Advanced International Journal for Research (AIJFR)
E-ISSN: 3048-7641 ● Website: www.aijfr.com ● Email: editor@aijfr.com

AI as a Scaffolding Tool for Student Learning in Saudi Arabia: A Literature Review

Muhammad Abdurrahman Alhadhari, Prof. Grami Mohammed Grami

Abstract

This literature review examines the role of AI as a scaffolding tool for student learning in Saudi Arabia. The review is based on 10 recent Saudi studies that discuss AI in different educational contexts, including higher education, primary education, EFL, Islamic Studies, online learning, learning management systems, formative assessment, teacher readiness, and student engagement. The purpose of this review is to understand how AI is presented as a supportive tool that helps students during the learning process, rather than a tool that replaces teachers or removes students' own effort. The reviewed studies show that AI can support learning through personalized support, immediate feedback, formative assessment, learner autonomy, engagement, and the simplification of difficult concepts. The studies also show that both students and teachers generally have positive attitudes toward AI, especially when it reduces workload, provides support, and makes learning more manageable. However, the literature also raises repeated concerns about accuracy, over-reliance, plagiarism, privacy, weak training, and the lack of clear policies. Overall, this review argues that AI has strong potential to function as a scaffolding tool in Saudi education, but this potential depends on teacher guidance, ethical use, and proper institutional support. The review also finds that the current literature still needs stronger evidence from real classroom practice and long-term studies that examine how AI supports learning over time.

Keywords: Artificial intelligence (AI), AI Scaffolding, Student learning, Saudi education.

1. Introduction

AI has become an important topic in education because it can support both students and teachers during the learning process. In Saudi Arabia, this has become especially relevant because education is closely connected to digital transformation and Vision 2030. Recent Saudi studies have examined AI in contexts such as higher education, primary education, EFL, Islamic Studies, online learning, learning management systems, and formative assessment.

This review does not treat AI as a replacement for teachers or student effort. Instead, it views AI as a possible scaffolding tool that can support learners through feedback, explanation, personalization, revision, and guidance. At the same time, AI use still raises concerns about accuracy, privacy, plagiarism, over-reliance, weak training, and unclear policies. Therefore, this review examines 10 recent Saudi studies to understand how AI supports student learning and what challenges still need attention.

Purpose of the Review & Research Questions

The purpose of this literature review is to examine how AI is presented as a scaffolding tool for student learning in recent Saudi educational research. More specifically, it focuses on how AI supports learning through feedback, personalization, learner autonomy, engagement, formative assessment, and teacher-guided use. It also aims to identify the main challenges and gaps that appear in the reviewed literature.

This review is guided by the following research questions:

1. How is AI presented as a scaffolding tool for student learning in recent Saudi educational research?

2. What learning benefits are most commonly associated with AI-supported scaffolding in the reviewed studies?

3. What challenges, limitations, and gaps appear in the Saudi literature on using AI to support student learning?

Method of the Literature Review

This paper follows a literature review approach to examine how AI is presented as a scaffolding tool for student learning in Saudi Arabia. The review is based on 10 recent Saudi studies that focus on AI in different educational contexts, including higher education, primary education, EFL, Islamic Studies, online learning, formative assessment, learning management systems, teacher readiness, and student engagement.

The studies were selected because they are directly connected to the main focus of the review: AI-supported learning. Some studies focus mainly on students' experiences with AI, such as feedback, engagement, autonomy, and learning outcomes, while others focus on teachers' perceptions, faculty readiness, and the conditions needed for AI integration. This range is useful because AI scaffolding does not depend only on the tool itself, but also on students, teachers, and institutions.

The selected studies were analyzed thematically. This means that they were not discussed only as separate studies, but were compared according to repeated ideas across the literature. The main themes included personalized learning, feedback and formative assessment, learner autonomy, engagement, teacher guidance, ethical concerns, technical challenges, and cultural or linguistic issues. This approach helps identify the common patterns, benefits, limitations, and gaps in the Saudi literature on AI-supported learning.

Conceptual Framework: AI as Scaffolding

In this review, AI is understood through the concept of scaffolding. Scaffolding refers to support given to learners while they are still developing their understanding, skills, or independence. It does not mean giving students direct answers, but guiding them through feedback, explanation, examples, and gradual support.

The reviewed studies show that AI can fit this role in several ways. Aldossary et al. (2024) found that Saudi students viewed generative AI as useful for understanding complex concepts, receiving feedback, improving self-efficacy, and supporting learning outcomes. Almohesh (2024) also showed that ChatGPT supported learner autonomy among Saudi primary students, while Alenezi and Alenezi (2025) connected AI formative assessment with feedback, revision, engagement, and writing improvement.

However, AI scaffolding still needs teacher guidance. Alzubi and Alelaiwi (2025) found that Saudi EFL teachers valued AI-generative tools for teaching, assessment, feedback, personalization, and engagement, but also raised concerns about accuracy, ethics, and over-reliance. Similarly, Al-Saad et al. (2026) showed that teachers supported AI use while emphasizing supervision, content accuracy, privacy, and ethical control. Therefore, this review treats AI as a supportive scaffolding tool, not as a replacement for teachers or student effort.

Overview and Classification of the Reviewed Studies

The reviewed literature consists of 10 recent Saudi studies that examine AI in different educational contexts. These studies are connected by their focus on AI in education, but they do not all approach the topic from the same direction. Some studies focus directly on student learning, feedback, engagement, autonomy, and learning outcomes. Others focus on teachers' perceptions, faculty readiness, online learning, institutional support, and challenges related to AI integration. For this reason, the studies can be understood in two main groups: student-focused studies and teacher/institution-focused studies.

The student-focused studies are central to this review because they show how AI can support learners directly. Aldossary et al. (2024) examined Saudi students' perceptions of generative AI and connected AI with understanding complex concepts, receiving feedback, improving self-efficacy, and supporting learning outcomes. Almohesh (2024) focused on ChatGPT and learner autonomy among Saudi primary school students, which is directly related to the idea of scaffolding because autonomy shows how students can become more independent with the right support. Singh et al. (2026) also contributes strongly because it links AI-based learning tools with student engagement, academic performance, employability, and empowerment. In addition, Alenezi and Alenezi (2025) is important because it examines AI formative assessment, feedback, revision, writing improvement, and engagement, which are all closely connected to learning support.

Other studies support the review by showing how AI-supported learning depends on teachers, institutions, and educational conditions. Mutambik (2024) discusses AI-driven automation and learning management systems, showing that AI support can also appear through digital learning environments, not only through direct chatbot use. Alzubi and Alelaiwi (2025) and Al-Saad et al. (2026) are important because they show teachers' views of AI as a tool for instruction, feedback, personalization, explanation, and assessment. At the same time, these studies show that teachers still emphasize supervision, accuracy, and ethical use. Alnasib (2023) and Alammari (2024) add another layer by focusing on readiness, awareness, perceived usefulness, and the conditions needed for AI integration. Aldawsari and Almohish (2024) also contributes by highlighting opportunities and risks related to ChatGPT in Saudi online higher education, especially training, privacy, data security, and institutional challenges.

This classification is useful because it shows that AI scaffolding is not only a student issue. The student-focused studies explain how AI can support learning directly through feedback, autonomy, engagement, and learning outcomes. The teacher- and institution-focused studies explain the conditions that make this support possible, such as readiness, supervision, training, policies, and ethical control. Together, the 10 studies provide a focused basis for examining AI as a scaffolding tool for student learning in Saudi Arabia.

Thematic Review of the Literature

AI as Personalized Learning Support

A major theme in the reviewed studies is that AI can make learning more responsive to students' needs. Instead of giving the same type of support to every learner, AI can provide explanations, examples, and suggestions that match the learner's current difficulty. This connects clearly to scaffolding because support becomes more useful when it fits the student's level and need. Aldossary et al. (2024) found that Saudi students viewed generative AI as helpful for understanding complex concepts, improving skills, and supporting learning outcomes. Al-Saad et al. (2026) also showed that teachers viewed AI as useful for simplifying difficult concepts and supporting personalized instruction. Together, these studies suggest that AI can help make learning less general and more directed toward the learner.

AI as Feedback and Formative Assessment

Feedback is one of the strongest scaffolding functions because it helps students understand their mistakes while they are still learning. AI can offer faster feedback than traditional assessment, which may help students revise their work and improve before final evaluation. Alenezi and Alenezi (2025) connected AI formative assessment with feedback, revision, writing improvement, and engagement. Alzubi and Alelaiwi (2025) also found that Saudi EFL teachers viewed AI-generative tools as useful for assessment and feedback. This shows that AI feedback is not only about correction, but also about guiding students through the learning process and helping them recognize what needs improvement.

AI and Learner Autonomy

The literature also connects AI with learner autonomy. This is important because scaffolding should not make students permanently dependent. Instead, it should help them become more able to manage their own learning over time. Almohesh (2024) found that ChatGPT supported Saudi primary students' autonomy in online classes. Singh et al. (2026) also linked AI-based learning tools with autonomy, self-efficacy, motivation, and engagement. These findings suggest that AI can help students ask questions, seek explanations, revise work, and continue learning outside direct teacher instruction. In this sense, AI can support independence when it is used as guidance rather than as a source of ready-made answers.

AI, Engagement, and Learning Outcomes

Several studies suggest that AI may improve engagement and learning outcomes. Engagement matters because students are more likely to benefit from support when they are active, interested, and willing to

participate. Singh et al. (2026) linked AI tools with engagement, academic performance, employability, and empowerment. Mutambik (2024) also showed that AI-driven automation can improve student learning experiences through digital learning environments. These studies suggest that AI can support learning not only through direct explanation, but also by making the learning environment more accessible, organized, and motivating. This makes AI useful not only as a content-support tool, but also as a tool that can improve the overall learning experience.

Teacher Mediation and Readiness

AI-supported learning also depends on teachers and institutions. Even if AI provides feedback or explanations, teachers are still needed to guide its use and connect it to learning goals. Alnasib (2023) found that faculty readiness was connected to perceived benefits, attitudes, behavioral intentions, and facilitative conditions. Alammari (2024) also showed that educators' awareness and perceived usefulness influenced generative AI use. This means that AI scaffolding is not only about the technology itself. It also depends on whether teachers are prepared to use AI in a meaningful and controlled way. Without teacher mediation, AI may become random support rather than purposeful educational support.

Ethical, Technical, and Cultural Challenges

The reviewed studies also raise concerns about accuracy, ethics, privacy, plagiarism, over-reliance, training, and institutional readiness. These concerns are important because AI support can become harmful if students depend on it without understanding or if the information it gives is inaccurate. Alzubi and Alelaiwi (2025) raised concerns about accuracy, ethical use, and over-reliance. Al-Saad et al. (2026) emphasized supervision, privacy, plagiarism prevention, and content accuracy. Aldawsari and Almohish (2024) also highlighted issues related to training, privacy, data security, and institutional readiness in online higher education. Therefore, AI can support learning, but its use needs clear guidance, ethical control, and proper training. In the Saudi context, this is especially important because AI tools should fit local educational values, language needs, and institutional expectations.

Gaps in the Literature

Although the reviewed studies show that AI has strong potential to support student learning in Saudi Arabia, the literature still has some clear gaps. First gap is that many studies depend on perceptions, readiness, and attitudes rather than direct evidence of learning improvement. Several studies focus on students' perceptions, teachers' perceptions, faculty readiness, or educators' awareness of AI use in education. These studies are useful, but they do not fully show how AI supports students during real learning tasks over time.

Another limitation is that AI scaffolding is rarely treated as a clear framework. Many studies discuss ideas that are closely related to scaffolding, such as feedback, personalization, engagement, autonomy, and formative assessment, but they do not always connect these ideas directly to scaffolding. For example, Alenezi and Alenezi (2025) discuss AI formative assessment and feedback, while Almohesh (2024) focuses on learner autonomy, but these ideas are usually discussed separately rather than under one clear

scaffolding model. This gives the present review a clear purpose: to bring these related ideas together and explain them through the concept of AI-supported scaffolding.

It also lacks long-term and classroom-based research. Some studies provide useful evidence about AI feedback, autonomy, engagement, and learning experiences, but more research is needed to examine whether AI actually improves students' independence, achievement, writing quality, motivation, or problem-solving skills over time. This is important because AI may seem helpful in the short term, but its real value depends on whether it helps students develop lasting learning skills.

Finally, the Saudi context needs more attention to Arabic-language support, cultural suitability, privacy, accuracy, and ethical use. Alenezi and Alenezi (2025) highlight Arabic NLP feedback and raise linguistic, cultural, and fairness concerns, while Al-Saad et al. (2026), Alzubi and Alelaiwi (2025), and Aldawsari and Almohish (2024) also discuss issues such as content accuracy, supervision, privacy, plagiarism, and institutional readiness. Therefore, future research should not only ask whether AI is useful, but also how it can be used in ways that are pedagogically effective, culturally appropriate, and ethically controlled in Saudi education.

Discussion

The reviewed studies suggest that AI is becoming an important part of Saudi education. Across the literature, AI is repeatedly connected to feedback, personalization, learner autonomy, engagement, assessment, and teacher support. For this reason, the main issue is not whether AI should be accepted or rejected completely, but how it can be used in a professional, practical, and ethical way.

One of the strongest points in the reviewed studies is that AI can reduce pressure on both students and teachers. For students, it can provide quick explanations, immediate feedback, examples, and guidance when direct teacher support is not available. Aldossary et al. (2024), Almohesh (2024), and Singh et al. (2026) show that students often view AI as a source of support that can make learning clearer, more manageable, and more engaging.

For teachers, AI can also reduce routine workload and support planning, assessment, feedback, and personalized instruction. Alzubi and Alelaiwi (2025) and Al-Saad et al. (2026) show that teachers generally see value in AI, but they also want its use to be accurate, supervised, and educationally meaningful. This means that AI should not replace teachers or student effort. Instead, it should be guided by teachers and supported by clear institutional policies.

Overall, the reviewed literature supports the idea that AI can function as a useful scaffolding tool in Saudi education. However, concerns about accuracy, plagiarism, privacy, over-reliance, weak training, and lack of clear policies still need attention. Since AI is already becoming part of education, Saudi education would benefit more from organizing its use professionally than from resisting it.

Conclusion

This literature review examined AI as a scaffolding tool for student learning in Saudi Arabia. Based on the 10 reviewed studies, AI appears to have strong potential to support learning through feedback,

personalization, formative assessment, learner autonomy, engagement, and teacher-guided instruction. These functions show that AI can help students during the learning process, not only after learning has already happened.

The review also shows that AI is generally viewed positively by both students and teachers. Students value AI because it can make learning clearer and more accessible, while teachers see its value in reducing workload and supporting instruction. However, the literature also shows that AI use must be handled carefully because of concerns related to accuracy, plagiarism, privacy, over-reliance, weak training, and unclear policies.

Overall, AI should not be seen as a replacement for teachers or students' own effort. It should be understood as a supportive tool that can strengthen learning when it is used with clear purpose, ethical awareness, and human supervision. In the Saudi context, the future of AI in education depends not only on using the technology, but on using it wisely, responsibly, and in ways that fit the needs of students, teachers, and institutions.

References

1. Alammari, A. (2024). Evaluating generative AI integration in Saudi Arabian education: A mixed-methods study. PeerJ Computer Science, 10, Article e1879. https://doi.org/10.7717/peerj-cs.1879
2. Aldawsari, M. M. M., & Almohish, N. R. I. (2024). Threats and opportunities of students' use of AI-integrated technology (ChatGPT) in online higher education: Saudi Arabian educational technologists' perspectives. International Review of Research in Open and Distributed Learning, 25(3), 19–36. https://doi.org/10.19173/irrodl.v25i3.7642
3. Aldossary, A. S., Aljindi, A. A., & Alamri, J. M. (2024). The role of generative AI in education: Perceptions of Saudi students. Contemporary Educational Technology, 16(4), Article ep536. https://doi.org/10.30935/cedtech/15496
4. Alenezi, A., & Alenezi, A. (2025). AI formative assessment in Saudi education: A study across universities. Journal of Teaching and Learning, 19(4), 284–299. https://doi.org/10.22329/jtl.v19i4.10012
5. Almohesh, A. R. I. (2024). AI application (ChatGPT) and Saudi Arabian primary school students' autonomy in online classes: Exploring students and teachers' perceptions. International Review of Research in Open and Distributed Learning, 25(3), 1–18. https://doi.org/10.19173/irrodl.v25i3.7641
6. Alnasib, B. N. M. (2023). Factors affecting faculty members' readiness to integrate artificial intelligence into their teaching practices: A study from the Saudi higher education context. International Journal of Learning, Teaching and Educational Research, 22(8), 465–491. https://doi.org/10.26803/ijlter.22.8.24
7. Al-Saad, L. S. A., Albahiri, M. H., & Alhaj, A. A. M. (2026). Integrating artificial intelligence technologies into the teaching of Islamic Studies at the intermediate level in Saudi Arabia: Teachers' perceptions. QiST: Journal of Quran and Tafseer Studies, 5(1), 33–58. https://doi.org/10.23917/qist.v5i1.16033

8. Alzubi, A. A. F., & Alelaiwi, A. S. (2025). Exploring EFL university teachers' perceptions of AI-generative tools in Saudi Arabia: A mixed-methods study. Discover Computing, 28, Article 282. https://doi.org/10.1007/s10791-025-09793-x
9. Mutambik, I. (2024). The use of AI-driven automation to enhance student learning experiences in the KSA: An alternative pathway to sustainable education. Sustainability, 16(14), Article 5970. https://doi.org/10.3390/su16145970
10. Singh, A., Singh, H. P., & Alam, M. F. (2026). The impact of AI tools enabled student engagement on academic performance, employability, and empowerment in Ha'il Region, Saudi Arabia. Acta Psychologica, 262, Article 106103. https://doi.org/10.1016/j.actpsy.2025.106103