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PAPER

AI-Powered Chatbots for Mobile Teacher Training: Enhancing Interactive Learning Experiences

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ABSTRACT

The study aims to explore the impact of artificial intelligence (AI)-powered chatbots in mobile teacher training, specifically in enhancing interactive learning. To achieve the objective, the researcher employed an experimental approach using a single-group (pre-post) design. The study sample consisted of 50 male and female secondary school teachers who received training based on chatbot applications over a four-week period. Following the training, the research instrument—a teaching skills scale was administered. This scale measured three key skills: interactive planning, the integration of technology in teaching, and interactive evaluation. The results revealed statistically significant differences between the participants' scores on the teaching skills scale in the pre- and post-tests across all dimensions and the overall score. These differences favored the post-test results, indicating an improvement after exposure to the chatbot-based training program. Considering these findings, the study recommends the development of ongoing professional training programs for teachers, particularly those incorporating innovative models such as chatbot applications.

KEYWORDS

artificial intelligence (AI)-powered chatbots, chatbot technology, mobile training, chatbots for mobile, interactive learning, mobile learning

1 INTRODUCTION

The rapid advancements in technology necessitate a reassessment of traditional education systems, as reliance on conventional teaching methods has become unsustainable. Educational institutions must adapt to these changes by updating curriculum and enhancing teachers' skills to ensure that future generations are equipped to face challenges with flexibility and efficiency.

Technological advancements have led to the rapid expansion of artificial intelligence (AI) applications, revealing significant potential across various tasks. This has made AI in education a prominent and innovative research area. [1], [2] Studies have demonstrated how these intelligent technologies can enhance the teaching

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and learning process, using tools such as AI-powered chatbots that support diverse inputs, outputs, and processes. [3] Research indicates that chatbot applications provide a flexible training environment for teachers to develop digital skills, especially as teacher training undergoes significant transformation to accommodate the multifaceted roles of educators, ranging from mentor and curriculum designer to technology integrator. To adapt to emerging educational trends, teachers must engage in continuous professional development to enhance their skills.

Moreover, as the influence of AI continues to expand and permeate various aspects of daily life, the field of education cannot remain insulated from its effects. This has resulted in a significant increase in research focused on AI in education (AIED), reflecting the growing acknowledgment of AI's potential to transform teaching and learning methodologies [4–5].

The teacher is a crucial element in translating strategies and plans into reality within the classroom. By equipping educators with modern technology and innovative teaching methods, their ability to adapt to rapid transformations in educational systems can be significantly enhanced. The teacher's role extends beyond the mere transfer of traditional knowledge; it encompasses the preparation of generations capable of critical thinking and flexible problem-solving. This contribution is vital for building a knowledge society that keeps pace with global changes [6]. Consequently, teachers become key partners in implementing strategies aimed at elevating the status of education as a fundamental driver of development and innovation in the face of future challenges [7].

Artificial intelligence applications have opened new horizons for innovative training programs that enhance teachers' skills, enabling them to perform their roles efficiently by effectively utilizing the latest educational technologies. Chatbots are emerging as a groundbreaking tool, allowing educators to manage the educational process with ease, whether in traditional classrooms or e-learning platforms, while leveraging advanced technological resources [8]. These intelligent systems can answer users' questions and provide proactive solutions, making them an effective tool for supporting interactive learning and improving communication within digital environments.

The researcher's observations reveal a significant research gap: there is a lack of studies focusing on the design of training programs that utilize chatbot applications to enhance teachers' efficiency in using technology. This is especially important during sensitive educational stages, such as secondary education. Most existing studies have focused on the impact of chatbots from the students' perspective, while the direct effects on the development of teachers' instructional skills have been seldom addressed.

1.1 Study questions

The study will address the following primary questions:

- Are there statistically significant differences at the 0.05 level of significance between the average performance of the members of the experimental group before and after the application of the teaching skills scale?
- Are there statistically significant differences at the 0.05 level of significance between the average performance of the members of the experimental group in the post-application of the teaching skills scale based on chatbot attributes, considering gender, specialization, and years of experience?

1.2 Importance of studying

The theoretical significance of this study lies in its contribution to the development of scientific knowledge regarding the use of chatbots as an innovative training tool in education. This study directly addresses the rapid technological advancements of the digital age. Its practical significance is evident in enabling teachers to acquire the technical skills necessary for effectively integrating technology into classrooms, as well as enhancing the capacity of educational institutions to leverage AI applications to improve the quality of education.

2 LITERATURE REVIEW

2.1 Chatbots in teacher training

Chatbots are sophisticated software systems or applications designed to engage users by simulating human conversations. They analyze input messages and deliver accurate and relevant responses based on pre-programmed algorithms or machine learning techniques. Some chatbots operate autonomously without direct human intervention, while others depend on specific commands to generate responses or execute required tasks. These systems exemplify a practical application of technological advancements aimed at enhancing human interactions with digital platforms, thereby improving usability and saving time across various domains [9].

According to [10], chatbots are a cutting-edge educational tool due to their characteristics, which enhance the effectiveness and flexibility of the learning process. These programs serve as reliable teaching aids, available to students around the clock without time constraints. They are characterized by features that contribute to an engaging learning environment, such as persistence, transparency, and friendly interactions with students. Chatbots assist learners by providing detailed information on courses, assignments, and exam dates, as well as personalized reminders. Furthermore, students can participate in virtual educational groups with chatbots, which enhances group interaction and promotes collaborative learning. Today, chatbots are recognized as innovative AI technology widely utilized in the field of education. In simple terms, chatbots are computer programs designed to simulate human conversation via text or voice interactions [11].

The educational process faces numerous challenges, most notably the evident lack of teaching skills related to the use of modern technology. Many educators lack the necessary competence to effectively integrate digital technologies into their teaching, which hinders the achievement of educational goals aimed at enhancing students' creative and interactive thinking skills. The study referenced in [9, 12] revealed that this deficiency is partly due to the absence of training programs designed to develop teachers' capabilities in utilizing technological tools, including applications of AI. Furthermore, [7] recommended the development of innovative training strategies that enable teachers to acquire the skills needed to incorporate modern technologies into the educational process. Previous studies have indicated the positive impact of chatbots on education. For instance, [13] confirmed that these applications contribute to creating an interactive learning experience that fosters communication and interaction between teachers and students. Additionally, the findings from [14] suggested that chatbots can support educators by providing customized content and interactive assessment tools.

2.2 Interactive chatbot & adaptive learning

According to contemporary theories, interactive chatbots can enhance training programs by providing an engaging and interactive experience, particularly due to their accessibility on mobile and portable devices [13]. They also serve as valuable assistants in improving teachers' pedagogical skills [13–15]. It is important to emphasize that interactive chat applications offer teachers the opportunity to pose questions, engage in discussions, and access the information they require via smart devices and mobile phones, thereby ensuring timely and on-demand learning support. A study by [16] confirmed that interactive chat and conversation features contribute to the assertion that chatbots enhance learning processes, support teacher development, and enable access to educational materials anytime and anywhere via mobile phones. In the realm of mobile learning, [17] asserts that adaptive learning ensures the integration of adaptive applications with smart mobile devices within online learning platforms and courses. These platforms employ a variety of adaptive learning strategies, including intelligent tutoring systems, learning analytics, and personalized learning pathways. Adaptive learning customizes educational experiences to meet each student's unique needs using data-driven approaches. This method, which prioritizes personalization, flexibility, autonomy, and interaction, can be effectively implemented in mobile learning environments, making it well-suited for smartphone applications in classrooms [18]. Educational technology tools, such as chatbots, virtual reality, AI, and machine learning, facilitate this personalized learning experience.

Mobile-based interactive chatbot training has proven effective in education by providing instant feedback and enhancing student engagement [19]. AI-powered chatbots are assessed based on their interactivity, adaptability, and capacity to deliver personalized learning experiences. Educators value the benefits of tools such as Sosyalci Bot, highlighting their user-friendliness, accessibility beyond the classroom, and the motivating content they provide during question-and-answer sessions.

2.3 Artificial intelligence in mobile learning

With the rapid development of mobile learning technologies, mobile learning environments have become an integral part of modern education, offering students flexible learning methods and a wealth of educational resources. In this context, project-based learning (PBL), a student-centered instructional model, has garnered significant attention due to its proven effectiveness in enhancing students' autonomous learning capabilities and problem-solving skills [20].

The study underscores the transformative potential of m-learning in education, underscoring the importance of leveraging such technology to foster student-centered learning environments. This study contributes to the body of literature on educational technology, offering valuable insights for educators, policymakers, and scholars seeking to effectively implement m-learning strategies to enhance student learning outcomes [21].

2.4 Teaching skills

Teaching skills are the competencies that empower educators to effectively achieve educational objectives. These skills encompass technical, academic, and

communication dimensions, enabling teachers to design innovative lessons, manage engaging classrooms, and assess students accurately. They facilitate a balance between knowledge transfer, critical thinking, and student motivation for independent learning [22]. Teaching skills are essential for enhancing the quality of education by developing strategies that cater to students' diverse needs and intellectual levels. A proficient teacher cultivates a flexible learning environment that promotes positive interactions, supports both academic and social development, and addresses individual differences. These skills enable educators to plan lessons, employ innovative teaching methods, manage classrooms effectively, and integrate technology to enrich the learning experience. Furthermore, teaching skills assist in evaluating student performance, providing constructive feedback, and enhancing communication, thereby fostering a learning environment in which students feel free to express their ideas [9].

2.5 The use of artificial intelligence in education

The use of AI has grown significantly, assisting teachers in enhancing the quality of education by improving learning content and teaching practices. Teachers play a crucial role in guiding students' interactions with AI and assessing its impact. As AI continues to evolve, it is essential for teachers to prepare for the effective use of new tools in the classroom to enhance learning outcomes. Training aimed at improving teachers' skills and knowledge will be a primary focus for the educational community, particularly in examining the effects of digital training on developing online learning methods that incorporate chatbots during teacher training. The results indicated that training with chatbots using the Akita template contributed to a 46% increase in teachers' creativity and a 47% improvement in their understanding of the robots' structure. These findings underscore the effectiveness of training in enhancing teachers' abilities to utilize this instructional technique.

2.6 Design and aesthetic appearance

The design of a chatbot's interaction interface should be carefully structured to ensure ease of use. This design encompasses various elements, including layout, colors, background images, text size, and more. Chatbot developers can also offer users the option to customize the interface to align with their preferences or personalities, such as changing the background color and image, as well as adjusting text size. This customization enhances the user experience, as indicated by [23] and illustrated in Figure 1.

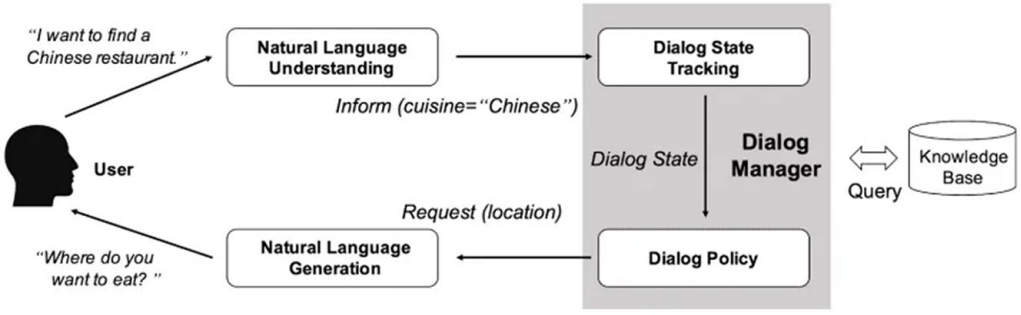

Fig. 1. The components of a chatbots [24]

- **Natural language processing (NLP)** enables chatbots to convert users text speech into stored data to be understood by a machine. The NLP process consists of the following steps:
- **Tokenization** also called lexical analysis, is the process of splitting the string of words forming a sentence into smaller parts, known as "tokens," based on its meaning and its relationship to the whole sentence.
- **Normalization** also called syntactic analysis, is the process of checking words for typos and changing them into standard form. For example, the word "tmrw" will be normalized into "tomorrow."
- **Entity recognition** the process of looking for keywords to identify the topic of the conversation.
- **Semantic analysis:** the process of inferring the meaning of a sentence by understanding the meaning of each word and its relation to the overall structure.

2.7 User interfaces

A conversational user interface serves as the front end of chatbots, facilitating a tangible representation of the conversation. These interfaces are classified as either text-based or voice-based assistants and can be integrated into various platforms, such as Facebook Messenger, Slack, and Google Teams. Most modern chatbots are designed to be accessible on mobile devices. They typically operate across devices in one of three ways:

1. **Responsive web design**–Accessible via mobile browsers, adapting to different screen sizes.
2. **Mobile apps**–Integrated into native applications, such as banking or shopping apps.
3. **Messaging platforms**–Hosted on applications such as WhatsApp, Facebook Messenger, or Slack.

These methods improve clarity, readability, and technical accuracy while correcting grammatical errors and punctuation.

For example, the E-Java chatbot [25] serves as a virtual tutor that teaches the Java programming language. Generally, these tools facilitate the deployment of chatbots on both web and mobile platforms. As highlighted in [26], chatbots have gained popularity in various fields, particularly in education, where they can enhance student learning and provide support in large-scale learning environments. Studies indicate the potential of chatbots in education; however, their effectiveness is complex and depends on multiple factors.

3 MATERIALS AND METHODS

3.1 Research approach

The quasi-experimental approach, designed as a single cohort, was chosen to align with the study's objectives. A preliminary field study conducted by the researcher revealed that the targeted schools had benefited from external projects aimed at enhancing digital infrastructure-particularly in the training and qualification of teachers. However, a notable discrepancy was in the level of acceptance of

these programs among teachers and their engagement with them, prompting the researcher to focus on a single research group.

Consequently, a single experimental group was utilized, as it was deemed the most suitable and effective for achieving the study's goals. The sample comprised 50 teachers, selected for their high levels of engagement and cooperation in fulfilling the study's objectives. These participants were also the most actively involved in digital training programs and represented the target group intended to be prepared as trainers for other teachers in the future. This group had a critical need for hands-on practice and interactive training. Furthermore, decision-makers recommended that if this training method proved effective, it should be adopted by all teachers due to its accessibility and ease of communication.

3.2 Participants and study settings

The study population comprised all secondary school teachers in government schools within the Second Amman Directorate of Education, totaling 238 educators—110 male and 128 female teachers—according to data from the Planning Department for the academic year 2024/2025. The study sample consisted of 50 male and female teachers, selected using a purposive sampling method, who were employed in these schools during the same academic year.

It is acknowledged that the sample size may not be sufficient to generalize the findings. Therefore, future research should replicate this study using a broader range of teachers and a larger sample size to enhance the accuracy, reliability, and generalizability of the results.

3.3 Ethical considerations

This methodology was designed to ensure reliability, validity, and ethical integrity throughout the research process. Ethical approval was obtained in advance, and participants provided informed consent, safeguarding their rights to privacy and confidentiality at all stages of the study. Data privacy and confidentiality were rigorously maintained by anonymizing the data to protect participants' identities.

3.4 Study tools

The study instrument, an observation checklist, was developed to encompass four areas: interactive planning, the use of technology in teaching, interactive assessment, and teaching skills. Each area included five items, for a total of 20 items. The development of the tool was informed by a review of previous studies relevant to the current research. The checklist was subsequently presented to a panel of expert evaluators to assess its content accuracy, clarity, linguistic quality, and appropriateness for measuring the intended constructs. Based on their feedback, which indicated an 80% agreement rate, necessary modifications were made. To assess the internal consistency of the instrument, it was administered to 33 teachers who were not part of the study sample. Pearson correlation coefficients were calculated between the individual items and the total score for each domain to evaluate internal validity. Table 1 presents the Pearson correlation coefficients between the average scores of the domains and the overall average of the questionnaire.

Table 1. Pearson correlation coefficients for the paragraphs of each field with the total degree of the field

#	Coefficient of Correlation with the Field of Interactive Planning	#	Coefficient of Correlation with the Field of Technology Employment in Teaching	#	Coefficient of Correlation with the Field of Interactive Assessment	#	Coefficient of Correlation with the Field of Teaching Skills
1	0.762	6	0.701	11	0.802	16	0.853
2	0.603	7	0.763	12	0.644	17	0.855
3	0.667**	8	0.885	13	0.796	18	0.768
4	0.757	9	0.785	14	0.733	19	0.656
5	0.625	10	0.721	15	0.689	20	0.508

Note: **Dal is observed at the significance level of 0.01 and below.

Table 1 shows that the correlation coefficients for each paragraph and its respective field are positive and statistically significant at a significant level of 0.01 or lower, indicating strong alignment with the corresponding fields. To evaluate the tool's reliability, it was administered to a pilot sample of 12 teachers (male and female) who were not part of the main study population. The stability of the correlation was measured using the Pearson correlation coefficient, yielding a value of 0.86. Furthermore, internal consistency reliability was assessed using Cronbach's alpha, resulting in a coefficient of 0.94. The teaching skills of the study sample were enhanced through a chatbot-based training program. This program consists of targeted training sessions designed to improve specific competencies, including:

- The integration of modern technological advancements in education,
- The use of chatbots to facilitate student interactions, and
- The promotion of digital efficiency in implementing educational activities.

The program will be developed according to the following steps:

1. Identifying the essential requirements and needs of teachers regarding chatbot usage,
2. Designing training sessions on chatbots as educational tools, and
3. Conducting ten sessions, each with a specified duration.

4 RESULTS AND DISCUSSION

QR1: Which states: Are there statistically significant differences at the 0.05 level of significance between the average performance of the members of the experimental group before and after the application of the teaching skills scale?

To answer this question, the means and standard deviations of the scores of the study members were extracted on the scale of teaching skills, and the table below shows this.

Table 2. Arithmetic means and standard deviations of the grades of the study members on the scale of teaching skills in the pre and post measurements

#	Dimension	Pre-Test		Post-Test	
		M	S.D	M	S.D
1	Reactive Planning	2.73	0.22	3.42	0.22
2	Using Technology in Teaching	2.58	0.31	3.66	0.24
3	Interactive Assessment	2.56	0.33	3.54	0.25
4	Teaching Skills	2.63	0.19	3.53	0.10

Table 2 reveals notable differences in the arithmetic means of participants' scores on the teaching skills scale. To assess whether these differences were statistically significant, we employed the Wilcoxon Signed-Rank Test to compare participants' average scores before and after the intervention (see Table 3 for results).

The Wilcoxon Signed-Rank Test was selected for three primary reasons. First, its suitability for small sample sizes made it particularly appropriate for this study. Second, unlike parametric tests (e.g., paired t-tests), it does not require normally distributed data – an important consideration given our sample characteristics. Third, this nonparametric test is specifically designed for comparing paired observations (pre-test/post-test) within the same group, thereby optimizing measurement accuracy.

Table 3. The results of the Wilcoxon Signed Ranks Test to find the significance of the differences between the average grades of the grades of the study members on the scale of teaching skills in the pre and post measurements

	Grades	N	FS-3 Average Level	Total Ranks	Z	Sig
Reactive Planning	Negative Ranks	50	10.50	210.00	928	0.000
	Positive Ranks	0	00	00		
	Equal Ranks	0				
	Total	50				
Using Technology in Teaching	Negative Ranks	50	10.50	210.00	926	0.000
	Positive Ranks	0	00	00		
	Equal Ranks	0				
	Total	50				
Interactive Assessment	Negative Ranks	50	10.50	210.00	942	0.000
	Positive Ranks	0	00	00		
	Equal Ranks	0				
	Total	50				
Teaching Skills	Negative Ranks	50	10.50	210.00	407	0.000
	Positive Ranks	0	00	00		
	Equal Ranks	0				
	Total	50				

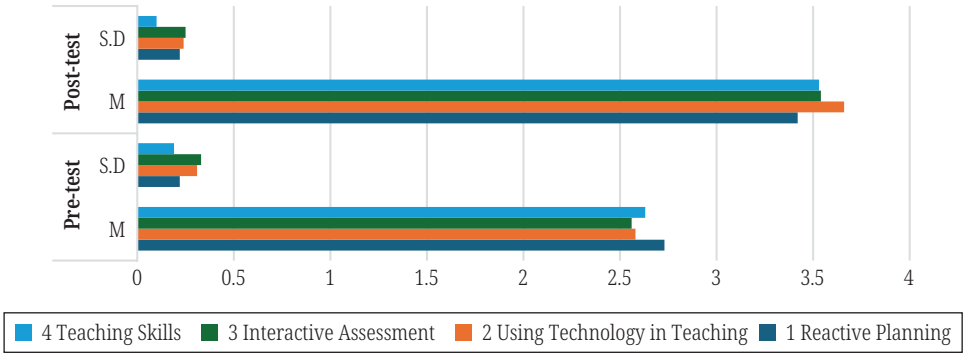

Fig. 2. Arithmetic means and standard deviations of the grades of the study members on the scale of teaching skills in the pre- and post-measurements

Figure 2 reveals statistically significant differences ($\alpha = 0.05$) between participants' scores on the teaching skills scale in both pre- and post-measurements across all dimensions, including the total score. These differences consistently favored post-intervention performance, indicating a positive effect of the chatbot-based training program.

The results demonstrate significant improvements in post-measurement scores, attributable to the training program's use of chatbot technology. This outcome stems from chatbots' interactive nature, which facilitates dynamic learning through real-time dialogue. Such interactions promote active trainee engagement, heighten interest in training activities, and enhance skills in interactive planning. The immediacy of chatbot responses simulates interaction with a human instructor, bolstering trainees' confidence and practical application of acquired knowledge.

The findings of the current study corroborate those of [13], which established that chatbots significantly enhance learning experiences. Furthermore, research by [9] on Chabot—a virtual teaching assistant—demonstrates its educational applications in, developing personalized learning environments. Addressing learners' cognitively challenging inquiries. Through an evaluation of existing literature on educational chatbots, this study incorporates the work of [7], whose findings substantiate the efficacy of chatbot-based training in enhancing teachers' technological competencies, and facilitating effective integration of this educational technology.

QR2: Which states "Are there statistically significant differences at the 0.05 level of significance between the average performance of the members of the experimental group in the post-application of the teaching skills scale based on chatbot attributes, considering gender, specialization, and years of experience?

To investigate the second research question, the researcher analyzed differences in participants' mean responses according to two key variables: (1) gender and (2) years of experience. The analysis employed multiple statistical approaches: An independent samples t-test was conducted to examine significant differences in responses for categorical variables (gender and specialization). A one-way analysis of variance (ANOVA) was performed to evaluate response differences across the three experience-level categories. The subsequent sections present detailed results for each variable.

4.1 Gender variance

The following table presents the results of the independent samples t-test (Test-T) to indicate the differences in the average responses of study participants regarding

statistically significant differences at the significance level ($\alpha = 0.05$). This analysis focuses on the performance averages of the members of the experimental group following the application of the teaching skills scale, which was developed based on chatbot applications, and examines the effects attributed to the gender variable.

Table 4. Results of the Test-T for independent samples to indicate differences in the averages of the responses of the study members according to gender

	Gender	N	M	S.D	T Value	D.F	Significance
Reactive Planning	Male	25	3.42	0.22	3.69	18	0.001
	Female	25	3.42	0.24			
Using Technology in Teaching	Male	25	3.66	0.25	2.85	Using technology in teaching	0.010
	Female	25	3.66	0.10			
Interactive Assessment	Male	25	3.54	0.22	2.29	Using technology in teaching	0.036
	Female	25	3.54	0.24			
Total	Male	25	3.53	0.25	3.40	Using technology in teaching	0.002
	Female	25	3.53	0.10			

Fig. 3. Results of the Test-T for independent samples to indicate differences in the averages of the responses of the study members according to gender

The statistical indicators from the independent samples *t*-test reveal significant findings. Specifically, the calculated *t*-value for the domain of interactive planning was 3.695, with a significance level of 0.001. For the domain of technology employment in teaching, the *t*-value was 2.850, with a significant level of 0.010. Additionally, the *t*-value for interactive evaluation was 2.293, with a significance level of 0.001. Finally, the *t*-value for the total score was 3.409, with a significance level of 0.002.

It is evident from the graph in Figure 3 reveals slight differences between males and females across all fields; however, the arithmetic means are very similar. This suggests that these discrepancies may stem from sample dispersion rather than from a fundamental divergence in attitudes or perspectives between genders.

The graph indicates slight differences between males and females across all fields; however, the arithmetic means are remarkably similar. This suggests that these minor discrepancies likely arise from sample dispersion rather than from any fundamental divergence in attitudes or perspectives between genders. All calculated Cohen's *d* values were 0.0, indicating no practical difference between males and females in any field—despite the statistical significance of the observed differences. This implies that the detected effect may be attributable to sample size rather than to meaningful practical significance.

As evidenced by the independent samples *t*-test results (refer to Table 4), there are no statistically significant differences ($p < 0.05$) in gender-based variation concerning the average responses of the research sample members. This conclusion also applies to the experimental group's performance after the implementation of the teaching skills scale developed for chatbot applications, which was examined in relation to gender.

The statistical results reveal no statistically significant differences in the experimental group's average performance on the chatbot-based teaching skills scale with respect to gender. This finding suggests comparable improvements in teaching performance among both male and female participants following the chatbot-based training program.

This outcome likely stems from the program's design, as the AI-powered chatbot delivers standardized, comprehensive educational content that meets all users' needs without gender-based discrimination. By providing identical support and information in a personalized, immediate format, the program ensures equal opportunities for skill acquisition regardless of gender.

4.2 Specialization variable

Table 5 presents the results of the independent samples t-test, which was conducted to examine potential statistically significant differences ($\alpha = 0.05$) in response means among study participants. The analysis focused on performance differences in the experimental group's post-test scores on the chatbot-based teaching skills scale, with particular attention to variations attributable to academic specialization.

Table 5. Results of the Test-T for independent samples to indicate the differences in the averages of the responses of the study members according to the different specializations

	Major	N	M	S.D	T Value	D.F	Significance
Reactive Planning	Theoretical	30	3.40	70	7.57	18	0.000
	Scientific	20	3.44	50			
Using Technology in Teaching	Theoretical	30	3.60	–	7.15	18	0.000
	Scientific	20	3.72	65			
Interactive Assessment	Theoretical	30	3.50	85	8.63	18	0.000
	Scientific	20	3.58	87			
Total	Theoretical	30	3.50	84	7.94	18	0.000
	Scientific	20	3.56	2.34			

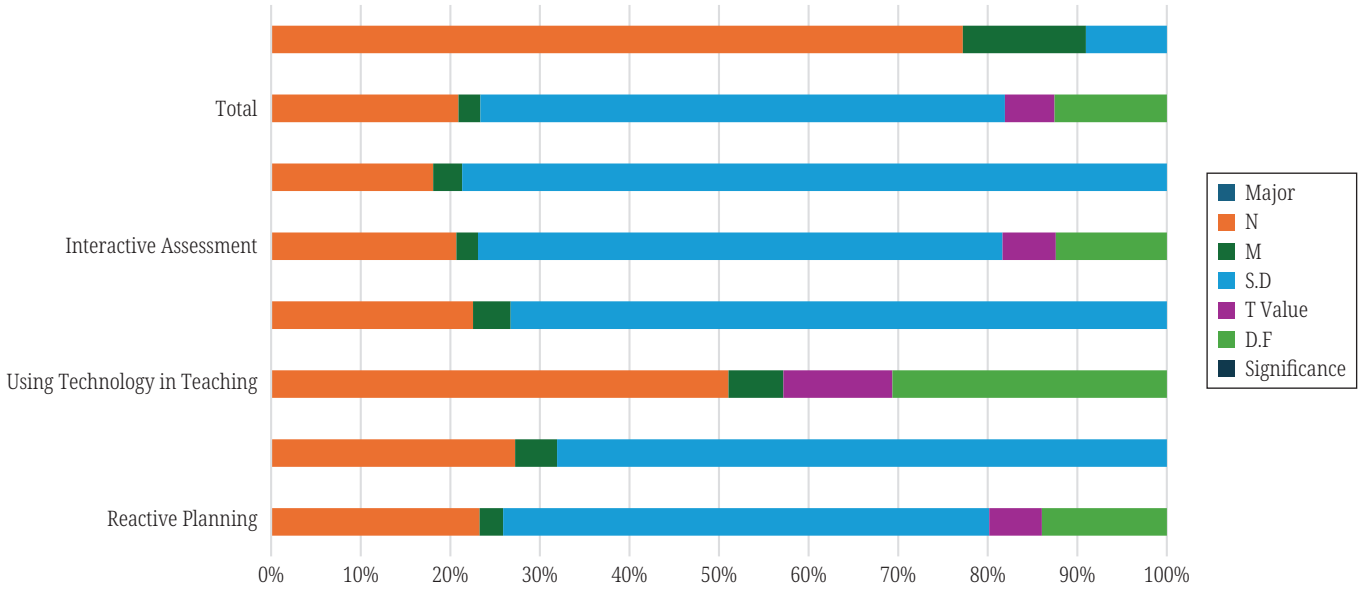

Fig. 4. Results of the Test-T for independent samples to indicate the differences in the averages of the responses of the study members according to the different specializations

The independent samples t-test results presented in Table 5 demonstrate statistically significant differences across all measured domains. The analysis yielded the following t-values: interactive planning (t = 7.57), technology employment in teaching (t = 7.15), interactive evaluation (t = 8.63), and overall score (t = 7.94). All results were statistically significant at $p < 0.001$ (two-tailed), exceeding the conventional $\alpha = 0.05$ threshold for significance.

The statistical results presented in Table 5 indicate no statistically significant differences ($p > 0.05$) in participants' mean responses across specializations. This finding suggests that academic specialization does not significantly influence experimental group performance on the chatbot-based teaching skills assessment.

Looking at Figure 4, we find that the results indicate no statistically significant differences in the experimental group's mean performance on the teaching skills scale following chatbot-based training, regardless of specialization (theoretical or scientific). This consistent performance likely reflects the training program's effectiveness in providing an equitable learning experience for all participants across academic backgrounds. The chatbot-delivered content focuses on core teaching principles—including interactive planning, assessment, and technology integration—which are universally applicable across disciplines.

Chatbots offer personalized training tailored to each user's needs, ensuring that participants from both theoretical and scientific disciplines receive equally high-quality instruction. The program supports both fields by focusing on practical skills and enhancing technology integration in education. This approach ensures that chatbots meet diverse needs effectively, making the program inclusive and adaptable regardless of academic background.

4.3 Variable years of experience

The following table shows the results of the (T-test) test for independent samples to indicate differences in the averages of the responses of the study members about

statistically significant differences at the level of significance (α = 0.05) between the averages of the performance of the members of the experimental group in the post-application of the teaching skills scale that grew on chatbot applications. Which is due to the variable years of experience.

Table 6. The results of the single variance analysis test show the significance of differences in the averages of the responses of the research sample according to different years of experience

Scope	Source of Variance	Squares Total	D	M	Feddan	Significance
Reactive Planning	Between Groups	72.4	2	30.2	9.46	0.000
	Within Groups	2700	17	38.1		
	TOTAL	732	19			
Using Technology in Teaching	Between Groups	72.4	2	108	2.94	0.053
	Within Groups	2700	17	36.7		
	TOTAL	732	19			
Interactive Assessment	Between Groups	72.4	2	60.9	2.01	0.035
	Within Groups	2700	17	30.4		
	TOTAL	732	19			
Total	Between Groups	24.8	2	4	6.00	0.003
	Within Groups	1582	17	151		
	TOTAL	1907	19			

It is evident from the statistical indicators of significance levels in the single variance analysis test, as presented in Table 6, that the calculated T value for the domain of interactive planning was 9.46, with a significance level of 0.000. The calculated T value for the domain of technology employment in teaching was 2.94, with a significance level of 0.053. Additionally, the calculated T value for the domain of interactive evaluation was 2.01, with a significance level of 0.035. The calculated T value for the total score was 6.00, with a significance level of 0.003.

The results indicate that there are no statistically significant differences in the performance of the experimental group members on the teaching skills scale, as attributed to the variable of years of experience. This finding suggests that training utilizing chatbots has facilitated a convergence in the level of teaching skills among participants, irrespective of their prior experience. This phenomenon can be attributed to the capacity of chatbots to deliver personalized training that adapts to the knowledge and experience levels of each trainee. Chatbots analyze user interactions and provide tailored content that meets individual needs, allowing novice trainees to grasp foundational concepts while simultaneously offering additional challenges for more experienced trainees.

Chatbots provide personalized training that adapts to individual users' needs, guaranteeing equally high-quality instruction for participants from both theoretical and scientific disciplines. The program equally supports both fields by emphasizing practical skill development and promoting effective technology integration in educational contexts. This adaptive approach enables chatbots to successfully address diverse learning requirements, ensuring the program's inclusivity and adaptability across all academic backgrounds.

4.4 Discussion about the experiences of practitioner teacher in terms of the use of chatbots throughout the process of teaching

Following the training program, participating teachers reported positive impacts of chatbot integration on their teaching performance. Multiple respondents valued the chatbots' capacity to re-explain concepts and conduct question-answer sessions, which effectively reinforced learning outcomes. For instance, one participant (Yemen) emphasized the utility of chatbot-generated summaries as supplementary materials following instructor explanations. Another teacher (Hamza) acknowledged initial comprehension difficulties but found that subsequent chatbot-mediated lesson reviews significantly improved his understanding of challenging content. Educators particularly appreciated the chatbots' application in lesson preparation, noting their effectiveness in creating interactive learning environments and enabling continuous mobile-assisted learning. Some found it particularly beneficial for students who had not prepared in advance, as it served as a valuable preparatory tool. Amjad noted that using chatbots at the beginning of class positively impacted student learning. Additionally, many teachers reported that this practice enhanced their active participation in the classroom. These findings align with studies conducted by [27, 28, 29]. As revealed by a study [30] on the effectiveness of mobile technology in facilitating instructor-student interactions in various teaching contexts.

4.5 Challenges facing teachers in using interactive chat from their point of view

Despite the numerous benefits of interactive chat in education, teachers encounter several challenges. These include resistance to adopting digital tools, particularly among educators with limited technical experience or a preference for traditional teaching methods. Additionally, technical and infrastructural limitations—such as poor internet connectivity and a lack of suitable devices—hinder the development of digital skills, especially in rural areas where many teachers have low incomes. Furthermore, some educators struggle to manage interactive chats during class while maintaining traditional teaching methods due to time constraints and insufficient content knowledge. Although adjustments were made to accommodate their schedules, and chat responses were monitored for accuracy, initial participation in training programs remained low. These findings align with studies by [31, 32, 33].

To address the challenges teachers face in utilizing interactive chat, several solutions can be implemented. First, providing comprehensive training for educators on the effective use of interactive chat would enhance their technological proficiency. Second, improving technical infrastructure—particularly ensuring reliable internet connectivity and access to appropriate devices—would facilitate a more seamless learning experience. Third, designing interactive educational content tailored to students' needs could increase engagement and improve learning outcomes. Finally, maintaining robust privacy and security standards when using interactive chat is essential to safeguard both teachers and students.

5 CONCLUSIONS

It is evident that AI technologies, particularly chatbots, play a crucial role in personalizing training content for teachers in an individualized and effective manner,

thereby improving teaching efficiency and overall education quality. By analyzing prior experiences, adapting to performance, and customizing content to diverse teaching needs, intelligent chatbots provide a personalized and adaptive learning experience. Smart systems integrated into mobile devices assess teachers' expertise and technical proficiency to design appropriate training materials. Chatbots initiate this process by asking diagnostic questions or analyzing historical data to determine the teacher's knowledge level. This approach eliminates redundant content while providing more advanced materials when needed. Based on the teacher's responses, the system aligns content with their expertise by recommending specialized educational resources, such as pedagogical research, teaching strategies, or classroom management techniques. Subsequently, intelligent chatbots develop interactive training programs that incorporate continuous feedback mechanisms. These systems facilitate teaching performance improvements by offering supplementary resources or adjusting content difficulty levels. Furthermore, key metrics—including interaction rates, course completion, and performance analyses—are monitored to dynamically adapt training content. This ensures the system meets varying teacher needs, accounting for preferred learning styles (visual, auditory, or interactive), ultimately enhancing professional development efficiency through AI-powered systems.

5.1 Limitations and future studies

Although this study provides valuable insights, several limitations must be acknowledged. The research was conducted with a relatively small sample of 50 teachers in Amman, Jordan's capital city, potentially limiting its generalizability to broader populations. Future studies should incorporate larger and more diverse samples while employing mixed-methods approaches to better capture the complexity of educational contexts and contemporary teaching strategies involving mobile-based chatbot applications.

Policymakers and educational leaders should implement targeted training programs to address the digital divide among teachers and ensure the secure integration of mobile applications in education. Furthermore, future research should examine the long-term effects of AI-powered chatbots on the development of teachers' digital competencies, their efficacy in improving learning outcomes, and their potential to support digital pedagogy. Such initiatives would enable the effective adoption of AI-powered chatbots in instructional practices.

Based on the study's findings, the following recommendations are proposed: First, educational institutions should expand the implementation of chatbots as innovative training tools to enhance teaching competencies. Second, training programs should be meticulously designed to accommodate trainees' diverse needs, irrespective of gender, specialization, or professional experience. Third, future research should investigate chatbots' impact on developing advanced pedagogical skills, including classroom management, curriculum design, and communication with both students and parents. Finally, subsequent studies should examine how chatbot-assisted teacher training influences students' academic achievement and classroom dynamics.

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