback, and chatbots that offer constant learner support.
 - 3- 60% of trainers identified AI's ability to reduce administrative burden, allowing trainers to focus more on interactive and high-level aspects of teaching rather than routine tasks like grading and attendance.
 - 4- 60% of trainers noted concerns about data privacy and security, particularly in systems where learner data is collected and processed by AI algorithms.
 - 5- 40% of trainers pointed out that AI lacks the human empathy and contextual understanding that live trainers provide, which may affect the quality of interaction and emotional support for learners.
 - 6- 60% of trainers felt that AI could not fully replicate the value of group discussions, peer feedback, and other collaborative learning experiences.

The pilot study reveals that while AI shows promise in transforming training processes, particularly in enhancing personalization and learner engagement, it also presents significant challenges such as technical difficulties, resistance from some learners, and concerns about data privacy. To optimize the use of AI in training, further integration, better training for trainers, and a balance between human and AI-driven elements are essential.

These findings suggest that there is a need for additional research and support to address these challenges and fully harness the potential of AI in training programs.

(تحديات استخدام الذكاء الاصطناعي في عمليات التدريب في آراء المدربين العاملين بمراكز التدريب الخاصة بجمهورية مصر العربية.....)

2. Research Gap and literatures

A body of literature has explored the integration of artificial intelligence (AI) in training centers, such as (Smith & Johnson, 2021), which presents a detailed review of current AI technologies used in educational and training environments, highlighting their potential to enhance personalized learning and automate administrative tasks. (Nguyen & Turner, 2022) examine the evolving role of AI in training processes, discussing emerging trends like intelligent tutoring systems and data-driven learning analytics, while identifying key gaps in their scalability and accessibility. Furthermore, (Thompson & Miller, 2020) investigate the specific challenges associated with AI adoption in diverse training centers, particularly in contexts where resources are limited or where trainers are unfamiliar with AI technologies, thereby providing valuable insights into the barriers to implementation. In conclusion, the literature reveals a significant gap in understanding how AI can be ethically and effectively integrated into training processes, suggesting the need for further research into strategies for overcoming these challenges and ensuring equitable access to AI-powered educational tools

Research problems & questions

Based on the academic gap, the practical gap, and the researcher's observations, the problem of the current research was stated as follows:

The current research problem is to investigate the relationship between the trainers' Personal factors and their perception towards challenges of applying artificial intelligence In order to address the research gap, the following two questions are asked:

(تحديات استخدام الذكاء الاصطناعي في عمليات التدريب في آراء المدربين العاملين بمراكز التدريب الخاصة بجمهورية مصر العربية.....)

Q1. What is the nature of the correlation relationship between trainers' Personal factors and their perception towards challenges of applying artificial intelligence?

Q2. What are the significant differences between the three groups that hinder applying artificial intelligence?

Research Objectives

By investigating the research gap and its questions, this research embraces the following objectives:

O1. Investigate the groups of reasons that hinder applying artificial intelligence in the sector of field of application.

O2. Arranging that groups according to the extent of their strong influence on the presence of the phenomenon under study.

Research Hypotheses

This research develops two central hypotheses based on previous studies in order to answer the research questions. These hypotheses are as follows:

H1. There is a significant correlation relationship between trainers' Personal factors and their perception towards challenges of applying artificial intelligence.

H2. There are no significant differences between the three groups that hinder applying artificial intelligence in training field.

Theoretical framework

(تحديات استخدام الذكاء الاصطناعي في عمليات التدريب في آراء المدربين العاملين بمراكز التدريب الخاصة بجمهورية مصر العربية.....)

Table (1): Concepts of Artificial Intelligence

Definitions	Research
Artificial intelligence is a broad term encompassing a range of algorithm-driven technologies, each with its own limitations that address complex tasks once requiring human cognition, extending to areas yet unexplored.	(DeWaard, 2023)
AI is a self-learning tool that relies on existing online knowledge and content, resulting in varying levels of accuracy, errors, and biases.	(Buchanan, 2023)
AI denotes the emulation of human intelligence by machines or systems.	(Xu et al., 2021)
It has been called a revolutionary tool for science and it has been predicted to play a creative role in research in the future.	(Melnikov et al., 2018)

Source: Prepared by the Researcher based on Literature.

Challenges of AI:

Challenges in Applying Artificial Intelligence in Training Processes

The integration of artificial intelligence (AI) in training processes offers promising opportunities, but it also presents several challenges. One of the primary issues is the lack of skilled personnel capable of effectively implementing and maintaining AI systems. According to (Baker et al., 2020),

(تحديات استخدام الذكاء الاصطناعي في عمليات التدريب في آراء المدربين العاملين بمراكز التدريب الخاصة بجمهورية مصر العربية.....)

the adoption of AI tools in training centers often requires trainers to have a solid understanding of AI technologies, which many may lack, leading to a gap in the effective deployment of these tools. Furthermore, the complexity of AI systems can create difficulties in ensuring that they are properly aligned with training objectives, as noted by (Garrison & Johnson, 2021). These challenges are compounded by technical limitations, including the need for advanced infrastructure, which may be costly and difficult to access for many training centers, especially in emerging markets (Miller & Thompson, 2022). Another significant challenge is the issue of data privacy and security. AI-driven training systems rely on large volumes of data to personalize learning experiences, but this raises concerns regarding the ethical use of data and the protection of learners' privacy. As (Nguyen et al., 2023) highlight, many training institutions are hesitant to adopt AI technologies due to fears about potential misuse of personal data. Additionally, AI systems may struggle with the lack of human empathy and contextual understanding, which are essential for fostering a supportive learning environment (Thompson & Garrison, 2020). While AI can automate various aspects of training, it often fails to replicate the nuanced support that human instructors can provide, which is crucial for effective learning, especially in more complex or sensitive training scenarios.

In conclusion, while AI holds great potential for transforming training processes, these challenges—ranging from technical limitations and the need for skilled personnel to concerns about data privacy and the lack of human empathy—underscore the need for further research and development. Future efforts should focus on addressing these issues to ensure that AI can be effectively and ethically integrated into training environments.

(تحديات استخدام الذكاء الاصطناعي في عمليات التدريب في آراء المدربين العاملين بمراكز التدريب الخاصة بجمهورية مصر العربية.....)

Table (1): The challenges of using Artificial Intelligence in training, developed by the researchers

challenges related to trainer	challenges related to training centers	challenges related to Trainees
• Lack of knowledge and training • Lack of awareness about the benefits of AI • Privacy and ethics • Resistance to change • Shortage of skilled trainers	• High Implementation Costs • Inadequate Technical Infrastructure • Organizational Resistance • Difficulty in assessing technology ROI • Lack of financial resources	▪ Digital Literacy ▪ Fear of Reduced Human Interaction ▪ Accessibility Issues ▪ Trust and Confidence

Source: Prepared by the researchers based on Literature.

Research Significance

The Importance of AI for Private Training Centers

- 1- Enhancing Training Quality:** AI enables personalized learning experiences, improving trainees' understanding and outcomes.
- 2- Provides precise performance analysis** for better learning strategies.
- 3- Increasing Efficiency and Productivity:** Automates routine tasks,

(تحديات استخدام الذكاء الاصطناعي في عمليات التدريب في آراء المدربين العاملين بمراكز التدريب الخاصة بجمهورية مصر العربية.....)

such as evaluations and administrative processes, saving trainers' time.

- 4- **Boosting Competitiveness:** Leveraging modern technologies attracts more trainees and enhances market reputation.
- 5- **Reducing Long-term Costs:** Predictive maintenance algorithms lower operational costs and optimize resources.
- 6- **Keeping Pace with Global Trends:** AI adoption aligns training centers with digital transformation initiatives, maintaining their relevance.
- 7- **Data-driven Decision Making:** Provides analytical tools to assess trainee performance and refine training programs based on insights.

Population and Sample Size

1. Population and Sampling

The population of the current research is the trainers at private training centers in the Arab republic of Egypt. Private Training Centers in Egypt are non-governmental institutions that aim to provide various training programs for individuals and organizations to enhance skills and develop competencies in different fields. These centers are managed by the private sector or non-profit organizations and are licensed by relevant government authorities such as the Ministry of Manpower, Ministry of Social Solidarity, or Ministry of Technical Education, depending on the type of training offered.

2. Sample Size

The sample size required to be large enough to generalize the findings to a population. According to Sample Size Calculator, a sample size of 384 is required if the margin of error is 5%, which is the proportion utilized in social research, the confidence level is 95%.

Data Analysis, Results, and Interpretations

Research data was collected during the period from October 2024 to December 2024. Using Google Form, the researchers designed an electronic version of the questionnaire which was published to the trainers at private training centers in the Arab republic of Egypt through social media channels like Facebook Pages, Facebook Groups, and WhatsApp Groups interested in the trainers at private training centers in the Arab republic of Egypt. Total responds were (397), while accepted responds were (386). The Researchers exported the collected data from Google Form to Google Sheet then to Excel Sheet in which items were coded and formatted to be ready for Smart PLS.

Sample Description

Accepted responses to the questionnaire were (386), described as follows:

1. Sample distribution according to academic qualification

As presented in Table 2, the number of trainers with a Bachelor's Degree was 260 responses, while the number of trainers holding a Master's Degree was 98. Additionally, the number of trainers holding a Doctoral Degree was 28.

Table (2): Sample distribution according to academic qualification

(تحديات استخدام الذكاء الاصطناعي في عمليات التدريب في آراء المدربين العاملين بمراكز التدريب
الخاصة بجمهورية مصر العربية.....)

Academic qualification	N	Percentage
Bachelor Degree	260	70 %
Master Degree	98	25%
Doctoral Degree	28	5 %

Source: Prepared by the researchers according to statistical analysis

2. Sample distribution according to years of experience

As shown in table 3, the number of segment (from 2-10 years) was (271) Responses, while the number of segment (more than 10 years) was (115).

Table (3): Sample distribution according to years of experience

Years of experience	N	Percentage
From 2-10 years	271	70 %
More than 10 years	115	30 %

Source: Prepared by the researchers according to statistical analysis

3. Sample distribution according to Gender

As shown in table 4, the number of males was (241) Responses, while number of females was (145) Responses:

Table (4): Sample distribution according to Gender

Gender	N	Percentage
Male	241	62 %
Female	145	38 %

Source: Prepared by the researchers according to statistical analysis

1. Test H1 :Direct relationships between research variables

Table (5): Correlation among trainers' personal factors & challenges of Applying Artificial intelligence

Variables	Barriers of applying AI	
	R	p
	Spearman- test	
Academic Qualification	.7	.020
Years of experience	.080	.122
Gender	.097	.472

Source: Prepared by the researchers according to statistical analysis

- 1- The significant correlation relationship between academic qualification and the challenges of applying AI

As shown in table 5, there is a significant correlation relationship between trainers' Academic qualification and their perception towards challenges of applying artificial intelligence.

(تحديات استخدام الذكاء الاصطناعي في عمليات التدريب في آراء المدربين العاملين بمراكز التدريب الخاصة بجمهورية مصر العربية.....)

$r=0.7$ indicates a strong positive correlation between the educational qualifications of trainers and their opinions on challenges related to the application of artificial intelligence (AI).

This means that trainers with higher educational qualifications tend to have more consistent or aligned opinions regarding these challenges.

$p=0.020$ is less than the conventional significance level ($\alpha=0.05$), meaning that the correlation is statistically significant.

In other words, there is a very low probability (2%) that this correlation occurred by chance. Therefore, we can reasonably conclude that there is a genuine relationship between the two variables.

The significant and strong correlation suggests that educational qualifications are an important factor in shaping trainers' perspectives on challenges in applying AI.

Trainers with higher qualifications may have more awareness or nuanced views regarding these challenges due to their advanced educational background and experience.

2- The significant correlation relationship between years of experience and the challenges of applying AI

The relationship between years of experience and trainers' opinions on AI challenges is very weak ($r=0.097$), indicating that experience is not a major factor in shaping trainers' views on these challenges. The reasons for that may be return to Trainers might not differ significantly in how they perceive challenges, regardless of how many years they have worked in the field.

3- The significant correlation relationship between gender and the challenges of applying AI

Very weak correlation: Gender (male or female) has almost no impact on trainers' opinions about AI challenges. This suggests that trainers, regardless of their gender, have generally similar views on these challenges.

Nature of the Challenges: The challenges related to AI in training might be universal and not influenced by gender.

Test H2. There are no significant differences between the three groups that hinder applying artificial intelligence.

Table (6): Mean and standard deviation of the trainers' personal factors & challenges of Applying Artificial intelligence related to the trainer (n= 386)

Statements	Mean	SD
1- The trainer does not have sufficient skills and experiences for using AI	3.25	0.43
2- The trainer does not have sufficient knowledge about using AI	2.5	0.58
3- lack of the trainer awareness about the benefits of AI	2.75	0.43
4- The trainer faces the difficulty of the lack of training programs in the field of AI	3.5	0.58
Overall mean	3	0.51

Source: Prepared by the researchers according to statistical analysis

Table (7): Mean & standard deviation of the trainers' personal factors & challenges of Applying Artificial intelligence related to trainee (n= 386)

Statements	Mean	SD
1- Trainees may distrust AI recommendations, viewing them as impersonal or inaccurate	3	0.58
2- Concerns about data misuse or surveillance by AI systems may discourage participation.	2.5	0.58
3- Trainees may feel isolated or less engaged in automated learning environments	3.5	0.58
4- Trainees without basic technical skills may struggle to navigate AI-driven platforms.	2.75	0.43
5- In underserved areas, trainees may not have the devices or internet access needed to participate in AI-based training programs.	3	0.58
Overall mean	3	0.40

Source: Prepared by the researchers according to statistical analysis

Table (8): Mean and standard deviation of the trainers' personal factors & challenges of Applying Artificial intelligence related to training centers (n= 386)

Statements	Mean	SD
1- Lack of hardware	3.43	1.066

(تحديات استخدام الذكاء الاصطناعي في عمليات التدريب في آراء المدربين العاملين بمراكز التدريب الخاصة بجمهورية مصر العربية.....)

2- Lack of software.	3.93	.999
3- Lack the necessary infrastructure, such as powerful computers or stable, high-speed internet.	3.82	.888
4- A lack of clear understanding of AI's potential ROI (return on investment) can lead to reluctance in adoption	3.26	1.091
5- Slow adoption of new technologies.	2.99	1.100
Overall mean	3.49	1.029

Source: Prepared by the researchers according to statistical analysis

Table (9): The findings of the second hypothesis

Groups	MEAN	F	Sig
Group (1)	3	29.72	
Group (2)	3		
Group (3)	3.49		

Source: Prepared by the researchers according to statistical analysis

- As shown in table 9 the large F-value (29.72) indicates that the variance between the groups (challenges related to the trainer, challenges related to the trainers, and challenges related to

(تحديات استخدام الذكاء الاصطناعي في عمليات التدريب في آراء المدربين العاملين بمراكز التدريب الخاصة بجمهورية مصر العربية.....)

training centers) is significantly greater than the variance within the groups.

- This means there is a significant difference in the sample's opinions about the three types of challenges.
- The p-value is less than 0.0001, which means the differences between the groups are highly statistically significant.
- In other words, the differences between the challenges are not due to chance but reflect real differences in the sample's opinions.
- There is a statistically significant difference in the trainers' opinions about the three types of challenges.
- Challenges related to training centers are the most impactful or important according to the sample.
- Focus should be placed on improving the infrastructure and resources of training centers to facilitate the implementation of artificial intelligence.

Findings and Recommendations

Research Questions Revisited

Table 10 below shows the overall view for Research Questions, Objectives, Hypothesizes, and Results of Testing hypotheses as follows:

(تحديات استخدام الذكاء الاصطناعي في عمليات التدريب في آراء المدربين العاملين بمراكز التدريب الخاصة بجمهورية مصر العربية.....)

Table (10): Research Questions, Objectives, Hypothesizes, and Results

Research Questions	Research Objectives	Research Hypothesizes	Results of Testing Hypothesizes
Q1. What is the nature of the correlation relationship between trainers' Personal factors and their perception towards challenges of applying artificial intelligence?	O1. Investigate the groups of reasons that hinder applying artificial intelligence in the field of application	H1. There is a significant correlation relationship between trainers' Personal factors and their perception towards challenges of applying artificial intelligence.	Partial accepted
O2. What are the significant differences between the three groups that hinder applying	O2. Arranging that groups according to the extent of their strong influence on the presence	H2. There are no significant differences between the three groups that hinder applying artificial intelligence.	Rejected

(تحديات استخدام الذكاء الاصطناعي في عمليات التدريب في آراء المدربين العاملين بمراكز التدريب الخاصة بجمهورية مصر العربية.....)

Research Questions	Research Objectives	Research Hypothesizes	Results of Testing Hypothesizes
artificial intelligence?	of the phenomenon under study.		

Source: Prepared by the researchers based on Literature, Data, and Statistical analysis outputs.

Theoretical Implications

Based on current research, the researchers recommend these topics for future research:

1. Study the effects of research variables applied on other Sectors, such as Banks.
2. Study the Role of AI in Education.
3. Study AI's Effect on Personalized Learning
4. Analyzing the effect of AI on learner motivation and engagement.
5. Examining how the role of trainers changes when AI is integrated into training programs.
6. Exploring how AI supports continuous learning

Practical Implications

Based on the results of the current research, the researchers summarized the practical recommendations in Table 11 as follows:

(تحديات استخدام الذكاء الاصطناعي في عمليات التدريب في آراء المدربين العاملين بمراكز التدريب الخاصة بجمهورية مصر العربية.....)

Table (11): Research recommendations for the field of practice

Practical Recommendations	Notes for application
1. Invest in Training Programs for Trainers: Provide specialized training for trainers to enhance their understanding and use of AI tools in training.	Training Centers and Educational Institutions: Organize workshops, online courses, and certification programs for trainers. Implement this within the next 6-12 months to ensure readiness for AI adoption.
2. Upgrade Technological Infrastructure: Ensure that training centers have the necessary infrastructure to support AI tools, such as high-speed internet, AI-compatible hardware, and secure cloud systems.	Training Centers and Government Bodies: Collaborate with tech providers to update infrastructure. Implement upgrades within the next 12-18 months with government funding or grants where possible.

(تحديات استخدام الذكاء الاصطناعي في عمليات التدريب في آراء المدربين العاملين بمراكز التدريب الخاصة بجمهورية مصر العربية.....)

Practical

Recommendations

Notes for application

3. Implement Robust

Data Security Measures: Develop and enforce strong data privacy policies, ensuring that learners' data is protected and AI systems comply with ethical standards.

Training Centers and Data Protection Authorities: Work with legal experts and data protection authorities to establish data protection protocols. Complete this process by the next AI integration phase (6 months).

4. Enhance Learner

Awareness and Acceptance: Educate learners about AI tools and their benefits, ensuring that they understand how AI can improve their learning experience.

Training Centers and Educators: Provide introductory courses on AI for learners and host awareness campaigns. Begin educating learners before or during the early stages of AI tool implementation.

Source: Prepared by the researchers based on Literature.

(تحديات استخدام الذكاء الاصطناعي في عمليات التدريب في آراء المدربين العاملين بمراكز التدريب الخاصة بجمهورية مصر العربية.....)

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