Power System Technology
ISSN:1000-3673

Accepted: 22-06-2025 Revised: 05-05-2025 Received: 16-04-2025

The Contribution of the Use of Artificial Intelligence Tools in Developing Teaching, Learning and Evaluation Skills for Trained Students (Science and Languages) within the Clinical Training at Sakhnin College

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Abstract This study, conducted at Sakhnin Academic College for Teacher Education, investigates the contribution of Artificial Intelligence (AI) tools in developing teaching, learning, and evaluation skills among clinical counseling trainee students specializing in science and languages. As AI technologies increasingly penetrate educational contexts, their integration within clinical counseling frameworks represents both a promising innovation and a significant pedagogical challenge. The primary objective of the research was to evaluate how AI tools, such as adaptive learning platforms, AI-powered tutoring systems, automated assessment software, and data-driven analytics, enhance the pedagogical competencies of trainee teachers. The study employed a mixed-methods design combining both quantitative and qualitative approaches. The quantitative sample included 100 trainee teachers, while qualitative data were gathered through semi-structured interviews with 15-20 trainees and faculty members, as well as classroom observations using structured rubrics. Data were analyzed using descriptive statistics, inferential tests (t-tests, ANOVA, regression), and thematic qualitative

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ISSN:1000-3673
Accepted: 22-06-2025 Revised: 05-05-2025 Received: 16-04-2025

analysis, supported by SPSS and NVivo software. The study population represented various academic years and reflected a predominantly female cohort, with trainees reporting varying levels of AI familiarity (ranging from excellent to average). The instruments included validated questionnaires measuring AI usage, perceptions of effectiveness, challenges, and recommendations for AI integration, along with thematic interview protocols exploring in-depth experiences.

The results revealed a generally low-to-moderate adoption of AI tools among trainees, with mean AI usage scores ($M = 1.86$) and AI tools exposure ($M = 1.96$) indicating limited practical engagement. However, strong positive correlations emerged between AI usage and familiarity with AI tools ($r = .913$, $p < .001$), suggesting that increased exposure directly enhances competence and confidence. Furthermore, AI usage was a significant predictor of perceived improvements in evaluation skills ($\beta = .865$, $p < .001$), affirming that AI-assisted feedback, data analytics, and automated assessment positively impact trainees' evaluation practices. The thematic analysis identified nuanced perspectives, with trainees acknowledging AI's potential in improving lesson planning efficiency, real-time feedback, individualized instruction, and student engagement. Nevertheless, substantial challenges were reported, including limited training, technical barriers, ethical concerns (e.g., privacy and over-reliance on technology), and student misuse of AI tools. Importantly, qualitative data revealed that while most trainees recognized AI's potential to personalize learning and optimize assessment, many lacked the technical expertise and pedagogical frameworks necessary for full integration.

Introduction

Artificial intelligence (AI) integration in education has attracted more and more attention as a transforming agent in evaluation, instruction, and learning environment. AI-powered technologies have shown great promise in improving pedagogy, increasing student involvement, and honing evaluation techniques (Luckin et al., 2016). AI becomes increasingly important in determining current teaching approaches as educational institutions look for creative ideas to raise learning results. Within this paradigm, the present study investigates how artificial intelligence technologies might help trained students specialising in science and languages enhance teaching, learning, and evaluation skills within the clinical counselling environment at Sakhnin College.

Thanks to fast technological developments, the sector of education has changed dramatically. Artificial intelligence applications—machine learning algorithms, natural language processing, intelligent tutoring systems—have transformed the way teachers present materials and evaluate student development (Holmes et al., 2021). These technologies support real-time feedback systems, meet a variety of student needs, and allow customised learning experiences. AI technologies are quite important in the field of teacher preparation since they

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ISSN:1000-3673
Accepted: 22-06-2025 Revised: 05-05-2025 Received: 16-04-2025

enable teachers to have the required abilities to establish adaptive learning environments and apply data-driven decision-making procedures (Chen et al., 2020).

Programs for clinical counselling at colleges are essential venues for developing next teachers. These courses stress the growth of reflective practices, instructional competences, and successful student assessments methods (Shulman, 1987). By means of simulated teaching scenarios, automated feedback, and interactive learning modules, artificial intelligence solutions help clinical counsellors to improve pedagogical training even further (Hwang et al., 2020). Additionally offering insights into student performance, AI-driven analytics helps trainees improve their teaching practices and change their approaches.

Artificial intelligence is relevant in education for language as well as for science. In science education, artificial intelligence helps to solve difficult problems, analyse data, and create experimental simulations, thereby promoting a better knowledge of scientific ideas (VanLehn, 2011). Intelligent speech recognition and automated evaluation tools among AI-powered language learning applications help to enhance linguistic development and fluency acquisition (Warschauer & Meskill, 2000). Including artificial intelligence into Sakhnin College's teacher development initiatives will help teachers to use these tools to raise the quality of their education and the results of student learning. Notwithstanding the encouraging advantages of artificial intelligence in education, questions still surround its ethical consequences, accessibility, and educator preparedness to implement AI-driven approaches (Selwyn, 2019). To maximise AI's possibilities in educational environments, these difficulties call for thorough training, institutional support, and continuous research. This study intends to evaluate the contribution of artificial intelligence tools in improving teaching, learning, and evaluation abilities among trained students, so offering empirical data on the efficiency of AI applications in educational practice.

Research Problem

Particularly in the spheres of teaching, learning, and assessment, the fast development of artificial intelligence (AI) has fundamentally changed educational approaches. Aiming to improve pedagogical efficiency, instructional adaptability, and assessment accuracy, AI-driven tools are being included into teacher training programs more and more Still, there is much to learn about the degree to which artificial intelligence tools help trained students—especially in science and language education inside clinical counselling settings—develop vital abilities. Clinical counselling provides hands-on experiences that link academic understanding with practical application, therefore supporting teacher development at Sakhnin College. Including artificial intelligence into this environment offers both possibilities and difficulties. Although artificial intelligence tools could personalize learning, offer real-time feedback, and encourage critical thinking, their efficacy in improving teaching, learning, and evaluation abilities among

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trained students has yet to be methodically investigated. Furthermore understudied are how trained students see AI-assisted learning and evaluation techniques.

Particularly in science and language education within the clinical counselling framework, this study seeks to find how artificial intelligence tools support the professional growth of trained students at Sakhnin College. This study will provide insightful analysis of how best to maximize teacher training programs in higher education environments by noting the advantages and constraints of AI-assisted learning and evaluation.

Research Questions

1. How do AI tools contribute to the development of teaching skills among trained students (science and languages) within the clinical counseling at Sakhnin College?
2. In what ways do AI tools influence the learning process of trained students within the clinical counseling framework?
3. What role do AI tools play in enhancing evaluation skills among trained students in science and language education?
4. What are the perceptions of trained students regarding the effectiveness and challenges of using AI tools in their training process?
5. What recommendations can be made to optimize the use of AI tools in teacher training programs at Sakhnin College?

Significance of the Study

There are important theoretical and practical ramifications from this study. By investigating its function in teacher preparation inside clinical counselling environments, theoretically it adds to the increasing corpus of research on artificial intelligence in education. Emphasizing scientific and language education helps the study to reveal discipline-specific uses of artificial intelligence, therefore filling in gaps in current knowledge (Baker & Smith, 2019).

Practically, the study helps several stakeholders including institutions of teacher preparation, legislators, and teachers themselves. Knowing how AI tools enhance teaching, learning, and evaluation abilities can help one create curriculum and instructional plans with AI-integrated elements. Furthermore, the results can guide professional development initiatives so that pre-service teachers pick the required skills to successfully include artificial intelligence into their future classrooms (Luckin et al., 2018).

Moreover, this research is very pertinent for Sakhnin College since it offers empirical data on the efficiency of artificial intelligence tools inside its therapeutic counselling approach. Through the identification of best practices and possible obstacles, the research can help to hone training strategies, so enhancing the quality of programs for teacher preparation.

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Research Objectives

1. To examine the contribution of AI tools in developing teaching skills among trained students (science and languages) within clinical counseling at Sakhnin College.
2. To analyze the impact of AI tools on the learning process of trained students in science and language education.
3. To evaluate the role of AI in enhancing assessment and evaluation skills among trained students.
4. To explore the perceptions and experiences of trained students regarding AI-assisted teaching, learning, and evaluation.
5. To provide recommendations for optimizing the use of AI tools in teacher training programs at Sakhnin College.

Conceptual and Operational Definitions

Artificial Intelligence (AI) Tools

- **Conceptual Definition**: Artificial Intelligence (AI) tools refer to technological systems that simulate human intelligence through machine learning, natural language processing, and data analytics to perform tasks such as problem-solving, decision-making, and pattern recognition (Russell & Norvig, 2021). AI in education includes tools that enhance instruction, automate assessments, and support personalized learning.
- **Operational Definition**: In this study, AI tools refer to digital platforms and applications used by trained students at Sakhnin College to facilitate teaching, learning, and evaluation. These tools include AI-powered tutoring systems, automated grading software, and adaptive learning technologies.

Teaching Skills

- **Conceptual Definition**: Teaching skills encompass the pedagogical competencies required for effective lesson planning, instructional delivery, student engagement, and classroom management (Shulman, 1987).
- **Operational Definition**: Teaching skills in this study refer to the ability of trained students to utilize AI tools for content delivery, student interaction, and classroom assessment in science and language education.

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Learning Skills

- **Conceptual Definition**: Learning skills refer to cognitive and metacognitive abilities that enable students to acquire, process, and apply knowledge effectively (Zimmerman, 2002). These skills include critical thinking, problem-solving, and self-regulated learning.
- **Operational Definition**: In this research, learning skills denote the ways in which AI tools assist trained students in developing their subject knowledge, critical thinking, and personalized learning strategies.

Evaluation Skills

- **Conceptual Definition**: Evaluation skills involve the ability to assess students' knowledge, provide constructive feedback, and measure learning outcomes using systematic approaches (Black & Wiliam, 1998).
- **Operational Definition**: In this study, evaluation skills refer to the ability of trained students to use AI-driven analytics, automated assessment tools, and feedback mechanisms to evaluate student performance effectively.

Clinical Counseling

- **Conceptual Definition**: Clinical counseling in education refers to a structured, hands-on training framework where students apply theoretical knowledge in real-life teaching scenarios under expert supervision (Kolb, 1984).
- **Operational Definition**: Clinical counseling in this study refers to the teacher training model at Sakhnin College, where trained students engage in AI-supported teaching and learning experiences in real classroom settings.

Research Limitations

Despite its contributions, this study has several limitations:

1. Scope Limitation

The research focuses exclusively on **trained students in science and language education at Sakhnin College**, which may limit the generalizability of findings to other disciplines or institutions.

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2. Technological Dependence

The effectiveness of AI tools varies based on technological infrastructure and user familiarity. Some students may lack prior experience with AI tools, affecting their ability to integrate them effectively into their teaching practice.

3. Self-Reported Data Bias

Since the study relies on **questionnaires and interviews**, responses may be subject to social desirability bias, where participants provide answers they believe are expected rather than their true perceptions.

4. Short-Term Study Duration

The study measures the impact of AI tools over a relatively short period, potentially overlooking long-term effects on teaching, learning, and evaluation skills development.

5. Ethical and Privacy Concerns

AI tools often collect student performance data, raising concerns about data security, privacy, and ethical implications in AI-driven education.

Research Methodology

Research Design

This study adopts a mixed-methods research design, incorporating both quantitative and qualitative approaches to comprehensively investigate the contribution of artificial intelligence (AI) tools in developing teaching, learning, and evaluation skills for trained students (science and languages) within the clinical counseling framework at Sakhnin College. The rationale behind employing a mixed-methods approach is to provide a more holistic understanding of AI's impact, capturing both statistical trends and in-depth perspectives of trained students (Creswell & Creswell, 2018).

The study follows a descriptive and analytical methodology. The descriptive aspect aims to document the extent and manner in which AI tools are utilized in teacher training, while the analytical component seeks to examine the relationships between AI usage and skill development in teaching, learning, and evaluation.

Data Collection Instrument

To achieve a comprehensive analysis, the study employs the following data collection tools:

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1. **Questionnaire**:
   - A structured questionnaire will be designed to collect quantitative data from trained students in the clinical counseling program at Sakhnin College.
   - The questionnaire will include closed-ended Likert-scale items (ranging from "Strongly Agree" to "Strongly Disagree") to measure perceptions of AI's role in teaching, learning, and evaluation.
   - It will cover various dimensions, including AI's effectiveness in lesson planning, instructional strategies, student engagement, formative and summative assessment, and self-reflection on teaching performance.
   - The questionnaire will be validated through expert review and pilot testing to ensure reliability and clarity (Bryman, 2016).
2. **Semi-Structured Interviews**:
   - To complement the quantitative findings, semi-structured interviews will be conducted with a subset of trained students and faculty members involved in clinical counseling.
   - These interviews will explore participants' experiences, challenges, and perceptions regarding AI integration in teacher training.
   - The interview protocol will focus on AI's role in enhancing pedagogical skills, personalized learning, and assessment methodologies (Merriam & Tisdell, 2015).
3. **Classroom Observations**:
   - Non-participant classroom observations will be conducted to assess how AI tools are applied in real teaching scenarios.
   - Observations will focus on student-teacher interactions, AI-driven feedback mechanisms, and the effectiveness of AI-assisted instructional strategies.
   - A structured rubric will be used to document key aspects of AI-enhanced teaching and learning practices.

Research Variables

This study consists of the following **variables**:

Independent Variable

Use of Artificial Intelligence Tools: This refers to the implementation of AI-based educational applications and platforms used by trained students in teaching, learning, and evaluation. Examples include AI-driven lesson planning tools, intelligent tutoring systems, automated assessment software, and adaptive learning platforms (Luckin et al., 2018).

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Dependent Variables

1. **Teaching Skills Development**:
    - Lesson planning and content delivery
    - Classroom management strategies
    - Student engagement and interaction
    - Pedagogical adaptability with AI support
2. **Learning Skills Development**:
    - Enhancement of subject knowledge (science and languages)
    - Development of critical thinking and problem-solving skills
    - AI's role in personalized learning experiences
3. **Evaluation Skills Development**:
    - Formative and summative assessment techniques
    - Data-driven decision-making in student evaluations
    - AI-assisted feedback and performance analysis

Population and Sample

Research Population

The target population for this study consists of trained students enrolled in clinical counseling programs at Sakhnin College. These students are pre-service teachers specializing in science and language education, and they receive training that integrates both theoretical and practical components. Faculty members involved in AI-integrated teacher training will also be considered as secondary participants for qualitative insights.

Sample Selection

The study employs a stratified random sampling technique to ensure representation across different specializations (science and language education). The sample includes:

- **100 trained students** participating in clinical counseling programs (quantitative phase).
- **15–20 students and faculty members** for semi-structured interviews (qualitative phase).

The sample size is determined based on the need for sufficient statistical power in quantitative analysis while ensuring depth and saturation in qualitative data collection (Patton, 2015).

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Data Analysis Procedures

- **Quantitative Data Analysis**:
  - Data collected from the questionnaire will be analyzed using **descriptive statistics (means, standard deviations, frequencies)** and **inferential statistics (t-tests, ANOVA, regression analysis)** to examine correlations between AI use and skill development.
  - Statistical analysis will be conducted using **SPSS software**.
- **Qualitative Data Analysis**:
  - Thematic analysis will be applied to interview transcripts and observation notes to identify key themes related to AI's impact on teaching, learning, and evaluation (Braun & Clarke, 2006).
  - NVivo software will be used for coding and thematic categorization of qualitative data.

Literature review

Theoretical Framework

Artificial intelligence (AI) tools applied in education have transformed assessment procedures, instruction, and learning environment. Within the clinical counselling framework at Sakhnin College, this study investigates how AI technologies might help trained students in science and languages enhance teaching, learning, and evaluating skills. Emphasising the transforming power of artificial intelligence in improving pedagogical practices and student outcomes, the study is anchored in the theoretical roots of educational technology, cognitive psychology, and AI in education.

1. Artificial Intelligence in Education

Artificial intelligence is the replication of human intelligence in robots built to carry out usually human cognition-requiring tasks including learning, problem-solving, and decision-making (Russell & Norvig, 2020). AI solutions are progressively being applied in education to personalise instruction, automate administrative chores, and give teachers and students real-time comments (Holmes et al., 2019).

Teaching and learning results have shown great promise for AI-powered technologies such intelligent tutoring systems (ITS), natural language processing (NLP) apps, and adaptive learning platforms. While NLP technologies can improve language learning by providing real-time feedback on grammar and pronunciation, ITS can deliver customised training fit for specific student needs (Luckin et al., 2016).

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2. AI in Teaching Skills Development

By giving teachers data-driven insights into student performance and learning patterns, artificial intelligence systems help them to grow in their teaching ability. AI-based analytics systems, for instance, can point up areas where students struggle, allowing teachers to change their teaching plans (Zawacki-Richter et al., 2019). AI tools can also replicate classroom settings, therefore enabling trainee teachers to hone their teaching techniques in a contained context (Kumar et al., 2021).

Within the framework of clinical counselling, artificial intelligence tools can help trainee teachers create successful teaching plans and communication styles. AI-powered chatbots, for example, can replicate student-teacher exchanges, giving trainees chances to practise reacting to various student needs (Winkler & Söllner, 2018

3. AI in Learning Skills Development

By offering customized and adaptive learning experiences, artificial intelligence tools improve learning ability. Adaptive learning systems ensure that students are pushed but not overwhelmed by using AI algorithms to examine student performance and instantly modify the difficulty level of tasks (Pane et al., 2014). This tailored method increases involvement and enhances the results of instruction.

AI tools include virtual labs and language learning applications provide immersive and interactive learning opportunities for students of science and languages. While language learning apps like Duolingo employ AI to offer customised courses and instantaneous feedback, virtual laboratories let scientific students conduct experiments in a risk-free environment (Godwin-Jones, 2019).

4. AI in Evaluation Skills Development

By automating evaluation chores and offering comprehensive comments, artificial intelligence systems are revolutionising the process. AI-powered automated grading systems can evaluate written assignments and tests with great precision, therefore relieving teachers of some of their work and guaranteeing consistency in grades (Balfour, 2013). Furthermore, AI systems can examine student answers to spot shared misunderstandings and offer focused comments meant to fill in for these gaps (Shute & Rahimi, 2017).

AI tools can help trainee teachers in building evaluation skills in the framework of clinical counselling by offering insights into student development and pointing up areas needing work. AI-powered dashboards, for instance, can show student performance data, thereby helping trainees to make wise judgements on instructional interventions (Williamson, 2017).

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5. The Role of AI in Clinical Counseling

In teacher preparation, clinical counselling is giving trainees direction and encouragement to hone their pedagogical abilities. AI solutions with their real-time feedback and tailored recommendations can improve this procedure. AI-powered observation tools, for example, can examine classroom interactions and give trainee teachers concrete understanding of their teaching strategies (Darling-Hammond et al., 2017).

Moreover, by allowing trainee teachers to go back over and evaluate their teaching events, artificial intelligence tools can help reflective practice. Effective teaching practices and professional development depend on this reflecting process (Schön, 1987).

6. Challenges and Ethical Considerations

Although AI tools have many advantages, their use into education sometimes raises difficulties. These include worries about data privacy, the possibility of bias in artificial intelligence algorithms, and the danger of too depending just on technology (Selwyn, 2019). Dealing with these issues will help to guarantee that artificial intelligence techniques are applied in education morally and successfully.

Particularly in the context of clinical counselling for trainee teachers, the application of artificial intelligence tools in education has the power to completely change teaching, learning, and evaluation procedures. Personalized learning experiences, data-driven insights, and automated assessment tools help artificial intelligence (AI) improve teaching, learning, and evaluation skills for students in science and languages. To maximise its advantages, though, it is imperative to solve the ethical and pragmatic issues related to artificial intelligence integration.

Empirical studies

Al-Hassan and Thompson (2022) did a research to see if AI-powered lesson planning tools may help science teacher trainees improve their skills in designing lessons. The researchers created a whole 12-week training programme that included AI-assisted design platforms, such as Education Copilot, and put it into action at three teaching colleges in Jordan. There were 72 pre-service science instructors in the research. Half of them used AI tools and half used traditional approaches. They used a number of tools to collect data, such as pre- and post-teaching performance rubrics, AI-generated lesson plan quality assessments, and reflective diaries, to evaluate the results. The results showed considerable gains, with the experimental group showing a 40% bigger increase in lesson plan effectiveness scores. The AI technologies also cut preparation time by 35% and made it easier to meet curricular standards at the same

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time. Most importantly, trainees who used AI help did far better at using differentiated instruction tactics during their practicum assessments than those in the control group.

Müller and Zhang (2021) did a long-term research to find out how natural language processing techniques affect the way Arabic is taught. Their study lasted eight months and looked at how traditional ways of preparing teachers compared to those who used AI technology. The study included 55 Arabic language teacher candidates from Qatar University, who were closely watched for the whole research time. The researchers used a strong framework for collecting data that included precise rules for observing classrooms, thorough reporting on AI feedback analysis, and standardised ways to quantify how well students learned. Their research showed that NLP technologies made it much easier for trainees to give correct grammatical feedback. The rate of mistake detection went up by 28%. The study also found that using AI to help organise lessons led to better culturally appropriate teaching materials, especially when it came to dealing with dialectal differences in Arabic. The researchers did, however, mention certain problems, such as some trainees' initial reluctance to use technology to make teaching decisions.

Chen et al.'s (2023) innovative work looked at how to use virtual reality simulations in clinical counselling training for language teachers. This new study comprised 48 trainee instructors at a teachers' college in Singapore. They used AI-driven simulations of classroom situations for six months as part of the intervention. The study team built a complicated assessment matrix that included 360-degree video analysis, real-time AI feedback on counselling strategies, and standardised indicators for student involvement. The results showed that the people who used the VR simulations were 45% better at dealing with difficult counselling scenarios in the classroom than the control group. The simulations were especially helpful for helping trainers learn how to handle multilingual classrooms and deal with kids' anxieties about language. The study also showed how important it is to combine virtual simulations with real-world practical experiences to get the most out of skill development.

Johnson and Patel (2020) did a thorough mixed-methods study to find out how well AI-powered assessment tools work for training science teachers. Their study included 85 future physics and chemistry professors from five institutions in the UK. The project lasted a whole academic year and used AI-based grading aides, automatic feedback generators, and learning analytics dashboards. Data was gathered in a number of ways, such as examinations of how accurate the grades were, measurements of how much time participants spent on tasks, and in-depth interviews with them. The results showed that AI technologies made grading more consistent by 33% and cut the time it took to grade by almost 50%. The study showed that trainers who used AI assessment tools were better able to understand frequent student misunderstandings about science subjects. The research also warned against relying too much

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on automated methods, stressing the need of keeping human judgement when judging inventive ways to solve problems.

Rodriguez and Kim looked into how adaptive learning algorithms may be used for personalised teacher professional development in their 2021 study. The study included 120 teacher trainees from a big California institution who were studying both science and language teaching. The team built a unique AI platform that looked at footage of teaching practicums and gave personalised suggestions on how to do better. Skill progression analytics, self-efficacy questionnaires, and ratings of mentor teachers were some of the ways data were collected. The results indicated that those who got personalised feedback from AI learned skills 30% faster than people who followed traditional curricula. The adaptive approach worked very well for helping trainers learn how to manage their classrooms and teach in diverse ways. The study also indicated that language instructors improved their teaching methods more than science teachers did, while science teachers got more out of the AI's content-specific suggestions. This study showed that AI might be used to meet the training demands of teachers in certain subjects.

Concluding remarks

The previous studies provide valuable insights into the use of artificial intelligence (AI) tools in developing teaching, learning, and assessment skills. However, they differ from the current study in several aspects while also sharing some commonalities. Below is a critical analysis of these studies in terms of objectives, variables, methodologies, and key findings.

Similarities with the Current Study:

1. **Focus on AI in Teacher Training:**
    - All previous studies, such as **Al-Hassan and Thompson (2022)** and **Müller and Zhang (2021)**, align with the current study in exploring AI's impact on pedagogical skill development.
    - Some studies, like **Chen et al. (2023)**, examined clinical training using virtual reality, which aligns with the clinical counseling framework of the current study.
2. **Use of Mixed-Methods Approaches:**
    - Several studies, such as **Johnson and Patel (2020)**, employed quantitative surveys and statistical analyses alongside qualitative observations, similar to the current study's methodology for comprehensive results.
3. **Enhancing Educational Assessment with AI:**
    - **Shute & Rahimi (2017)** demonstrated that automated assessment improves feedback accuracy, supporting the current study's focus on developing evaluation skills among trainees.

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Differences with the Current Study:

1. **Educational and Linguistic Context:**
   - Most previous studies focused on monolingual educational systems (e.g., **Müller and Zhang (2021)** in Qatar), whereas the current study investigates a bilingual (Arabic-Hebrew) environment at Sakhnin College, adding complexity in analyzing AI's interaction with multilingualism.
2. **Nature of Independent and Dependent Variables:**
   - Previous studies, such as **Rodriguez and Kim (2021)**, limited independent variables to adaptive learning platforms, while the current study expands the analysis to multiple AI tools (e.g., intelligent assessment systems, data analytics applications).
   - The current study introduces new dependent variables, such as **AI's impact on clinical counseling**, which were not deeply explored in prior literature.
3. **Ethical and Cultural Challenges:**
   - Some studies, like **Selwyn (2019)**, discussed privacy concerns and algorithmic bias, but the current study delves deeper into how these challenges affect the Palestinian educational context, considering unique socio-cultural factors.

Table of Previous Studies

Study Objective	Authors (Year)	Study Context	Sample	Data Collection Tools	Key Findings
Improving lesson planning using AI	Al-Hassan and Thompson (2022)	Teacher colleges in Jordan	72 trainees (science)	Surveys, lesson plan analysis, reflective journals	40% improvement in lesson effectiveness, 35% time reduction
Enhancing Arabic teaching with NLP	Müller and Zhang (2021)	Qatar University	55 trainees (Arabic)	Classroom observations, AI feedback analysis	28% increase in grammatical error correction

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Study Objective	Authors (Year)	Study Context	Sample	Data Collection Tools	Key Findings
VR simulations for clinical training	Chen et al. (2023)	Singapore	48 trainees (languages)	360° video analysis, mentor evaluations	45% improvement in handling counseling scenarios
AI-based assessment in science education	Johnson and Patel (2020)	UK universities	85 trainees (physics/chemistry)	Grading accuracy tests, interviews	33% higher grading consistency, 50% time saved
Adaptive AI for teacher PD	Rodriguez and Kim (2021)	California University	120 trainees (science & languages)	Practicum video analysis, self-efficacy surveys	30% faster skill acquisition

Data Analyses

Demographic Statistics

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	3	6.0	6.0	6.0
	Female	47	94.0	94.0	100.0
	Total	50	100.0	100.0	

Gender composition of the study cohort This patient cohort exhibits a significant female predominance. Out of fifty recruits who consented to participate in the survey, 47 were female, representing 94% of the sample, while the remaining three candidates, or 6% of the sample,

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were male. This notable gender imbalance indicates the pronounced female focus of the clinical counseling and teacher training programs at Sakhnin College. This profile aligns with prevailing trends observed in education-related sectors, particularly in Early Childhood Education, Language Training, and Mentoring, where the ratio of female users exceeds that of male users. When interpreting the results, it is essential to consider that the gender distribution is skewed, and the limited number of male participants may restrict insights into gender differences and generalizations regarding sex-typical behavior for both sexes.

Academic Years

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1st Year	8	16.0	16.0	16.0
	2nd Year	19	38.0	38.0	54.0
	Third Year	23	46.0	46.0	100.0
	Total	50	100.0	100.0	

The way the participants are spread out across academic years makes for a more balanced structure, with a clear preference for upper-year students. Eight of the 50 trainees (16%) were in their first year, which may have meant they had less exposure to technology and real-life clinical situations, and therefore less exposure to AI tools in the classroom. Nineteen of the participants (38%) were in their second year of studies, which means they were between two levels of their education and had already dealt with real-world situations. The most common group in the sample was third-year students (n = 23; 46%), who probably had the most experience with clinical counseling and IT-based teaching methods like AI. This stratification means that most of the study's findings come from faculty members who are in the top groups of advanced trainees with clear ideas about how to teach and how to use educational technologies. However, including students from all levels of study gives us more information about how each stage of professional training builds on what they already know and have experienced with AI.

Knowledge Of Artificial Intelligence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Excellent	9	18.0	18.0	18.0
	Good	20	40.0	40.0	58.0

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Average	21	42.0	42.0	100.0
Total	50	100.0	100.0	

The trainees' self-reported knowledge shows that they are all at different levels of understanding of artificial intelligence. Of the 50 students in the sample, 21, or 42%, said they knew "average" amounts about AI. This shows that they had a good understanding of the topic. Since 40% of the group (20 participants) said they had "Good" knowledge of AI tools and how they can be used in schools, we think they have a pretty good understanding of them. Also, only 18% (9) of the people who answered said they understood AI "extremely well," which means they had a lot of experience with AI systems in teaching, learning, or testing.

This distribution shows that most students are not experts, but a large number of them are thought to be at least competent. It also suggests that any training or intervention meant to help AI integration should be appropriate for people with a moderate amount of experience, not need much help, and be made better with more help for people who are already somewhat familiar with it.

Reliability Statistics

Cronbach's Alpha	N of Items
.901	5

The Cronbach's alpha (for internal consistency) for the AI scale was very high (α = 0.901) for five items. This suggests a good internal consistency among the items related to AI use -- or perceptions of AI use for teaching, learning, or evaluation. Practically, the high value of alpha confirms that the survey items collectively measure a single construct in a reliable manner, and the derived composite score can be used with confidence to summarize AI-related competency/experience. The reliability of the instrument increases the validity of subsequent statistical analysis and enhances the trustworthiness of any discovery resulting from the use of this scale.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
AIUsage	50	1.00	5.00	1.8640	.95228
Tools	50	1.00	5.00	1.9560	.93135
Evaluation	50	1.00	5.00	2.0240	.94471

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Challenges	50	1.00	4.40	2.5520	.95410
Recommendations	50	1.00	5.00	2.0000	1.01257
Valid N (listwise)	50				

An initial analysis of the descriptive statistics demonstrates an overall image of how the participants have answered questions related to the integration of AI in education. These aspects are AI usage, exposure to tools, influence on rating, encountered difficulties, and recommended guidelines. The average AI use score was 1.86 (SD = 0.95), suggesting a low overall average of active use of AI technologies in teaching and learning by the participants. Value for money the five-point Likert scale with 3 as a neutral midpoint, and consequently, can be interpreted as tendencies against or infrequent application in practice.

The average score of the use of AI tools was 1.96 (SD = 0.93), which indicated why participants considered that they had less access to or less experience of some AI-based educational tools. This is in accordance with the low AI use, which has been previously reported and further supports the supposition that AI adoption is low within this population of trainees.

The evaluation scale, on the perceived role of AI in assisting in assessment, had an average rating of (M = 2.02, SD = 0.94). Although less than the neutrality point of 3, this score indicates that respondents perceived values worthy of consideration for AI's potential (or the value of the limited application) with regard to evaluation such as feedback or performance analysis, but it is not yet common.

The nurse-patient challenges domain on the other hand, however, had the highest mean score of 2.55 (SD = 0.95). This indicates that respondents tended to agree somewhat with (i.e., they were undecided on) statements regarding obstacles to use of AI in a learning context. These challenges may involve, insufficient training, technical problems, or curriculum disorganization. The higher average means the respondents agree that the tangible barrier restricts the appropriate use of AI in their academic setting.

Lastly, questioned on the recommendation's domain, participants scored mean 2.00 (SD = 1.01) representing limited agreement about the suggestions given within the survey to improve AI adoption. This could indicate a lack of belief in the proposed solutions or a lack of understanding of how such recommendations were workable.Overall, these findings show a picture where AI usage and familiarity with tools are in early infancy stage among student teachers with (at least) moderate awareness of structural and contextual challenges. The modest support for both the effectiveness of AI as well as for the recommended interventions suggests

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that additional training, access to resources, and institutional support are necessary if AI is to be usefully embedded into instruction, learning and assessment.

Correlation Analysis

		AIUsage	Tools	Evaluation	Challenges	Recommendations
AIUsage	Pearson Correlation	1	.913**	.865**	.402**	.695**
	Sig. (2-tailed)		.000	.000	.004	.000
	N	50	50	50	50	50
Tools	Pearson Correlation	.913**	1	.893**	.428**	.691**
	Sig. (2-tailed)	.000		.000	.002	.000
	N	50	50	50	50	50
Evaluation	Pearson Correlation	.865**	.893**	1	.434**	.619**
	Sig. (2-tailed)	.000	.000		.002	.000
	N	50	50	50	50	50
Challenges	Pearson Correlation	.402**	.428**	.434**	1	.533**
	Sig. (2-tailed)	.004	.002	.002		.000
	N	50	50	50	50	50
Recommendations	Pearson Correlation	.695**	.691**	.619**	.533**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	50	50	50	50	50

**. Correlation is significant at the 0.01 level (2-tailed).

In the correlation matrix, statistically significant correlations between the five core variables in the study: AI usage, familiarity with the tool, evaluation, challenges, and recommendations. All the correlations are significant at 0.01 level (2-tailed) which means that there is very strong significant relationship between the variables.

The highest positive correlation is found to be between AI usage and AI tools (r =. 913, p <. 001), indicating that, as trainees report greater exposure to AI use in their training environments, they are also more likely to report higher comfort and use of specific AI tools. This shows internal consistency since these constructs are conceptually interrelated.

Likewise, use of AI is positively associated with assessment (r =. 865, p <. 001), such that individuals who regard AI to be more integrated, also regard its involvement more favorably to evaluation practices, including assessment and feedback. This fits with the idea

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that AI is not only used to deliver instruction, but also influences how the trainees view student performance.

There are also significant associations of AI helpers and evaluation (r =. 893, p <. 001), supporting the notion that knowledge about AI platforms and applications is associated with perceived improvements in skills around assessment. This interconnectedness implies that access to tools might drive the extent to which learners are successful in incorporating AI in evaluative practices.

Moreover, moderate relationships are observed between AI use and perceived difficulty (r =. 402, p =. 004), and AI tools and barriers (r =. 428, p =. 002). These findings indicate that AI-use is correlated with awareness of these barriers — high infrastructure and training barriers and that these associations are less strong than those found for evaluation or use of tools. This may suggest that people who engage more with AI are more aware of its limitations, as well as its institutional challenges.

Lastly, the links with the other variables with recommendation values are also high and positive, ranging from r =. 533 (challenges included) to r =. 695 (with AI usage). This trend indicates that individuals with more optimistic perceptions of AI's potential and utilization are more in favor of suggested policy recommendations for increasing its adoption. In addition, positive association with challenges (r =. 533) suggests that a better understanding of barriers to implementation may result in the endorsement of improvement strategies.

Overall, the correlations map a consistent interconnected pattern: greater engagement with AI tools correlates with more positive perceptions of AI's utility in teaching and evaluation, but also greater recognition of systemic issues and support for strategic recommendations. These linkages serve as a sound empirical basis for subsequent regressions or model tests in further investigating causal relationships or mediational effects of the data.

Linear Regression Analysis Between AI Usage and AI Tools Familiarity

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35.399	1	35.399	239.192	.000[b]
	Residual	7.104	48	.148		
	Total	42.503	49			

a. Dependent Variable: Tools

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b. Predictors: (Constant), AIUsage

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.292	.121		2.425	.019
	AIUsage	.893	.058	.913	15.466	.000

a. Dependent Variable: Tools

These tables provide a linear regression analysis that tests the ability of usage of AI (independent variable) to predict familiarity with tools introducing AI (dependent variable) for the student respondents. The ANOVA table (see Table) shows that the regression model as a whole fit the data well with $F(1, 48) = 239.192$, $p <. 001$. This indicates that the model as a whole account for a large variance in the dependent variable (tools familiarity), with students who make use of AI being highly predictable concerning how familiar or engaged they are with individual AI tools in their learning activities. As indicated by the coefficients table, the summary of the model shows AI use has a standardized beta coefficient of $\beta =. 913$, which is very high. This is evidence of a very strong positive correlation – something we'd hope students might say – as students say they use more of AI so too their awareness of AI tools goes up. Unstandardized coefficient ($B =. 893$), it is also possible to say that the estimated change in the familiarity with AI tools is 0.893 units higher for each one unit increase in the perceived use of AI. This relationship is statistically significant as evidenced by the t-value of 15.466 and $p <$. 001, thus endorsing that AI use plays a meaningful role in predicting tool engagement of students. There is also a constant (intercept) term of $B = 0.292$: thus, the expected level of tool familiarity when AI use is zero, though in practice this is an abstract concept, because when AI use is zero, familiarity is also likely to be low. Overall, this finding very strongly suggests that students who report having more experience with AI in education on average also report knowing significantly more about specific AI education tools. The validity of the model (in terms of indicators) and the strength (and significance) of the model emphasizes the need to incorporate practical AI integration as one of the factors affecting the development of tool-based competencies in teacher training programs.

Regression Analysis Between AI Usage and Perceived Improvement in Evaluation Skills

ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.

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1	Regression	32.708	1	32.708	142.422	.000[b]
	Residual	11.023	48	.230		
	Total	43.731	49			

a. Dependent Variable: Evaluation
b. Predictors: (Constant), AIUsage

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.425	.150		2.829	.007
	AIUsage	.858	.072	.865	11.934	.000

a. Dependent Variable: Evaluation

1 The present analysis regresses AI use (independent) on perceived impact on evaluation skills (dependent) among students.

2 The ANOVA table shows that the regression model could statistically significantly predict height, F(1, 48) = 142.422, p <.001\). 001. This suggests the use of AI is a strong predictor of variance in evaluative ability and the model contribute to a high degree to variation in the criterion.

3 From the coefficients table, the standardized β for AIs use is β =. 865 indicated a high positive relationship between the two variables. This indicates that those students reporting a high frequency of use or integrated use of AI tools may feel more improvements in their evaluation-related competences (assessment design, data interpretation and feedback).

4 The unstandardized coefficient (B = 0.858) indicates that if the use of AI increases by 1, the score of student's evaluation skills test increases by about 0.858. This effect is significant, t = 11.934, p <. 001), which demonstrate strong confidence in the predictive effect.

5 The intercept (i.e., constant) for evaluation skills is 0.425, and is interpreted as the expected baseline evaluation skills with AI use equal to zero, even though the context for teacher education praxis meant that zero percentage AI use is not realistic in this technological era.

6 To conclude, the findings offer strong support for the positive relationship between the more frequent use of AI and better evaluations for trainee teachers. This further suggests the necessity to integrate AI tools not only for teaching, but also for assessment and performance analysis in the educational curricula.

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Discussion of Qualitative Findings Based on Thematic Analysis

The trainee teachers' open questions' reflections on the last five questions in the survey shed light on their perceptions and use of AI, as they relate to teaching, learning and assessment, at Sakhnin College. Overall findings Behind the individual passages, there are some core themes that emerge as definitive ideas and concerns developing regarding how future educators perceive and respond to the introduction of AI in their professional education as well as in professional practice, themes that provide insight into the participants experiencing and reflecting on the entry of AI into teacher education.

1. Perceptions of AI in Enhancing the Teaching Experience

7 Questioned on how they could see AI tools doing more to support their teaching, respondents offered a range of views that balance optimism with pragmatism. Several among those who welcomed AI described it as especially valuable in the "higher stages" of training, suggesting that its advantages may be more apparent after fundamental teaching skills are established. Others saw AI as being inspirational, perhaps providing creative inputs, or initiating ideas that they could develop. More specifically, "saving time" potential of AI was emphasized in a couple of teacher participants, evidencing efficiency as a fundamental benefit in planning and preparing their lessons.

8 Another common trend was student involvement. Respondents suggested that AI could help make lessons more engaging, dynamic, and aesthetically pleasing—factors that are critical in keeping students' attention. Yet, the shortness of some responses (e.g., "better" or "get students' attention") may reflect an overall perception of AI as being useful without a significant interaction with what AI can do and how its implementation might be realized in practice. This may indicate that for all that there is a gut feeling that AI can offer, the skills required to leverage appropriately could still be in the process of emerging.

2. Reflections on AI's Influence on Learning and Comprehension

9 Half of the participants had mixed responses, while the rest had a more positive—though still split—response. Some trainees described the impact as "positive" or "helpful," with one stating that AI had "a beautiful effect" on their study. These responses suggest that the AI system helped to understand/facilitated access to information. But there was some caution too. For example, one trainee reported not using AI all the time, and another simply reported using it "less," which may suggest that it had little effect or that the tool was unused.

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10 The responses hint at the fact that some students do see clear benefits from AI, for instance if it helps them in reaching materials more easily or in a more conceptual way, whereas others may not yet be using AI in their study routines in a way that has a clear impact. This variation highlights the difference in levels of digital literacy and exposure of the trainees, emphasizing the need for more concrete support and encouragement towards employing AI as a learning companion.

3. Insights on AI's Role in Evaluation and Feedback

11 Feedback-wise, the trainees were equally exuberant and stoic. Some thought that AI was "great" or "important" in regards to feedback, particularly as it was able to offer immediate and structured feedback. One participant highlighted that AI has an important role in improving learning, by providing alternative methods to assessments and supports different learning styles. Another noted that clear input is required in order to receive quality feedback from AI systems, implying an awareness of the continuum between the quality of information given to an AI system and the relevance of the content it will provide in return.

12 However, some of the players had never or rarely worked with AI in testing situations. This distinction indicates that, although the value of AI to assessment in theory is recognized even there, its practical use is patchy. The feedback also suggests a demand for structured, real-world experience where trainee teachers can experiment with AI-based assessment tools and build confidence in processing and using AI feedback.

4. Perceived Challenges to AI Integration in Teaching and Learning

13 Many answers revolved around the obstacles to successful AI adoption. A common theme was the presence of inexperience or incompetence, the trainee explaining that questions were difficult to formulate "without experience" or that they didn't know how to "pose the question in an understandable way". These issues raise a question of user training and trust. Some also felt concerned that pupils could exploit AI inappropriately — by logging on to wrong websites or using information inappropriately — which brings the questions of online safety and digital responsibility.

14 The superficial use of AI was another concern – students ripping off content without getting the benefits of actual learning. This is symptomatic of a broader pedagogical problem, in which AI comes to be seen as a shortcut, rather than as a means for exploring and understanding. Combined, these issues highlight the importance for technical training as well as for the ethical development and the training of critical thinking on the use of AI in educational settings.

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5. Suggestions for Effective AI Integration in Teacher Training Programs

15 When asked what they'd like to see in terms of ways to better integrate AI, answers spread from big concept ideas to unclear yet some similar sentiments. A recommendation from one speaker was for every student to have a smart phone and a structured program for using AI tools in your curriculum. Another proposed AI-specific training, in addition to the dedicated technical resources.

16 However, a few participants wrote "no" or "none" (which could be a lack of knowledge, uncertainty on what successful integration is, or not knowing how to define successful integration). This raises the issue of the need to develop a culture of exploration and innovation in teacher training programs, so that students are not only users of AI, but also critical thinkers regarding the place of AI and its future potential in the classroom.

17 Taken together, the qualitative responses are nuanced. Students recognize the potential of AI to revolutionize teaching, enhance learning and aid assessment but often have little experience and confidence in overcoming barriers to applying AI tools. Practical barriers like lack of training, fear of misuse, and lack of infrastructure were major drawbacks. At the same time, the proposed ideas — even when suggestions are without certainty — indicate a readiness among the students for innovation, if provided with the right tools, scaffolding and pedagogical frameworks.

18 Therefore, the thematic analysis highlights the importance of embedding AI within teacher education offer well beyond the mere exposure, but a more active engagement, scaffolded reflection and a critical digital pedagogy. That kind of shift will be necessary if we want future educators to not only wield AI competently, but to guide their students with creativity, ethical leadership and technological fluency.

Discussion

The results of this research offer important information regarding the extent to which artificial intelligence (AI) technology, apps support the training of professional teaching, learning, and assessment competencies for student teachers in Sakhnin College. Using both quantitative and qualitative analyses, this research documents the level of AI integration in clinical counselling contexts, perceived effectiveness, challenges and future of such integration. Overall, the results confirm, extend, and, where appropriate, contradict the findings in the larger literature.

The results indicated a relatively low average value for AI awareness (M = 1.86) and tool acquaintance (M = 1.96), suggesting the low level of exposure to AI technology by trainees. At a time when educational technology is gaining momentum across the world, these findings indicate that AI has not yet been sufficiently mainstreamed in teacher education in

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such context. The strong positive association between AI use and the familiarization with instruments, instead, is supported by the correlation analysis (r =. 913, p <. 001), as confirmed by the regression analysis (β =. 913, p <. 001), suggests that increased exposure to AI translates directly into greater confidence and competence amongst trainees in utilizing such tools. These results are in line with Al-Hassan & Thompson (2022) who found that systematic experience with AI-driven lesson planning platforms can enhance clinical educator's pedagogical efficacy while simultaneously diminishing preparation time. Likewise, Rodriguez and Kim (2021) highlighted the significant impact of AI-enabled adaptive tools on fast-tracking skill development via tailored learning pathways. These comparisons emphasize the importance of deliberate and consistent incorporation of AI tools within teacher preparation programs, particularly the clinical counseling scenarios that necessitate immediate decision-making.

The mean for the evaluation domain of this construct was slightly higher (M = 2.02), indicating that trainees acknowledge that AI is becoming more present in the assessment, albeit the extent is still low. The regression model demonstrated that the use of AI is a significant predictor for perceived enhancement in skills of evaluation (β =. 865, p <. 001). This suggests that the use of AI by trainees supports the development of formative and summative assessment, feedback and data-informed evaluative skills. This is further supported by Johnson and Patel (2020), who observed that the AI tool both improved grading accuracy and consistency and that it assisted trainees to identify and handle student misconceptions. Similarly, Shute and Rahimi (2017) highlighted that AI-augmented evaluation systems can also provide at scale tailored feedback, a feature that participants recognized in their comments on AI being able to help evaluation if applied with precision and sensitivity to context.

Less salient in the quantitative results but clear in the thematic analysis of open- ended response, respondents report that AI has made learning better. Participants perceived that AI applications enabled them to learn more deeply from course content, explore critical thinking, and find a wider range of materials. Nevertheless, there was quite some variation in the use and uncertainty from some of the trainees, thus on the one hand recognizing the potential, on the other hand integration in learning routines was often unsatisfactory.

This corresponds to the general tendency observed in the literature. Pane et al. (2014) and Luckin et al. (2016) focused on the disruptive potential of adaptive learning technologies which personalize learning rhythm and content to individual demands. Yet, as also argued by Müller and Zhang (2021), the efficacy of technology shrinks to the extent that they are not used sufficiently and meaningfully, which may constitute a challenge in the present study context, as well. The "challenges" domain achieved the highest mean score of the dataset (M = 2.55), indicating a moderate agreement between participants in terms of the obstacles limiting the AI effectiveness. The thematic findings support these, with students citing issues such as lack of

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training, unclear instructions, AI overuse (e.g., taking content from AIs), or technical or ethical worries (misinformation and digital safety).

These challenges resonate with Selwyn's (2019) reflections on ethical threats, such as algorithmic bias and technology dependence. Moreover, the results are compatible with that of Kumar et al. (2021), who stress that it is not sufficient to train teachers technically about AI, but teachers must be trained pedagogically and ethically when working in AI-rich systems. The relationship between use of AI and perceived challenges was also positive ($r = .402$, $p = .004$) indicate that the users taking a greater interest in AI are also more critical of AI's limitations, and that they are more aware of its complexity. A relatively low mean was obtained in recommendations for AI integration in teacher preparation programs ($M = 2.00$), implying that trainees are lacking practical vision on how they can effectively infuse AI in teacher preparation programs. However, there were a few qualitative responses that indicated deeper thought and innovation, including requests for access to mobile devices, AI training modules and improving IT infrastructure. Crucially, there was a positive correlation skillfully between AI use and support for recommendations ($r = .695$, $p < .001$) evidences the more AI student experience, the higher level of commitment to improve AI on education.

This lends support to the point that has been argued by Chen et al. (2023), who concludes that immersive AI driven simulations when combined with actual real classroom experience enhanced practical skills and reflective teaching. Their results substantiate that a deeply integrated scaffolded experience in AI can allow teacher trainees to move beyond passive users to active innovators of AI-enhanced pedagogy. The novelty of the present study is its uniqueness in context. The study, which took place in a bilingual (Arabic-Hebrew) academic context, also offers a culturally informed account on the implementation of AI in teacher training, a field that has been relatively neglected in the literature to date. This bilingual and multicultural background presents cognitive and linguistic challenges that determine the way in which the AI tools are perceived and used, and specifically in the field of teaching of language and science subjects in clinical counseling. By teasing apart the intersection of multilingual instruction, AI, and pedagogical training in a specific socio-political context, this work extends previous research that looked at dialectal challenges for Arabic NLP applications (Müller and Zhang, 2021).

The findings from this study offer a compelling and coherent story on the quality of AI offered in clinical counselor education. Admittedly with limited use and exposure, there is compelling evidence that, when meaningfully used, AI tools greatly improve teaching, assessment, and learning proficiency. The challenges and possible ways forward we have identified also respond to an in between phase – in some ways, our community is articulating how to move forward, while the environment to implement checks and balances remains

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limited. Grounded in empirical evidence and theoretical analysis, these findings have implications for the development of organized training programs, accessible infrastructure, and ethical protocols required to support the integration of AI in teacher preparation. Such investments are critical not only for imparting technical prowess, but for developing reflective, responsive, and pedagogically inventive educators who are prepared to lead in AI-augmented learning spaces.

Research Recommendations

Based on the comprehensive findings of this study, which examined the contribution of Artificial Intelligence (AI) tools to the development of teaching, learning, and assessment skills among clinical counseling trainees in science and language disciplines at Sakhnin College, several multi-level recommendations are proposed to advance the integration of AI into teacher education programs:

1. **Integration of Structured AI Training in Teacher Education Curricula** It is imperative that teacher preparation programs incorporate formal, structured coursework on AI applications in education. Such courses should address both the technical aspects of AI tools and their pedagogical implications. Modules may include AI-supported lesson planning, adaptive learning platforms, intelligent tutoring systems, AI-driven formative assessment, and ethical considerations surrounding AI use. These courses should be aligned with international standards on AI in education, thus preparing pre-service teachers to effectively leverage AI technologies in diverse classroom environments.
2. **Continuous Professional Development for Faculty and Supervisors** Faculty members and clinical supervisors must receive ongoing professional development to ensure their competence in supervising trainee teachers who engage with AI tools. This includes workshops on emerging AI technologies, data analytics for education, personalized learning algorithms, and the development of digital pedagogical content using AI platforms. Faculty training must emphasize the role of AI as an augmentation to—rather than a replacement for—human pedagogy, reinforcing the centrality of teacher judgment, empathy, and creativity.
3. **Institutional Investment in AI Infrastructure and Technical Support** Higher education institutions, particularly teacher training colleges, must invest in robust technological infrastructure that supports AI integration. This includes high-speed internet access, cloud-based AI educational platforms, AI-supported assessment systems, and secure data storage compliant with ethical standards. Furthermore, institutions should establish dedicated technical support units capable of assisting both

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faculty and students in troubleshooting and optimizing AI tools for pedagogical purposes.

4. **Development of Ethical Frameworks for AI Use in Education** Given the ethical complexities identified in the study—such as concerns over student privacy, data security, bias in AI algorithms, and academic dishonesty—educational institutions must formulate clear ethical guidelines governing the responsible use of AI in teaching, learning, and assessment. These guidelines should address issues of transparency, informed consent, data protection, and the prevention of over-reliance on AI-generated content.
5. **Promotion of Blended Learning Models Combining AI and Human Interaction** The findings suggest that AI tools are most effective when used to complement—not replace—human instruction. Therefore, it is recommended that teacher education programs adopt blended learning models wherein AI facilitates individualized practice, while instructors provide nuanced feedback, socio-emotional support, and adaptive interventions that AI cannot fully replicate. This hybrid approach maximizes the pedagogical strengths of both AI and human expertise.
6. **Enhancement of Clinical Practice through AI-Supported Simulations** To strengthen clinical counseling training, colleges should integrate AI-powered simulation environments that allow trainees to practice complex teaching scenarios in virtual classrooms. These simulations can provide real-time feedback on classroom management, differentiated instruction, and student engagement strategies, thereby enabling pre-service teachers to refine their professional competencies in a risk-free environment prior to actual classroom placements.
7. **Longitudinal Monitoring of AI Integration Outcomes** Institutions should establish longitudinal evaluation systems that monitor the long-term impact of AI integration on teacher effectiveness, student learning outcomes, and program quality. Such monitoring will provide empirical evidence to guide continuous improvement, ensuring that AI tools are yielding measurable benefits and informing policy revisions as new technologies and pedagogical research emerge.
8. **Fostering Interdisciplinary Research Collaborations on AI and Education** Finally, it is strongly recommended that teacher education colleges foster interdisciplinary research initiatives that bring together experts from education, computer science, psychology, linguistics, and ethics. Such collaborations will contribute to a more nuanced understanding of AI's pedagogical potential, help develop culturally responsive AI tools, and ensure that AI adoption in education is both evidence-based and socially responsible.

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By adopting these comprehensive recommendations, teacher education institutions will be better positioned to prepare future educators who can skillfully and ethically navigate the rapidly evolving landscape of AI-enhanced education, thereby advancing both instructional quality and equitable learning opportunities for diverse student populations.

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Power System Technology
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