

The Role of Digital Feedback in Enhancing Academic and Professional Standards in Inquiry Research Writing among Arabic Language Students in a Teacher Preparation Diploma

Rasha Mohmmmed Al-Hurani ^{1,*}, Mohammad Mowafaq Bani Khaled ¹, and Mohammad F. Hawamdeh ²

¹ Faculty of Educational Sciences, Yarmouk University, Irbid, Jordan

² Faculty of Arts and Languages, Mohamed Bin Zayed University for Humanities, Abu Dhabi, United Arab Emirates

Email: rashamur@yu.edu.jo (R.M.A.-H.); tem_mbanikhaled@yu.edu.jo (M.M.B.K.); Mohammad.alhawamdeh@mbzuh.ac.ae (M.F.H.)

*Corresponding author

Manuscript received April 2, 2026; revised May 19, 2026; accepted June 18, 2026; published October 22, 2026

Abstract—This study examined the role of the digital feedback strategy in enhancing adherence to academic and professional standards in inquiry research writing among Arabic language students enrolled in the higher diploma program for teacher preparation. To achieve this objective, a research assessment instrument was developed to measure participants' performance across seven dimensions of inquiry research writing: Demonstration of knowledge and understanding, application of knowledge and understanding, critical thinking, critical reflection on professional practice, initiative and problem solving, pedagogy, and presentation and communication. The sample comprised 183 Arabic language teacher candidates at Yarmouk University, selected through convenience sampling during the second semester of the 2024/2025 academic year. Participants were assigned to two sections, one of which was randomly designated as the experimental group ($n = 92$) and taught using the Digital Feedback Strategy, while the other served as the control group ($n = 91$) and was taught using the conventional strategy. The findings indicated statistically significant differences in adherence to academic and professional standards, both individually and collectively, in favor of the experimental group.

Keywords—digital feedback strategy, inquiry research writing, academic and professional standards, teacher preparation

I. INTRODUCTION

Language plays a central role in knowledge construction, thinking, and communication [1]. It also serves as a means of preserving cultural and intellectual heritage [2]. Within this context, the Arabic language represents a fundamental component of Arab-Islamic identity and culture [3]. Furthermore, proficiency in the mother tongue contributes significantly to learners' cognitive development and academic achievement [4].

The Higher Diploma Program for Teacher Preparation is a professional, full-time diploma comprising 27 credit hours over a period of nine months. It integrates theory and practice for teachers of grades four through ten. The program includes face-to-face instruction delivered at four accredited universities—the University of Jordan, Yarmouk University, the Hashemite University, and Mu'tah University—in addition to professional practice in public and private schools through the school-experience component. Continuous support is also provided through e-learning for both face-to-face instruction and field-based school experience [5].

The program's structural framework consists of an integrated system of core units, namely: The pedagogy of

learning and teaching, subject-specific teaching methods, and school experience (practicum), in addition to a pivotal component focused on academic reading and writing. These elements reflect an integrative orientation that balances theoretical grounding with field-based application, ensuring professional preparation based on solid scientific foundations and informed pedagogical practice [6]. The academic reading and writing component plays a foundational role in building the professional competence of pre-service teachers, as it enables teacher candidates to read literature and educational research through critical, analytical engagement, to understand their theoretical premises and methodological procedures, and then to reproduce and articulate their own ideas in precise academic language characterized by clarity, coherence, and terminological discipline [7]. Accordingly, this component extends beyond developing formal linguistic skills; it contributes to shaping a research-oriented awareness that strengthens teachers' ability to bridge the gap between theory and practice [8].

This structure aligns with contemporary trends in pre-service teacher education and preparation, which emphasize the integration of theoretical and practical components. Such trends reinforce research and writing competencies as an integral part of professionalization, thereby fostering the development of teachers capable of reflection, analysis, critique, and evidence-based decision-making grounded in scientific knowledge [9, 10].

The diploma program is taught and assessed in both Arabic and English. English-specialization teacher candidates are assessed in English, whereas Arabic-specialization teacher candidates are assessed in Arabic. The diploma consists of three main units. The first core unit is the pedagogy of learning and teaching, which focuses on key principles underlying learning and teaching practices [5]. The second core unit is subject pedagogy (subject teaching methods), which focuses on approaches to teaching specific subjects. It includes areas such as classroom-teacher subjects, methods for teaching Arabic, methods for teaching English, methods for teaching mathematics, and methods for teaching science (chemistry, physics, and biology). Several specializations have also been added recently, such as methods for teaching social and Islamic studies, methods for teaching special education, and methods for teaching counselling psychology. The third core unit is school experience, which focuses on practicum training over 20 weeks. During this unit, teacher candidates are placed in two or three schools across the public and private sectors, which enhances teachers' capacity

to adapt to diverse educational environments and strengthens the standing of the diploma program within the educational context [11].

Assessment in the Higher Diploma Program for Teacher Preparation is divided into two types: formative (ongoing) assessment and summative assessment. Formative assessment is conducted continuously throughout the year and aims to improve learning outcomes and guide the professional trajectory of the trainee teacher candidate [12]. It encompasses various practices, such as providing comments and feedback on drafts, holding follow-up sessions, and conducting formal observations during school visits. Qualitative feedback is regarded as the primary driver of academic and professional performance development [13]. This feedback is provided based on rubrics derived from academic and professional standards, which are the same standards used in summative assessment to ensure consistency and transparency in the assessment process [14]. Summative assessment includes the practicum and the submission of three written assignments; each core unit has its own summative (achievement) assessment, and teacher candidates must successfully complete all three assessments in order to pass the diploma program [5].

The task for the second core unit in subject pedagogy during the second semester is based on a small-scale, practice-based inquiry research project. This project demonstrates the fulfillment of diploma standards, particularly the indicators within the academic and professional rubrics. This subject-specific inquiry requires teacher candidates to engage with pedagogical methods and collect evidence from inquiry-informed practice to formulate a research question, which is then investigated systematically within their subject area. Inquiry research is considered an effective tool for bridging the gap between theoretical knowledge and authentic classroom practices [15]. The inquiry question must be linked to the pedagogical aspects studied in the second core unit and is examined through the candidates' classroom practices during their third school placement. Accordingly, relevant evidence is collected to draft the inquiry research report—a 3,500-word document ($\pm 10\%$) summarizing the findings. The report is structured into several sections: introduction, literature review, overview of the inquiry process, ethical considerations, results, reflective discussion, and finally, references and appendices [5].

Inquiry research is a systematic and evidence-based process through which teacher candidates investigate authentic educational and classroom-related issues in order to improve their professional practice and deepen their understanding of teaching and learning contexts [16]. Grounded in inquiry-based learning principles, this approach encourages participants to formulate meaningful questions, collect and analyze relevant evidence, and construct knowledge through critical reflection and informed decision-making rather than through passive reception of information [17–19]. The inquiry cycle typically involves identifying a problem, formulating an inquiry question, conducting an investigation, interpreting findings, and engaging in reflective discussion, thereby supporting the development of problem-solving skills, professional judgment, and evidence-based classroom practices [18, 20].

Accordingly, the importance of inquiry research for Arabic language students in the Higher Diploma Program for Teacher Preparation becomes evident in that it trains pre-service teacher candidates to adopt the stance of the teacher-researcher—one that connects theory to practice by interrogating teaching, collecting classroom-based evidence, and transforming it into knowledge that can be shared and refined. This was affirmed by Ginsberg [21], who showed that inquiry creates space for constructing professional meaning and generating practice-based knowledge about teaching that goes beyond ready-made theoretical models. Consequently, Arabic language students in the Higher Diploma Program for Teacher Preparation benefit from inquiry in particular because it not only develops their systematic thinking skills, but also provides them with a practical framework for investigating central linguistic and educational issues such as reading comprehension, writing development, linguistic error analysis, reflective practice, critical thinking, problem solving, and the ability to select the most effective instructional strategies based on authentic classroom data. This, in turn, enhances the quality of their instructional decisions and strengthens their ability to justify them through evidence and educational literature [18, 22].

Writing the inquiry research report is of particular importance because it motivates teacher candidates to analyze their professional problems through a rigorous, systematic scientific approach. However, practice indicates noticeable difficulties in adhering to academic and professional standards in their inquiry research writing—whether in the depth of the theoretical treatment provided, the soundness of the methodology followed, or the accuracy of referencing and documentation [5]. In the same context, Carless and Winstone [23] emphasized a substantial gap between rubric expectations and teacher candidates' level of feedback literacy, as many lack the ability to translate feedback into developmental actions that improve the quality of the final research product—highlighting the need for interactive digital strategies to narrow this gap.

Written assignments in the diploma program, including the inquiry research report, are marked according to rubrics derived from the academic and professional standards. These standards are divided into four main domains, with sub-dimensions in three of them, as reflected in the marking criteria as follows:

- **Knowledge and Understanding**

This domain goes beyond the mere recall of information to the level of deep conceptual understanding. Teacher candidates are required to demonstrate a high level of ability to critique and analyze linguistic and educational theories and to relate them to the inquiry context. This includes accurate use of specialized terminology and the ability to integrate previous literature in constructing the theoretical framework, thereby enhancing the credibility and comprehensiveness of the inquiry research report. In doing so, the report is moved beyond general description toward rigorous, precise scholarly grounding based on evidence and proof generated through field-based practicum experience [24].

- **Cognitive Skills**

This domain represents analytical intelligence in writing the inquiry research report. It is divided into two complementary dimensions:

Critical Thinking: This is reflected in the quality of constructing logical arguments, the ability to examine classroom data intelligently, and the capacity to distinguish between actual findings and personal expectations, thereby preventing bias in interpreting results.

Critical Reflection of Professional Practice: This constitutes the core of the teacher candidate's role, as the teacher candidate reviews underlying instructional assumptions and analyzes the reasons for the success or difficulty of the inquiry procedures. This, in turn, contributes to building practical knowledge that distinguishes the expert teacher from the novice. Recent studies also indicate that clarity of these criteria raises teacher candidates' research awareness, making them more disciplined in addressing complex educational issues [25].

- **Professional Skills and Pedagogy**

This domain is performance-based, as it measures the teacher candidate's ability to translate theory into successful classroom practice. It comprises the following:

Initiative and Problem Solving: This is demonstrated in the teacher candidate's ability to diagnose learning gaps—such as weaknesses in targeted skills—and to design well-considered educational interventions, with the flexibility to modify these interventions based on classroom-derived feedback. This, in turn, highlights professional reasoning in decision-making.

Pedagogy: This aspect is closely related to the specificity of teaching Arabic. It assesses the extent to which the teacher succeeds in selecting appropriate linguistic and pedagogical strategies for the subject matter and in justifying these choices based on learners' characteristics, interests, preferences, and learning styles within the classroom. In this way, inquiry research becomes a tool for developing teaching competence, research capacity, and ongoing professional development in writing, rather than merely an academic requirement [26, 27].

- **Presentation and Communication**

This domain is concerned with the quality of the written product and its ability to convey ideas with clarity and professionalism. It includes the logical structural organization of the research report, smooth transitions between paragraphs, and strong command of formal academic Arabic. The domain also places strong emphasis on rigorous adherence to international scholarly referencing conventions in accordance with the APA (7th Edition) style, as well as on presenting results and discussion in a manner characterized by objectivity and scientific neutrality. Specifying these criteria with precision reduces assessment ambiguity and provides students with clear performance standards that enhance the quality of their final outputs [28].

In light of the rapid digital transformation taking place in the education sector, the Digital Feedback Strategy has emerged as a contemporary approach that supports learning quality and improves learning outcomes. It employs digital technologies to provide learners with timely, organized, and specific feedback, thereby enhancing interaction and deepening their understanding of academic performance criteria [29]. This strategy constitutes an instructional approach through which learners receive targeted information about the quality of their performance or learning outcomes via a digital medium, such as learning

platforms or embedded comments in Microsoft Word, which provides teacher candidates with broader opportunities for continuous assessment, performance analysis, and tracking professional progress and development based on accurate data aligned with the rubrics of academic and professional standards in the Higher Diploma Program for Teacher Preparation [13, 30].

Digital feedback derives its significance from making learning improvement an ongoing process. It offers the advantage of documentation and the ability to monitor improvement across the inquiry research reports produced by teacher candidates, which enhances learners' self-regulation and helps narrow the gap between current performance and the targeted level in accordance with standards [31]. In this regard, the role of this strategy is reflected in Arabic language students' adherence to academic and professional standards while writing the inquiry research report by making the standards visible and operationally applicable, across the following domains:

- (1) **Knowledge and Understanding:** Writing an inquiry research report requires a high level of proficiency in drawing on educational literature to support the issue under investigation. This approach guides teacher candidates in presenting knowledge synthesized from multiple sources—including educational literature, reflective practices, and field experience—to support their ideas with a clear and substantive voice [5]. Furthermore, digital feedback helps candidates bridge the gap between theoretical knowledge and the applied research context, ensuring that educational terminology is used accurately within well-developed contexts [13].
- (2) **Cognitive Skills:** Critical thinking represents the essence of inquiry research. Through structured digital comments and guidance, teacher candidates are encouraged to construct clear and persuasive arguments supported by evidence [5]. Educational literature further suggests that practices such as marginal comments embedded in Microsoft Word documents stimulate critical reflection on professional practice by identifying gaps in performance and supporting logical inferences that contribute to professional growth [31].
- (3) **Professional Skills and Pedagogy:** Within the inquiry research project, teacher candidates seek to address authentic instructional problems. The strategy supports participants in proposing alternative solutions and evaluating them in light of newly acquired knowledge [5]. It also encourages a shift from merely applying teaching strategies to becoming reflective practitioners capable of justifying pedagogical decisions and explaining their impact on learning and teaching processes [32].
- (4) **Presentation and Communication:** The inquiry research report is an academic product that requires a high level of precision. Digital feedback reinforces adherence to the structure specified in the program guide and to the required formatting conventions. It also provides opportunities to refine language, eliminate redundancy, maintain conciseness, and ensure accurate referencing in accordance with APA (7th Edition) guidelines [5]. In the educational literature, this process is described as strengthening academic identity and academic integrity [33, 34].

In a study conducted in Egypt, Qasim [32] examined the effectiveness of the Digital Feedback Strategy in enhancing action research writing skills and adherence to professional standards among pre-service Arabic language teachers. To achieve the study's objectives, a quasi-experimental design was employed. The sample consisted of 40 male and female teachers, divided into two groups: an experimental group ($n = 20$) taught using the Digital Feedback Strategy, and a control group ($n = 20$) taught via conventional methods. The results revealed statistically significant differences in favor of the experimental group regarding both the quality of inquiry research writing and adherence to established academic and professional standards.

By contrast, a study by Zheng and Yu [35] in China aimed to examine the effectiveness of the Digital Feedback Strategy in improving standards of inquiry and critical writing among pre-service teachers. To achieve the study objectives, an experimental approach with a quasi-experimental design was used. The study sample consisted of (54) male and female teachers, who were distributed into two groups: an experimental group comprising (27) male and female teachers who were taught using the Digital Feedback Strategy, and a control group comprising (27) male and female teachers who were taught using the conventional strategy. The results demonstrated that the interactive Digital Feedback Strategy contributed significantly to narrowing the gap between current performance and the required academic standards in formulating logical arguments in research.

A study by Al-Hoorie *et al.* [36] in the Kingdom of Saudi Arabia aimed to examine the effectiveness of synchronous feedback tools in enhancing adherence to academic publishing standards and improving research quality among students of educational studies. To achieve the study objectives, an experimental approach with a quasi-experimental design was employed. The study sample consisted of (60) male and female teachers, who were distributed into two groups: an experimental group comprising (30) male and female teachers who were taught using the Digital Feedback Strategy, and a control group comprising (30) male and female teachers who were taught using the conventional strategy. The study results indicated that the group that received immediate digital feedback outperformed the group that received conventional feedback in scientific inquiry skills and in accuracy of following professional standards.

As for the scientific contribution of this study, it sought to present an operational model that links the Digital Feedback Strategy to the level of improvement across the four academic and professional standards among Arabic language students in the Higher Diploma Program for Teacher Preparation. The findings of previous studies support the current study in demonstrating the role of digital interaction in moving the teacher candidate from the level of "does not meet" to "meets to a very high degree." The present study also aimed to provide a scientific basis for affirming that formative digital feedback is the primary drive of improving the quality of inquiry research, strengthening the construction of logical arguments, and deepening Critical Reflection of Professional Practice among Arabic language teacher candidates. In addition, the value of the current study lies in its capacity to narrow the gap between current performance

and the required standards, thereby enhancing teacher candidates' Presentation and Communication skills and their commitment to academic integrity and rigorous scholarly documentation. Despite growing international interest in digital feedback, limited research in the Jordanian context has explored its role in enhancing adherence to academic and professional standards among Arabic language teacher candidates in teacher preparation programs.

A. Research Problem and Questions

In alignment with international educational standards, graduate teacher preparation programs place considerable emphasis on the professional preparation and training of teachers. This emphasis is reflected in the growing body of educational literature and research addressing the challenges faced by teacher candidates in meeting academic and professional standards. Within the Higher Diploma Program for Teacher Preparation, these challenges have become evident in participants' performance across several dimensions, including Demonstration of Knowledge and Understanding, Application of Knowledge and Understanding, Critical Thinking, Critical Reflection of Professional Practice, Initiative and Problem Solving, Pedagogy, and Presentation and Communication.

This weakness has been reflected in teacher candidates' ability to write inquiry research reports and to apply the rubrics of academic and professional standards correctly. Such shortcomings constitute the problem addressed in the current study, alongside the continued persistence of the same challenges in employing instructional strategies—whether in the strategies adopted, the ways educational content is presented and delivered, or reliance on conventional instruction to date. This concern has also been highlighted in previous studies [32, 35].

The current study problem further emerged from the researchers' observations during their field experiences while training Arabic language students in the Higher Diploma Program for Teacher Preparation. Accordingly, this study investigates the role of the Digital Feedback Strategy in improving adherence to academic and professional standards in writing inquiry research among Arabic language students in the Higher Diploma Program for Teacher Preparation in Jordan. The research problem is defined through answering the following question:

Is there a statistically significant difference at the significance level ($\alpha = 0.05$) between the mean scores of the study participants across the dimensions of the academic and professional standards, individually and collectively, attributable to the teaching method (conventional instruction vs. the Digital Feedback Strategy)?

Two hypotheses were derived from this question:

- There is no statistically significant difference at the significance level ($\alpha = 0.05$) between the mean scores of the study participants across the individual dimensions of the academic and professional standards attributable to the teaching method (conventional instruction vs. the Digital Feedback Strategy).
- There are no statistically significant differences at the significance level ($\alpha = 0.05$) between the mean scores of the study participants across the individual and overall dimensions of the academic and professional

standards—Demonstration of Knowledge and Understanding, Application of Knowledge and Understanding, Critical Thinking, Critical Reflection of Professional Practice, Initiative and Problem Solving, Pedagogy, and Presentation and Communication—attributable to the teaching method (conventional instruction vs. the Digital Feedback Strategy).

B. Significance of the Study

The significance of the study is presented in two aspects, as follows:

Theoretical significance: This aspect relates to the importance of the study topic and its variables, and to its contribution to enriching contemporary educational literature on formative (ongoing) assessment, particularly in the area of digital feedback. The study addresses digital feedback as an effective approach for improving adherence to academic and professional standards in writing inquiry research. It may also deepen the theoretical understanding of the relationship between the Digital Feedback Strategy and the level of improvement in adhering to academic and professional standards in inquiry research writing. In addition, it offers an analytical framework that links cognitive and professional dimensions in teacher preparation and qualification, especially for Arabic language teachers in Higher Diploma programs for teacher preparation.

Practical significance: This study may benefit program coordinators and faculty members involved in teacher preparation by providing a research-based perspective on how to employ the Digital Feedback Strategy in teaching educational research courses and in writing inquiry research reports. It may also help teacher candidates improve the quality of their research writing, raise their level of adherence to academic and professional standards, and enhance Critical Thinking, Critical Reflection of Professional Practice, Initiative and Problem Solving, Pedagogy, and Presentation and Communication, which would positively reflect on their academic performance and future teaching practices.

C. Study Objectives

The current study aims to investigate the role of the Digital Feedback Strategy as a contemporary instructional approach for training teacher candidates within the Higher Diploma Program for Teacher Preparation. Specifically, it seeks to examine the effectiveness of this strategy in enhancing Arabic language students' adherence to academic and professional standards compared to conventional methods. By doing so, the study contributes to improving inquiry research writing, addressing recommendations from previous research, and aligning with global educational trends that emphasize the active role of teacher candidates in their own professional development.

D. Delimitations and Limitations of the Study

- The present study was limited to a convenience sample of Arabic language students enrolled in the Higher Diploma Program for Teacher Preparation at the Faculty of Educational Sciences, Yarmouk University, Jordan, during the second semester of the 2024/2025 academic year. Accordingly, the findings of the study should be interpreted with caution, as the use of convenience

sampling may limit the generalizability of the results beyond the specific context and population investigated in the present study.

- The findings of the current study are interpreted in light of the elements and steps of the Digital Feedback Strategy addressed in the study, the instrument used and the validity and reliability indicators established for it, as well as the study procedures.

E. Study Terms and Operational Definitions

The study included the following terms and operational definitions:

- Digital Feedback Strategy (operational definition): A set of organized assessment procedures through which the teacher trainer employs digital tools to provide written feedback to Arabic language students on their performance in writing the inquiry research report, with the aim of improving their rubric levels for the academic and professional standards adopted in the Higher Diploma Program for Teacher Preparation.
- Academic and Professional Standards Rubric (operational definition): A rubric-based assessment instrument used in the inquiry research component to evaluate Arabic language teacher candidates' adherence to academic and professional standards in inquiry research writing. The rubric framework consisted of four major domains encompassing seven dimensions: Demonstration of Knowledge and Understanding, Application of Knowledge and Understanding, Critical Thinking, Critical Reflection of Professional Practice, Initiative and Problem Solving, Pedagogy, and Presentation and Communication. Each dimension included five behavioral indicators, resulting in a total of 35 indicators. Performance was assessed using a five-level rating scale ranging from 4 to 8, where a score of 8 reflected a very high level of mastery, while a score of 4 indicated insufficient evidence of achievement. Improvement in performance was monitored through the digital feedback provided via the learning platform.
- Inquiry research (operational definition): An educational research project completed by teacher candidates in the Higher Diploma Program for Teacher Preparation, within the specialization of methods of teaching Arabic. It addresses an instructional problem related to professional practice and is based on data collection, analysis, and interpretation, as well as adherence to the adopted academic and professional standards in research writing.

II. METHODOLOGY

A. Study Design

The present study employed a quasi-experimental design (a pre-test/post-test design with two equivalent groups) to examine the role of the Digital Feedback Strategy in improving Arabic language students' adherence to academic and professional standards within the Higher Diploma Program at the Faculty of Educational Sciences, Yarmouk University, Jordan.

B. Study Participants

The study population comprised 183 Arabic language teacher candidates enrolled in the Higher Diploma Program

for Teacher Preparation at the Faculty of Educational Sciences, Yarmouk University. A convenient sampling approach was used due to the availability of the facilities and resources required to conduct the study. The two study groups were then selected randomly: The participants were assigned to an experimental group ($n = 92$), which received instruction through the Digital Feedback Strategy, and a control group ($n = 91$), which received conventional instruction, taught using conventional strategy, during the second semester of the 2024/2025 academic year.

C. Study Instrument: Inquiry Research Test

To achieve the study objectives, the dimensions and their corresponding behavioral indicators targeted for improvement were identified by referring to the rubric framework for academic and professional standards adopted in the Higher Diploma Program for Teacher Preparation at the Faculty of Educational Sciences, Yarmouk University, as well as the program handbook. The framework consisted of seven dimensions comprising 35 behavioral indicators, with five indicators assigned to each dimension. The dimensions included: Demonstration of Knowledge and Understanding, Application of Knowledge and Understanding, Critical Thinking, Critical Reflection of Professional Practice, Initiative and Problem Solving, Pedagogy, and Presentation and Communication. To measure participants' performance, an inquiry research writing test was developed. The test consisted of one task requiring participants to prepare an inquiry research report in accordance with the rubric framework for academic and professional standards and the approved inquiry research writing guidelines.

D. Validity of the Inquiry Research Test

The initial version of the inquiry research test was reviewed by a panel of experts specializing in Arabic language curricula and methods of teaching, drawn from faculty members at four universities. They were asked to verify the appropriateness of the standards for training students to write inquiry research, the suitability of the inquiry question, the adequacy of the proposed time allocation, and to provide any comments or suggestions for improving clarity and relevance. Based on their feedback, the test was revised, an inquiry research writing guide was added, and certain behavioral indicators were modified. Participants were given one week—rather than three days—to complete the test, following calculation of the average time required by Arabic language teachers in the pilot sample to respond to the test.

E. Inter-Rater Agreement Reliability for the Inquiry Research Test

Inter-rater agreement reliability was established by administering the inquiry research test to a pilot sample consisting of 32 male and female teachers. The participants' responses were independently scored by the researchers, both of whom had prior experience teaching Arabic in the Higher Diploma Program for Teacher Preparation. Inter-rater agreement reliability coefficients were then calculated for each dimension of the academic and professional standards, as well as for the overall test, using Holsti's formula [37]. Table 1 presents the inter-rater agreement reliability coefficients for each dimension and for the overall test.

Table 1. Inter-rater agreement reliability coefficients for each dimension of the academic and professional standards and for the overall test

Dimension of Academic and Professional Standards	Inter-rater reliability coefficient
Demonstration of Knowledge and Understanding	0.92
Application of Knowledge and Understanding	0.92
Critical Thinking	0.90
Critical Reflection of Professional Practice	0.86
Initiative and Problem Solving	0.92
Pedagogy	0.90
Presentation and Communication	0.92
Overall Test Score	0.91

As shown in Table 1, the inter-rater agreement reliability coefficient for the test as a whole was 0.91, whereas the inter-rater agreement coefficients for the dimensions of the academic and professional standards ranged from 0.86 to 0.92. All of these values were considered acceptable for the purposes of the present study, as Holsti [37] indicated that an agreement coefficient of 0.85 or higher represents an acceptable level of agreement.

To verify the equivalence of the two study groups on the pre-test, the means and standard deviations of participants' pre-test performance in inquiry writing were calculated. An independent-samples t-test (t-test for Two Independent Samples) was then conducted to examine whether the apparent difference between the two-group means was statistically significant according to the teaching method (conventional instruction vs. the Digital Feedback Strategy). Table 2 presents the results.

Table 2. Results of the independent-samples t-test for participants' pre-test performance in inquiry writing according to the teaching method

GROUP	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Control	36.03	2.75	1.110	181	0.271
Digital Feedback Strategy	35.41	2.01			

Based on the t-test results presented in Table 2, the obtained t-value for the teaching method was 1.110, with a significance level of 0.271, which exceeds the significance threshold ($\alpha = 0.05$). This result indicates that no statistically significant differences existed between the control and experimental groups in their pre-test performance across the dimensions of the academic and professional standards. Accordingly, the two groups were considered equivalent prior to the implementation of the instructional intervention. To achieve greater statistical control in the post-test analysis, Analysis of Covariance (ANCOVA) was employed.

F. Study Variables

This study examined the following variables:

- Independent variable: Teaching method, with two categories (conventional instruction and the Digital Feedback Strategy).
- Dependent variable: This included:

The dimensions of the academic and professional standards collectively, as reflected in participants' overall performance across all dimensions of the inquiry research test.

Each dimension of the academic and professional

standards individually (Demonstration of Knowledge and Understanding, Application of Knowledge and Understanding, Critical Thinking, Critical Reflection of Professional Practice, Initiative and Problem Solving, Pedagogy, and Presentation and Communication), as reflected in participants' performance on the items of each dimension.

G. Statistical Analysis

To answer the study question and test the main hypothesis, means, standard deviations, and adjusted means were calculated for the performance of the two study groups across each dimension of the academic and professional standards separately. To examine the statistical significance of the differences between the groups according to the teaching method, a one-way multivariate Analysis of Covariance (MANCOVA) was conducted.

In addition, means, standard deviations, and adjusted means were calculated for participants' overall performance

across the academic and professional standards collectively. To determine the statistical significance of the post-test differences between the two groups, a one-way Analysis of Covariance (ANCOVA) was employed. Eta squared (η^2) was also calculated to estimate the effect size associated with the teaching method variable [35].

III. RESULTS AND DISCUSSION

To answer the study question, which states: "Are there statistically significant differences at ($\alpha = 0.05$) between the mean scores of the study participants across the individual and overall dimensions of the academic and professional standards attributable to the teaching method (conventional instruction vs. the Digital Feedback Strategy)?", the means and standard deviations of participants' pre-test, post-test, and adjusted post-test performance were calculated for each dimension of the academic and professional standards according to the teaching method, as shown in Table 3.

Table 3. Means and standard deviations of participants' pre-test, post-test, and adjusted post-test performance on each dimension of the academic and professional standards according to the teaching method

Dimensions	Group	Pre-test		Post-test		Adjusted Post-test	
		Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Error
Demonstration of Knowledge and Understanding	Control	5.00	0.67	6.14	0.63	6.11	0.10
	Digital Feedback Strategy	5.14	0.67	7.54	0.51	7.57	0.10
Application of Knowledge and Understanding	Control	5.11	0.70	5.38	0.79	5.39	0.12
	Digital Feedback Strategy	5.00	0.62	7.27	0.51	7.26	0.12
Critical Thinking	Control	5.27	0.61	5.54	0.65	5.48	0.10
	Digital Feedback Strategy	5.22	0.79	7.35	0.54	7.41	0.10
Critical Reflection of Professional Practice	Control	5.16	0.76	5.19	0.78	5.16	0.12
	Digital Feedback Strategy	5.08	0.80	7.35	0.54	7.38	0.12
Initiative and Problem Solving	Control	4.95	0.57	5.78	0.79	5.7	0.11
	Digital Feedback Strategy	5.08	0.68	7.16	0.44	7.25	0.11
Pedagogy	Control	4.92	0.49	6.16	0.76	6.17	0.11
	Digital Feedback Strategy	4.68	0.67	7.11	0.52	7.1	0.11
Presentation and Communication	Control	5.62	0.64	6.08	0.68	6.12	0.09
	Digital Feedback Strategy	5.22	0.53	7.59	0.50	7.55	0.09

Table 3 indicates notable differences between the pre-test and post-test mean scores of participants in the experimental group following the implementation of the Digital Feedback Strategy. To determine the statistical significance of the

observed post-test differences according to the teaching strategy, a one-way multivariate analysis of covariance (One-way MANCOVA) was conducted, as shown in Table 4.

Table 4. Results of the one-way Multivariate Analysis of Covariance (MANCOVA) for participants' post-test performance across each dimension of the academic and professional standards according to the teaching method

Source	Dependent Variable	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Teaching Method	Demonstration of Knowledge and Understanding	32.086	1	32.086	**94.710	< 0.001	0.593
Hotelling's Trace=10.167	Application of Knowledge and Understanding	52.698	1	52.698	**114.387	< 0.001	0.638
Statistical significance = 0.000*	Critical Thinking	55.711	1	55.711	**158.195	< 0.001	0.709
	Critical Reflection of Professional Practice	73.597	1	73.597	**156.247	< 0.001	0.706
	Initiative and Problem Solving	35.85	1	35.85	**93.308	< 0.001	0.589
	Pedagogy	13.164	1	13.164	**30.478	< 0.001	0.319
	Presentation and Communication	30.538	1	30.538	**106.634	< 0.001	0.621

*Table abbreviated. **Statistically significant at (< 0.001).

Based on the MANCOVA results presented in Table 4, the Hotelling's Trace value associated with the teaching method was statistically significant ($p < 0.05$), indicating the presence of significant differences between the two study groups in at least one dimension of the academic and professional standards.

Further examination of the univariate results revealed statistically significant differences across all dimensions—Demonstration of Knowledge and Understanding, Application of Knowledge and Understanding, Critical Thinking, Critical Reflection of Professional Practice, Initiative and Problem Solving, Pedagogy, and Presentation and Communication—in favor of the Digital Feedback Strategy group, as all significance values were below the adopted significance level ($\alpha = 0.05$).

Accordingly, the null hypothesis was rejected, indicating that the teaching method had a statistically significant effect on participants' performance across the dimensions of the academic and professional standards.

Moreover, the mean scores shown in Table 3 indicate that the statistically significant difference favored the

performance of the experimental group participants who were taught using the Digital Feedback Strategy program. The effect size values for the dimensions were calculated and amounted to (0.593, 0.638, 0.709, 0.706, 0.589, 0.319, 0.621), respectively, which are considered high [35]. These values indicate that (59.3%, 63.8%, 70.9%, 70.6%, 58.9%, 31.9%, and 62.1%) of the variance (improvement) in participants' post-test performance in the dimensions of Demonstration of Knowledge and Understanding, Application of Knowledge and Understanding, Critical Thinking, Critical Reflection of Professional Practice, Initiative and Problem Solving, Pedagogy, and Presentation and Communication, respectively, is attributable to the use of the Digital Feedback Strategy.

In addition, the means, standard deviations, and adjusted post-test means for participants' overall performance across the dimensions of the academic and professional standards were calculated according to the teaching method (conventional instruction vs. the Digital Feedback Strategy), as presented in Table 5.

Table 5. Means, standard deviations, and adjusted post-test means of participants' overall performance across the dimensions of the academic and professional standards according to the teaching method

Group	Pre-test		Post-test		Adjusted Post-test	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Error
Control	36.03	2.75	40.27	1.97	40.22	0.30
Digital Feedback Strategy	35.41	2.01	51.38	1.75	51.43	0.30

Table 5 indicates a notable increase in the post-test mean scores of participants in the experimental group following the implementation of the Digital Feedback Strategy. To determine the statistical significance of the observed post-test

differences according to the teaching strategy, a one-way analysis of covariance (One-way ANCOVA) was conducted, as shown in Table 6.

Table 6. Results of the one-way Analysis of Covariance (ANCOVA) for participants' post-test performance across the dimensions of the academic and professional standards according to the teaching method

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Covariate Pre-test	11.411	1	11.411	3.396	0.07	
Teaching Method	2286.023	1	2286.02	*680.281	< 0.001	0.905
Error	238.589	180	3.36			
Total	2532.716	182				

*Statistically significant at ($\alpha = 0.05$)

Based on the ANCOVA results presented in Table 6, the effect of the teaching method was statistically significant ($p < 0.05$), indicating significant differences between the two study groups in their overall performance across the dimensions of the academic and professional standards. Accordingly, the null hypothesis was rejected, confirming that the teaching method had a significant effect on participants' post-test performance.

The adjusted means presented in Table 5 further demonstrated that the statistically significant differences favored the experimental group, which was taught using the Digital Feedback Strategy. The calculated effect size ($\eta^2 = 0.905$) indicated a large effect according to Cohen's criteria [35]. This result suggests that approximately 90.5% of the variance in participants' post-test performance across the dimensions of the academic and professional standards can be attributed to the use of the Digital Feedback Strategy.

These results can be interpreted in light of the theoretical literature emphasizing the central role of formative feedback in improving learning outcomes and guiding professional development. According to Hattie and Timperley [13],

feedback becomes most effective when it provides clear information about current performance, the desired level of performance, and the steps required to bridge the gap between the two. The Digital Feedback Strategy applied in this study aligns with this framework, as it provided participants with structured and continuous comments linked directly to the rubric indicators of the academic and professional standards. This alignment likely enabled teacher candidates to better understand the expectations associated with inquiry research writing and to systematically improve their performance.

Similarly, the findings correspond with the perspective of Nicol and Macfarlane-Dick [31], who emphasize that formative feedback contributes to the development of self-regulated learning by enabling learners to monitor their progress and adjust their performance accordingly. In the present study, digital feedback allowed teacher candidates to review comments repeatedly, revise their inquiry research reports, and progressively refine their work. This process likely contributed to the significant improvements observed across the various domains of the academic and

professional standards.

The improvement in the dimensions related to Demonstration of Knowledge and Understanding and Application of Knowledge and Understanding can also be interpreted through the role of feedback in guiding learners' engagement with educational literature and theoretical frameworks. As noted in the program guidelines of the Queen Rania Teacher Academy [5], inquiry research writing requires teacher candidates to connect theoretical knowledge with classroom practice and to integrate scholarly literature within their research reports. The digital comments and guidance provided during the writing process likely supported students in strengthening the theoretical grounding of their work and in using educational terminology more accurately and systematically.

Furthermore, the results indicating improvement in Critical Thinking and Critical Reflection of Professional Practice align with the theoretical foundations of inquiry-based learning, which emphasize the importance of questioning, evidence collection, and reflective analysis as central processes in knowledge construction [18, 19]. Digital feedback appears to have facilitated these processes by prompting teacher candidates to reconsider their interpretations of classroom evidence and to justify their conclusions with clearer reasoning and stronger argumentation. This is consistent with the view that inquiry research promotes teachers' cognitive autonomy and positions them as producers of knowledge rather than passive recipients of information.

The significant improvement observed in the domains of Initiative and Problem Solving and Presentation and Communication can also be understood in light of the role of feedback in supporting professional competence and academic writing skills. The educational literature indicates that feedback provided through digital platforms allows learners to refine their written work, improve clarity and coherence, and adhere more closely to academic conventions [14, 23]. In the context of the present study, digital comments embedded in the writing process likely helped teacher candidates organize their inquiry research reports more effectively, maintain logical connections between sections, and apply appropriate referencing conventions.

Although the Pedagogy domain also improved as a result of the Digital Feedback Strategy, the degree of improvement was relatively smaller compared with the other domains. This finding may be interpreted by considering that pedagogical competence involves not only theoretical understanding but also complex practical skills developed through classroom interaction and professional experience. As indicated in the literature on teacher preparation [6, 11], pedagogical development is closely linked to authentic teaching practice and reflective engagement with classroom situations. Consequently, while digital feedback can support the analysis and documentation of pedagogical decisions within inquiry research writing, deeper pedagogical development may require more extensive practical experiences and richer forms of performance-based feedback.

Overall, the collective analysis of the dimensions of the academic and professional standards indicates that the improvement in participants' performance was largely

attributable to the Digital Feedback Strategy rather than to pre-existing differences between the two groups. This finding reinforces the argument that structured digital formative feedback can serve as an effective instructional mechanism within teacher preparation programs.

By making performance criteria explicit and providing continuous guidance aligned with rubric indicators, digital feedback enabled teacher candidates to progressively refine their inquiry research writing and strengthen their academic and professional competencies. These findings are consistent with previous studies emphasizing the role of interactive digital feedback in narrowing the gap between learners' current performance and the expected academic standards [32, 35].

IV. CONCLUSION

The findings of this study suggest that the Digital Feedback Strategy is an effective approach for enhancing Arabic language teacher candidates' adherence to academic and professional standards in inquiry research writing within the Higher Diploma Program for Teacher Preparation. The findings demonstrated the effectiveness of the strategy across both the overall performance and the individual dimensions of the academic and professional standards, including Demonstration of Knowledge and Understanding, Application of Knowledge and Understanding, Critical Thinking, Critical Reflection of Professional Practice, Initiative and Problem Solving, Pedagogy, and Presentation and Communication.

The findings suggest that digital feedback contributes to learning improvement by providing continuous, documented, and criterion-referenced guidance that helps learners understand performance expectations and systematically refine their work. By aligning feedback with rubric indicators, the strategy appears to support the development of both academic and professional competencies while narrowing the gap between current and expected performance.

Nevertheless, although the Pedagogy domain also improved, it demonstrated the lowest relative gain compared to the other domains, suggesting that pedagogical competence may require additional forms of practice-based support and authentic teaching experiences that extend beyond written digital feedback alone.

Accordingly, the study confirms that digital feedback not only improves the quality of inquiry research writing, but also supports the development of higher-order thinking, professional reflection, academic communication, and evidence-based decision-making. These findings highlight the potential of digital feedback as a valuable component of contemporary teacher preparation programs and underscore its role in strengthening academic integrity, professional learning, and the overall quality of pre-service teacher education.

Based on the findings of this study and their implications for teacher preparation and inquiry research writing, the following recommendations are proposed:

- Integrating the Digital Feedback Strategy systematically into research and academic writing courses within teacher preparation programs.
- Providing targeted professional development for faculty members and teacher trainers on the design and

implementation of effective digital feedback that not only evaluates performance but also explains errors, guides improvement, and aligns feedback with rubric indicators and professional standards.

- Expanding the implementation of the strategy across other academic disciplines and higher education institutions and conducting further studies that compare: Synchronous and asynchronous feedback, Immediate versus delayed feedback.

CONFLICT OF INTEREST

The authors declare no conflict of interest

AUTHOR CONTRIBUTIONS

Rasha Mohammed Al-Hurani conceived the study, designed the research, collected the data, and prepared the first draft of the manuscript. Mohammad Mowafaq Bani Khaled contributed to the study design, data interpretation, and critical revision of the manuscript. Mohammad F. Hawamdeh supervised the research, contributed to the interpretation of the findings, critically reviewed the manuscript, and approved the final version. All authors have read and approved the final manuscript.

REFERENCES

- [1] M. Attia, *Language and Thinking Development*, Amman, Jordan: Dar Al-Manahij for Publishing and Distribution, 2021.
- [2] A. Madkour, *Arabic Language Teaching Curricula: A Contemporary Vision*, Cairo, Egypt: Dar Al-Fikr Al-Arabi, 2022.
- [3] M. Abdel-Bari, *Reading Comprehension Strategies: Theory and Practice*, Amman, Jordan: Dar Al-Maseera for Publishing and Distribution, 2020.
- [4] M. A. Zaid, "Language as a pillar of identity: The role of Arabic in fostering cultural belonging and cognitive development," *Journal of Language and Cultural Education*, vol. 11, no. 1, pp. 88–102, 2023.
- [5] Queen Rania Teacher Academy, *Higher Diploma for Teacher Education and Qualification Handbook*, Amman, Jordan, 2022.
- [6] L. Darling-Hammond, "Teacher education around the world: What can we learn from highly productive systems?" *European Journal of Teacher Education*, vol. 40, no. 3, pp. 291–309, 2017. doi: 10.1080/02619768.2017.1315399
- [7] K. Hyland, "Symposium on academic writing and teacher education: Developing a professional voice," *Journal of English for Academic Purposes*, vol. 33, pp. 95–102, 2018.
- [8] M. Cochran-Smith and A. M. Villegas, "Research on teacher preparation: Charting the landscape of a growing field," in *Handbook of Research on Teaching*, 5th ed. D. H. Gitomer and C. A. Bell, Eds. Washington, DC: American Educational Research Association, 2016, pp. 437–494.
- [9] S. Abu Jado, *Educational Psychology*, 10th ed. Amman, Jordan: Dar Al-Maseera for Publishing and Distribution, 2020.
- [10] M. Al-Khatib, "Modern trends in teacher preparation and professional development in light of global experiences," *Journal of the Faculty of Education*, vol. 37, no. 2, pp. 150–185, 2021.
- [11] K. Zeichner, "Rethinking the connections between campus courses and field experiences in college- and university-based teacher education," *Journal of Teacher Education*, vol. 61, no. 1–2, pp. 89–99, 2010. doi: 10.1177/0022487109347671
- [12] P. Black and D. Wiliam, "Classroom assessment and formative function," in *International Handbook of Educational Evaluation*, M. Robertson, Ed. Springer, 2018, pp. 649–659. doi: 10.1007/978-1-4020-2824-3_45
- [13] J. Hattie and H. Timperley, "The power of feedback," *Review of Educational Research*, vol. 77, no. 1, pp. 81–112, 2007. doi: 10.3102/003465430298487
- [14] S. M. Brookhart, "Appropriate criteria: Key to effective rubrics," *Educational Leadership*, vol. 75, no. 5, pp. 64–71, 2018.
- [15] M. Cochran-Smith, M. C. Carney, E. S. Keefe, A. F. Miller, J. G. Sánchez, and M. E. Wolter, *Reconceptualizing Teacher Quality: Lessons from Teacher Education Policy and Practice*, New York, NY: Teachers College Press, 2020.
- [16] N. F. Dana and D. Yendol-Hoppey, *The Reflective Educator's Guide to Classroom Research: Learning to Teach and Teaching to Learn Through Practitioner Inquiry*, 4th ed. Thousand Oaks, CA: Corwin Press, 2020.
- [17] P. Blessinger and J. M. Carfora, *Inquiry-Based Learning for Multidisciplinary Programs: A Conceptual and Practical Framework*. Bingley, U.K.: Emerald Group Publishing, 2015.
- [18] M. Pedaste, M. Mäeots, L. A. Siiman, T. D. Jong, S. A. V. Riesen, E. T. Kamp *et al.*, "Phases of inquiry-based learning: Definitions and the inquiry cycle," *Educational Research Review*, vol. 14, pp. 47–61, 2015. doi: 10.1016/j.edurev.2015.02.003
- [19] S. K. W. Chu, R. B. Reynolds, N. J. Tavares, M. Notari, and L. C. Yi, *21st Century Skills Development Through Inquiry-Based Learning: From Theory to Practice*, 2nd ed., Singapore: Springer Nature, 2021. doi: 10.1007/978-981-15-2401-1
- [20] C. C. Kuhlthau, L. K. Maniotes, and A. K. Caspari, *Guided Inquiry: Learning in the 21st Century*, 3rd ed. Santa Barbara, CA: ABC-CLIO, 2022.
- [21] R. Ginsberg, *Inquiry as a Way of Being: Professional Learning and Teacher Identity*, New York, NY: Teachers College Press, 2023.
- [22] A. W. Lazonder and R. Harmsen, "Meta-analysis of inquiry-based learning: Effects of guidance," *Review of Educational Research*, vol. 86, no. 3, pp. 681–718, 2016. doi: 10.3102/0034654315627366
- [23] D. Carless and N. J. Winstone, "Design of feedback for learning in the post-digital age," *Assessment & Evaluation in Higher Education*, vol. 48, no. 8, pp. 1145–1157, 2023. doi: 10.1080/02602938.2023.2165634
- [24] A. Al-Adwan and N. Al-Khawaldeh, "Developing teacher education programs: A framework for pedagogical excellence and academic rigor," *Jordan Journal of Educational Sciences*, vol. 20, no. 1, pp. 45–68, 2024.
- [25] Cambridge Assessment, *Principles of Effective Assessment in Teacher Professional Development*, Cambridge, U.K.: University of Cambridge, 2024.
- [26] Jordan Ministry of Education, *Professional Standards for Teachers: Implementation and Assessment Manual*, Amman, Jordan: Queen Rania Teacher Academy, 2024.
- [27] UNESCO, *Global Standards for Teacher Education: Ensuring Quality and Professional Ethics*, Paris, France: UNESCO Publishing, 2023.
- [28] Stanford Graduate School of Education, *Inquiry-Based Learning and Teacher Preparation: Assessment Rubrics and Communication Standards*, Stanford, CA: Stanford University, 2024.
- [29] M. Henderson *et al.*, "Conditions that enable effective feedback in digital environments," *Higher Education*, vol. 85, no. 4, pp. 811–827, 2023.
- [30] N. J. Winstone and D. Carless, *Designing Effective Feedback Processes in Higher Education: A Learning-Focused Approach*, London, U.K.: Routledge, 2022.
- [31] D. J. Nicol and D. Macfarlane-Dick, "Formative assessment and self-regulated learning: A model and seven principles of good feedback practice," *Studies in Higher Education*, vol. 31, no. 2, pp. 199–218, 2006.
- [32] M. Qasim, "The effectiveness of a learning environment based on digital feedback in developing procedural research writing skills and adherence to professional standards among Arabic language student teachers," *Journal of Educational and Psychological Studies*, vol. 14, no. 3, pp. 412–435, 2020.
- [33] D. Carless and D. Boud, "The development of student feedback literacy: Enabling uptake of feedback," *Assessment and Evaluation in Higher Education*, vol. 43, no. 8, pp. 1315–1325, 2018.
- [34] J. Cohen, *Statistical Power Analysis for the Behavioral Sciences*, 2nd ed. Hillsdale, NJ: Lawrence Erlbaum Associates, 1988.
- [35] Y. Zheng and S. Yu, "The role of digital feedback in improving academic standards and inquiry-based writing among pre-service teachers," *Technology, Pedagogy and Education*, vol. 31, no. 2, pp. 185–202, 2022. doi: 10.1080/1475939X.2021.1982345
- [36] A. H. Al-Hoorie, J. P. Vitta, and N. Spada, "The effectiveness of digital feedback in teacher education programs: A quasi-experimental study," *Journal of Computer Assisted Learning*, vol. 37, no. 4, pp. 1120–1135, 2021. doi: 10.1111/jcal.12550
- [37] O. Holsti, *Content Analysis for the Social and Humanities*, Reading, MA: Addison-Wesley Publishing Company, 1969.

Copyright © 2026 by the authors. This is an open access article distributed under the Creative Commons Attribution License which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited ([CC BY 4.0](https://creativecommons.org/licenses/by/4.0/)).