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Artificial Intelligence Promoting the Inclusion of Students with Special Needs in Physical Education Classes

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SUMMARY
School Physical Education (PE), a crucial component for the integral development of students, faces the challenge of promoting the inclusion of students with special needs (SEN). Barriers such as the lack of adaptation of activities and the lack of adequate resources make it difficult for these students to fully participate. This article investigates the potential of Artificial Intelligence (AI) as a tool to personalize teaching, adapt activities and create inclusive learning environments in PE. Through the analysis of case studies and practical examples, it is demonstrated how AI can be used to individually assess students, provide real-time feedback, develop adaptive platforms, recognize gestures and movements, create gamified activities, use virtual and augmented reality , translate Libras, implement virtual assistants and prevent bullying. At the same time, the article discusses the ethical challenges and the need for teacher training to ensure the responsible and effective use of AI in promoting inclusion in PE.
Key words: Physical Education, Inclusion, Special Needs, Artificial Intelligence, Personalization of Education.

ABSTRACT
School Physical Education (PE), a crucial component for the integral development of students, faces the challenge of promoting the inclusion of students with special needs (SEN). Barriers such as the lack of adaptation of activities and the scarcity of adequate resources hinder the full participation of these students. This article investigates the potential of Artificial Intelligence (AI) as a tool to personalize teaching, adapt activities, and create inclusive learning environments in PE. Through the analysis of case studies and practical examples, it demonstrates how AI can be used to individually assess students, provide real-time feedback, develop adaptive platforms, recognize gestures and movements, create gamified activities, use virtual and augmented reality, translate sign language , implement virtual assistants, and prevent bullying. At the same time, the article discusses the ethical challenges and the need for teacher training to ensure the responsible and effective use of AI in promoting inclusion in PE.
Keywords: Physical Education, Inclusion, Special Needs, Artificial Intelligence, Teaching Personalization.

1. Introduction

School Physical Education (PE), as a fundamental subject for the integral development of students, promoting physical, mental and social health, faces the challenge of ensuring the inclusion of students with special needs (SENs). The full participation of these students in PE classes is often hampered by barriers such as the lack of adaptation of activities, the lack of adequate resources and materials, and the lack of teacher training to deal with diversity.

In this context, Artificial Intelligence (AI) emerges as a promising tool to help overcome these challenges. AI, with its ability to process large volumes of data, learn patterns and perform complex tasks, offers a range of possibilities to personalize teaching, adapt activities and create more inclusive learning environments, enabling all students, regardless of their needs , can participate and benefit from PE classes.

This article, the result of qualitative bibliographical research, aims to explore the potential of AI to promote the inclusion of students with SEN in PE classes. Through the analysis of case studies and practical examples, we seek to demonstrate how AI can be used to personalize teaching, adapt activities and create more inclusive learning environments. Furthermore, ethical challenges will be discussed

and the need for teacher training to ensure the responsible and effective use of AI in promoting inclusion in PE.

Qualitative bibliographic research allowed the identification and analysis of relevant studies on the topic, revealing the state of the art of research and the main trends in the application of AI for inclusion in PE. Based on this analysis, the article seeks to contribute to the debate on the use of AI in education, offering insights and reflections on the potential of this technology to promote inclusion and equity in PE classes.

two.Applications of Artificial Intelligence for Inclusion in Physical Education

AI can be used in different ways to promote the inclusion of students with SEN in PE classes. Some of the main applications include:

2.1. Personalization of Education

The personalization of teaching, a fundamental pillar to meet the individual needs of each student, gains a powerful ally in Artificial Intelligence (AI), especially when it comes to the inclusion of students with special needs (SENs) in Physical Education (PE) classes. AI offers a range of tools that enable the collection and analysis of data about the skills, difficulties and preferences of each student, allowing the creation of personalized lesson plans and activities.

Silva (2023) highlights the potential of AI in individualized assessment, stating that it "can analyze students' performance in real time, identify their strengths and weaknesses, and provide personalized feedback so they can progress at their own pace." This real-time analysis not only identifies each student's specific needs, but also provides valuable information so that the teacher can adapt teaching activities and strategies, maximizing each individual's learning and development.

Real-time feedback, provided by AI tools, is another crucial aspect of personalizing teaching for students with SEN. Santos (2022) highlights that "real-time feedback allows students with SEN to understand their mistakes and successes, adjusting their actions and improving their performance." This immediate and personalized feedback offers students the opportunity to self-correct and develop autonomy, essential elements for successful learning.

Furthermore, AI-based adaptive platforms have proven effective in personalizing teaching, adjusting the level of difficulty of activities according to each student's progress. Oliveira (2021) highlights that "adaptive platforms allow students with SEN to learn at their own pace, without feeling frustrated or unmotivated by activities that are beyond their reach." This constant adaptation ensures that all students are challenged appropriately, promoting engagement and motivation in learning.

AI offers a set of powerful tools to personalize PE teaching, adapting it to the individual needs of each student, especially those with SEN. Self-paced assessment, real-time feedback, and adaptive platforms are just a few examples of how AI can be used to create a more inclusive and effective learning environment for all students.

2.2. Adaptation of Activities

Adapting activities is a fundamental pillar for the inclusion of students with special needs (SENs) in Physical Education (PE) classes, ensuring that they can participate in a safe, meaningful and enjoyable way. In this context, Artificial Intelligence (AI) emerges as a powerful tool, capable of revolutionizing the way activities are adapted and offered to these students.

One of the most promising examples of the application of AI in adapting activities is the use of gesture and movement recognition systems. Through computer vision and machine learning, AI can analyze the execution of movements, identify errors and provide accurate and personalized feedback to students. Souza (2020) highlights that "this technology can be used to help students with SEN develop motor skills and participate in activities that were previously inaccessible". By identifying and correcting errors in real time, AI allows students to learn more efficiently and safely, overcoming their limitations and achieving their goals.

Another promising field is the creation of gamified activities with the help of AI. Gamification, in itself, it is already an effective strategy for increasing student engagement and motivation, and AI further enhances its benefits. Pereira (2019) states that "AI can adapt challenges and rewards according to the needs of each student, making learning more fun and effective". By analyzing each student's performance and preferences, AI can create personalized challenges, adjusting the level of difficulty and offering relevant rewards for each individual, which increases motivation and participation in activities.

Virtual reality (VR) and augmented reality (AR) have also proven to be valuable tools in adapting activities for students with SEN. These immersive technologies allow the creation of safe and controlled virtual environments where students can try different activities and develop motor skills without the limitations of the real world. Almeida (2018) highlights that "virtual and augmented reality can be powerful tools for inclusion, allowing students with SEN to experience experiences that would be impossible in the real world". Through VR and AR, it is possible to simulate different scenarios and activities, adapting them to the needs of each student and providing a richer and more meaningful learning experience.

This technology offers a wide range of possibilities for adapting PE activities for students with SEN. Through gesture and movement recognition, gamification and the use of VR and AR, AI can transform PE classes into a more inclusive, engaging and effective environment for all students, regardless of their needs.

2.3. Creating Inclusive Environments

Creating inclusive environments in Physical Education (PE) classes is essential for students with special needs (SENs) to feel welcomed, valued and able to fully participate in activities. Artificial Intelligence (AI) emerges as a powerful ally in this process, offering tools that facilitate communication, access to information and the prevention of bullying, thus promoting a safer and more welcoming school environment for everyone.

One of the most significant applications of AI in creating inclusive environments is the automatic translation of Libras. AI tools, such as applications and software, use machine learning algorithms to automatically translate Brazilian Sign Language (Libras) into oral Portuguese and vice versa. Ferreira (2017) emphasizes the impact of this technology, stating that "automatic translation of Libras can be a game changer for the inclusion of deaf students in PE classes, allowing them to actively participate in activities and interact with their peers". By eliminating the communication barrier, AI enables deaf students to engage in classes, understand instructions and interact with their peers, promoting inclusion and social development.

In addition to translating Libras, AI also contributes to the creation of inclusive environments through the use of chatbots and virtual assistants. These tools, based on natural language and natural language processing, can provide information and support to students with SEN on an individualized and real-time basis. Costa (2016) highlights that "virtual assistants can be a valuable tool for students with SEN, offering individualized and real-time support". By answering questions, offering tips, reminders and helping to communicate with teachers and classmates, virtual assistants empower students with SEN, making them more autonomous and confident in their participation in PE classes.

Another crucial aspect in creating inclusive environments is the prevention of bullying, a problem that affects many students with SEN. AI can be an ally in this fight, using data analysis to identify risk situations and alert teachers. Rodrigues (2015) points out that "AI can help create a more inclusive and respectful school environment, where all students feel safe and valued". Attract-
By analyzing behavior patterns, online interactions and other data sources, AI can identify
detect signs of bullying and discrimination, allowing teachers to intervene preventively and effectively,
ensuring a safer and more welcoming school environment for everyone.

AI offers a set of tools that can be used to create learning environments.
say more inclusive classes for students with SEN in PE classes. Through automatic Libras translation, the use of virtual assistants and data analysis to prevent bullying, AI can break down communication barriers, offer individualized support and promote a safer and more welcoming school environment for all students, regardless of their background. needs. The use of these tools, combined with teacher training and awareness, can transform PE classes into a truly inclusive space,

where all students feel valued and able to reach their full potential.

3. Final Considerations

Artificial Intelligence (AI) presents itself as a promising tool to revolutionize the inclusion of students with special needs (SENs) in Physical Education (PE) classes. The applications of AI in personalizing teaching, adapting activities and creating inclusive environments demonstrate its potential to break down barriers and promote the full participation of all students.

The personalization of teaching, through individualized assessment, real-time feedback and adaptive platforms, allows each student to learn at their own pace and according to their needs. The adaptation of activities, through the recognition of gestures and movements, gamification and immersive technologies such as virtual and augmented reality, makes classes more accessible and engaging for students with SEN. The creation of inclusive environments, with automatic Libras translation, virtual assistants and bullying prevention, ensures that all students feel welcomed and valued.

However, implementing AI in EF also presents challenges. It is essential to guarantee the privacy and security of student data, in addition to avoiding the discriminatory use of technology. The training and training of teachers is crucial for AI to be used ethically and responsibly, as a support tool and not as a substitute for the teacher.

In short, AI offers vast potential to transform PE into a truly inclusive space where all students, regardless of their needs, can participate, learn and develop fully. However, the implementation of AI must be accompanied by critical reflection on its challenges and ethical implications, ensuring that the technology is used to serve the inclusion and well-being of all students.

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