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# THE USE OF INFORMATION TECHNOLOGY IN EDUCATION: THE APPLICATION OF ARTIFICIAL INTELLIGENCE IN ONLINE SYSTEMS

# O USO DE TECNOLOGIA DA INFORMAÇÃO NO ENSINO: A APLICAÇÃO DE INTELIGÊNCIA ARTIFICIAL EM SISTEMAS ONLINE

# EL USO DE LAS TECNOLOGÍAS DE LA INFORMACIÓN EN LA EDUCACIÓN: LA APLICACIÓN DE LA INTELIGENCIA ARTIFICIAL EN SISTEMAS EN LÍNEA

https://doi.org/10.56238/sevened2025.030-049

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**ABSTRACT**
In a Brazilian educational context, it is not uncommon to see tools that improve and stimulate learning. This article aims to investigate the possible applications of Information Technology in education, focusing on the hypothesis that Artificial Intelligence (AI) can be effectively used to improve learning through online systems. The general objective is to examine and demonstrate how AI and other strategic technologies can improve education, such as their use in digital platforms and techniques like gamification. The specific objective is to conceptualize and explore the applications of AI in online systems and gamification for education, as well as to demonstrate how these tools can improve the learning experience and expand the reach of education. The methodology adopted is deductive, with a qualitative approach, justified by the social and academic relevance of the topic in the current educational landscape.

**Keywords:** Teaching. Technology. AI. Possibility. Learning.

**RESUMO**
Em um contexto no Brasil acerca do ensino, percebe-se que é não seria incomum verificar ferramentas que aperfeiçoem e estimulem a forma de aprender. Este artigo visa investigar as possíveis aplicações de Tecnologias da Informação no ensino, com foco na hipótese de que a Inteligência Artificial (IA) pode ser utilizada de maneira eficaz para otimizar o aprendizado através de sistemas online. O objetivo geral seria verificar e demonstrar como a IA e outras tecnologias contribuem para melhorar a educação, como, por exemplo, na sua utilização em plataformas digitais e técnicas como a gamificação. O objetivo específico é conceituar e explorar as aplicações de IA, em sistemas online e gamificação, para o ensino, além de mostrar como essas ferramentas podem melhorar a experiência de aprendizado e ampliar o alcance da educação. A metodologia adotada é dedutiva, com uma abordagem qualitativa, justificando-se pela relevância social e acadêmica do tema no cenário educacional atual.

**Palavras-chave:** Ensino. Tecnologia. IA. Possibilidade. Aprendizado.

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**RESUMEN**
En el contexto educativo brasileño, es frecuente encontrar herramientas que mejoran y estimulan el aprendizaje. Este artículo investiga las posibles aplicaciones de las tecnologías de la información en la educación, partiendo de la hipótesis de que la inteligencia artificial (IA) puede utilizarse eficazmente para optimizar el aprendizaje mediante sistemas en línea. El objetivo general es verificar y demostrar cómo la IA y otras tecnologías contribuyen a la mejora de la educación, por ejemplo, mediante su uso en plataformas digitales y técnicas como la gamificación. El objetivo específico es conceptualizar y explorar las aplicaciones de la IA en sistemas en línea y la gamificación para la educación, así como demostrar cómo estas herramientas pueden mejorar la experiencia de aprendizaje y ampliar el alcance de la educación. La metodología adoptada es deductiva, con un enfoque cualitativo, justificada por la relevancia social y académica del tema en el panorama educativo actual.

**Palabras clave:** Enseñanza. Tecnología. IA. Posibilidad. Aprendizaje.

## 1 INTRODUCTION

Digital transformation has generated considerable advances in several areas, and education is one of the sectors that has benefited the most from this evolution. The focus of this study is to investigate whether it is possible to use Information Technologies, especially Artificial Intelligence, to promote improvements in teaching.

The intended idea under analysis presented in this work is that the integration of these technologies in online education systems is not only feasible, but also effective, being able to create more dynamic and efficient learning environments. The central idea is that Artificial Intelligence, when applied to teaching platforms, can personalize the learning process, adapting to the needs of students and making the experience more interactive and engaging.

In addition, the flexibility provided by online systems, coupled with the use of advanced technologies, allows for a more accessible and accessible education to a wider audience. Thus, the integration of these technologies has the potential to transform teaching, providing a more adapted, efficient, and quality experience for students.

This digital transformation has provided significant advances in several areas, and education is no exception. The central question of this study is: would it be possible to use information technologies, especially Artificial Intelligence, to promote improvements in education? The hypothesis presented in this work is that yes, it is possible and feasible to integrate these technologies into online education systems, in order to create more dynamic and efficient environments for learning.

The overall objective is to demonstrate how Artificial Intelligence and other technologies can be incorporated into online education systems, expanding learning opportunities. Specifically, it seeks to conceptualize AI, online systems, and gamification, highlighting their contributions to improving educational processes.

The methodology used is of a deductive nature, with a qualitative approach, in order to understand the practices and impacts of information technologies in the educational context. This research is justified by its social and academic importance, since the use of technologies in teaching can expand access and improve the quality of education.

## 2 METHODOLOGY

The methodology used is of a deductive nature, with a qualitative approach, in order to understand the practices and impacts of information technologies in the educational

context. This research is justified by its social and academic importance, since the use of technologies in teaching can expand access and improve the quality of education.

According to Gil (2017), deductive research would be defined with an analysis of the researched, based on general data and classifying the individual cases that appear sequentially, in this case, obtained in surveys, directed by bibliography, books and articles. Thus, it is a qualitative analysis, by the works and directions of the area, with a deductive form of general positioning applied to individual cases that fit into a certain situation.

## 3 THEORETICAL FRAMEWORK

This chapter presents the concept and application of three exponents of information technologies that are fundamental for innovation in education: Artificial Intelligence, online education systems and gamification.

### 3.1 ARTIFICIAL INTELLIGENCE IN EDUCATION

Artificial Intelligence (AI) refers to the ability of machines to perform tasks that traditionally require human intelligence, such as reasoning, learning, and problem-solving (Baker & Siemens, 2021).

The use of Artificial Intelligence (AI) in teaching has become a powerful tool to personalize learning, improve school management, and support the development of cognitive skills in students.

AI can be used to tailor courseware according to the individual needs of students. AI-based learning systems, such as smart tutors, analyze student performance and adjust content according to the level of understanding and difficulties encountered. This allows each student to have a unique learning experience, which can improve academic results. According to what is implied by the analysis of the research by Baker & Siemens (2014).

It is highlighted, as an understanding of AI (and its learning), which, for example, can be used to analyze student performance, identify patterns, and predict academic results. This can be useful for early intervention, helping teachers identify students who may need additional support before their results degrade.

The same authors make it clear that AI can automate administrative tasks, such as correcting tests, analyzing educational data, and even organizing teaching materials. This frees up educators' time, allowing them to focus more on teaching and developing relationships with students, and accessibility tools for students with disabilities could be

created, such as automatic text-to-speech translators, real-time captioning, and voice-based learning resources. This makes learning more accessible for all students, regardless of their abilities or special needs.

The use of AI in education is also related to the development of 21st-century skills, such as critical thinking, problem-solving, and collaboration. AI-based tools can support the teaching of these skills by providing interactive simulations, educational games, and dynamic learning environments.

In this reasoning, in the educational context, AI can be used to personalize learning, adjusting content and pace according to the needs of each student. Tools such as intelligent tutors, content recommendation systems, and predictive analytics are examples of how AI can be applied to optimize the teaching-learning process.

## 3.2 ONLINE EDUCATION SYSTEMS

Online education systems have become popular as an alternative to complement or even replace traditional teaching methods. Online platforms allow educators to make content available, monitor student progress, and promote interaction between participants efficiently. These systems enable flexible learning, accessible from anywhere, and adapted to the needs of each student, as understood by the research (Gaalen, 2020).

According to Gaalen (2020), **Online teaching platforms** offer educators (in their health study) the possibility of making **educational content** available in different formats, such as videos, texts, quizzes, and discussion forums, asynchronously or live. This allows students to study according to their own schedules and pace, which is ideal for those who have **external commitments** or more independent learning preferences.

Flexibility is one of the main advantages of online systems, as it eliminates the **physical limitation** of a specific learning location (such as the traditional classroom) and allows students to **access content from anywhere** that has an internet connection. This feature is especially important for students from remote regions, who may have difficulty accessing a traditional school. In addition, it allows students to repeat the content whenever necessary, until they feel comfortable with learning, which is difficult to achieve in a traditional face-to-face system.

This makes it easier to identify **learning disabilities (*gaps*)** in real time, allowing for faster and more personalized interventions. In addition, many systems use **machine**

**learning algorithms** to analyze performance patterns and offer suggestions for content or activities that can help the student overcome their difficulties.

For all this panorama, it is verified that these interactions are crucial for students to develop communication and collaboration skills, and they also help to create a **sense of community**, which can be a challenge in a purely digital environment.

With online education systems, **accessibility expands**, allowing students from different parts of the world to have access to quality courses, often without having to travel. This is particularly important for, for example,**students with disabilities**, who can benefit from technologies such as screen readers, real-time subtitles, and translation tools, or **students in remote regions or with transportation difficulties** who would otherwise not have access to certain courses or educational institutions.

## 3.3 GAMIFICATION IN EDUCATION

Gamification in education uses game elements, such as scoring, rewards, and competition, to engage students and make learning more interactive and motivating. This technique has been widely adopted in virtual environments, creating a more engaging learning experience. In addition, gamification can help improve content retention and increase student engagement, making the educational process more dynamic and enjoyable (Christopoulos, 2023).

Gamification in teaching has proven to be a powerful and innovative tool to transform the learning process. By integrating typical game elements, such as scoring, rewards, and competition, it creates a more engaging dynamic, motivating students to dedicate themselves more to learning and overcome challenges.

Unlike traditional methods, which can often be seen as monotonous or demotivating, gamification offers a more interactive learning experience, where students feel more active participants in the educational process. This approach is especially effective in virtual teaching environments, where digital resources allow the implementation of scoring systems, medals, rankings, and even missions or challenges that must be completed by students (Dahalan, 2023).

These elements are common in games, but when applied to the educational context, they make learning more engaging, fun, and accessible. For example, a student can earn points for completing a study module or for correctly answering a quiz, and these rewards can be accumulated to unlock new content or features within the platform.

In addition to making the learning process more dynamic, Christopoulos (2023) refers to the idea that gamification can also help improve content retention. When learning is gamified, it is no longer just a hard task and becomes an activity that the student proposes to do with enthusiasm, since the rewards and continuous progress keep motivation high. This is crucial to ensure that the knowledge gained is not easily forgotten, as is often the case with traditional methods, where students feel unmotivated or saturated over time.

Another important point is that gamification has the power to increase student engagement. The sense of progress, whether through accumulated points or overcoming a challenge, creates a positive learning experience. This can be particularly beneficial in educational contexts where students, especially younger ones or those facing attention difficulties, tend to become distracted or disinterested quickly.

According to Dalahan's (2023) idea, by introducing elements of healthy competition, such as rankings or collaborative challenges, gamification can also stimulate cooperation among students and the development of teamwork skills. In addition, gamification allows for a more personalized approach to learning, as it can be adjusted according to the individual progress of each student.

On a gamified platform, each student can advance at their own pace, taking on the challenges that best suit their level of knowledge, without the pressure of following a rigid schedule or competing directly with other students in terms of time. This makes the process more inclusive and accessible for all student profiles.

In terms of effectiveness, research indicates that gamification not only makes learning more attractive, but can also be an ally in the development of cognitive and emotional skills, such as problem-solving, strategic thinking, and persistence. When facing challenges in a gamified learning environment, students are encouraged to try again, learn from mistakes and seek creative solutions to obstacles, characteristics that are valuable for their academic and personal growth.

## 4 GENERAL DISCUSSION

### 4.1 OUTPUTS ANALYSED AND RESULTS

The results indicate that it is, in fact, possible to use AI in online systems to improve the teaching experience. Tools such as virtual tutors, adaptive teaching platforms, and content recommendation systems are becoming increasingly common. AI has proven to be

efficient in personalizing learning, providing students with a more focused and interactive experience.

In addition, the use of gamification has shown positive results in terms of student engagement and motivation, contributing to the creation of a more stimulating learning environment.

The results indicate that it is, in fact, possible to use artificial intelligence (AI) in online systems to improve the teaching experience. Tools such as virtual tutors, adaptive teaching platforms, and content recommendation systems are becoming increasingly common.

AI has been shown to be effective in personalizing learning, allowing students to have a more focused and interactive experience that is tailored to their specific needs. This personalization not only makes learning more efficient but also increases engagement, as students can progress at their own pace and receive suggestions for content that better suits their interests and difficulties.

In addition, the use of gamification has shown positive results, especially with regard to student engagement and motivation. The incorporation of elements such as points, rewards, and challenges contributes to creating a more stimulating learning environment, where students feel more involved in the educational process.

These elements make learning more dynamic, promoting greater interaction between students and the content, as well as encouraging active participation and continuous effort. Combined, AI and gamification have the potential to transform online teaching, making it more engaging, effective, and tailored to the individual needs of learners.

## 4.2 DISCUSSION OF RESULTS

The results obtained by the content demonstrated indicate that the use of artificial intelligence (AI) in online systems can, in fact, improve the teaching experience. Tools such as virtual tutors, adaptive teaching platforms, and content recommendation systems are becoming increasingly frequent in the educational environment.

AI has been shown to be effective in personalizing learning, providing a more focused and interactive experience for students, tailored to their specific needs. This personalization process allows students to advance in learning at their individual pace and receive content suggestions that better suit their preferences and difficulties, which contributes to learning efficiency.

In addition, gamification has shown positive results, especially in relation to student engagement and motivation. Incorporating typical game elements such as points, rewards, and challenges helps create a more stimulating learning environment where students feel more involved in the educational process. These elements make the learning experience more dynamic, promoting deeper interaction between students and the content, as well as encouraging active participation and continuous effort. When combined, AI and gamification have the potential to transform online teaching, making it more engaging, effective, and tailored to the individual needs of each student.

The content and data collected point to a promising future in the integration of information technologies into education. AI and online systems have the potential to transform the way students learn, creating a more flexible, dynamic, and accessible educational environment. The personalization of learning, combined with the use of gamification, can significantly improve the effectiveness of teaching and increase student engagement.

Although there are still challenges, such as the need for technological infrastructure and the training of educators, the possibilities offered by these technologies are immense and should be explored in more depth.

Thus, it is possible, as has been exposed so far, to use AI in online education systems. AI can be applied in several areas, such as content personalization, analysis of student behavior, automatic feedback, and optimization of the teaching-learning process. Through machine learning algorithms, it is possible to create platforms that adapt to the individual needs of students, offering a personalized educational path.

In addition, online systems offer flexibility and accessibility, making teaching more democratic and allowing students from different parts of the world to access quality educational resources. Integrating AI into these systems can further speed up the process of personalizing and optimizing learning.

Gamification, when integrated with online systems, contributes to greater student interaction and motivation. Educational games, challenges, rankings, and prizes encourage student engagement and make the learning process more interesting. Gamification can also be used to evaluate students' progress in a playful way, which facilitates the retention of information and the improvement of acquired skills.

## 5 CONCLUSION

This study confirmed the hypothesis that the use of Information Technologies, especially Artificial Intelligence, in online education systems, is not only feasible, but also brings significant benefits.

AI allows you to personalize the learning experience, adjusting to the individual needs of each student, while online systems offer flexibility and accessibility, which extends the reach of teaching.

Also, auxiliary tools, such as gamification, in turn, have shown effectiveness in engaging and motivating students, making learning more dynamic and interactive. With the integration of these technologies, education can be transformed, not only by expanding its reach, but also by improving the quality of teaching.

However, for this transformation to be effective, it is essential that there are investments in technological infrastructure, in the training of educators, and in the creation of content adapted to new digital platforms. In this way, the combination of AI with online systems and gamification can provide a richer and more effective educational experience.

This study confirmed the hypothesis that the use of Information Technologies, especially Artificial Intelligence, in online education systems, is not only possible but also beneficial. AI can personalize the learning experience, adapting to the needs of each student, while online systems offer flexibility and accessibility. Gamification contributes to engaging and motivating students, making learning more dynamic.

Therefore, the adoption of these technologies has the potential to transform education, expanding its reach and improving the quality of teaching. For this to happen effectively, it is essential to invest in technological infrastructure, training of educators, and the creation of content adapted to new digital platforms.

## REFERENCES

Baker, R. S. (2021). Artificial intelligence in education: Applications and research directions. Springer. https://books.google.com.br/books?hl=pt-BR&lr=&id=Yj8yEAAAQBAJ

Baker, R. S., & Siemens, G. (2014). Educational data mining and learning analytics. Journal of Educational Data Mining, 6(1), 1–17. https://doi.org/10.1017/CBO9781139519526.016

Christopoulos, A., & Mystakidis, S. (2023). Gamification in education. Encyclopedia, 3(4), 1223–1243. https://doi.org/10.3390/encyclopedia3040089

Dahalan, F., Alias, N., & Shaharom, M. S. N. (2023). Gamification and game based learning for vocational education and training: A systematic literature review. Education and Information Technologies. Advance online publication. https://doi.org/10.1007/s10639-023-11906-1

Gil, A. C. (2017). Como elaborar projetos de pesquisa (6th ed.). Atlas.

van Gaalen, A. E. J., et al. (2020). Gamification of health professions education: A systematic review. Advances in Health Sciences Education, 26(2), 683–711. https://doi.org/10.1007/s10459-020-10000-3