

AI applications that improve the academic performance of students living in areas of social exclusion for the prevention of school dropout.

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Aplicaciones IA que mejoran el rendimiento académico del alumnado que reside en zonas en exclusión social para la prevención del abandono escolar

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Received: 21/01/2025 | Accepted: 08/03/2025 | Publication date: 03/05/2025
DOI:<https://doi.org/10.20868/abe.2025.1.5453>

TITULARES

- Uso de la inteligencia artificial para mejorar el rendimiento académico de los estudiantes que viven en zonas de exclusión social.
- Revisión bibliográfica centrada en investigar el uso de herramientas de IA para mejorar el rendimiento académico.
- El uso de aplicaciones de IA permite personalizar las experiencias de aprendizaje y mejorar el rendimiento académico.

Advances in Building Education / Innovación Educativa en Edificación | ISSN: 2530-7940 |

<http://polired.upm.es/index.php/abe>

| Cod. 2501 | January - April 2025 | Vol. 9. Nº 1 | pp. 51/63 |

HIGHLIGHTS

- Use of artificial intelligence to improve the academic performance of students living in areas of social exclusion.
 - Focused literature review to investigate the use of AI tools to improve academic performance.
 - The use of AI applications enables personalisation of learning experiences and improved academic performance.
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RESUMEN

La inclusión de la IA en las instituciones educativas está alterando la forma en la que el estudiantado, profesorado y centros educativos funcionan. El presente estudio tiene como objetivo general indagar en el uso de las aplicaciones IA que mejoran el rendimiento académico del alumnado que reside en zonas en exclusión social para la prevención del abandono escolar. Se utilizó una metodología basada en el empleo de una revisión enfocada de la literatura. Las bases de datos que se utilizaron fueron Scopus y Web of Science. Los resultados incluyen veinte aplicaciones de inteligencia artificial, de las cuales se han extraído su objetivo, aplicabilidad, uso, accesibilidad y mejora. Finalmente, se concluye que el uso de estas aplicaciones permite la personalización de las experiencias de aprendizaje y mejora del rendimiento académico, pero se incide en la formación del profesional y del estudiante para garantizar el uso ético de la inteligencia artificial.

Palabras clave: *Inteligencia artificial; inclusión social; abandono escolar; rendimiento académico; exclusión social*

ABSTRACT

AI applications that improve the academic performance of students residing in socially excluded areas for the prevention of school dropout. The inclusion of AI in educational institutions is altering the way in which students, teachers and educational centers function. The general objective of the present study was to investigate the use of AI applications that improve the academic performance of students living in socially excluded areas for the prevention of school dropout. A methodology based on the use of a focused literature review was used. The databases used were Scopus and Web of Science. The results include twenty artificial intelligence applications, from which their purpose, applicability, use, accessibility and improvement have been extracted. Finally, it is concluded that the use of these applications allows the personalization of learning experiences and improvement of academic performance, but the training of the professional and the student to guarantee the ethical use of artificial intelligence is emphasized.

Keywords: *Artificial intelligence; social inclusion; school dropout; academic achievement; social exclusion*

1. INTRODUCTION

Artificial intelligence (AI) has rapidly established itself as a transformative force across a variety of fields, including education. Similarly, its development has triggered numerous advances that have impacted various facets of human life. Thus, as a key aspect of individual development and social evolution, education has significantly benefited from AI advancements (Adamopoulou & Moussiades, 2020; Hwang & Chang, 2021; Nicolescu & Tudorache, 2022; Okonkwo & Ade-Ibijola, 2021; Wollny et al., 2021).

The integration of AI into educational institutions is changing the way students, teachers, and schools operate. In this regard, the personalization of learning experiences, automation of administrative responsibilities, and real-time feedback reduce gaps and foster more effective and inclusive learning environments (Chen et al., 2023; Malmström et al., 2023; Rudolph et al., 2023; Stokel-Walker, 2022; Sullivan et al., 2023; Wollny et al., 2021).

Furthermore, the applications of AI in educational areas highlight the potential of a wide range of advantages made possible through the use of intelligent systems. The impact of AI can be seen in improved learning outcomes, time and cost efficiency, as well as global access to quality education. Personalized learning and intelligent systems can help improve students' academic performance, particularly for those living in areas characterized by social exclusion, inadequate services, low education levels, and poor housing conditions, among others (Alafnan et al., 2023; Dwivedi et al., 2023; Kamalov et al., 2021; Khalil & Er, 2023; Malmström et al., 2023; Rasul et al., 2023; Selwyn et al., 2021).

Specifically, Andalusia is the most populated autonomous community in Spain, with approximately 8.5 million inhabitants. It is among the most disadvantaged regions in southern Europe, with an unemployment rate of 18.98% in 2022 and a poverty risk rate of 32.3% in 2021. Notably, several metropolitan contexts show a high concentration of vulnerable neighborhoods (for example, Málaga, Seville, Granada, and Cádiz) (Delgado-Baena et al., 2022; National Institute of Statistics, 2021; National Institute of Statistics, 2022). Additionally, Andalusia has the third-highest rate of minors at risk of social exclusion and/or poverty, representing 32.5% in 2021 (National Institute of Statistics, 2021).

Despite progress made in combating structural social inequalities at both the local and regional levels, it remains important to implement inclusion policies, which are fundamental to social cohesion. That is, areas typically marked by social exclusion must find opportunities to transition toward social inclusion. In this sense, social cohesion plays a key role in national development, as fostering inclusive and integrated territorial dynamics can lead to significant transformations in the field of inclusion. Moreover, such policies can serve as an example for other European nations (Delgado-Baena et al., 2022; Junta de Andalucía, 2018; Junta de Andalucía, 2024; Martínez-Virto & Sánchez-Salmerón, 2020).

Thus, territorial and local governments are fundamental bodies in generating local development processes, but they are not the only authorities within a territory. Different levels of government must ensure that local governance is neither invisible nor isolated from the country itself or the rest of the world. However, the integration and social inclusion of vulnerable groups cannot be analyzed solely

from territorial patterns, since a high geographical dispersion does not necessarily lead to greater sociocultural integration, nor does it foster a sense of belonging to the receiving society (Badanta et al., 2021; Delgado-Baena et al., 2022; Hrabina, 2021; Peters & Fontaine, 2020; Simone, 2020a; Simone, 2020b; Torres-Gutiérrez, 2021; Vela-Jiménez et al., 2022).

Given this social reality, the Junta de Andalucía (2018; 2024) launched an initiative called the Andalusian Regional Strategy for Social Cohesion and Inclusion: Intervention in Disadvantaged Areas (ERACIS; ERACIS+). Its objective is to improve the living conditions of individuals residing in areas marked by exclusion and social marginalization. Thus, it is a project that, through citizen participation and the design, management, and evaluation of public policies, requires community involvement in the Local Plans in Disadvantaged Areas (PLIZD) (Delgado-Baena et al., 2022; Díez-Bermejo et al., 2021; Vela-Jiménez et al., 2022).

It is important to note that ERACIS+ is a continuation of the original ERACIS, with the key difference being the strengthening of interventions through the incorporation of professional agents who mediate and/or mentor workgroups to develop specific initiatives (Junta de Andalucía, 2018; Junta de Andalucía, 2024). Therefore, disadvantaged areas are those that present various weaknesses in their sociodemographic structures and/or environmental qualities compared to the rest of the city. The intention of this initiative is characterized by cooperation to address inequality issues, promoting the creation of a territorial structure capable of intervening and managing itself at the regional level (Delgado-Baena et al., 2022; Díez-Bermejo et al., 2021; Simone, 2020a; Simone, 2020b; Vela-Jiménez et al., 2022).

In line with this argument, the strategy is divided into four principles inspired by the Andalusian Social Services Law: 1. Policies for social cohesion and well-being; 2. Improvement of coexistence and habitat; 3. Innovation in social intervention and networking; 4. Sustainable community and economic development. All these approaches feature a holistic and multidimensional focus in their design and implementation. Specifically, in the educational field, professional agents intervene with disadvantaged youth by assuming a dual role: on one hand, they are committed to advocating for the interests of young people by facilitating the achievement of personal goals; on the other hand, they are also required to respect the bureaucratic regulatory framework that often hinders this social group's lives (Díez-Bermejo et al., 2021; Fernández-Simo et al., 2022; Junta de Andalucía, 2018; Junta de Andalucía, 2024; Torres-Gutiérrez, 2021; van Raemdonck et al., 2021).

Moreover, the difficult situation faced by individuals living in areas of social exclusion has worsened significantly in recent years. These areas are characterized by high rates of school dropout and absenteeism. High school dropout rates have a very negative impact on the country, such as creating an underqualified workforce unable to access quality jobs or diverting young people into activities with harmful consequences. Therefore, it is crucial that students have goals and skills to develop as individuals and contribute positively to society in the future. Given this alarming reality, it is imperative to seek alternative solutions to introduce computer science into classrooms (Devlin et al., 2023; Díaz-León et al., 2023; Scandurra & Xavier, 2021; Shapira et al., 2023; Wang et al., 2022).

Taking all the aforementioned into account, the present study's general objective is to explore

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the use of AI applications that enhance the academic performance of students living in socially excluded areas to prevent school dropout.

2. MATERIALS AND METHODS

2.1 Methodology

The methodology is based on the use of a focused literature review to synthesize and analyze AI applications that enhance academic performance and prevent school dropout. In this sense, the aim is to identify and synthesize the characteristics to address the objective of the present research (Rubio-Hernández et al., 2020; Pardal-Refoyo & Pardal-Peláez, 2020). Thus, information regarding the application's name, objectives, applicability, usage, accessibility, and improvements will be extracted.

2.2 Search Strategy and Procedure

The databases used to carry out the literature review were Scopus and Web of Science, including grey literature (conferences, websites, book chapters, etc.). Additionally, the keywords, previously identified in the ERIC and UNESCO thesauri in both English and Spanish, are specified in Table 1. The descriptors were combined using Boolean operators (AND/OR/NOT) and truncation symbols (*/?).

Table 1. *Keywords*

Participantes	Colectivos vulnerables	Participants	Vulnerable groups
	Jóvenes		Youths
	Adolescentes		Teenagers
	Menores de edad		Minors
	Jóvenes desfavorecidos		Disadvantaged youth
	Estudiantes		Students
Intervención	Inclusión social	Intervention	Social inclusion
	Exclusión social		Social exclusion
	Abandono escolar		School dropout
	Inteligencia artificial		Artificial intelligence
	Aplicaciones		Applications
	Herramientas		Instruments

2.3 Eligibility Criteria

On one hand, regarding the eligibility criteria, the following were selected: a) Applications aimed at students; b) Applications specifically designed to improve academic performance; c) Free accessibility to the application. On the other hand, regarding the exclusion criteria, the following were included: d) Applications intended for Early Childhood Education, Higher Education, and Vocational Training stages; e) Tools designed in a language other than Spanish and/or English.

2.4 Analysis of AI Applications

Given that the methodology is mainly based on the general description of AI applications aimed at improving academic performance to prevent school dropout, a descriptive analysis (frequencies and percentages) of the tools that meet the inclusion criteria will be conducted.

3. RESULTS AND DISCUSSION

Next, Table 2 provides a general overview of AI applications that enhance academic performance and prevent school dropout. At first glance, it can be observed that there are a variety of tools aimed at facilitating the teaching-learning process. Furthermore, in general terms, all the

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applications are intended to improve writing skills, generate new ideas, process information, create presentations, solve problems, and plan actions.

On another note, the majority of these applications (90%, n = 18) are applicable across any curricular area, while the remaining (10%, n = 2) address cross-curricular aspects. Similarly, 90% (n = 18) of the applications require electronic registration for access, while 10% (n = 2) do not require it. Additionally, all the applications are free of charge, although two of them limit their use if no registration is completed. Finally, all the tools (95%, n = 19) contribute to improving academic performance, except for one (5%), which is aimed at enhancing psychological well-being.

Table 2. AI Applications That Enhance Academic Performance and Prevent School Dropout

Jenni AI	Escribir y editar textos	Áreas curriculares	Registro electrónico	Gratuito	Rendimiento académico
Cogram AI	Tomar notas, realizar seguimientos de las acciones, resumir textos	Áreas curriculares	Registro electrónico	Gratuito	Rendimiento académico

Aplicación	Objetivo	Aplicabilidad	Uso	Accesibilidad	Mejora
Undetectable AI	Humanizar textos escritos por una herramienta IA	Áreas curriculares	Sin registro electrónico	Gratuito	Rendimiento académico
Claude AI	Procesar información; generar ideas y texto; facilitar la comprensión de textos; simplificar el trabajo; realizar resúmenes	Áreas curriculares	Registro electrónico	Gratuito, con limitaciones de uso	Rendimiento académico
Tome AI	Crear presentaciones y documentos	Áreas curriculares	Registro electrónico	Gratuito, con limitaciones de uso	Rendimiento académico
Glasg AI	Resaltar y organizar ideas	Áreas curriculares	Registro electrónico	Gratuito	Rendimiento académico
WolframAlpha	Resolver problemas en cualquier área curricular	Áreas curriculares	Registro electrónico	Gratuito	Rendimiento académico
ChatGPT	Realizar actividades mediante preguntas	Áreas curriculares	Registro electrónico	Gratuito	Rendimiento académico
Youper AI	Atender a la salud mental; Reducir la depresión y la ansiedad	Áreas transversales	Registro electrónico	Gratuito	Bienestar psicológico
GoatChat – AI Twin Assistant	Realizar diversas tareas (textos, resúmenes...) a través de preguntas y respuestas	Áreas curriculares	Registro electrónico	Gratuito	Rendimiento académico

LuzIA	Ayudar en tareas de diversa índole (tareas cotidianas, estudios, idiomas...)	Áreas curriculares	Sin registro electrónico	Gratuito	Rendimiento académico Bienestar psicológico
Grammarly	Mejorar la expresión escrita	Áreas curriculares	Registro electrónico	Gratuito	Rendimiento académico
Figma	Diseñar y construir actividades	Áreas curriculares	Registro electrónico	Gratuito	Rendimiento académico Trabajo en equipo
Pitch	Crear presentaciones en línea	Áreas curriculares	Registro electrónico	Gratuito	Rendimiento académico
Notion	Escribir textos, organizar la información y gestionar trabajos	Áreas curriculares	Registro electrónico	Gratuito	Rendimiento académico
WriteFull	Escribir, parafrasear y editar documentos	Áreas curriculares	Registro electrónico	Gratuito	Rendimiento académico
Easy-peasy AI	Crear contenido, elaborar imágenes, generar audio y transcribir textos	Áreas curriculares	Registro electrónico	Gratuito	Rendimiento académico
Jasper AI	Parafrasear	Áreas curriculares	Registro electrónico	Gratuito	Rendimiento académico
Elai AI	Crear videos a partir de texto	Áreas curriculares	Registro electrónico	Gratuito	Rendimiento académico
Gravity Write	Crear páginas web, imágenes, publicaciones en redes sociales, correos electrónicos	Áreas transversales	Registro electrónico	Gratuito	Rendimiento académico

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The objective of this research was to explore the use of AI applications that improve the academic performance of students living in socially excluded areas to prevent school dropout. Artificial intelligence is beginning to exemplify novel teaching and learning methods, while also demonstrating its potential to personalize learning. In this sense, its application in educational environments covers, among other aspects, intelligent, conversational, and personalized educational systems, such as systems that provide assessment, feedback, and facilitate teamwork (Bulathwela et al., 2022; Bulut et al., 2023; Brusilovsky, 2023; Nazaretsky et al., 2022; Rahman & Watanobe, 2023; St-Hilaire et al., 2022).

The AI tools selected in the present study offered a wide range of functions, such as humanizing written texts, processing and summarizing information, generating and organizing ideas, facilitating text comprehension, creating presentations, websites, and videos, problem-solving, supporting mental health, improving writing skills, generating images, creating audio, and planning, among others. Moreover, various studies have shown that the use of AI allows students to follow their learning process at their own pace by providing feedback, suggestions, or guidance, in addition to designing teaching processes according to each student's individual needs (Ali et al., 2023; Crompton et al., 2022; Crompton & Burke, 2023; Holmes et al., 2019; Zhan et al., 2022).

Additionally, the applicability of these tools can be found across any field of knowledge, including cross-curricular areas. AI in educational environments translates into designing guidelines that not only engage students but also challenge them to think critically and creatively. Thus, it has the capacity

to transform traditional classrooms into interactive tools that stimulate deeper learning and understanding across any curricular area. In this sense, the importance of using AI applications in education cannot be underestimated, as it is becoming increasingly sophisticated and integrated into various learning environments. It also allows educational agents to guide AI interactions in ways that enhance the educational experience, facilitating the creation of personalized learning scenarios that adapt to the needs and abilities of each student, making learning more engaging and effective (Chen et al., 2023; Eager & Brunton, 2023; Lee et al., 2023; Muthmainnah et al., 2022; Theophilou et al., 2023; van den Berg & du Plessis, 2023).

Regarding usage and accessibility, most of the tools require electronic registration and are free of charge. Given that technology is revolutionizing academic support by shifting from traditional human-centered approaches to automated online AI-based methods, technological resources offer a non-traditional support experience, while also reducing costs, increasing flexibility and accountability, and optimizing services. This promotes improved student satisfaction and higher graduation rates. Nevertheless, even though AI offers an alternative for students who cannot rely on tutors, its use should be viewed as a support rather than a replacement for human counseling (Assiri et al., 2020; Caratiquit & Caratiquit, 2023; Dahri et al., 2023a; Dahri et al., 2023b; Dahri et al., 2022).

Likewise, technological applications have contributed to a transformative era of academic support within educational institutions, going beyond conventional boundaries. Their multifaceted advantages include personalized guidance, timely assistance, data-driven information, and the availability of virtual

advisors, among others. This constant accessibility is particularly valuable in the digital age, where students seek instant solutions to academic queries and greater engagement. Thus, these tools foster active support, enabling the student population to interact seamlessly with academic guidance, strengthening their connection and commitment to the teaching-learning process (Ahmad et al., 2021; Ahmad & Ghapar, 2019; AIDhaen, 2022; Bilquise et al., 2023; Dahri et al., 2019; Dahri et al., 2022).

However, the shortage of teaching staff also poses a major challenge, hindering personalized attention. Current educational models face obstacles in addressing diverse learning styles and the evolving needs of students in the 21st century. This can leave students feeling unsupported and impact their academic performance. In this context, AI-based academic support emerges as a promising solution. Its benefits are numerous, from providing personalized learning pathways and attending to individual needs to offering academic support. It effectively overcomes limitations related to time, geographical barriers, and teacher availability. The use of AI-driven tools can offer a new learning process by incorporating interactive experiences and personalized feedback. In this sense, it has the potential to significantly boost motivation and improve academic performance (Assiri et al., 2020; Qureshi et al., 2012; Foroughi et al., 2023; Khan, 2023; Ouyang et al., 2022; Su & Yang, 2023).

Thus, it can be seen that AI holds the potential to create a more supportive and engaging learning environment, reducing the gap between existing resources and students' needs.

4. CONCLUSIONS

The most Support during teaching-learning processes is crucial for student success and for

achieving both personal goals and learning objectives. In this way, the active relationship between advisor and student is essential to overcoming difficulties, promoting student success and satisfaction.

AI in the field of education marks a transformative era that is fundamentally redefining teaching and learning methodologies. One of the most appealing perspectives it offers in educational institutions is the personalization of learning experiences, as it has the ability to adapt educational content to each individual's unique learning styles and needs, thus highlighting its potential to achieve goals effectively and engagingly.

Nevertheless, continuous teacher training is crucial to ensure they can effectively integrate AI applications into their pedagogical practices. Similarly, the ethical and social implications of AI in education are important, where the integration of technological resources requires a critical approach to address biases, guarantee privacy and security, and promote ethical use.

Another important aspect is accessibility to AI resources, where ensuring equitable access is imperative to prevent educational disparities from widening. Moreover, it is especially relevant to develop a critical mindset toward AI among students and educators in order to fully and responsibly leverage the potential of these technologies. Perhaps the most significant risk is that both students and professionals may use AI systems without acknowledging their limitations.

Therefore, considering all of the above, it is suggested that future lines of research aim to explore effective methods for integrating AI literacy across different educational stages and curricular areas, as well as to develop and

implement transparent, unbiased technological tools that respect student privacy.

Finally, we would like to conclude by highlighting the main limitations: a) The selected AI tools in this study were not applied to determine to what extent they contribute to improving academic performance and preventing school dropout; b) There is a lack of research specifically focused on the use of AI for school dropout prevention.

5. ACKNOWLEDGEMENTS

University Teacher Training Fellowship (FPU20/04914). Grant funded by MCIN/AEI/10.13039/501100011033 and, where applicable, by “FSE Invests in Your Future” or by the “European Union NextGenerationEU/Recovery, Transformation and Resilience Plan (PRTR).”

University Teacher Training Fellowship (FPU22/00811). Grant funded by the State Plan for Scientific and Technical Research and Innovation (PEICTI) 2021–2023.

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