

The Effectiveness of Using Artificial Intelligence Applications in Solving Homework Assignments on Student Achievement in Chemistry from The Perspective of Teachers in Iraq

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ABSTRACT

Objective: This study aimed to examine the effectiveness of artificial intelligence (AI) applications used in homework completion on students' chemistry achievement as perceived by teachers in Iraq. **Method:** A descriptive analytical design was employed, targeting all chemistry teachers in preparatory and secondary schools under the Directorate of Education in Kirkuk Governorate for the academic year 2024/2025. A randomly selected sample of 120 teachers participated by completing a validated and reliable questionnaire consisting of demographic information and three core domains measured on a five-point Likert scale. **Results:** The findings indicated that students' use of AI applications positively influenced their chemistry achievement (overall mean = 3.91; agreement rate = 78.2%). Sub-results further showed that AI usage ranged from moderate to high, with teachers acknowledging its benefits while expressing concerns regarding overdependence on ready-made solutions and difficulty distinguishing students' original work from AI-generated outputs. **Novelty:** This study contributes new insights into teacher perceptions of AI-assisted homework within the Iraqi educational context, highlighting ethical use, regulatory needs, and teacher training as strategic priorities, and offering directions for future research integrating AI with active learning approaches.

INTRODUCTION

In the last decade, the world has witnessed a tremendous technological development that has led to the emergence of educational tools and applications based on artificial intelligence, which aim to improve the educational process and enhance the effectiveness of learning among students [1], [2]. This development has been reflected at all levels of education, where the use of digital and technological applications has become vital to achieve high-quality and efficient education, allowing students to actively participate in their learning, and helping teachers to provide educational content that is commensurate with students' abilities and level of understanding [3], [4]. As the amount of information available online increases, the role of the teacher has become more important, as he plays the role of a mentor and a catalyst that facilitates the use of technology within traditional and virtual classrooms, promoting self-learning and achieving the goals of the educational process efficiently.

AI is one of the focal points for the Fourth Industrial Revolution than that "is capable of processing complex data, learn from experience and make predictions as most humans can do without necessary input" [5], [6]. Such apps include language models

like ChatGPT, Perplexity AI, Claude, Bing Chat, Chat Sonic, Jasper AI and Tutor AI as well as interactive learning platforms like Chegg Study which offer interactive step-by-step explanation of solutions to exercises (including chemistry problems) to enable students comprehend complex ideas; they provide real-world examples that enhance interactivity in education. These applications also help teachers to monitor students' performance and provide appropriate feedback according to each student's level, which contributes to improving academic achievement, developing critical thinking and problem-solving skills, and promoting self-learning and active participation in the educational process [7].

Smart educational apps Smart educational applications provide intelligent ways to interact with education content by reasoning, question answering and supporting adaptive learning that fits the student's learning styles as well as their specific needs [8], [9], [10]. Moreover, they can help teachers tailor learning experiences and more precisely track a student's performance to achieve better results and efficacy in the learning process [11]. Recent research confirm the important role of such applications in closing the educational gap between students, improving skills in collaboration and communication, and promoting equality of education regardless of the social background or geographical location [12], [13].

Schools face various difficulties in deploying AI applications, even though such technologies offer many benefits. These obstacles are: the lack of digital skills in lecturers and students, insufficient technical resources; and concerns with regard to academic integrity as well as personal data protection [14], [15], [16]. Furthermore, experts highlight the importance of leveraging artificial intelligence in adaptive learning. This model individualizes the paths of learning based on students' characteristics, which activates their reasoning and innovative ability while promoting self-learning. These programs help in preparing students effectively for their academic and professional career requirements [17], [18].

This research relies on the diffusion of innovation theory, as it emphasizes that technology integration within educational institutions is affected by multiple factors such as infrastructure readiness, senior management support and training programs in addition to knowledge utilization towards digital skills implying that an individual's determination to embrace modern technology is also a crucial factor.

Previous research has also reported the application of AI in education, which culminates in improving academic achievement [19]. Nevertheless, studies point to personalized learning gains through challenges encountered such as infrastructure, training and financing support provided; teachers understandings of the value of its use [20], [21], [22]. Therefore, the realization of using artificial intelligence in chemistry applications from teachers' perspective in Iraqi schools is necessary to be studied and investigated as well as its effects on students' Chemistry their saving time for solving homework and encouraging self-study.

This research seeks to shed light on the effectiveness of AI applications in tackling homework challenges, sharing teachers' experiences using these tools during classroom instruction and uncovering educational pros and cons they come across. The results will provide information for evidence-based recommendations in improving educational quality and promoting students' academic, cognitive development.

First: The Research Problem

The increasing use of AI technologies in solving homework indicates obvious educational challenges in chemistry high schools in Iraq. From the teachers' point of view, some students rely on these techniques to solve assignments without understanding the scientific content or reviewing the solutions themselves, leading to poor academic achievement when taking exams and difficulty developing critical thinking and problem-solving skills. Despite the potential benefits of AI in providing educational assistance and support, over-reliance on AI may hinder real learning and increase the risk of academic cheating [23].

Main Question: "What is the effectiveness of using artificial intelligence applications in solving homework on students' achievement in chemistry from the point of view of teachers in Iraq?"

Sub-questions:

1. To what extent do students use AI in solving chemistry homework from the teacher's point of view in Iraq?
2. What are the students' attitudes towards using AI to solve chemistry homework from the teachers' point of view?
3. What are the barriers facing students' use of AI in solving assignments and achieving actual achievement in chemistry from the teachers' point of view?

Second: Study Hypotheses

Main Hypothesis: There is a statistically significant relationship between students' use of artificial intelligence applications in solving homework and their level of achievement in chemistry from the point of view of teachers in Iraq.

Subhypotheses

1. There are statistically significant differences in the degree to which students use AI in solving homework according to the level of teachers in Iraq.
2. There are statistically significant differences in students' attitudes towards using artificial intelligence in solving chemistry homework according to teachers' point of view.
3. There are statistically significant differences in the obstacles faced by students when using artificial intelligence to solve homework and achieve the actual achievement of chemistry according to the teachers' point of view.

Third: Research Objectives

Main Objective:

Main Objective: To identify the effectiveness of the use of artificial intelligence applications in solving homework on students' achievement in chemistry from the point of view of teachers in Iraq.

Sub-Objectives:

1. Measure the degree to which students use AI in solving chemistry homework from the teachers' point of view.
2. Identify students' attitudes towards using AI in solving chemistry homework from teachers' point of view.
3. Identify the barriers facing students' use of AI in solving assignments and achieving actual achievement in chemistry from the teachers' point of view.

Fourth: The Importance of Research

The theoretical significance of this study stems from the fact that it sheds light on the role of artificial intelligence in the educational process of chemistry students in Iraqi schools, and how students use it in solving homework. The study helps to understand the impact of this use on students' academic achievement, and to highlight the problems that may arise from over-reliance on these applications, such as not understanding concepts correctly, which contributes to enriching the Arab scientific library in the field of school technological education.

The practical importance is to help decision-makers and educators identify the challenges students face when using AI, and to develop educational strategies that reduce the effects of over-reliance on these applications. The results of the study can also be directed towards designing training programs for teachers to promote the positive use of artificial intelligence, in a way that develops students' skills and enhances their actual achievement in chemistry.

Fifth: Research Limits

1. Time limit: This research was limited to the first semester of the academic year 2025-2026, where data were collected during this period.
2. Spatial boundary: The research was conducted in Iraqi high schools that teach chemistry to senior students.
3. Human Limit: The research included chemistry teachers in secondary schools as a main source of information.
4. Objective limit: The research focuses on the effectiveness of using artificial intelligence applications in solving chemistry homework, from the teachers' point of view, and the impact of this use on students' achievement and level of understanding of chemical concepts, while identifying students' attitudes and obstacles they face during the use of artificial intelligence.

Sixth: Definition of Terms

1. Effectiveness

- a. Theoretical Definition: It is the ability of the tool or method to achieve the desired results in practice, i.e. the extent to which the desired educational goals are achieved [24], [25], [26].

- b. Procedural definition: as the degree to which students' use of artificial intelligence applications in solving homework on their achievement in chemistry is estimated by teachers through the questionnaire prepared for this purpose.

2. Artificial Intelligence (AI) Applications

- a. Theoretical Definition: They are software systems that use artificial intelligence technologies such as machine learning and neural networks to process data and provide intelligent solutions, such as providing explanations and solving assignments in a way similar to human thinking [27], [28], [29].
- b. Procedural definition: as students' use of artificial intelligence applications such as ChatGPT, Perplexity AI, Claude and Bing Chat and Chat Sonic The Jasper AI Tutor AI To solve homework in chemistry.

3. Academic achievement

- a. Theoretical Definition: It is the level of academic performance achieved by the student in a particular subject, and reflects the extent of his understanding of the required concepts and skills [30]
- b. Procedural definition: It is the academic achievement through teachers' evaluation of students' results in chemistry after they use artificial intelligence applications in solving homework.

Eighth: Theoretical Framework and Previous Studies

Theoretical Framework

First: Definition of Artificial Intelligence

Artificial intelligence is one of the most prominent modern technologies that has invaded various fields, including education. Some researchers have described it as the ability of machines to do things that humans usually do with their mind, such as thinking, learning, interpreting and decision making identify it more specifically as a subdivision of computer science, attempting to reproduce human-like cognitive processes for intelligent software and systems with an aims to create tools that can solve problems or be environment adaptable [31], [32], [33]. Argue that artificial intelligence is an interdisciplinary field of study devoted to realizing intelligent systems with the ability of self-learning, decision-making, and understanding natural language.

Artificial intelligence includes a wide range of applications such as machine learning that enables systems to continuously learn and improve through data, deep learning that uses neural networks to analyze big data, expert systems that mimic expert decisions, and smart agent that performs specific tasks independently [34]. These applications have emerged in education to support teachers and students alike, and improve learning efficiency.

Second: The Role of Artificial Intelligence in the Educational Process

Artificial intelligence has contributed significantly to the development of the educational process by providing tools that help customize the educational experience for each student in accordance with their abilities and preparations, which enhances self-learning and allows students to progress at their own pace [35]. Some of the most

prominent educational applications of AI are: generating educational content, providing instant feedback, suggesting exercises and assignments, and providing simulated conversational interaction with students [35], [36].

Despite these advantages, the ignorant and unregulated use of these programs is counterproductive to student achievement. When a student relies on AI software to complete their homework without understanding or analysis, learning effectiveness decreases, and academic achievement is impaired [37]. Studies have shown that some students use these apps as a way to complete tasks quickly, without grasping concepts, leading to poor basic skills in reading, writing, and solving scientific problems, especially in upper subjects that require deep understanding and practical application of concepts [38].

Arab studies also indicate that students' and teachers' awareness of how to use AI programs is still limited, which may promote non-optimal use and negatively affect academic achievement. The study of Melweth and Al-hawiti, showed that social studies teachers noticed students' desire to use AI tools without a sufficient understanding of their principles, which affected the effectiveness of learning [32].

Third: The Role of the Teacher in Guiding Students

The teacher plays a pivotal role in guiding students towards the optimal use of AI, so that it becomes an aid rather than a substitute for personal thinking and analysis. This role includes:

1. Raising students' awareness of educational objectives and encouraging them to self-understand before resorting to programs.
2. Identify the appropriate tools for educational tasks, and monitor their use in a way that ensures the development of students' skills and not just solving assignments automatically [27].
3. Provide ethical guidance on the responsible use of modern technologies, and prevent fraud or total reliance on software [3].

Studies confirm that the success of integrating AI into education depends heavily on the teacher's ability to integrate these tools into innovative teaching methods, motivate students to actively participate in solving problems themselves, while supporting them when needed to correct mistakes and promote self-learning [5].

Fourth: Obstacles to the Use of Artificial Intelligence Programs

Despite the multiple benefits, the use of AI software in education faces several challenges that may affect the effectiveness of learning, especially when students use it unknowingly, including:

1. Lack of awareness among students and teachers on how to use these programs effectively, leading to complete reliance on the tool and a decline in achievement [1], [7].
2. Poor human interaction, as students lack the ability to debate and interact with teachers and colleagues, which limits the development of critical thinking skills [3], [5].

3. Data and content bias resulting from software, which may lead to the presentation of inaccurate or unbalanced information, thus affecting the quality of learning [8], [9].
4. Technical and financial challenges, such as the difficulty of accessing programs, their cost, and the need to prepare appropriate infrastructure for use in schools [12], [14].
5. Privacy and security risks, as programs can collect personal data about students that is used unauthorized or compromised [1], [18], [20].

Thus, it is clear that the ignorant and undirected use of AI software may reduce the effectiveness of learning and impair student achievement, especially in scientific subjects that require practice, critical thinking, and practical application, such as chemistry. Hence the importance of the teacher's role in guiding students, providing support, and developing their skills to ensure that they make the most of these technologies

Previous Studies

Melweth and Al-hawiti in 2024: The study aimed to reveal the reality of promoting social studies through artificial intelligence applications from the point of view of social studies teachers in the Asir region of the Kingdom of Saudi Arabia. The study sample consisted of 119 middle school teachers, and the study used the questionnaire as a data collection tool, and the descriptive-analytical approach was adopted. The results of the study showed the desire of large female teachers to know and understand artificial intelligence applications and how to use them in teaching, while the most prominent challenges came the lack of awareness of the disadvantages of using these applications to a great extent [1].

Al-Ghamdi and Jado in 2022: The study aimed to explore the reality of the use of artificial intelligence applications in Middle Eastern colleges in the Kingdom of Saudi Arabia from the perspective of students, and to identify the areas of its use in the educational process and the obstacles they face. The study sample consisted of 117 students from the Department of Educational Means and Technology, and the questionnaire was used as a data collection tool, and the descriptive curriculum was adopted [9].

The results of the study showed that students frequently use AI applications in their educational journey, and take advantage of their advantages in facilitating learning, enhancing the flexibility of presenting materials, and activating the role of the teacher, while the study highlighted challenges such as a lack of specialists, lack of awareness of the capabilities of applications, ethical concerns, and technical challenges related to accessibility and cost.

Al-Hanaki and Al-Harthi in 2022: The study focused on the reality of artificial intelligence applications in education from the point of view of female computer and information technology teachers in Riyadh. The study sample consisted of 80 female

teachers, and the questionnaire was used as a data collection tool, and the survey descriptive method was adopted [13].

The results of the study showed that the challenges of using AI applications included the belief that their use requires more effort than traditional education, the weak ability of learners to solve problems, the lack of technical support, and the high financial cost of preparing classes capable of employing the applications.

Meshaal and Al-Eid in 2022The study aimed to identify the reality of employing appropriate artificial intelligence applications in early childhood from the perspective of female teachers in the Kingdom of Saudi Arabia. The study sample consisted of 99 female teachers from the field of early childhood in Shaqra Governorate, and the questionnaire was used as a data collection tool, and the descriptive approach was adopted [17].

The results of the study showed that female teachers have little knowledge of artificial intelligence applications, despite their awareness of their importance, and the scarcity of employing these applications in early childhood.

Seoud-El Abou et al. in 2023: The study aimed to explore the impact of the use of artificial intelligence applications on the achievement of university students in Egypt, and to identify the challenges and ethical practices associated with their use in the educational process. The study sample consisted of 75 faculty members and students in Egyptian universities, and the questionnaire was used as a data collection tool, and the descriptive investigative method was adopted. The results of the study showed that the use of smart applications enhances interaction with educational content and helps provide immediate feedback, but the adoption of the total number of students on these homework solutions has reduced the level of actual achievement and deep understanding of scientific concepts, especially in applied subjects [18].

Baidoo-Anu and Ansah in 2023: The study aimed to assess the impact of the use of AI applications on students' academic achievement and skills in the United States, India, and the United Kingdom, highlighting the ethical challenges associated with the content generated by these apps. The study sample consisted of 155 teachers and 105 students, and the questionnaire and interview were used as data collection tools, and the mixed curriculum was adopted. The results of the study showed that smart applications support teachers in providing feedback and improving their skills students, but she stressed that students' over-reliance on ready-made solutions reduces actual achievement and affects the development of critical thinking and problem-solving skills [20].

Commenting on previous studies

The current study shares with previous Arab studies (Melweth and Al-hawiti, Al-Ghamdi and Jado, Al-Hanaki and Al-Harthi, Meshaal and Al-Eid), in the interest in using artificial intelligence applications in the educational process and understanding teachers' and students' attitudes towards them, while foreign studies (Seoud-El Abou *et al*, Baidoo-Anu and Ansah).) have focused on the use of artificial intelligence applications (Seoud-El Abou *et al*).The impact of these applications on achievement and skill development and ethical challenges, while the current study deals with students' use of applications in

solving homework and its impact on their achievement in chemistry. In terms of methodology, the current study relied on a descriptive-analytical approach such as Arab studies, while some foreign studies used a mixed or descriptive investigative approach (Al-Bayati). As for the study tool, as in most Arab studies, the questionnaire was used, while some foreign studies used multiple tools (questionnaire and interview). For the sample, the current study focused only on teachers, unlike some previous studies that included students or both. The current study population also differs in that it represents public school teachers in Iraq, compared to different regions in Saudi Arabia or multiple countries in foreign studies. These studies helped build the theoretical framework and design of the tool, and shed light on the impact of reliance on smart applications and the challenges associated with them, which is the focus of the current study.

RESEARCH METHOD

Study population and sample

The study population consists of all chemistry teachers in the preparatory and secondary schools affiliated to the General Directorate of Education of Kirkuk Governorate for the academic year 2024/2025.

For the purpose of conducting the study, a random sample of (120) male and female teachers from different schools in the governorate was selected, with (48) male and (72) female teachers, in order to ensure an appropriate representation of the views of the teaching staff on the research topic.

Study Tool

In collecting the data of the study, the researcher relied on a questionnaire developed specifically to measure the effectiveness of the use of artificial intelligence applications in solving homework and its impact on students' achievement in chemistry from the point of view of teachers of the subject in Iraq. The questionnaire included three main axes, designed to cover the dimensions of the subject of the study, and each axis included 10 paragraphs according to the five-point Likert scale.

RESULTS AND DISCUSSION

Result

Honesty and Fortitude

The validity of the questionnaire for the current study was verified using two main methods:

1. **Honesty of the Judges:** The questionnaire was presented to 5 referees specialized in the field of education and methods of teaching chemistry. The reviewers studied the paragraphs and gave their comments on the clarity of the questions and their compatibility with the objectives of the study. Based on their observations, slight modifications were made to some of the wording to make the paragraphs clearer and more accurate, and it was ensured that the paragraphs were comprehensive for the main areas of each axis.

2. **Validity of internal consistency:** The internal consistency of the questionnaire was tested by applying it to a survey sample of 20 male and female teachers from outside the study sample. The correlation coefficients between the score of each paragraph and the overall score of its axis were calculated, and the results were as follows:

Table 1. Validity of internal consistency.

Number	Axis	Number of paragraphs	Lowest correlation coefficient	Highest correlation coefficient	Average correlation coefficient
1	Use AI Apps	10	0.678	0.752	0.715
2	Students' attitudes towards applications	10	0.664	0.741	0.703
3	Barriers to using apps	10	0.659	0.734	0.696
4	The questionnaire as a whole	30	0.659	0.752	0.705

The results showed that all the paragraphs have a high degree of internal consistency with the overall score of the axis and the resolution as a whole, as the correlation coefficients ranged between (0.659) and (0.752), which are statistically significant values at the level of 0.01, which indicates that all paragraphs are homogeneous and effectively measure the target dimensions in the study.

The stability of the questionnaire was verified using two methods:

1. **Cronbach's alpha stability coefficient:** The stability coefficient was calculated using Cronbach's alpha test, and the results showed that the stability coefficient of the instrument in general was 0.93, which is a very high rate. This indicates that the questionnaire has a high level of consistency, and that the results obtained from it will be reliable when applied to a large sample of chemistry teachers.
2. **Retesting:** The questionnaire was applied to a survey sample of 20 male and female teachers outside the main study sample, where the test was conducted at two different times with a short period of time between them. The results showed significant consistency in the answers between the two times, which enhances the credibility of the tool in measuring the target variables.

Based on these procedures, the questionnaire can be considered as a valid and reliable tool for application in field research directed to chemistry teachers, as its validity and consistency have been verified by accurate scientific methods.

Statistical processing

In order to verify the hypotheses related to the study of the effectiveness of the use of artificial intelligence applications in solving homework on students' achievement in

chemistry from the teachers' point of view, the appropriate statistical analysis was used according to the nature of the variables. The data extracted from the questionnaire were entered into the SPSS program, statistical indicators were used, and the differences or relationships were considered as statistically significant at the significance level $\alpha \leq 0.05$, which allows the results to be interpreted objectively and accurately in light of the hypotheses and objectives of the study.

Data Analysis

Main Hypothesis: There is a statistically significant relationship between students' use of artificial intelligence applications in solving homework and their level of achievement in chemistry from the point of view of teachers in Iraq.

Table 2. Averages of Chemistry Teachers on the Effectiveness of Students' Use of Artificial Intelligence Applications in Solving Homework and its Impact on Students' Achievement in Chemistry.

Number	Axles	Arithmetic Average	Standard Deviation	Percentage of Agreement	Order
1	Use AI Apps	3.84	0.93	%76.8	2
2	Students' attitudes towards applications	4.01	0.88	%80.2	1
3	Barriers to using apps	3.88	0.97	%77.6	3
The questionnaire as a whole		3.91	0.92	%78.2	

The results of Table (2) indicate that teachers believe that students' use of artificial intelligence applications in solving homework has a positive effect on their achievement in chemistry, and that they have positive attitudes towards this use despite the presence of some obstacles, as the arithmetic average reached 3.91 with a standard deviation of 0.92 and a consensus rate of 78.2%, which reflects a high consistency between teachers' answers and confirms the reliability of the tool in measuring the effectiveness of using artificial intelligence applications in solving homework and the level of students' achievement In chemistry.

These results are consistent with the findings of previous studies, as the study of Melweth and Al-hawiti, showed a great desire among female teachers to know and understand the applications of artificial intelligence and how to employ them in the educational process, despite the challenges related to the lack of awareness [21]. It is also in line with the results of the study of Al-Ghamdi and Jado, which confirmed the frequent use of smart applications by students in their educational journey and their benefit from their advantages in facilitating learning and enhancing the flexibility of presenting materials [2]. The results of the table are also consistent with the study Seoud-El Abou et

al, which showed that the use of smart apps enhances interaction with educational content and helps provide immediate feedback [13], while the study by Baidoo-Anu and Ansah, indicated that apps support teachers in improving students' skills, but stressed the need to be cautious against over-reliance on off-the-shelf solutions, which is in line with teachers' observations about potential impediments to students' use of AI in solving assignments [24].

The first sub-hypothesis: There are statistically significant differences in the degree of students' use of artificial intelligence in solving homework according to the level of teachers in Iraq.

Table 3. Averages of Chemistry Teachers on the Effectiveness of Students' Use of Artificial Intelligence Applications in Solving Homework and its Impact on Students' Achievement in Chemistry.

Number	Paragraphs	Arithmetic Average	Standard deviation	Degree	Order
1	Students periodically use AI applications when solving homework in chemistry	3.68	0.87	Medium	5
2	Students rely on these apps to get ready-made solutions without trying to self-solve	4.55	0.71	high	1
3	Students use AI to facilitate the solution of complex problems in chemistry	4.10	0.64	Medium	3
4	Students turn to AI instead of textbook or notes	3.47	0.86	Medium	8
5	Students seek quick answers without reviewing the validity of the information	4.03	0.99	Medium	4
6	Artificial Intelligence Applications	3.41	1.02	Medium	9

Number	Paragraphs	Arithmetic Average	Standard deviation	Degree	Order
	Accelerate Students' Completion of Homework				
7	Students rely on these apps more for hands-on and experiential assignments	3.78	1.04	Medium	6
8	Students use AI to understand complex scientific concepts	3.82	0.82	Medium	7
9	Students rely on AI for all assignments and not just hard assignments	3.36	0.78	Medium	10
10	Students show a high reliance on AI when working alone compared to teamwork	4.21	1.09	High	2
Axis as a whole		3.84	0.93	Medium	

Table 3 indicates that the degree of students' use of artificial intelligence applications in solving homework in chemistry ranged from medium to very high, as the greatest reliance came on applications to obtain ready-made solutions and individual work using these applications, while the reliance was less on the use of artificial intelligence in all assignments or to facilitate the understanding of all difficult assignments, and the average of the overall axis was 3.84 with a standard deviation of 0.93, which indicates that students use these applications to a moderate degree in general. Agree These findings are in line with the studies of Seoud-El Abou *et al* and Baidoo-Anu and Ansah, that confirmed that over-reliance on smart apps facilitates the resolution of assignments but may reduce actual achievement and deep understanding of concepts, and are also partially consistent with the findings of Melweth and Al-hawiti; Al-Ghamdi and Jado, which showed the desire of students and teachers to use smart applications to facilitate learning with challenges associated with awareness and knowledge of how to use [8], [28], [29].

Second sub-hypothesis: There are statistically significant differences in students' attitudes towards the use of artificial intelligence in solving chemistry homework according to teachers' viewpoints.

Table 4. Mathematical Averages, Standard Deviations and Ranks for the Degree of Students' Attitudes Towards the Use of Artificial Intelligence in Solving Homework

Number	Paragraphs	Arithmetic Average	Standard deviation	Degree	Order
1	Students prefer to use AI because it saves their time and reduces effort	4.32	0.85	High	2
2	Students feel comfortable using AI to solve complex assignments	4.18	0.89	High	4
3	Students believe that AI enhances their learning of chemistry concepts	4.40	0.82	High	1
4	Students are increasingly relying on AI with each new semester	3.95	0.91	Medium	6
5	Students see AI making homework easier and more fun	4.05	0.87	High	5
6	Students tend to share AI answers with their peers	3.88	0.92	Medium	7
7	Students feel that AI enhances their problem-solving skills	4.10	0.84	High	3
8	Students look forward to using AI to evaluate their performance and understanding of the material	3.75	0.90	Medium	9
9	Students trust AI output more than relying on other sources sometimes	3.70	0.93	Medium	10
10	Students want to use AI more in the future of study	3.80	0.88	Medium	8
Axis as a whole		4.01	0.88	High	

Table 4 shows that students' attitudes towards using AI applications in solving homework were generally high, with an overall average of 4.01 with a standard deviation of 0.88, indicating that students have a positive attitude towards leveraging these applications in learning chemistry. The highest paragraphs in the ranking were "Students believe that AI enhances their learning of chemistry concepts" and "Students prefer to use

AI because it saves their time and reduces effort", which shows students' awareness of the usefulness of applications in facilitating learning and improving performance.

These findings are consistent with previous studies such as Melweth and Al-hawiti, Al-Ghamdi and Jado, that showed the desire of students and teachers to use smart applications to facilitate learning and increase interaction with educational content, as well as with Seoud-El Abou *et al* and Baidoo-Anu and Ansah, that emphasized that smart applications enhance interaction and improve achievement, noting the importance of directing their use in a balanced manner to avoid full reliance on off-the-shelf solutions [12], [15], [18], [23].

The third sub-hypothesis: There are statistically significant differences in the obstacles faced by students when using artificial intelligence to solve homework and achieve the actual achievement of chemistry according to the teachers' point of view.

Table 5. Mathematical Averages, Standard Deviations and Ranks for the Degree of Students' Attitudes Towards the Use of Artificial Intelligence in Solving Homework.

Number	Paragraphs	Arithmetic Average	Standard deviation	Degree	Order
1	Students' understanding of chemical concepts decreases when fully relying on AI	4.32	0.91	High	1
2	Excessive reliance on AI leads to lower actual student achievement	4.10	0.88	High	3
3	Teachers have a hard time distinguishing between real student work and AI solutions	4.21	0.95	High	2
4	Some students don't have enough devices or internet to access apps	3.55	1.02	High	9
5	Some apps lack the accuracy of the information or its relevance to the curriculum	3.49	0.93	High	10
6	Students lack awareness of how to use apps correctly and ethically	3.64	1.01	Medium	8

Number	Paragraphs	Arithmetic Average	Standard deviation	Degree	Order
7	Reliance on Artificial Intelligence Increases Students' Poor Critical Thinking Skills	3.76	1.08	Medium	7
8	No clear school policies to regulate the use of AI	3.82	1.12	Medium	6
9	Teachers have difficulty providing correct feedback to students due to the use of apps.	3.98	1.10	Medium	4
10	Uncontrolled use of these apps may lead to educational and ethical problems in students	3.89	1.15	Medium	5
Axis as a whole		3.88	0.97	High	

Table 5 indicates that the overall arithmetic average of the axis of "Obstacles to Students' Use of Artificial Intelligence and Achieving Actual Achievement" reached (3.88) with a high degree of estimation, with a standard deviation of (0.97), which indicates that there is agreement among the sample members about the existence of clear and influential obstacles. The first three paragraphs came with the highest averages: poor understanding of chemical concepts when relying on artificial intelligence (4.32), difficulty in distinguishing between the student's real work and the work produced by artificial intelligence (4.21), and low actual achievement Due to over-reliance on applications (4.10). The least average paragraphs were the lack of accuracy of information in some applications (3.49). These results indicate that the most prominent constraints are related to the low real understanding of students, the difficulty of realistic assessment, in addition to the weakness of school organization and policies. These findings are in line with the findings of Alsolami (2025) study, which confirmed that excessive use of AI tools leads to impaired thinking skills and real achievement in students, and is consistent with Ahuja *et al.* (2025) study, which indicated that it is difficult to distinguish the actual student performance when using algorithm-based assistive applications, in addition to the Mehdaoui (2024) study [27], [28], [31]. The study showed that the lack of clear policies and the lack of technical awareness among students are the most prominent obstacles to the effective educational use of artificial intelligence.

Discussion

1. The results of the study showed that there is a statistically significant relationship between students' use of artificial intelligence applications in solving homework

and their level of achievement in chemistry from the point of view of teachers in Iraq, where the total average of the questionnaire was (3.91) with an agreement percentage (78.2%).

2. The results of the first sub-hypothesis showed that the degree of students' use of artificial intelligence in solving assignments came with an overall average of (3.84) and a moderate grade of appreciation.
3. The results of the second sub-hypothesis showed that students' attitudes towards using AI applications were high, with an overall average of 4.01.
4. The results of the third sub-hypothesis showed that there are clear obstacles facing students when using artificial intelligence applications, as the average of the axis as a whole reached (3.88) with a high grade of appreciation.

CONCLUSION

Fundamental Finding : This study demonstrated that the use of AI applications in homework completion has a positive and meaningful influence on students' chemistry achievement, as perceived by teachers, despite concerns related to overreliance on automated solutions and challenges in distinguishing authentic student work. **Implication :** These findings underscore the need for structured integration of AI in instructional practices through ethical-use training for students, strengthened teacher oversight, comprehensive school policies, curriculum-aligned digital content, equitable access to devices and internet, and capacity-building programs that enable teachers to utilize AI for more accurate and timely feedback. **Limitation :** The study relied solely on teacher perceptions within a single governorate and focused only on chemistry, which may limit the generalizability of the results across subjects and broader educational settings. **Future Research :** Further investigations are recommended to measure the direct impact of AI on student performance, compare outcomes across schools and subjects, explore students' perspectives, examine moderating factors such as teacher experience and class size, and develop integrated educational models that combine AI tools with active learning approaches.

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