

## Research Article

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## The Impact of Employing Artificial Intelligence Tools on Developing Electronic Portfolio Design Skills Among Teachers in Mafrq District

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### Abstract

**Background/purpose.** Rapid technological advances are reshaping education, primarily through artificial intelligence (AI) tools that enrich electronic portfolios—key assessment artifacts that showcase teachers' professional growth. Despite their potential to improve planning, organization, and digital media use, teachers in Mafrq District employ AI tools sparingly. This study examined the impact of AI applications on teachers' portfolio-design skills.

**Materials/methods.** A descriptive–analytical design was adopted for this research. The data were gathered through a questionnaire, validated for reliability and content accuracy, which was administered to a stratified random sample of 322 teachers from a population of ≈3,200. The questionnaire measured competence in planning, organization, and digital-media utilization when AI tools were integrated. Descriptive statistics and inferential tests were used to assess overall effects and demographic differences.

**Results.** AI integration had a significant positive effect on portfolio design skills. The digital-media utilization domain recorded the highest relative mean (83%), followed by the planning and organization domain (80.2%). No statistically significant differences attributable to teaching experience or academic qualifications were observed, indicating uniform benefits across subgroups.

**Conclusion.** AI applications demonstrably enhance teachers' capacity to create robust electronic portfolios. Teacher training programmes should therefore embed AI-based portfolio design. At the same time, educational authorities provide supportive digital infrastructure, guidance manuals, and practical workshops to develop teachers' digital design competencies in line with smart education goals.

## 1. Introduction

Amid the rapid digital revolution, the education sector is experiencing significant shifts in teaching and assessment methods. Artificial intelligence (AI) tools have become integral to modern learning environments (Al Mousa, 2024). These innovations are driven by technological progress, turning traditional educational practices into more interactive and efficient approaches. This transition enhances learners' skills and boosts the overall quality of education (Melweth, 2024). A notable educational innovation in this digital era is the electronic portfolio (e-Portfolio), which serves as a vital tool for documentation and assessment. It connects theory with practice, promotes reflective and collaborative learning, and enriches the teacher's experience (Malkawi, 2023).

Recent studies show that integrating artificial intelligence into education significantly enhances students' abilities to organize content, refine achievement presentations, and foster more accurate and objective self-reflection. Zahran (2024) aimed to foster creative linguistic self among third-year secondary Azhari students using AI tools. The results indicated statistically significant improvements post-application, thereby confirming AI's role in enhancing creative language skills. Similarly, Muhammad (2024) found that AI applications effectively improved cognitive achievement, practical skills, and self-regulation among students studying educational technology. Additionally, Alkahtani (2024) explored how innovative applications develop educational and pedagogical skills in the Arab world, revealing that AI-supported activities were more effective at developing these skills than conventional methods.

Although integrating artificial intelligence tools into electronic portfolio development is increasingly important, educational literature reviews indicate a lack of empirical research on how these tools affect teachers' electronic portfolio skills in the Mafraq District. Field experiences also reveal that many teachers lack the skills to effectively use AI tools for portfolio design, which may affect portfolio quality and their role in documenting and evaluating professional growth (Malkawi, 2023). This gap highlights the need to study how AI tools influence the development of electronic portfolio skills among teachers in Mafraq District, helping to bridge the gap between technological possibilities and actual educational practices.

This study investigates how the use of artificial intelligence tools affects teachers' skills in designing electronic portfolios in Mafraq District, with a focus on modern educational needs and current teacher training trends in the digital age. It aims to answer the following research questions:

- 1 How do teachers in Mafraq District perceive the impact of using artificial intelligence tools on their development of planning and organization skills in electronic portfolio design?
- 2 What is the effect of using artificial intelligence tools on improving teachers' skills in multimedia and digital technology within electronic portfolios in Mafraq District?
- 3 Are there statistically significant differences ( $\alpha \leq 0.05$ ) in the study sample's estimates regarding the impact of using artificial intelligence tools on developing electronic portfolio design skills, based on variables such as years of experience, specialization, and academic qualification?

### Study Terminology

**Artificial Intelligence Tools:** These are intelligent digital applications used in the educational process that employ AI techniques, such as natural language interaction and automated analysis, to support teacher learning and skill development. These tools include applications such as generative content design tools and intelligent assessment systems (Shen, 2024).

**Operational Definition:** These are the intelligent digital applications the researcher used to design the teacher's electronic portfolio during the study's implementation, including content-generation tools, intelligent assessment tools, and linguistic interaction tools.

**Electronic Portfolio Design Skills:** These are the abilities and knowledge that teachers possess for planning, building, organizing, and documenting an interactive electronic portfolio. Through this portfolio, they showcase their academic and professional achievements using digital multimedia tools. These skills include selecting appropriate content and organizing digital components in the learning process (Yoon, 2025).

**Operational Definition:** These are the skills the researcher aimed to develop in teachers through the use of artificial intelligence tools. This was measured using a special assessment tool developed by the researcher to determine the extent of teachers' mastery of planning, building, organizing, and documenting processes for an electronic portfolio.

**Teachers of Mafraq District - Operational Definition:** Teachers working in schools under the Mafraq District Education Directorate who participated in implementing the study during the designated academic semester. These teachers represent the target sample for the research and were selected to measure the impact of using artificial intelligence tools on the development of electronic portfolio design skills.

## 2. Literature Review

In recent years, the field of education has seen increasing interest in using artificial intelligence, particularly to develop teacher skills and enable them to use modern digital tools such as electronic portfolios. Recent studies have aimed to reveal the effectiveness of these tools in enhancing learning and developing personal and technical skills among teachers, in line with digital education requirements.

In this context, Zahran (2024) conducted a study aimed at developing creative linguistic self among third-year secondary Azhari students using artificial intelligence applications, employing a quasi-experimental approach with pre- and post-application assessments involving a group of 30 students. The results showed statistically significant differences in favor of the post-application at the 0.01 level, with a large effect size (0.99), confirming the effectiveness of artificial intelligence in enhancing creative linguistic abilities. The researcher recommended employing these applications in the educational process and generalizing the experience to different academic levels.

Muhammad (2024) presented a study entitled "The Effectiveness of Some Artificial Intelligence Applications in Developing E-learning and Self-regulation Skills among Educational Technology Students with High and Low Mental Capacity," which aimed to verify the effectiveness of artificial intelligence applications, specifically the (app.Gamma) application, in developing e-learning and self-regulation skills among educational technology students at Assiut University, by comparing two experimental groups according to mental capacity level. The results showed the application's effectiveness in improving cognitive achievement, practical performance, and self-regulation, with no statistically significant differences between high- and low-mental-capacity groups. The researcher recommended developing artificial intelligence skills among university students by providing specialized training and supporting self-learning, thereby enhancing motivation and creativity.

Alkahtani's study (2024) addressed the role of innovative applications in developing educational and pedagogical skills in the Arab world, their potential effects on traditional education systems, and identified positive areas and obstacles associated with their use in education. The researcher used a descriptive approach and a questionnaire to collect data from a random sample of 140 faculty members at Arab universities. The results indicated that sample members' perceptions of the use of artificial intelligence applications in education were moderate. In contrast, AI-supported educational activities were more effective for skill development than traditional education. The study also showed that using these applications makes education more interactive and enjoyable. The most prominent obstacles were the possibility of system hacking and self-replicating viruses. The results also revealed

statistically significant differences in the role of artificial intelligence, influenced by years of experience and age.

Adlani's study (2024) aimed to identify the extent to which Mafraq Governorate school principals use artificial intelligence applications and the relationship between their use and the quality of administrative decision-making. It also sought to analyze the impact of variables such as gender, experience, and academic qualification. The study used a descriptive correlational survey approach and was conducted with a sample of 365 male and female teachers. The results showed that the level of school principals' use of artificial intelligence applications and the quality of administrative decision-making were at a medium level, with no statistically significant differences attributable to demographic variables. It also showed a statistically significant positive correlation between the use of artificial intelligence and the quality of administrative decisions. The study recommended training school principals and teachers on artificial intelligence applications to enhance administrative efficiency.

In a related context, Abdelmoneim's study (2024) added insights by exploring Palestinian teachers' opinions on the use of artificial intelligence technologies in education, employing a mixed-methods approach that included a questionnaire administered to 264 teachers and interviews with 15 of them. The results showed high levels of constructive beliefs, confidence, and expected benefits among those who use technology or have attended artificial intelligence courses, particularly among male teachers, young people, and individuals with scientific backgrounds. The study recommended more research on the impact of these technologies on teachers and students.

Abuzaid's study (2024) reached similar results, titled "The Reality of Using Artificial Intelligence among University Students," and aimed to explore the reality of artificial intelligence use in education through a field study of Jerash University students in Jordan. The results showed that the most prominent challenges include weak student engagement with modern technologies, a lack of faculty awareness, and insufficient technical support. The study suggested solutions, including training academic staff, improving infrastructure, and providing technical support to enhance the integration of artificial intelligence in education.

Al Salmi's study (2024), entitled "Exploring the Integration of Artificial Intelligence in Education and Smart Transport Technology in Oman; Perceptions, Challenges and Ethical Considerations," aimed to explore artificial intelligence use in education and smart transport technology adoption in the Sultanate of Oman, through a mixed approach that included questionnaires and interviews with teachers and residents. The results showed that artificial intelligence contributes to personalizing the learning experience, despite ethical and practical challenges. The study also revealed variation in the adoption of innovative transport technology due to concerns related to privacy, ease of use, and the environment. The study concluded by providing recommendations to enhance the ethical use of artificial intelligence and accelerate the adoption of smart transport, with the aim of building a sustainable and inclusive society.

Shami's study (2024) examined, from teachers' perspectives, the effectiveness of electronic portfolios as an educational tool to improve writing performance among Saudi intermediate-level female students at Taif University. It aimed to measure the effectiveness of using electronic portfolios as an educational tool to enhance English writing skills among Saudi female intermediate-level students, as perceived by their teachers at Taif University. The study used a mixed-methods approach, including Zoom interviews and a closed-ended yes/no questionnaire, with data collected from English-language teachers. The results showed that teachers see multiple benefits of using electronic portfolios in improving the language learning process, despite some challenges they faced during implementation.

### What Distinguishes This Study from Previous Studies

- Designing an integrated study tool to measure the impact of employing artificial intelligence tools on developing electronic portfolio design skills among teachers in Mafraq District. The tool's validity and reliability were verified using appropriate statistical methods, allowing its use in similar studies addressing the same topic in different educational environments.
- Focusing on teachers in Mafraq District schools, a category that has not received sufficient attention in previous studies that often focused on practicing teachers. This represents an original scientific contribution in the field of developing pre-service teacher competencies.
- The local study context in Jordan, specifically in Mafraq District, where Arabic literature, to the researcher's knowledge, lacks studies that address employing artificial intelligence tools in electronic portfolio design in Mafraq District schools, enhancing the study's field value.
- Providing an accurate vision of the actual reality of electronic portfolio design skills among teachers in Mafraq District, and analyzing the extent of artificial intelligence tools' impact on developing those skills, serving self-assessment processes, professional documentation, and independent learning.

### 3. Methodology

This study employed a descriptive-analytical research design, which is appropriate for investigating how educators use artificial intelligence tools to develop electronic portfolio skills, assessing their influence, and examining the relationships among the associated variables.

#### Population and Sample

The study encompassed all public school teachers in Mafraq District, totaling approximately 3,200 teachers, both male and female, for the academic year 2024/2025. A stratified random sampling method was employed to select 322 teachers, ensuring proportional representation across various categories of the initial population, based on variables such as years of experience, academic qualifications, and specialization.

#### Research Instrument

To fulfill the study's objectives, a questionnaire was developed as the primary data collection instrument. It comprises two main sections: the first solicits demographic information from participants. In contrast, the second evaluates the impact of using artificial intelligence tools on the development of electronic portfolio design skills. The latter section concentrates on two critical domains: (1) planning and organizational skills, and (2) multimedia and digital technology skills. The items within the questionnaire were meticulously formulated utilizing a five-point Likert scale.

The study instrument's validity was confirmed through consultation with experts and reviewers in educational technology, curriculum, and teaching methodologies. Subsequent revisions were made in response to their feedback to ensure both face and content validity. Its reliability was assessed using a pilot sample separate from the main study, yielding a Cronbach's alpha of 0.88, indicating high reliability.

#### Data Analysis Procedures

Following data collection, the data were systematically coded and subsequently entered into SPSS software for analysis. The study utilized a range of statistical techniques to interpret the data and to address the research questions effectively.

Descriptive statistics, including means and standard deviations, were used to summarize the study sample's responses across the questionnaire domains to address the first and second questions.

Inferential Statistics: Before applying parametric tests, the data distribution was assessed using the Kolmogorov-Smirnov test. The results indicated a normal distribution, justifying the use of parametric tests. One-way ANOVA was then employed to identify statistically significant differences in the responses of sample participants attributable to the study variables (years of experience, academic qualification, and specialization), to answer the third question.

Table 1 shows the study sample characteristics:

**Table 1.** Distribution of Study Sample According to Study Variables

Variable	Category	Number (n)	Percentage (%)
Academic Qualification	Bachelor's	222	74.75%
	Master's and above	100	25.25%
	Total	322	100%
Years of Experience	Less than 5 years	130	16.52%
	5 to less than 10 years	52	25.22%
	10 years or more	140	58.26%
	Total	322	100%

#### Study Variables

- Independent Variable: Employing artificial intelligence tools
- Dependent Variable: Electronic portfolio design skills among teachers
- Demographic Variables: Academic qualification, years of experience

#### Study Instrument

To achieve the study objectives, the researcher used the questionnaire as the primary tool for data collection. A questionnaire is a scientific research tool widely used to gather data on individuals' opinions, attitudes, or behaviors. It consists of a form with a set of items that the participant answers independently, without the researcher's intervention.

The researcher prepared the questionnaire to measure the impact of artificial intelligence tools on developing electronic portfolio design skills, including 17 items distributed across two main domains, as shown in Table 2:

**Table 2.** Distribution of Questionnaire Items Across Domains

Domain	Number of Items
First Domain: Developing planning and organization skills in the electronic portfolio	9 items
Second Domain: Using digital media in electronic portfolio design	8 items
Total	17 items

A five-point Likert scale was used to measure sample members' responses, according to the following degrees:

**Table 3.** Scoring Degrees

Response Degree	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Score	5	4	3	2	1

### Questionnaire Validity

#### Internal Consistency Validity

The questionnaire's internal consistency and validity were assessed using a pilot sample of 100 responses, and the Pearson correlation coefficient was calculated for each item score relative to the domain total score.

**Table 4.** Correlation Coefficients for Electronic Portfolio Planning and Organization Items

Item	Pearson Correlation	Sig. Value
AI tools help teachers design an organized and motivating electronic portfolio	0.78	0.00
AI tools contribute to developing systematic thinking skills during portfolio content planning	0.81	0.00
AI tools help teachers set clear and measurable goals within the portfolio	0.77	0.00
Teachers use AI tools to monitor their own progress and continuously update portfolio content	0.82	0.00
AI tools enable flexible and effective time and task organization within the portfolio	0.88	0.00
AI tools support planning educational activities attached to the portfolio interactively	0.74	0.00
AI tools enhance teachers' ability to analyze and organize data within the electronic portfolio	0.86	0.00
AI tools help build an integrated portfolio considering specific educational goals and outcomes	0.79	0.00
AI tools encourage teachers to use flexible planning models within electronic portfolio design	0.78	0.00

The table shows that correlation coefficients between first domain items and their total score were statistically significant at a significance level ( $\alpha \geq 0.05$ ), with Pearson coefficient values ranging between 0.74 and 0.88, indicating that items have a high degree of internal consistency and are valid in measuring planning and organization skills in electronic portfolio design among teachers.

**Table 5.** Correlation Coefficients for E-Portfolio Digital Media Design Items

Item	Pearson Correlation	Sig. Value
AI tools help teachers insert multimedia within the portfolio	0.87	0.00
AI tools contribute to creating electronic platforms to display teacher achievements	0.91	0.00
Teachers use AI tools to access digital knowledge sources supporting portfolio content	0.91	0.00
AI tools help develop digital assessment tools accompanying the portfolio	0.92	0.00
AI tools enable teachers to design specialized interactive content displayed in the electronic portfolio	0.89	0.00
AI tools provide opportunities to communicate with technical experts to support digital content development in the portfolio	0.88	0.00
AI tools allow teachers to access the latest programs and technologies supporting portfolios	0.88	0.00
AI tools help design digital educational materials attached to the portfolio	0.92	0.00

The table shows that all correlation coefficients are statistically significant at the significance level ( $\alpha \geq 0.05$ ), with values ranging between (0.8 and – 0.2), indicating high internal consistency of items and their accurate measurement of the digital media utilization domain in electronic portfolio design. This reflects the item's validity in representing this dimension of teachers' skills in employing artificial intelligence to prepare their digital portfolios.

### Construct Validity

Construct validity is one of the measures of tool validity that assesses the extent to which the tool achieves its intended objectives, showing the correlation between each study domain and the total score of the questionnaire items.

**Table 6.** Correlation Coefficients Between Each Questionnaire Domain and the Total Questionnaire Score

No.	Domain	Pearson Correlation	Sig. Value
1	Developing planning and organization skills in the electronic portfolio	0.98	0.00
2	Using digital media in electronic portfolio design	0.98	0.00

Correlation is statistically significant at a significance level ( $\alpha \geq 0.05$ )

The table shows that the correlation coefficients between each questionnaire domain and the total questionnaire score are statistically significant at the 0.05 level ( $\alpha = 0.05$ ) for all domains. The coefficients for both domains reach 0.98, indicating that the domains are valid for their intended measurements.

## Questionnaire Reliability

Reliability indicates the consistency of results, meaning that if the measurement is repeated, you get the same results. In most cases, it is a correlation coefficient, and several methods are used to estimate it, with Cronbach's alpha and the split-half method being the most common.

The researcher used Cronbach's alpha method, the most famous method for measuring tool reliability, revealing the extent of respondent score dispersion, with the following results:

**Table 7.** Cronbach's Alpha Coefficient for Measuring Questionnaire Domain Reliability

No.	Domain	Number of Items	Cronbach's Alpha
1	Developing planning and organization skills in the electronic portfolio	9	0.94
2	Using digital media in electronic portfolio design	8	0.97
3	All items	17	0.99

The table shows that Cronbach's alpha coefficient for all questionnaire domains exceeds 0.94, indicating high reliability for all domains and the questionnaire overall. After ensuring the questionnaire's validity and reliability and making modifications, the questionnaire took its final form, giving the researcher confidence to apply it to the study sample to achieve the study's objectives.

### Statistical Treatments Used in the Study

To achieve study objectives, the following statistical treatments were used:

1. Frequencies, percentages, means, and standard deviations to understand sample characteristics and phenomenon prevalence level among the sample.
2. One-sample test to test respondents' opinions about the phenomenon to be measured.
3. Pearson correlation coefficient to measure the correlation degree between two variables, used to calculate internal consistency and construct validity.
4. Cronbach's alpha test to determine questionnaire reliability.

## 4. Results

To address the research questions, the questionnaire data were analyzed, resulting in the following outcomes:

### Verification of Data Distribution Normality

Before commencing data analysis for the research questions, the distributions of the study variables were examined using the Kolmogorov-Smirnov test. The findings revealed that all significance (Sig) values across the study domains exceeded 0.05, suggesting that the data are normally distributed. This validates the use of parametric tests in the analysis.

### Results Related to the First Question

To address the initial inquiry: "What is the impact of employing artificial intelligence tools on developing planning and organization skills in electronic portfolio design among teachers in Mafraq District from their perspective?" means and standard deviations were computed for the responses of the study sample members regarding the "planning and organization skills" domain.

The results indicated an overall mean score of 4.01, accompanied by a standard deviation of 0.55 and a relative weight of 80.2%. This indicates that participants perceive the influence of artificial intelligence tools on the development of planning and organizational skills as "high." Educators

believe that using AI applications significantly enhances their ability to plan and organize electronic portfolio contents effectively.

### Results Related to the Second Question

To address the second question: "What is the impact of using artificial intelligence tools on improving multimedia and digital technology skills within electronic portfolios among teachers in Mafrq District?", means and standard deviations were computed based on the responses of the study sample members regarding the "multimedia and digital technology utilization skills" domain.

The findings revealed that this domain had the highest average score among all study areas, with a score of 4.15, a standard deviation of 0.52, and a relative weight of 83%. This suggests that participants viewed the influence of artificial intelligence tools in this area as "very high". It also shows that teachers firmly believe that AI tools are vital for enabling creative and interactive use of multimedia and digital technologies in their portfolio files.

### Results Related to the Third Question

To answer the third question: "Are there statistically significant differences at the level ( $\alpha \leq 0.05$ ) in the study sample members' estimates of the impact of employing artificial intelligence tools on developing electronic portfolio design skills attributed to variables (years of experience, academic qualification, and specialization)?", One-Way ANOVA was used.

The analysis results showed no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the study sample members' estimates across the variables years of experience, academic qualification, and specialization. The significance level (Sig) values for all variables were greater than 0.05. The following table shows the results of the One-Way ANOVA test:

**Table 8.** One-Way ANOVA Results for the Impact of Study Variables on Sample Members' Estimates

Variable	Source of Variance	Sum of Squares	Degrees of Freedom	Mean Square	F Value	Significance Level (Sig)
Years of Experience	Between Groups	1.24	2	0.62	1.89	0.153
	Within Groups	104.87	319	0.33		
	Total	106.11	321			
Academic Qualification	Between Groups	0.98	2	0.49	1.48	0.229
	Within Groups	105.13	319	0.33		
	Total	106.11	321			
Specialization	Between Groups	0.75	2	0.38	1.14	0.321
	Within Groups	105.36	319	0.33		
	Total	106.11	321			

These results indicate homogeneity in the study sample's opinions regarding the impact of using artificial intelligence tools, and that this positive impact does not vary by demographic characteristics such as years of experience, academic qualifications, or specialization.

## Domain-Specific Results

### First Domain: Planning and Organization Skills

The analysis of the first domain revealed that artificial intelligence tools significantly impact the development of planning and organization skills in electronic portfolio design. Teachers reported that AI tools help them design organized, motivating portfolios, develop systematic thinking skills in content planning, and set clear, measurable goals within their portfolios. The tools also enable flexible, effective time and task organization, support interactive planning of educational activities, and enhance teachers' ability to analyze and organize data in their electronic portfolios.

### Second Domain: Digital Media Utilization

The second domain showed even higher impact scores, indicating that artificial intelligence tools are particularly effective in enhancing digital media utilization skills. Teachers found that AI tools help them insert multimedia into portfolios, create electronic platforms to display achievements, access digital knowledge sources, develop digital assessment tools, design specialized interactive content, communicate with technical experts, access the latest programs and technologies, and design digital educational materials for portfolios.

The high scores in this domain reflect the sophisticated capabilities of artificial intelligence tools in multimedia integration and digital content creation, which are essential components of modern electronic portfolios.

## 5. Discussion

The study results showed that employing artificial intelligence tools has a significant positive impact on the development of electronic portfolio design skills among teachers in Mafraq District, where the study sample members' estimates were rated "high" overall. This result can be attributed to artificial intelligence tools, which, with their advanced capabilities in creating, organizing, and analyzing content, have enabled teachers to transcend traditional methods of building portfolio files, opening broader horizons for creativity and customization. This result is consistent with Alkahtani (2024), who found that educational activities supported by artificial intelligence are more effective for skill development than traditional education. Also, it aligns with Muhammad (2024), who demonstrated the effectiveness of artificial intelligence applications in enhancing students' practical performance.

Regarding planning and organizational skills, the findings indicated that educators acknowledged that artificial intelligence tools have significantly enhanced their ability to systematize files efficiently. This is presumably because these tools provide pre-designed templates and intelligent suggestions for organizing evidence and documentation, thereby minimizing cognitive load and allowing educators to focus more on content quality than on technical layout. Concerning multimedia skills, this domain received the highest evaluation, underscoring that the primary advantage of artificial intelligence tools, from the perspective of educators, lies in their capacity to facilitate the effortless creation, modification, and integration of digital media (images, videos, graphics), thereby transforming portfolios into dynamic and captivating presentations. This observation corroborates Zahran (2024), who emphasized the role of artificial intelligence in enhancing creative competencies.

The absence of statistically significant differences in experience, academic qualifications, and specializations suggests that the benefits of artificial intelligence tools are widespread. These tools are engineered to be user-friendly, empowering educators from diverse backgrounds to deploy them proficiently. This research helps bridge the gap in understanding how artificial intelligence affects teachers' practical skills, especially in preparing portfolio files, and provides empirical evidence supporting the integration of these technologies into professional development initiatives.

## Conclusion and Recommendations

The study concluded that the use of artificial intelligence tools plays a key role in improving teachers' skills in creating electronic portfolios. This enhances the quality of these files as tools for assessment and professional growth. It recommends including AI skills in teacher training and ongoing professional development programs. To ensure successful adoption, it suggests developing detailed guidance manuals and offering practical workshops to apply these tools. However, it is important to recognize risks such as over-reliance on pre-made tools, which can hinder genuine reflection, as well as data security and privacy issues. Therefore, educational authorities might consider partnering with tech companies to provide support for these tools, establish clear policies for their ethical and practical use, and promote further research on their impact on educators and students.

### Study Limitations

This study focused on public school teachers in Mafraq District during the second semester of the 2024/2025 academic year. The study's spatial and temporal limitations may affect the generalizability of the results.

## 7. Suggestions

Based on the findings and implications of this study, the researcher proposes several directions for future research and practical implementation:

### Future Research Directions

1. **Comparative Studies:** Conduct comparative research examining the impact of AI tools on electronic portfolio design skills across different geographic regions, educational systems, and cultural contexts to establish broader generalizability of the findings.
2. **Longitudinal Analysis:** Implement longitudinal studies to track the long-term effects of AI tool integration on teacher professional development and student outcomes, providing insights into the sustainability and evolution of these benefits over time.
3. **Technology-Specific Research:** Investigate the differential impacts of specific AI tools and platforms on portfolio design skills, helping educators and administrators make informed decisions about technology selection and implementation.
4. **Student Perspective Studies:** Examine the impact of teacher-created AI-enhanced portfolios on student learning outcomes and engagement, providing a more comprehensive understanding of the educational benefits.
5. **Cost-Benefit Analysis:** Conduct economic analyses of AI tool implementation in educational settings, examining the return on investment and resource allocation implications for educational institutions.

### Practical Implementation Recommendations:

**Professional Development Programs:** Design and implement comprehensive training programs that specifically focus on AI tool utilization for portfolio design, ensuring that teachers receive adequate support and guidance.

1. **Infrastructure Development:** Invest in the necessary technological infrastructure to support widespread AI tool adoption, including reliable internet connectivity, appropriate hardware, and technical support services.
2. **Policy Framework Development:** Establish clear policies and guidelines for AI tool use in educational settings, addressing issues of data privacy, ethical considerations, and quality assurance.

3. Collaborative Networks: Create professional learning communities and networks where teachers can share experiences, best practices, and innovations related to AI-enhanced portfolio design.

4. Continuous Evaluation: Implement ongoing assessment and evaluation mechanisms to monitor the effectiveness of AI tool integration and make necessary adjustments to maximize benefits.

The researcher emphasizes that the successful integration of artificial intelligence tools into educational practice requires a holistic approach that considers technological, pedagogical, and organizational factors. The positive findings of this study provide a strong foundation for such integration efforts, but continued research and careful implementation will be essential to realize the full potential of these technologies in enhancing teacher professional development and educational outcomes.

## Declarations

**Author Contributions.** F.A.K.: Conceptualization, methodology, data collection, data analysis, writing-original draft preparation, writing-review and editing. The author has read and approved the final version of the article.

**Conflicts of Interest.** The author declares no conflict of interest.

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**Ethical Approval.** This study was conducted in accordance with ethical guidelines for educational research. Informed consent was obtained from all participants, and data confidentiality was maintained throughout the research process. The relevant institutional review board at Al al-Bayt University approved the study.

**Data Availability Statement.** The data supporting the results reported in this study are available from the corresponding author upon reasonable request, subject to privacy and confidentiality considerations.

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## Study Limitations

**Human Limitations.** The study sample is limited to teachers in Mafraq District schools.

**Spatial Limitations.** This study was conducted in schools in the Mafraq District.

**Temporal Limitations.** The study is conducted during the second semester of the 2024/2025 academic year.

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