



## Artificial Intelligence-supported applications used in Science Education: a literature review

 <https://doi.org/10.47236/2594-7036.2026.v10.1894>

Özgür Özünlü<sup>1</sup>

Submission completion date: February 23, 2026. Approval date: March 11, 2026. Publication date: March 16, 2026.

**Abstract** – The integration of artificial intelligence within contemporary educational technologies has become a pivotal element, particularly within the domain of science education. The present study examined AI-supported tools applied in science education in accordance with a literature review, providing information regarding their intended purposes. In the course of the present study, intelligent tutoring systems were found to provide instantaneous feedback by offering content that is tailored to students' individual learning needs. Moreover, adaptive learning environments were found to offer different learning paths based on students' learning preferences and are supported by artificial intelligence techniques. AI-supported applications are utilised to assess students' performance and direct subsequent learning activities, while smart content and virtual reality applications enhance learning through digital materials and interactive experiences. The findings of the study indicate that these tools have a positive impact on students' academic achievement in science education, enhance their motivation, and make learning processes more interactive. Consequently, it is recommended that teachers and educational institutions consider the wider implementation and effective integration of AI-supported applications.

**Keywords:** Artificial Intelligence. Artificial Intelligence-supported applications. Science education.

### Aplicações apoiadas por Inteligência Artificial utilizadas no ensino das Ciências: revisão da literatura

**Resumo** – A integração da inteligência artificial nas tecnologias educacionais contemporâneas tornou-se um elemento fundamental, particularmente no domínio do ensino das ciências. O presente estudo examinou ferramentas apoiadas por IA aplicadas no ensino das ciências, de acordo com uma revisão da literatura, fornecendo informações sobre os seus objetivos pretendidos. No decorrer do presente estudo, verificou-se que os sistemas de tutoria inteligente fornecem feedback instantâneo, oferecendo conteúdos adaptados às necessidades individuais de aprendizagem dos alunos. Além disso, verificou-se que os ambientes de aprendizagem adaptativos oferecem diferentes percursos de aprendizagem com base nas preferências de aprendizagem dos alunos e são suportados por técnicas de inteligência artificial. As aplicações suportadas por IA são utilizadas para avaliar o desempenho dos alunos e orientar as atividades de aprendizagem subsequentes, enquanto o conteúdo inteligente e as aplicações de realidade virtual melhoram a aprendizagem através de materiais digitais e experiências interativas. Os resultados do estudo indicam que estas ferramentas têm um impacto positivo no desempenho acadêmico dos alunos no ensino das ciências, aumentam a sua motivação e tornam

---

<sup>1</sup> Ph.D. in Science Education from Bursa Uludağ University. Professor of Education at Ankara Yıldırım Beyazıt University. Ankara, Turkey. [ozgurozunlu@aybu.edu.tr](mailto:ozgurozunlu@aybu.edu.tr)  <https://orcid.org/0000-0001-7841-4869>. Curriculum: <https://avesis.aybu.edu.tr/oozunlu>.

os processos de aprendizagem mais interativos. Consequentemente, recomenda-se que os professores e as instituições de ensino considerem a implementação mais ampla e a integração eficaz de aplicações suportadas por IA.

**Palavras-chave:** Aplicações suportadas por Inteligência Artificial. Educação científica. Inteligência Artificial.

### **Aplicaciones basadas en Inteligencia Artificial utilizadas en la enseñanza de las Ciencias: revisión de la literatura**

**Resumen** – La integración de la inteligencia artificial en las tecnologías educativas contemporáneas se ha convertido en un elemento fundamental, especialmente en el ámbito de la enseñanza de las ciencias. El presente estudio examinó las herramientas basadas en IA aplicadas a la enseñanza de las ciencias, una revisión de la literatura, proporcionando información sobre sus objetivos previstos. En el transcurso del presente estudio, se ha observado que los sistemas de tutoría inteligente proporcionan retroalimentación instantánea, ofreciendo contenidos adaptados a las necesidades individuales de aprendizaje de los alumnos. Además, se ha observado que los entornos de aprendizaje adaptativos ofrecen diferentes itinerarios de aprendizaje basados en las preferencias de aprendizaje de los alumnos y están soportadas por técnicas de inteligencia artificial. Las aplicaciones respaldadas por IA se utilizan para evaluar el rendimiento de los alumnos y orientar las actividades de aprendizaje posteriores, mientras que el contenido inteligente y las aplicaciones de realidad virtual mejoran el aprendizaje a través de materiales digitales y experiencias interactivas. Los resultados del estudio indican que estas herramientas tienen un impacto positivo en el rendimiento académico de los alumnos en la enseñanza de las ciencias, aumentan su motivación y hacen que los procesos de aprendizaje sean más interactivos. En consecuencia, se recomienda que los profesores y las instituciones educativas consideren una implementación más amplia y una integración eficaz de las aplicaciones respaldadas por IA.

**Palabras claves:** Aplicaciones soportadas por Inteligencia Artificial. Educación científica. Inteligencia Artificial.

### **Introduction**

The rapid development of technology in recent times has created the conditions for the widespread adoption of artificial intelligence (AI) applications in educational and training processes. The integration of AI within educational settings promises numerous benefits, including the acceleration of the learning process, enhanced accessibility, and an augmentation in the precision of the information obtained. As in the manufacturing and service sectors, AI is indeed emerging as a transformative force in academia. AI-based tools have the potential to significantly enhance research, teaching and learning processes in education (Ünal and Yıldırım, 2024).

It is now widely accepted that technology has the capacity to facilitate life and is effective in a wide range of areas. Education has been directly affected by these developments, with technology-supported learning environments playing an important role in improving students' academic achievement. The advent of innovative technologies such as unmanned aerial vehicles, big data, robotic systems, the Internet of Things and artificial intelligence has precipitated the emergence of solutions to many of the difficulties encountered in society, thereby enabling more effective methods to be applied in education.

Despite the long-standing scientific foundation of AI studies, it is only in recent years that their ubiquity in daily life has accelerated. It is imperative to acknowledge and analyse the applications of AI in education to enhance the efficacy of prevailing teaching methodologies.

Science lessons have been shown to contribute to students' understanding of themselves and their environment, aiming to convey fundamental knowledge (Erkoç, 2023). Technological advancements have prompted researchers to examine the impact of integrating technology into science education (Arduç, 2024). The recent pervasive utilisation of AI tools has precipitated a shift in technology-supported teaching towards an AI-centric paradigm (Güzey et al., 2023).

AI-supported systems have the capacity to facilitate the creation of personalised learning programmes for students, the provision of content tailored to their level, and the development of recommendations based on their learning style. These systems have also been shown to provide rapid feedback (Coşkun & Gülleroğlu, 2021). These features have been shown to facilitate more effective management of learning processes, thereby increasing motivation to learn (Tosun, 2024). AI also offers significant advantages for pedagogues. Teachers are able to manage their time more efficiently, closely monitor students' progress, and prepare reports focused on individual students.

Moreover, AI-based applications have the potential to enhance the interactive relationship between students and teachers, thereby transforming the classroom environment into a more participatory and interactive space (İşler and Kılıç, 2017). Consequently, the integration of AI-supported applications within the domain of science education has been demonstrated to enhance the efficacy of the learning process, thereby engendering a more conducive educational environment for both students and educators.

Artificial intelligence technologies offer advantages such as personalising learning processes, providing content tailored to students' needs and enabling rapid feedback. They also allow teachers to plan their teaching processes more efficiently. Given that science education aims to develop students' analytical thinking and problem-solving skills, the opportunities offered by AI tools in this field are particularly significant. However, in environments with significant classroom diversity, existing teaching methods are not always sufficient and this can lead to problems with students' learning processes. While AI-supported applications have the potential to make science teaching more effective and efficient, studies in this area are currently limited.

The primary aim of this study is to systematically analyze artificial intelligence (AI)-supported applications used in the context of science education through a literature-based review and to elucidate their instructional functions, pedagogical contributions, and potential impacts on teaching and learning processes. The study seeks to examine, from a holistic perspective, the pedagogical purposes for which AI-based tools have been developed, the technological mechanisms underlying their operation, and the ways in which they are integrated into science teaching and learning environments.

In this regard, the research aims to conceptually and functionally investigate diverse categories of AI applications, including intelligent tutoring systems, adaptive learning environments, AI-based assessment tools, virtual laboratory applications, augmented and virtual reality-supported systems, and interactive digital content platforms. The study evaluates, based on existing literature, the effects of these applications on students' academic achievement, motivation levels, scientific process skills, critical thinking capacities, and scientific inquiry competencies.

Furthermore, the study seeks to analyze the affordances of AI-supported applications from the perspective of teachers. Specifically, it examines the advantages offered by AI technologies in areas such as instructional planning, personalized content delivery, monitoring of student performance, provision of data-driven feedback, and the development of instructional materials. Additionally, the research discusses how AI-supported simulations and digital tools may help mitigate the challenges associated with teaching abstract and complex scientific concepts, which are inherent to the nature of science education.

Methodologically, the study adopts a qualitative research design based on document analysis, systematically reviewing and synthesizing national and international literature. Rather than generating empirical data, the research aims to construct a comprehensive conceptual framework regarding the use of AI in science education and to provide a guiding resource for educational stakeholders.

In conclusion, the article aims to present the current state of AI-supported applications in science education, evaluate their pedagogical potential, identify existing gaps in the literature, and establish a theoretical and practical foundation for future research and implementation efforts in this field.

## **Conceptual Framework**

### **The Concept of Artificial Intelligence**

Artificial intelligence is generally defined as the ability of systems to produce effective solutions through learning, inference and the development of appropriate algorithms in situations where the method of solving a problem is not fully known. The fundamental characteristic of artificial intelligence is commonly considered to be the capacity of machines to exhibit human-like intelligence (Shieber, 2004). According to Brooks (1991), AI is a field of research developed to enable computers to perform tasks associated with human intelligence. The concept of intelligence encompasses problem-solving and learning processes, as well as cognitive skills such as reasoning, creativity, critical thinking and emotional intelligence (Legg & Hutter, 2007). Kaplan and Haenlein (2019) define AI as a system that can learn by analysing external environmental data and using the obtained information to achieve specific goals. Jarrahi (2018), on the other hand, emphasises intelligent agents that can mimic human cognitive tasks. In the literature, AI is sometimes described as intelligent systems that mimic human performance and sometimes as systems that exhibit 'ideal' rational performance (Russell & Norvig, 2016; Poole & Mackworth, 2010).

### **The Use of Artificial Intelligence in Science Education**

Technological progress is accelerating, which means that it has become imperative for education systems to integrate innovative solutions into pedagogical processes. In this context, artificial intelligence is making significant contributions to many areas, including intelligent content creation, digital curriculum design, data visualisation, the personalisation of learning processes and the global provision of educational services (Uğur, 2023). Reflections on the use of artificial intelligence in education in Türkiye have become increasingly prevalent, particularly over the past two decades. AI was initially employed primarily through computer-assisted teaching applications and natural language processing systems. Since the early 2000s, however, it has emerged as a key player in the development of teaching management systems and the implementation of automated assessment tools (Çavuş, 2024).

Learning Management Systems (LMSs) are web-based digital platforms designed to plan, deliver, manage, monitor, and evaluate teaching and learning

processes within a unified technological environment. In the literature, LMSs are conceptualized as integrated systems that combine content delivery, communication tools, assessment mechanisms, user management, and reporting functions under a single administrative framework (Paulsen, 2003; Coates, James, & Baldwin, 2005).

From a pedagogical perspective, LMSs can be aligned with constructivist learning theory by facilitating interaction, collaboration, and formative feedback. Features such as discussion forums, synchronous and asynchronous communication tools, assignment submission modules, and automated assessment systems are designed to enhance learner engagement and support active knowledge construction (Dalsgaard, 2006). Moreover, LMSs contribute to instructional design processes by enabling the alignment of learning outcomes with instructional materials and assessment strategies, thereby strengthening curricular coherence.

Technically, LMSs support the distribution of diverse instructional materials—including text-based resources, multimedia content, and interactive simulations—while also providing tools for online examinations, grading, and learning analytics. Widely adopted platforms such as Moodle, Blackboard Learn, and Canvas are utilized across higher education institutions, K–12 settings, and corporate training environments worldwide.

In the contemporary era, artificial intelligence (AI) and machine learning-based applications have become pervasive in educational settings.

These technologies are utilised for the purpose of evaluating student achievement, personalising learning processes, and devising teaching strategies that are tailored to the individual needs of each student.

Consequently, there has been an increasing incorporation of AI-based applications into educational settings (Verma, 2018). The integration of artificial intelligence and analogous technological innovations into education policies is a matter of particular concern for developed countries, who are closely monitoring this development.

The United States and China are among the world's leading nations in this field. They have restructured their education systems to capitalise on the opportunities offered by artificial intelligence and smart software (Knox, 2020). Therefore, countries aspiring to become developed nations in the future will inevitably invest in similar technologies and prioritise these tools in education. In Türkiye, one of the areas in which scientific and technological developments are most evident is science education (Ayyıldız, Yılmaz and Baltacı, 2021; Yılmaz, Gülgün, Çetinkaya and Doğanay, 2018). Indeed, the emphasis on technology in the science teaching programme is striking. Within the scope of science education, artificial intelligence and smart software are utilised for material design and applications, reducing students' misconceptions, creating mind and concept maps, and monitoring student performance and assignments.

A review of the literature reveals that artificial intelligence can enhance interaction between students and teachers in educational settings, making classrooms more participatory and interactive (İşler & Kılıç, 2017). AI-based applications have become an important teaching tool by offering personalised learning programmes, providing content appropriate to students' levels and learning styles, and playing an effective guidance role through rapid feedback (Coşkun & Gülleroğlu, 2021). Teachers also emphasise that AI-supported teaching has the potential to develop students' cognitive and emotional abilities (Köse et al., 2024). Indeed, various studies (Arslan, 2020; Luckin & Holmes, 2016; Yıldırım Tosun, 2024) reveal that AI-based learning supports students and has a positive effect on outcomes. However, when examining studies conducted in Türkiye, it is evident that insufficient research has been

conducted on the impact of AI-supported applications on attitudes towards science lessons (Arduç, 2024; Tang et al., 2023; Yıldırım Tosun, 2024).

In recent years, there has been a notable increase in research activity concerning the integration of artificial intelligence in the domain of science education. For instance, Anik et al. (2024) examined the experiences of Dhaka University students who utilised ChatGPT in their science education theses, accentuating the disparities between user and non-user groups. In the field of science education, the use of artificial intelligence (AI) has given rise to a series of ethical dilemmas, a subject that was discussed by Gouvea (2024). Similarly, Blonder et al. (2024) suggested the use of AI tools to assess the pedagogical content knowledge of science teacher candidates. Boateng and colleagues (2024) contributed to the field by adapting Kwame, a bilingual artificial intelligence assistant developed for coding instruction, to science education. In addition, Dağdalan and Taş (2017) determined that the implementation of simulation-based science teaching resulted in enhanced student achievement. Similarly, Kardeş and Aydoğdu (2024) revealed that the utilisation of virtual laboratory applications within science lessons had a positive impact on students' cognitive gains. Research conducted by Zhao et al. (2019) demonstrates the efficacy of artificial intelligence-based teaching methods in enhancing students' academic achievement and facilitating effective word recall.

In a similar vein, Topal et al. (2021) posit that chatbots have the capacity to enhance students' performance by facilitating their learning processes in the domain of science education. In addition, the findings presented by Kim and Kim (2022) demonstrate that the utilisation of AI-supported scaffolding systems by teachers can exert a positive influence on students' scientific writing skills in science, technology, engineering, and mathematics (STEM) subjects.

### **The utilisation of artificial intelligence tools within the domain of science education**

The fundamental aim of the scientific education of students is the development of their scientific thinking and inquiry skills. In this context, there has been a notable increase in the utilisation of artificial intelligence-based tools within educational settings in recent years, particularly to facilitate the comprehension of abstract and complex concepts (Erkoç, 2023; Sevil and Saralar-Aras, 2024). It is evident that certain tools employed within the domain of science education are distinguished by their capacity to promote active student participation and enhance the learning process. Science360, for instance, utilises three-dimensional simulations and videos to facilitate the discovery of scientific concepts. Toca Lab (Elements) offers an experimental approach to the exploration of the periodic table and the interactions between elements. In a similar manner, the Science Experiments programme facilitates the discovery of scientific concepts through practical experimentation.

Socrat AI employs generative artificial intelligence technology to facilitate personalised learning experiences, enhance student engagement, and furnish educators with progress monitoring assistance. Science Journal, an application developed by Google, facilitates the measurement of various physical quantities and the recording of experiments via sensors. Synthia is an application that is utilised particularly within the domain of organic chemistry. Its function is to automate chemical synthesis processes, thus offering more efficient and optimised solutions. It is evident that artificial intelligence tools in science education make significant contributions to the concretisation of abstract concepts, the enhancement of experimental learning opportunities, and the active participation of students in the learning process.

The utilisation of artificial intelligence-supported applications has become pervasive in numerous domains of education. Intelligent tutoring systems provide learning activities that are tailored to students' individual needs, whilst offering instant feedback (Luckin et al., 2016). Adaptive learning environments are characterised by the delivery of content that is tailored to the preferences and learning styles of individual students, with the utilisation of artificial intelligence techniques providing a foundation for these adaptive systems (Colchester et al., 2017). As asserted by Jin (2019), the utilisation of artificial intelligence-based assessments facilitates the identification of the subsequent academic trajectory for the student. The utilisation of smart content and virtual reality applications has emerged as a significant development in the field of digital teaching materials and interactive learning experiences (Al-Farani & Al-Hujaili, 2020; Jin, 2019). In addition, studies have shown that teachers utilise mobile applications and online platforms to the greatest extent (Xue & Wang, 2022).

## Method

The present study adopted a literature review method to examine artificial intelligence-based applications with potential application in science education, and to provide a framework to guide education stakeholders. The study was conducted using a qualitative research design that did not rely on empirical data collection, and document analysis was used as the primary data collection and analysis method. Document analysis, also referred to as documentary review in the literature, is defined as a process that aims to obtain data through the systematic examination of existing records and documents. The method is comprised of four stages: locating, reading, noting, and critically evaluating sources in accordance with a defined objective (Karasar, 2005). In essence, document analysis can be defined as the process of examining and interpreting materials found in printed or electronic media (Bowen, 2009).

Moreover, it is defined as the process of analysing written materials that provide information about the phenomenon or phenomena under investigation (Yıldırım and Şimşek, 2018). In the course of the document analysis process, a systematic review was conducted of national and international academic articles, books, reports, and conference papers concerning the application of artificial intelligence in the field of science education. The studies obtained were examined in detail in terms of artificial intelligence techniques, application objectives, and contributions; thus, the potential of artificial intelligence in science education, its functions, and its contributions to educational processes were revealed from a holistic perspective. This approach ensures that the study comprehensively examines artificial intelligence-supported applications in science and creates a guiding resource for educational applications.

This study employed a systematic literature review design to examine artificial intelligence (AI)-supported applications used in science education. Systematic reviews aim to synthesize existing research through a transparent and replicable process, enabling researchers to identify patterns, trends, and gaps within a specific field of study. In order to ensure methodological rigor and transparency, the review process was conducted in accordance with the guidelines of PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses).

PRISMA provides a standardized framework for identifying, screening, and selecting relevant studies while clearly documenting the decision-making process during the review procedure. By following these guidelines, the present study ensured the systematic identification and evaluation of research related to AI-supported applications in science education.

The literature search was conducted across several major academic databases widely used in educational and technological research. The primary databases included Scopus, Web of Science, Google Scholar, and ERIC.

A comprehensive search strategy was developed using combinations of keywords related to artificial intelligence and science education. The following search terms and Boolean operators were used:

- “Artificial Intelligence” AND “Science Education”
- “AI-supported learning” AND “Science Teaching”
- “Intelligent Tutoring Systems” AND “Science Learning”
- “Adaptive Learning” AND “Science Education”
- “Artificial Intelligence Applications” AND “STEM Education”

The search process focused on peer-reviewed journal articles, conference papers, and scholarly publications. Studies published between 2010 and 2025 were considered in order to capture the most recent developments in AI technologies applied to education.

### **Inclusion and Exclusion Criteria**

To ensure the relevance and quality of the reviewed studies, specific inclusion and exclusion criteria were established prior to the screening process.

#### **Inclusion Criteria**

Studies were included in the review if they met the following conditions:

1. The study focused on artificial intelligence applications in educational contexts.
2. The research specifically addressed science education or STEM-related learning environments.
3. The study examined AI-supported tools such as intelligent tutoring systems, adaptive learning systems, AI-based assessment tools, virtual laboratories, or immersive technologies.

#### **Exclusion Criteria**

Studies were excluded if they:

1. Did not focus on educational applications of artificial intelligence.
2. Were opinion papers, editorials, or non-scholarly publications.
3. Focused solely on technical AI development without educational implications.
4. Did not provide sufficient methodological or empirical information.

### **Study Selection Process**

The study selection process followed the four-stage PRISMA framework, which includes identification, screening, eligibility, and inclusion.

During the identification phase, relevant studies were retrieved from the selected databases using the predefined search keywords. Duplicate records identified across databases were removed prior to further analysis.

In the screening stage, the titles and abstracts of the remaining studies were reviewed to determine their relevance to the research topic. Studies that did not align with the research focus were excluded at this stage.

The eligibility stage involved a detailed full-text review of the remaining studies. Each article was carefully examined to determine whether it met the inclusion criteria established for the review.

Finally, in the inclusion stage, the studies that met all criteria were included in the final dataset and subjected to qualitative synthesis. The entire selection process was documented using the PRISMA flow diagram to ensure transparency and replicability.

## Data Analysis

Following the selection of eligible studies, a qualitative content analysis approach was employed to analyze the extracted data. The selected studies were systematically examined to identify the main themes related to the use of AI in science education.

The analysis focused on several key dimensions:

- Types of AI-supported applications used in science education
- Pedagogical purposes of these applications
- Reported impacts on students' learning outcomes
- Benefits and limitations identified in previous studies
- Implications for teaching practices and educational policy

The findings were then synthesized and organized into thematic categories in order to provide a comprehensive understanding of how AI technologies are currently being utilized within science education.

## Findings

The findings obtained during this research process indicate that artificial intelligence-supported applications are becoming increasingly widespread, particularly in the field of science education, especially chemistry education. The field of artificial intelligence has been shown to play an important role in the preparation of course materials, the development of interactive simulations that have the capacity to capture students' attention, and the design of personalised learning environments. In addition to the measurement of students' academic achievements through the utilisation of examinations and tests, the implementation of systems has been observed to facilitate the monitoring of performance on a daily and monthly basis. Furthermore, the integration of artificial intelligence-based prompts, which can be tailored to the specific needs of teachers and students, facilitates the continuous enhancement of educational content.

The unique symbols, signs and symbols of science education have been known to pose difficulties for students in the learning process. Consequently, AI-supported applications offer graphic, visual and design solutions that facilitate learning in these areas, thereby rendering concepts more understandable.

Moreover, the capacity to undertake costly laboratory experiments using interactive simulations in a virtual environment furnishes students with both accessible and safe learning opportunities. The utilisation of artificial intelligence applications, augmented by virtual reality (VR) and augmented reality (AR) technologies, has been demonstrated to enhance learning processes by providing students with real-time feedback. This scenario presents pragmatic solutions that are pertinent not only to individual learning experiences but also to the operations of schools and educational institutions.

In this context, the utilisation of artificial intelligence applications in science education is regarded as an innovative approach that enhances learning outcomes on a daily basis, mitigates misconceptions, and fosters students' scientific thinking skills.

## Artificial Intelligence-Based Applications

This section examines artificial intelligence-based platforms used in science education that require free membership and provides introductory information about these applications. In the course of preparing descriptions of the programmes, data from the literature was complemented by information provided on the websites of the

relevant software. This facilitated a comprehensive evaluation of the platforms' features, areas of application, and potential contributions to science education.

### **The Science360 Application**

Science360 is an innovative platform that enables students to explore scientific phenomena and engineering design skills (Analytical thinking, decision-making, problem-solving, communication and teamwork skills, flexibility, and continuous learning, etc.). The application facilitates the mastery of abstract concepts through experiential learning by offering interactive three-dimensional simulations. When employed within the domain of science education, it has been demonstrated to facilitate students' comprehension of subject matter and promote enduring learning by rendering learning processes more visual and concrete (Eğitimweb, 2023). The application facilitates the sharing of videos and images utilised in lessons via email, as well as the storage of these materials for subsequent utilisation. Moreover, the platform's regular dissemination of scientific news enables educators to maintain currency with developments in the scientific realm, thereby facilitating the integration of contemporary data into their instructional materials. Teachers can archive the materials they use with a single action through the application, and they can also save their favorite images and video clips for easy reuse in later lessons. Science360 assists educators in the effective organisation of teaching materials within the scientific classroom, whilst concurrently furnishing students with contemporary, visual and interactive learning experiences. This contributes substantially to the enhancement of the teaching process (Education World, 2025).

### **Toca Lab: Elements Application**

Elements is an educational application that offers children the opportunity to discover the 118 elements that comprise the periodic table. The application under discussion here supports science education through the provision of interactive 3D simulations that enable students to experience scientific concepts. It is possible for students to transform elements by means of laboratory equipment such as centrifuges, Bunsen burners, cooling agents and oscilloscopes. This process enables them to discover the unique properties of each element. The application's objective is to assist students in cultivating their scientific thinking skills (MEB, 2024).

### **Simple Machines by Tinybop Application**

The Simple Machines application, developed by Tinybop, facilitates student learning about the operation of simple machines and fundamental physics principles in an interactive manner. The application enables students to explore the interrelationships between force, motion, and energy through the utilisation of various mechanical devices, including levers, pulleys, and inclined planes. This tool, which supports the understanding of fundamental engineering and physics topics in science lessons, helps reinforce students' conceptual learning and develop their scientific thinking skills (Eğitimweb, 2023).

### **Mystery Science Application**

In contemporary science education, it is imperative to cultivate students' curiosity, facilitate active learning, and instill them with the capacity for scientific thinking. In this regard, the digital curriculum resource Mystery Science, which is extensively utilised in the United States, offers teachers substantial support. This platform, utilised from nursery school to fifth grade, enables students to engage with

science through interactive content and hands-on activities (The Learning Counsel, 2024).

Mystery Science lessons are characterised by an initiation of study that is characterised by the posing of a question that is designed to capture the attention of the students. The question is addressed through the use of interactive videos and guided discussions. Preliminary experiments, utilising rudimentary materials, facilitate students' engagement with the scientific method through a practical approach. It is evident that the learning process encompasses more than merely the transmission of theoretical knowledge; it also encompasses higher-order thinking skills such as questioning, observation, and the formation of conclusions (Mystery Science, 2025). Moreover, the platform's design is conducive to effective lesson planning by educators, thereby enhancing the accessibility of science education. The content, which is offered in both English and Spanish, has been designed to cater to a variety of student profiles. This demonstrates an inclusive approach to education. Mystery Science has been demonstrated to contribute to science lessons by moving beyond mere knowledge transfer, enabling students to relate scientific phenomena to real life, develop critical thinking skills, and gain lasting learning experiences (Mystery Science, 2025).

### **DIY Nano Application**

DIY Nano is an innovative artificial intelligence-based application that introduces nanotechnology to children in an understandable and engaging way, suitable for use in science lessons. Experiments supported by short videos and step-by-step instructions help students concretise abstract concepts while also developing their scientific process skills. Teachers can start the application with basic concepts such as 'Introduction to Nano' or enrich learning by relating it to different topics such as gravity. Offering a wide range of content from simple activities to more complex experiments, DIY Nano increases students' interest in science and guides them towards inquiry-based learning with its structure suitable for both individual and group work (IEEE, n.d.).

### **The Magic School Bus: Oceans Application**

The Magic School Bus: Oceans is an educational application that enables students to explore the mysterious world of the oceans. This application is enriched with a variety of visual media, interactive activities and experiments, which have been designed to facilitate an engaging and memorable learning experience. The application focuses on the study of underwater biology, the life cycles of marine creatures and ocean ecosystems. The application is a potent instrument in the pedagogy of science, which is effective not only in imparting knowledge to students but also in fostering the development of their scientific inquiry skills by stimulating their curiosity. This digital resource, which can be used in both the classroom and for individual learning, also has significant potential for increasing students' awareness of nature and the environment (EğitimWeb, 2024).

### **Google Teachable Machine Application**

Google Teachable Machine offers a web-based graphical user interface (GUI) that enables students, teachers and designers to create machine learning classification models without requiring specialised technical knowledge. Users have the capacity to develop their own machine learning models through straightforward projects such as image, sound, or pose recognition, thereby acquiring an understanding of artificial intelligence concepts through experiential learning. The platform is also employed in

the context of educational materials and curriculum development processes, thereby facilitating hands-on learning opportunities in machine learning and artificial intelligence ethics. It is estimated that over 125,000 classification models have been created in 201 countries worldwide, and the tool is designed to facilitate the discovery of machine learning concepts in an accessible and interactive manner (Carney et al., 2020).

### **Little Alchemy Application**

The interactive puzzle game, Little Alchemy, has been developed for the purpose of exploring fundamental chemistry concepts in the context of science education. In this engaging and informative text, students are guided through the process of synthesising various elements to create new compounds, thereby acquiring knowledge about the properties of substances, their reactions, and fundamental chemical interactions (MEB, 2024).

### **Science Experiments Application**

The 'Science Experiments' application is an educational tool that offers students the opportunity to conduct experiments in the field of science. This platform assists students in comprehending the manner in which diverse materials interact with each other and to grasp fundamental scientific concepts by simulating chemistry and physics experiments. Each experiment is presented with step-by-step instructions and reinforced with results reports, enabling students to understand scientific processes through experience (EğitimWeb, 2024). The application enables the execution of experiments in a safe manner using simple materials that can be found in the home or educational environment. Furthermore, it facilitates enhanced accessibility to learning through the use of audio narration and visual instructions.

### **Science Journal Application**

The Science Journal application, developed by Google, provides students with a practical tool for conducting scientific experiments and collecting data. The application facilitates the measurement of physical quantities such as light, sound, movement, and temperature through the utilisation of sensors on smart devices. Consequently, students are able to acquire proficiency in measurement while concurrently cultivating their capacity for scientific analysis with the data they collect and systematically documenting their observations (MEB, 2024).

The utilisation of artificial intelligence-supported tools within the domain of science education has been demonstrated to facilitate enhanced comprehension of scientific concepts among students, thereby fostering the development of their scientific research skills (Sun et al., 2023). It is asserted that students are able to engage deeply with science topics through interactive learning platforms, experiment simulations, and data analysis tools. The integration of artificial intelligence technologies into educational processes has been demonstrated to make a significant contribution to the strengthening of students' critical and analytical thinking skills, and to the support of their ability to produce solutions to real-life problems (Nazaretsky et al., 2022).

### **Conclusion**

The utilisation of artificial intelligence (AI) in educational settings has emerged as a pivotal instrument for augmenting the experiences of both students and educators (Kaplan-Rakowski et al., 2023). These technologies have been utilised to address students' diverse learning requirements, enhance the efficacy of teaching

methodologies, and augment the overall performance of educational institutions (Humble & Mozelius, 2019). The objective of AI applications is to enhance the learning potential of each student by providing personalised learning pathways, customising educational materials at the individual level, and monitoring their progress (Li & Wong, 2023). The advent of sophisticated technology and the concomitant increase in data analysis have resulted in the sophistication of AI in the field of education, with the potential to be effective in areas such as student performance prediction, the optimisation of teaching materials, and the provision of comprehensive feedback to teachers (Celik et al., 2022).

Current research indicates that the opening up of space in the learning process by modern digital applications engenders increased opportunities for supporting the development of education systems and adapting to new technological developments. The potential of artificial intelligence to influence various dimensions of teaching and learning processes has been identified as a significant opportunity to enhance the learning experiences of students, both in the present and in the future (Mahmoud, 2020). The ease with which information can be accessed via the internet has been demonstrated to enhance the potential of AI in education, thus rendering its effective use in curriculum design, teaching methods, and assessment processes important (Eltabakh, 2019).

However, the extensive utilisation of AI-supported tools in science education does not ensure that educators will adeptly employ them in the classroom setting. To ensure the standard of teaching, educators must be adequately prepared for AI-based teaching (Al Darayseh, 2023). The successful adoption of new educational techniques is contingent on the attitudes of teachers towards these technologies. At present, a number of teachers have a negative attitude towards the integration of technology in the classroom and continue to employ traditional methods. These attitudes have the potential to impede the integration of AI and other contemporary educational methodologies within the classroom environment (Hébert et al., 2021).

The present study aimed to examine artificial intelligence-supported applications used in science education through a comprehensive literature review. The findings indicate that AI technologies have become powerful tools for enhancing teaching and learning processes in science education. AI-supported systems such as intelligent tutoring systems, adaptive learning environments, AI-based assessment tools, and immersive technologies contribute to more personalized, interactive, and efficient learning experiences.

The literature consistently demonstrates that these technologies positively influence students' academic achievement, motivation, and engagement in science learning activities. By providing real-time feedback, adaptive learning pathways, and data-driven instructional support, AI applications enable learners to progress at their own pace and address individual learning needs. Moreover, AI technologies offer valuable support to teachers by facilitating instructional planning, monitoring student progress, and delivering targeted feedback.

However, the successful integration of AI into science education is not solely dependent on technological advancements. Pedagogical considerations, teacher competencies, ethical issues, and institutional infrastructure also play critical roles in determining the effectiveness of these technologies. Therefore, the implementation of AI-supported educational tools must be accompanied by appropriate teacher training programs, ethical guidelines, and supportive educational policies.

In conclusion, AI-supported applications represent a transformative opportunity for science education. When integrated effectively, these technologies can foster

innovative learning environments that support students' scientific thinking, inquiry skills, and conceptual understanding. Future research and educational initiatives should focus on maximizing the pedagogical potential of AI while addressing the challenges associated with its implementation.

Moreover, the integration of AI within educational settings has been shown to facilitate the development of students' critical thinking, problem-solving, and creativity skills (Tapalova & Zhiyenbayeva, 2022). Nevertheless, the utilisation of AI gives rise to ethical and social concerns, thereby bringing issues such as data privacy, security, and algorithmic fairness to the fore (Turan et al., 2022). Consequently, it is imperative that policymakers, educators, and technology experts collaborate to evaluate and oversee the ramifications of AI in education from both ethical and pragmatic standpoints.

## Discussion

The integration of AI in science education is of significant importance and is considered to be indispensable. Nevertheless, further research is required to investigate the external factors affecting the use of these tools, the benefits they provide, and their sustainable applicability by teachers. In this context, it is imperative to categorise the pertinent factors according to their relative importance and to formulate strategies that will ensure the effective utilisation of AI. In view of the information presented, it is evident that artificial intelligence (AI) has the capacity to induce significant change within the domain of education. However, meticulous planning, deliberate training, and the effective formulation of policies are imperative to ensure the optimal realisation of this potential.

The findings of the present literature review demonstrate that artificial intelligence (AI)-supported applications are increasingly becoming an integral component of contemporary science education. The reviewed studies collectively indicate that AI-based tools—such as intelligent tutoring systems, adaptive learning platforms, AI-driven assessment tools, virtual laboratories, and immersive technologies—play a significant role in enhancing the effectiveness of teaching and learning processes. These technologies enable personalized instruction, real-time feedback, and data-driven learning pathways, which are considered essential components of modern learner-centered educational environments.

One of the most prominent findings emerging from the literature is the effectiveness of intelligent tutoring systems in supporting individualized learning. Intelligent tutoring systems analyze learners' responses, track their progress, and provide immediate feedback tailored to individual needs. Previous research suggests that such systems significantly improve students' conceptual understanding and problem-solving skills by adapting instructional content according to learners' cognitive levels (Woolf, 2010; Luckin et al., 2016). In the context of science education, where abstract concepts and complex scientific phenomena often challenge students' comprehension, these systems can facilitate deeper conceptual learning by providing structured guidance and adaptive scaffolding.

Another important finding concerns the role of adaptive learning environments in supporting differentiated instruction. Adaptive learning technologies employ machine learning algorithms and learning analytics to modify instructional pathways based on students' performance and learning preferences. According to Holmes, Bialik, and Fadel (2019), AI-supported adaptive systems contribute to more efficient learning by continuously analyzing learner data and adjusting content difficulty levels accordingly. Such environments can be particularly beneficial in science education, where students often demonstrate diverse levels of prior knowledge and learning pace.

The literature also highlights the importance of AI-supported assessment systems. These systems utilize algorithms to evaluate students' performance, identify learning gaps, and provide targeted feedback. Unlike traditional assessment methods, AI-based evaluation tools allow for continuous monitoring of learners' progress and facilitate formative assessment practices (Zawacki-Richter et al., 2019). Consequently, teachers are able to obtain detailed insights into students' learning patterns and adapt instructional strategies accordingly.

Furthermore, immersive technologies such as virtual reality (VR) and augmented reality (AR), when integrated with AI, offer new possibilities for science learning. These technologies create interactive and experiential learning environments in which students can visualize abstract scientific concepts, conduct virtual experiments, and explore complex systems that may otherwise be inaccessible in traditional classrooms (Makransky & Petersen, 2019). Research indicates that immersive learning environments not only improve conceptual understanding but also increase student engagement and motivation.

Despite these advantages, the literature also reveals several challenges associated with the implementation of AI technologies in education. One of the most frequently discussed issues concerns ethical considerations and data privacy. AI systems rely heavily on large datasets to function effectively, which raises concerns about the protection and responsible use of students' personal data (Holmes et al., 2019). Additionally, the successful integration of AI technologies requires teachers to possess adequate digital competencies and pedagogical knowledge. Without sufficient training and institutional support, educators may face difficulties in effectively incorporating AI tools into their teaching practices.

Another challenge relates to technological infrastructure and accessibility. Educational institutions in different regions may have unequal access to advanced digital technologies, which can lead to disparities in educational opportunities. Therefore, policymakers and educational administrators must consider issues of equity and access when promoting the integration of AI-supported tools in educational systems.

Overall, the literature suggests that AI technologies have significant potential to transform science education by enabling personalized, interactive, and data-driven learning environments. However, the effective implementation of these technologies requires careful consideration of pedagogical, ethical, and infrastructural factors.

## Recommendations

Based on the findings of this literature review, several recommendations can be proposed for educators, researchers, and policymakers.

First, educational institutions should encourage the systematic integration of AI-supported tools into science curricula. Teachers should be supported in incorporating intelligent tutoring systems, adaptive learning environments, and immersive technologies into their instructional practices in order to enhance student engagement and promote deeper conceptual learning.

Second, professional development programs should be designed to improve teachers' digital competencies and their understanding of AI technologies in education. Teachers play a crucial role in the effective use of AI-based tools, and therefore training programs should focus on developing both technological skills and pedagogical strategies related to AI-supported instruction.

Third, future research should conduct empirical studies to investigate the long-term impact of AI-supported applications on students' learning outcomes in science

education. While many existing studies highlight the potential benefits of AI technologies, more experimental and longitudinal research is needed to evaluate their effectiveness in different educational contexts.

Fourth, policymakers should establish ethical frameworks and data protection policies to ensure the responsible use of AI in educational settings. Issues related to privacy, transparency, and algorithmic bias must be carefully addressed in order to maintain trust in AI-based educational technologies.

Finally, efforts should be made to improve technological infrastructure and ensure equitable access to AI-supported learning tools. Educational institutions should invest in digital resources and technological support systems so that all students can benefit from AI-enhanced learning environments.

In summary, the integration of artificial intelligence into science education offers significant opportunities for innovation and improvement. However, the successful implementation of these technologies requires collaborative efforts among educators, researchers, policymakers, and technology developers.

## References

- AL DARAYSEH, A. Acceptance of artificial intelligence in science education: Science teachers' perspectives. **Computers and Education: Artificial Intelligence**, v. 4, 100132, 2023.
- ANIK, M. H.; RAAZ, S. N. C.; KHAN, N. Embracing AI assistants: Unraveling young researchers' journey with ChatGPT in science education thesis writing. **International Journal of Artificial Intelligence in Education**, v. 35, n. 1, p. 225–244, 2024.
- ARDUÇ, M. A. Examination of technology-supported science education studies (2020–2023): A content analysis. **Alanyazın**, v. 5, n. 1, p. 85–103, 2024.
- ARSLAN, K. Artificial intelligence in education and its applications. **Western Anatolia Journal of Educational Sciences**, v. 11, n. 1, p. 71–88, 2020.
- AYYILDIZ, P.; YILMAZ, A.; BALTACI, H. S. Exploring digital literacy levels and technology integration competence of Turkish academics. **International Journal of Educational Methodology**, v. 7, n. 1, p. 15–31, 2021. Available at: <https://doi.org/10.12973/ijem.7.1.15>
- BLONDER, R.; FELDMAN-MAGGOR, Y.; RAP, S. Are they ready to teach? Generative artificial intelligence as a tool for revealing pre-service science teachers' PCK and improving teacher preparation programs. **Journal of Science Education and Technology**, p. 1–10, 2024.
- BOATENG, G. et al. Real-world deployment and evaluation of Kwame for science, an AI teaching assistant for science education in West Africa. In: *INTERNATIONAL CONFERENCE ON ARTIFICIAL INTELLIGENCE IN EDUCATION*. Cham: Springer, 2024. p. 119–133.
- BOWEN, G. A. Document analysis as a qualitative research method. **Qualitative Research Journal**, v. 9, n. 2, p. 27–40, 2009.

BROOKS, R. A. Intelligence without reason. In *The artificial life route to artificial intelligence*. London: Routledge, 2018. p. 25–81.

CARNEY, M. et al. Teachable machine: Approachable web-based tool for exploring machine learning classification. In: *CHI CONFERENCE ON HUMAN FACTORS IN COMPUTING SYSTEMS*. New York: ACM, 2020. p. 1–8.

CELIK, I. et al. The promises and challenges of artificial intelligence for teachers: A systematic review of research. **TechTrends**, v. 66, n. 4, p. 616–630, 2022.

COLCHESTER, K. et al. Artificial intelligence techniques used in adaptive educational systems within e-learning platforms. **Journal of Artificial Intelligence and Soft Computing Research**, v. 7, n. 1, p. 47–64, 2017.

COŞKUN, F.; GÜLLEROĞLU, H. D. The historical development of artificial intelligence and its use in education. **Ankara University Journal of Faculty of Educational Sciences**, v. 54, n. 3, p. 947–966, 2021.

ÇAVUŞ, M. N. A review on AI-based assessment and evaluation in education. **International Journal of English for Specific Purposes**, v. 2, n. 1, p. 39–54, 2024.

DAĞDALAN, G.; TAŞ, E. The effect of simulation-supported science teaching on students' achievement. **Journal of Science Education**, v. 5, n. 2, p. 160–172, 2017.

DALSGAARD, C. Social software: E-learning beyond learning management systems. **European Journal of Open, Distance and E-Learning**, [s. l.], n. 2, 2006. Disponível em: <https://www.eurodl.org/?article=223>. Acesso em: 1.03.2026.

DEVECİ TOPAL, A.; DILEK EREN, C.; KOLBURAN GEÇER, A. Chatbot application in a 5th-grade science course. **Education and Information Technologies**, v. 26, n. 5, p. 6241–6265, 2021.

EDUCATION WORLD. Artificial intelligence applications in science education. 2025. Available at: [https://www.educationworld.com/a\\_tech/app-review/science-360.shtml](https://www.educationworld.com/a_tech/app-review/science-360.shtml)

EĞİTİM WEB. Artificial intelligence tools that can be used in science education. 2023. Available at: <https://egitimweb.com/konu/fen-bilimleri-egitiminde-kullanilabilecek-yapay-zeka-araclari.383/>

ERKOÇ, M. Analysis of science teachers' use of artificial intelligence during distance education. **Journal of Dokuz Eylül University Buca Faculty of Education**, n. 58, p. 2682–2704, 2023.

GOUVEA, J. S. Ethical dilemmas in current uses of AI in science education. **CBE—Life Sciences Education**, v. 23, n. 1, 2024.

GÜZEY, C. et al. Trends in research on artificial intelligence in education. **Journal of Information and Communication Technologies**, v. 5, n. 1, p. 67–78, 2023.

HÉBERT, C.; JENSON, J.; TERZOPOULOS, T. Access to technology is the biggest challenge. **E-Learning and Digital Media**, v. 18, n. 3, p. 307–324, 2021.

HOLMES, W.; BIALIK, M.; FADEL, C. **Artificial intelligence in education: Promises and implications for teaching and learning**. Boston: Center for Curriculum Redesign, 2019.

HUMBLE, N.; MOZELIUS, P. Teacher-supported AI or AI-supported teachers. In: *EUROPEAN CONFERENCE ON THE IMPACT OF ARTIFICIAL INTELLIGENCE AND ROBOTICS*. 2019.

İŞLER, B.; KILIÇ, M. The use and development of artificial intelligence in education. **New Media Electronic Journal**, v. 5, n. 1, p. 1–11, 2021.

JARRAHI, M. H. Artificial intelligence and the future of work. **Business Horizons**, v. 61, n. 4, p. 577–586, 2018.

JIN, L. Investigation of potential applications of artificial intelligence in preschool education. **Journal of Physics: Conference Series**, v. 1288, 2019.

KAPLAN, A.; HAENLEIN, M. Siri, Siri, in my hand. **Business Horizons**, v. 62, n. 1, p. 15–25, 2019.

KARDEŞ, H.; AYDOĞDU, C. The effect of 3D virtual laboratory applications on students' cognitive achievement. **Journal of Science Education**, v. 12, n. 2, p. 397–420, 2024.

KIM, N. J.; KIM, M. K. Teachers' perceptions of using an AI-based educational tool. **Frontiers in Education**, v. 7, 2022.

KNOX, J. Artificial intelligence and education in China. **Learning, Media and Technology**, v. 45, n. 3, p. 298–311, 2020.

KÖSE, B. B. et al. The importance of artificial intelligence in education. **Journal of Social, Humanities and Administrative Sciences**, v. 9, n. 71, p. 4203–4209, 2024.

LEGG, S.; HUTTER, M. A collection of definitions of intelligence. **Frontiers in Artificial Intelligence and Applications**, v. 157, p. 17, 2007.

LI, K. C.; WONG, B. T. M. Artificial intelligence in personalised learning. **Interactive Technology and Smart Education**, v. 20, n. 3, p. 422–445, 2023.

LUCKIN, R.; HOLMES, W.; GRIFFITHS, M.; FORCIER, L. **Intelligence unleashed: An argument for AI in education**. London: Pearson, 2016.

MAHMOUD, A. Artificial intelligence applications in education during COVID-19. **International Journal of Research in Educational Sciences**, v. 3, n. 4, p. 171–224, 2020.

- MAKRANSKY, G.; PETERSEN, G. B. Immersive virtual reality and learning: A meta-analysis. **Educational Psychology Review**, v. 31, n. 4, p. 1011–1039, 2019.
- NAZARETSKY, T. et al. Teachers' trust in AI-based educational technology. **British Journal of Educational Technology**, v. 53, n. 4, p. 914–931, 2022.
- PAULSEN, M. F. **Online education and learning management systems: Global e-learning in a Scandinavian perspective**. Oslo: NKI Forlaget, 2003.
- POOLE, D. L.; MACKWORTH, A. K. **Artificial Intelligence: Foundations of Computational Agents**. Cambridge: Cambridge University Press, 2010.
- SUN, J. et al. Promoting AI teaching competency of K-12 teachers. **Education and Information Technologies**, v. 28, n. 2, p. 1509–1533, 2023.
- TANG, K. Y.; CHANG, C. Y.; HWANG, G. J. Trends in AI-supported e-learning. **Interactive Learning Environments**, v. 31, n. 4, p. 2134–2152, 2023.
- TAPALOVA, O.; ZHIYENBAYEVA, N. AI in education for personalised learning pathways. **Electronic Journal of e-Learning**, v. 20, n. 5, p. 639–653, 2022.
- TOSUN, A. A theoretical perspective on innovation through AI modelling for sustainable education. **SMART Journal**, v. 9, n. 78, p. 5408–5411, 2024.
- TURAN, T.; TURAN, G.; KÜÇÜKSİLLE, E. Artificial intelligence ethics and its societal impacts. **Mehmet Akif Ersoy University Journal of Graduate School of Natural and Applied Sciences**, v. 13, n. 2, p. 292–299, 2022.
- UĞUR, S. Digital transformation of open education systems. **Open Education Journal**, n. 40, p. 669–692, 2023.
- ÜNAL, C.; YILDIRIM, H. Academics' use of AI tools in Türkiye. **Sinop University Journal of Science**, v. 9, n. 1, p. 128–144, 2024.
- WOOLF, B. P. **Building intelligent interactive tutors: Student-centered strategies for revolutionizing e-learning**. Burlington: Morgan Kaufmann, 2010.
- VERMA, M. Artificial intelligence and its scope in education. **International Journal of Advanced Educational Research**, v. 3, n. 1, p. 5–10, 2018.
- YILMAZ, A. et al. Initiatives and new trends towards STEM education in Türkiye. **Journal of Education and Training Studies**, v. 6, n. 11a, p. 1–10, 2018.
- ZAWACKI-RICHTER, O.; MARÍN, V.; BOND, M.; GOUVERNEUR, F. Systematic review of research on artificial intelligence applications in higher education. **International Journal of Educational Technology in Higher Education**, v. 16, p. 39, 2019.

**Additional information**

| Description | Declaration |
|-------------|-------------|
|-------------|-------------|

|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Funding                                  | Not applicable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Ethical approval                         | Not applicable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Conflicts of interest                    | None.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Availability of underlying research data | This work is not a preprint, and the content underlying the research text is contained in this article.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Use of Artificial Intelligence           | Yes. Artificial Intelligence (AI) tools were used on an ad hoc and assisted basis in the development of this work, without prejudice to its originality, intellectual authorship, and scientific responsibility. The use of AI was restricted exclusively to technical support activities, consisting of: (a) grammatical and spelling review of the text; (b) improvement of the clarity, fluency, and cohesion of the academic language; and (c) specific suggestions for sentence restructuring, without the autonomous generation of theoretical, analytical, or interpretive content. All conceptual, theoretical, methodological, analytical, and conclusive content in the manuscript is my own work, with AI having been used solely as an auxiliary tool, similar to linguistic reviewers or text editing software. The suggestions provided were carefully evaluated, selected, and validated, with full control over the final text. |
| CrediT                                   | Özgür Özünlü<br>Functions: conceptualization, formal analysis, methodology, and writing – original draft.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

Reviewers: Dr. Gerson Pesente Focking\* (Federal Institute of Tocantins, Brazil). Reviewer “A” chose to submit a closed evaluation and remain anonymous.  
 Reviewer of Portuguese text: Patrícia Luciano de Farias Teixeira Vidal.  
 Reviewer of English text: Patrícia Luciano de Farias Teixeira Vidal.  
 Reviewer of Spanish text: Graziani França Claudino de Anicézio.

#### How to cite:

ÖZÜNLÜ, Özgür. Artificial Intelligence-supported applications used in Science Education: a literature review. **Revista Sítio Novo**, Palmas, v. 10, p. e2035, 2026. DOI: 10.47236/2594-7036.2026.v10.2035. Available at: <https://sitionovo.ifto.edu.br/index.php/sitionovo/article/view/2035>.

\* Chose the open review process and authorized the disclosure of their identity in the published article and of the review on the journal’s website.