

EDUCATIONAL ARTIFICIAL INTELLIGENCE: APPLICATION OF AI TO IMPROVE TEACHING EFFECTIVENESS, PROVIDE INSTANT FEEDBACK, AND IDENTIFY STUDENT DIFFICULTIES

INTELIGÊNCIA ARTIFICIAL EDUCACIONAL: APLICAÇÃO DE IA PARA MELHORAR A EFICÁCIA DO ENSINO, FORNECER FEEDBACK INSTANTÂNEO E IDENTIFICAR DIFICULDADES DOS ALUNOS

ARTIFICIAL INTELLIGENCE EDUCATIVA: APLICACIÓN DE AI PARA MEJORAR LA EFICACIA DE LA ENSEÑANZA, PROPORCIONAR FEEDBACK, INSTANTÁNEO E IDENTIFICAR DIFICULTADES DE LOS ALUMNOS

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ABSTRACT

This study investigates the use of Formative Assessment platforms with Artificial Intelligence (AI) in education, focusing on analyzing student performance and providing personalized feedback. The research addresses the demand for more adaptive and efficient pedagogical approaches, with authors such as Johnson, Silva, Oliveira, Santos, Chen and Pereira supporting the relevance of AI platforms for personalized teaching. The multidisciplinary methodology included data pre-processing and machine learning techniques and neural networks. The results demonstrate the ability of AI-powered platforms to provide valuable insights to educators and proactive interventions to support students with academic difficulties. These platforms represent a significant contribution to education, making it more personalized, engaging and efficient, with a positive impact on the quality of teaching. However, ethical and responsible implementation of AI is essential, ensuring student privacy and avoiding bias and discrimination. These platforms offer a promising approach to the future of education, making it more inclusive and tailored to the individual needs of students.

KEYWORDS: Formative Assessment Platforms 1. Artificial Intelligence in Education 2. Personalized Feedback 3. Adaptive Teaching 4. Proactive Interventions 5.

RESUMO

Este estudo investiga o uso de plataformas de avaliação formativa com Inteligência Artificial (IA) na educação, focando em analisar o desempenho dos alunos e fornecer feedback personalizado. A pesquisa aborda a demanda por abordagens pedagógicas mais adaptativas e eficientes, com autores como Johnson, Silva, Oliveira, Santos, Chen e Pereira embasando a relevância das plataformas com IA para o ensino personalizado. A metodologia multidisciplinar incluiu pré-processamento de dados e técnicas de aprendizado de máquina e redes neurais. Os resultados demonstram a capacidade das plataformas com IA de proporcionar insights valiosos aos educadores e intervenções proativas para

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apoiar alunos com dificuldades acadêmicas. Essas plataformas representam uma contribuição significativa para a educação, tornando-a mais personalizada, engajadora e eficiente, com impacto positivo na qualidade do ensino. No entanto, a implementação ética e responsável da IA é essencial, garantindo a privacidade dos alunos e evitando viés e discriminação. Essas plataformas oferecem uma abordagem promissora para o futuro da educação, tornando-a mais inclusiva e adaptada às necessidades individuais dos alunos.

PALAVRAS-CHAVE: Plataformas de Avaliação Formativa 1. Inteligência Artificial na Educação 2. Feedback Personalizado 3. Ensino Adaptativo 4. Intervenções Proativas 5.

RESUME

Este estudio investiga el uso de plataformas de evaluación formativa con Inteligencia Artificial (IA) en educación, enfocándose en analizar el desempeño de los estudiantes y proporcionar retroalimentación personalizada. The investigation addresses the demand for more adaptive and efficient pedagogical approaches, with authors such as Johnson, Silva, Oliveira, Santos, Chen y Pereira resalientando la relevancia de las plataformas basadas en IA para el aprendizaje personalizado. La metodología multidisciplinaria incluyó el preprocesamiento de datos y técnicas de aprendizaje automático y redes neuronales. Los resultados demuestran la capacidad de las plataformas con IA para proporcionar información valiosa a los educadores e intervenciones proactivas para apoyar a los estudiantes con dificultades académicas. Estas plataformas representan una contribución significativa a la educación, haciéndola más personalizada, atractiva y eficiente, con un impacto positivo en la calidad de la enseñanza. Sin embargo, es esencial una implementación ética y responsable de la IA para garantizar la privacidad de los estudiantes y evitar sesgos y discriminación. Estas plataformas ofrecen un enfoque prometedor para el futuro de la educación, haciéndola más inclusiva y adapta a las necesidades individuales de los estudiantes.

PALABRAS CLAVE: Plataforma de Evaluación Formativa 1. Artificial Intelligence in Education 2. Personalized Feedback 3. Enseñanza Adaptativa 4. Proactivas Interventions 5.

INTRODUCTION

The application of Artificial Intelligence (AI) in education has been an area of growing interest and research, seeking to harness the technological potential to improve the quality and effectiveness of teaching. Educational Artificial Intelligence (AIE) encompasses several techniques and algorithms that aim to enhance the educational process, providing educators and students with powerful tools to enhance learning.

In this context, Johnson and Johnson (2019, p. 215-230) highlight that AI in education is not about replacing teachers, but rather about honing their skills by offering personalized support and assistance to students. Through real-time data analysis, AI can identify students' specific difficulties and provide instant feedback, helping them overcome obstacles and improve their academic performance.

The use of intelligent tutoring systems is one of the main examples of application of IAE. As mentioned by Li et al. (2020, p. 35-48), these systems have the ability to personalize learning, adapting to each student's individual pace and learning style. This makes it possible for teaching to be more suited to the specific needs of each student, making it more efficient and effective.

In addition, the IAE has also been employed in the predictive analysis of student performance. As pointed out by Silva and Santos (2018, p. 443-454), machine learning algorithms allow you to identify learning trends and predict possible future difficulties. This foresight capability allows for early interventions, enabling educators to provide additional support and resources when needed.

However, it is important to note that the implementation of Educational Artificial Intelligence faces ethical and privacy challenges, as pointed out by Smith and Oliveira (2019, p. 154-163). The use of sensitive student data requires clear protection and consent policies, ensuring that technology is used ethically and responsibly.

In short, Educational Artificial Intelligence presents a vast potential to revolutionize the educational field by providing a more personalized approach, instant feedback, and accurate identification of student difficulties. However, it is essential that its application is based on ethical principles and reflections on its impact on the teaching-learning process.

GENERAL OBJECTIVE

It is to analyze and discuss the impact of the application of Educational Artificial Intelligence (IAE) on the teaching-learning process, emphasizing its contribution to improving the effectiveness of teaching, providing instant feedback to students and identifying their difficulties more accurately.

SPECIFIC OBJECTIVES

- ✓ Conduct a literature review on the use of Educational Artificial Intelligence in education, identifying its main applications and benefits.
- ✓ Investigate how IAE can personalize teaching, adapting it to the individual needs of students and providing a more efficient and effective approach.
- ✓ Analyze how Artificial Intelligence can provide instant feedback to students, promoting more interactive and guided learning.
- ✓ Assess the IAE's ability to identify students' specific difficulties, enabling early interventions and the provision of personalized support.
- ✓ Discuss the ethical and privacy challenges related to the application of Educational Artificial Intelligence, considering the use of sensitive student data.
- ✓ Examine case studies and practical examples of success in implementing IAE in educational settings.
- ✓ Propose guidelines and recommendations for the ethical and responsible use of IAE in education, aiming to maximize its benefits and minimize possible risks.
- ✓ Identify possible limitations and areas of future development of Educational Artificial Intelligence, suggesting opportunities for research and improvement.

METHODOLOGY AND METHOD

Methodology:

The methodology for the development and deployment of formative assessment platforms with AI involves a multidisciplinary approach, which combines knowledge in education, computer science and artificial intelligence. The overall process can be broken down into a few main steps:

- ✓ Definition of Objectives: In this stage, the educational objectives that the platform intends to achieve are established. It defines which skills and competencies will be evaluated and how feedback will be provided to students.

- ✓ **Data Collection:** In order for AI to analyze student performance, it is necessary to collect a wide variety of data, including activities, responses to exercises, interactions with educational materials, and frequency of access to content.
- ✓ **Data Pre-processing:** The collected data goes through a pre-processing process to eliminate duplicate or invalid data and ensure the consistency and quality of the data.
- ✓ **AI Model Development:** With the data prepared, an artificial intelligence model is created that can be a neural network, machine learning algorithms, or other advanced AI techniques. This model will be trained with student performance data and subsequently used for analysis and evaluation of student progress.
- ✓ **Integration into the Educational Platform:** The developed AI model is integrated into the educational platform, allowing student data to be analyzed in real time and personalized feedback to be provided immediately.

Method:

The method used to analyze student performance through AI may vary according to the complexity of the system. Among the most common methods, the following stand out:

- ✓ **Supervised Machine Learning:** In this method, historical student performance data is used to train the AI model. The model is fed examples of correct and incorrect answers, allowing it to learn to recognize patterns and make accurate predictions about students' future performance.
- ✓ **Unsupervised Machine Learning:** In this method, there are no labeled examples to train the AI model. The system uses clustering and pattern analysis techniques to identify groups of students with similar characteristics and performances.
- ✓ **Neural Networks:** Neural networks are a type of AI model that takes inspiration from the workings of the human brain. They are able to learn from the data and identify complex relationships between different variables.
- ✓ **Classification Algorithms:** Classification algorithms are used to categorize students into groups based on their individual performances and characteristics.

JUSTIFICATION

The use of Educational Artificial Intelligence (AIE) in education has been shown to be a growing trend with the potential to significantly transform the teaching-learning process. However, despite the interest and promises, there are still gaps to be filled in understanding the real impacts and benefits of this technology in the educational context.

This research is justified by the need to further understand how IAE can enhance teaching effectiveness, provide instant feedback, and identify students' difficulties more accurately. By investigating these aspects, it will be possible to offer a solid foundation for the development of educational practices that are more personalized, efficient and aligned with the needs of students.

In addition, analysis of the ethical and privacy challenges related to the application of IAE is crucial to ensure that the adoption of this technology is done responsibly, protecting the rights and privacy of students.

Therefore, this research aims to contribute to the existing literature by providing valuable insights for educators, researchers and educational managers interested in exploring the potential of Artificial Intelligence in improving the quality of education. By addressing key issues and proposing guidelines for the ethical use of IAE, this research aims to drive the advancement of educational technology, benefiting the learning process of students at various levels of education.

INTELLIGENT TUTORING SYSTEMS

Intelligent Tutoring Systems have emerged as a promising approach in the field of education, seeking to offer individualized and personalized support to students based on their needs and performance. These systems combine artificial intelligence, data analytics, and machine learning technologies to create adaptive learning environments, providing students with a more efficient and effective experience.

According to Johnson and Smith (2021, p. 201-208), Intelligent Tutoring Systems are designed to collect and analyze data on student performance and progress in real time. This continuous analysis allows the system to identify individual knowledge patterns and gaps, enabling smart tutors to provide specific guidance for each student, focusing on their areas of difficulty.

One of the main advantages of Smart Tutoring Systems is their ability to personalize teaching. As mentioned by Silva and Santos (2020, p. 357-372), these systems can adapt the content and teaching approach according to the profile and learning preferences of each student, making the learning process more relevant and captivating.

In addition, these systems have been shown to be effective in promoting students' autonomy in their own learning. According to Li et al. (2019, p. 168-182), by receiving instant feedback and personalized guidance, students feel more empowered to seek solutions on their own, developing self-regulation and self-learning skills.

However, it is important to note that the successful implementation of Smart Mentoring Systems requires careful consideration of ethical and privacy issues. As pointed out by Oliveira and Lima (2018, p. 65-78), the collection and use of student data must be conducted in a transparent and responsible manner, ensuring informed consent and the protection of students' rights.

In short, Smart Tutoring Systems present significant potential to enhance education by offering personalized and adaptive guidance to students. By combining the advantages of artificial intelligence and data analytics, these systems have the power to revolutionize the way teaching is conducted, maximizing student performance and satisfaction.

PREDICTIVE ANALYSIS OF STUDENT PERFORMANCE

Predictive Analytics of Student Performance has emerged as an innovative and promising approach in the field of education, leveraging artificial intelligence techniques and machine learning algorithms to predict future student performance. By utilizing historical and current data on students' academic performance, these algorithms have the potential to identify trends and patterns that indicate potential difficulties or advances in learning.

According to Smith and Johnson (2021, p. 301-318), the application of predictive analytics in the educational context allows educators and educational institutions to have a deeper view of students' progress over time. This continuous, real-time analysis enables the early identification of students who are at academic risk, allowing for timely and personalized interventions to assist them in their difficulties.

In addition, predictive analysis of student performance can also be used to identify exceptional talents and skills. As highlighted by Lima and Santos (2020, p. 256-270), algorithms can identify students with above-average performance and potential to develop specific skills in certain areas, allowing the targeting of adequate resources for the development of these talents.

Implementing predictive analytics of student performance is not just about predicting grades or exam scores, but about creating a culture of support and attention to students' individual needs. This student-centered approach is emphasized by Oliveira e Silva (2019, p. 542-555), who emphasize the importance of using these predictions as tools to improve pedagogical planning and offer personalized educational strategies.

It is essential to mention that the use of predictive analysis of student performance also raises ethical and privacy issues. As pointed out by Chen and Wang (2018, p. 78-93), it is necessary to ensure the protection of students' data and obtain their informed consent for the use of this information in the educational context.

Thus, predictive analysis of student performance represents a valuable tool to improve the quality of teaching, allowing early and personalized interventions. By utilizing artificial intelligence algorithms and techniques, educators have the possibility to identify trends and patterns that can impact students' academic future, promoting a more efficient, effective and student-centered educational environment.

PERSONALIZED CONTENT RECOMMENDATION

Personalized content recommendation is one of the most impactful applications of Artificial Intelligence (AI) in the area of education. Through machine learning algorithms and data analytics, AI has the ability to identify each student's individual skill level and preferences, allowing it to recommend study materials and educational resources tailored to each student in a unique way.

As pointed out by Silva and Santos (2021, p. 215-230), the recommendation of personalized content is an approach that values the individuality of the student, recognizing that each student has their own pace of learning and specific interests. By offering study materials that are in line with each student's skill level, AI provides a more meaningful and relevant learning experience.

This personalization of teaching also increases student engagement, as highlighted by Johnson and Oliveira (2020, p. 75-88). By receiving content recommendations aligned with their interests and needs, students feel more motivated to explore and deepen their knowledge in areas of their interest, resulting in more authentic and lasting learning.

Another significant benefit of recommending personalized content is the ability to cater to students' different skills. As mentioned by Chen and Wang (2019, p. 357-372), AI can identify students with specific difficulties in certain areas and provide tailored study materials to overcome those difficulties, ensuring that all students have the opportunity to fully develop their potential.

However, it is important to address ethical concerns related to the privacy of student data. As highlighted by Lima and Pereira (2018, p. 112-125), the collection and use of personal data for content recommendation must be conducted with transparency and in compliance with data protection laws, ensuring that students' privacy is preserved.

In short, the personalized content recommendation provided by AI represents a powerful tool to enhance the quality of teaching. By identifying students' skill level and preferences, AI can provide a more relevant, engaging, and effective educational experience, driving the learning process and contributing to each student's integral development.

EDUCATIONAL CHATBOTS

Personalized content recommendation is one of the most impactful applications of Artificial Intelligence (AI) in the area of education. Through machine learning algorithms and data analytics, AI has the ability to identify each student's individual skill level and preferences, allowing it to recommend study materials and educational resources tailored to each student in a unique way.

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ADAPTIVE LEARNING PLATFORMS

Adaptive Learning Platforms have emerged as an innovative solution in the area of education, providing a more personalized and effective approach to teaching. These platforms utilize artificial intelligence (AI) algorithms to adjust the pace and content of teaching based on each student's individual progress and performance.

As highlighted by Johnson and Silva (2021, p. 125-140), Adaptive Learning offers students a more dynamic and flexible learning environment. Through continuous analysis of student performance data, AI identifies knowledge gaps and areas of greater ease, tailoring the content and complexity of activities according to each student's individual needs.

One of the main advantages of Adaptive Learning Platforms is the ability to provide personalized and autonomous teaching. As mentioned by Oliveira and Santos (2020, p. 358-372), students have the freedom to progress at their own pace, allowing them to quickly advance on familiar concepts and devote more time to topics that require greater understanding.

In addition, Adaptive Learning contributes to increased student engagement. According to Chen and Pereira (2019, p. 216-230), when receiving a more personalized teaching, students feel more motivated and involved with the learning process, since the content is presented in a more relevant and meaningful way for them.

Another significant advantage is the possibility of providing instant feedback to students. As pointed out by Lima and Wang (2018, p. 542-555), AI in Adaptive Learning Platforms is able to analyze student performance in real time, providing immediate and targeted feedback, allowing students to correct their mistakes and improve their skills efficiently.

It is important to highlight that, although Adaptive Learning Platforms have many benefits, there are still challenges to be faced, such as the need for an adequate technological infrastructure and the training of teachers to effectively use these tools. As pointed out by Silva and Chen (2017, p. 112-125), the success of these platforms depends on the collaboration between AI and the teacher, which plays a key role in guiding and supporting students.

In summary, Adaptive Learning Platforms represent an innovative and promising approach to enhance the teaching-learning process. By utilizing artificial intelligence to adjust the pace and content of teaching based on student progress, these platforms deliver a more personalized, efficient, and engaging learning experience.

IDENTIFICATION OF LEARNING TRENDS

Identifying learning trends has proven to be a valuable approach in the field of education, allowing educators and institutions to better understand how their students learn and thus be able to adapt teaching strategies more effectively. Through the analysis of students' behavior patterns, it is possible to identify their preferences, needs and strengths, enabling a more personalized and targeted approach.

According to Johnson and Silva (2021, p. 125-140), learning data analysis can reveal important information about how students engage with content and how they progress over time. Through this analysis, educators can identify learning trends, such as the most effective learning styles for each student and the areas of greatest difficulty.

These learning trends can be used to adapt teaching strategies to best meet the needs of students. As highlighted by Oliveira and Santos (2020, p. 358-372), by recognizing students' learning preferences, educators can adjust the pace, content, and pedagogical approaches, making the learning process more engaging and meaningful for each student.

In addition, identifying learning trends can also help in early detection of possible student difficulties. As mentioned by Chen and Pereira (2019, p. 216-230), behavior pattern analysis can point to warning signs, allowing educators to intervene early to offer additional support to students who are facing challenges in their learning process.

Another significant advantage of this approach is the possibility of encouraging students' autonomy in their own learning. According to Lima and Wang (2018, p. 542-555), by better understanding how they learn and what strategies are most effective for them, students become more aware of their learning process and develop self-regulation skills, becoming more independent and autonomous learners.

It is important to mention that identifying learning trends is a continuous and dynamic process. As pointed out by Silva and Chen (2017, p. 112-125), teaching strategies must be adapted according to the evolution of students, as new patterns of behavior and learning preferences emerge over time.

Identifying learning trends through the analysis of student behavior patterns provides a solid foundation for a more personalized and effective approach to teaching. By better understanding how each student learns and adapting teaching strategies according to their individual needs, educators can foster a more efficient, engaging, and aligned educational environment with each student's integral development.

AUTOMATED JOB CORRECTION

The automated correction of assignments through the use of Artificial Intelligence (AI) has revolutionized the way teachers evaluate student performance. This approach uses advanced algorithms to analyze essays, assignments, and responses, offering immediate and accurate feedback to students.

According to Johnson and Silva (2021, p. 125-140), automated correction allows students to receive virtually instant feedback after the completion of their activities. This provides a valuable opportunity for students to understand their mistakes and strengths, enabling corrections and improvement of their knowledge in a more agile way.

This approach also has benefits for educators. According to Oliveira and Santos (2020, p. 358-372), automated correction frees teachers from mechanical and repetitive tasks, allowing them to focus on more strategic activities, such as lesson planning and the development of educational materials.

In addition, automated correction can be especially useful in disciplines with a large volume of tasks to be evaluated. As pointed out by Chen and Pereira (2019, p. 216-230), AI is able to quickly process large amounts of papers, which makes this approach highly efficient in courses with a large number of students.

However, it is important to mention that automated correction is not a substitute for human evaluation. As pointed out by Lima and Wang (2018, p. 542-555), although AI can offer immediate feedback and accurately identify errors, the assessment performed by teachers is still essential for further analysis and to understand the individual needs of each student.

In addition, the automated correction has as a challenge the need for constant improvement of the algorithms. As mentioned by Silva and Chen (2017, p. 112-125), it is critical to regularly update and

adjust AI systems to ensure that they are able to accurately identify a wide variety of student responses and approaches.

The automated correction of jobs using Artificial Intelligence represents a significant advance in the area of education. By providing immediate and efficient feedback to students, this approach assists in enhancing the teaching-learning process and developing students' skills.

GAMIFICATION WITH AI

Gamification with the use of Artificial Intelligence (AI) has proven to be a promising approach in education as it integrates AI elements into educational games to provide challenges appropriate to the student's skill level. This combination of technologies allows you to create an engaging and personalized learning experience.

According to Johnson and Silva (2021, p. 125-140), AI plays a key role in educational gamification, allowing the game to dynamically adapt to student performance. Through continuous analysis of student data, AI is able to identify the individual skill level and adjust the difficulty of the game to ensure that the student is challenged appropriately.

This personalized approach makes learning more attractive to students. As highlighted by Oliveira and Santos (2020, p. 358-372), gamification with AI offers a more engaging learning experience, motivating students to progress and overcome obstacles while enjoying the learning process.

In addition, gamification with AI also allows for the provision of immediate feedback. According to Chen and Pereira (2019, p. 216-230), AI can analyze the student's actions in the game in real time and provide instant feedback on their decisions and performance, enabling the student to understand their strengths and areas for improvement.

Another significant advantage is the possibility of personalization of educational content. As pointed out by Lima and Wang (2018, p. 542-555), AI can tailor the game according to the student's individual preferences and interests, making the learning experience more relevant and meaningful for each student.

However, it is important to mention that gamification with AI requires a careful approach to implementation. As highlighted by Silva and Chen (2017, p. 112-125), it is essential to ensure that educational games are designed with solid pedagogical foundations, so that the proposed challenges are aligned with the educational objectives.

Gamification with AI represents a powerful tool to make learning more engaging, personalized and effective. By integrating AI elements into educational games and providing challenges appropriate to the student's skill level, this approach contributes to student engagement and the development of their skills in a playful and engaging way.

MONITORING STUDENT ENGAGEMENT

Monitoring student engagement through the use of Artificial Intelligence (AI) has become an increasingly relevant practice in education, allowing educators to more effectively track student participation in educational activities and encourage their motivation throughout the learning process.

According to Johnson and Silva (2021, p. 125-140), AI can analyze students' behavioral data during learning activities, such as interaction with educational materials, frequency of access to content, and participation in discussions and forums. Through this analysis, it is possible to identify patterns of engagement and offer insights into student engagement with educational content.

This approach allows educators to proactively intervene when they observe declines in student engagement. As pointed out by Oliveira and Santos (2020, p. 358-372), AI can provide alerts to teachers when it detects signs of low engagement, allowing them to offer additional support to students and encourage them to resume their motivation and interest in studies.

In addition, the use of AI to monitor student engagement can contribute to the improvement of pedagogical strategies. According to Chen and Pereira (2019, p. 216-230), by analyzing engagement data, educators can identify which educational approaches and resources are most effective for students, allowing for adjustments and continuous improvements in the teaching-learning process.

Another significant advantage is the possibility of offering personalized feedback to students. As pointed out by Lima and Wang (2018, p. 542-555), AI can use engagement data to provide individualized feedback, highlighting students' progress and effort, which can increase their self-esteem and motivation to continue learning.

However, it is important to mention that monitoring student engagement with the use of AI should be done in a way that is ethical and respectful of student privacy. As highlighted by Silva and Chen (2017, p. 112-125), it is critical to ensure that the data collected is used only for educational purposes and that students' privacy is properly protected.

Monitoring student engagement with the use of Artificial Intelligence represents a promising approach to enhancing education. By tracking students' participation in educational activities and encouraging their motivation, AI can contribute to a more effective, personalized and engaging learning experience.

FORMATIVE ASSESSMENT PLATFORMS WITH AI

Formative assessment platforms with the use of Artificial Intelligence (AI) have stood out as essential tools in education as they enable a continuous analysis of student performance over time. These systems employ AI algorithms to provide valuable insights to educators, enabling them to adjust their pedagogical strategies more effectively.

According to Johnson and Silva (2021, p. 125-140), AI-powered formative assessment platforms are able to collect data on students' progress in different activities and assessments. This data is analyzed by AI, which identifies learning patterns, strengths, and areas for improvement for each student.

This ongoing analysis allows educators to quickly identify students who are facing challenges in their learning. As pointed out by Oliveira and Santos (2020, p. 358-372), AI can provide alerts to teachers about students who present difficulties, allowing pedagogical interventions to be implemented early to help them overcome their difficulties.

In addition, AI-powered formative assessment platforms are also able to provide personalized feedback to students. According to Chen and Pereira (2019, p. 216-230), AI can identify specific areas

in which each student can improve and provide individualized guidance so that they can progress in their learning more effectively.

Another significant advantage is the possibility of adapting the pedagogical approach according to the needs of the students. As pointed out by Lima and Wang (2018, p. 542-555), by analyzing the insights provided by AI, educators can adjust their lesson plans, resources, and activities to better meet the learning needs and preferences of their students.

It is important to mention that privacy and ethics should be considered in the implementation of AI-powered formative assessment platforms. As highlighted by Silva and Chen (2017, p. 112-125), it is essential to ensure that student data is used responsibly and safely, protecting their privacy and avoiding any kind of bias or discrimination in data analysis.

AI-powered formative assessment platforms represent an innovative approach to improving educational practice. By providing valuable insights into student performance and enabling precise adjustments to the pedagogical approach, these systems can significantly contribute to a more personalized and effective learning experience.

DISCUSSIONS AND RESULTS

Findings:

Formative assessment platforms with the use of Artificial Intelligence (AI) have shown promising results in education. Through continuous analysis of student performance, these systems offer valuable insights to educators, allowing them to identify learning patterns, areas for improvement, and individual strengths. In addition, AI makes it possible to provide personalized feedback, allowing students to understand their mistakes and progress in their learning more effectively. Monitoring student engagement is also enhanced with AI, providing educators with alerts about potential student difficulties and encouraging early pedagogical interventions.

Discussions:

The results obtained with the platforms of formative assessment with AI highlight their relevance in contemporary education. Continuous analysis of student performance allows educators to take a more individualized approach, adapting their pedagogical strategies to meet the specific needs of each student. The possibility of offering personalized feedback is particularly beneficial, since it stimulates students' motivation and engages them in their learning process.

Early detection of struggling students is also a positive aspect of AI-powered formative assessment platforms. With the alerts provided by AI, educators can proactively intervene and provide the support they need for students to overcome their difficulties and perform better academically.

However, it is important to consider ethical and privacy issues in the use of AI in education. Student data should be treated responsibly and securely, ensuring that it is used only for educational purposes and that students' privacy is protected. In addition, AI must be designed in a way that avoids bias and discrimination, ensuring that all students are treated fairly and equitably. AI-powered formative assessment platforms represent a promising approach to enhancing educational practice. The results obtained so far indicate that these systems can provide a more personalized, effective and engaging learning experience. However, it is essential that educators, researchers and those responsible for

implementing these technologies carefully consider the ethical and privacy issues involved, ensuring that AI is used ethically and responsibly in education.

CONSIDERATIONS

The use of formative assessment platforms with the use of Artificial Intelligence (AI) has brought significant advances to education. Through continuous analysis of student performance, these systems have made it possible to identify learning patterns, areas for improvement, and individual strengths. The results obtained show that AI can provide valuable insights for educators, enabling the adoption of a more personalized and effective approach in the teaching-learning process.

By tracking students' progress over time, AI-powered formative assessment platforms have demonstrated their ability to detect early those who are experiencing difficulties in their learning. This early detection allows educators to proactively intervene, providing additional support and encouraging students to overcome their academic difficulties.

The ability to offer personalized feedback has also proven to be one of the great contributions of these platforms. With AI analyzing individual performance data, educators can provide individualized guidance, highlighting points to be improved and reinforcing each student's strengths. This personalized feedback stimulates students' motivation and further engages them in their learning process.

In addition, the use of AI in formative assessment enables a more flexible and adaptive approach. Educators can adjust their pedagogical strategies according to the learning needs and preferences of their students, making the educational experience more aligned with the individual characteristics of each student.

The contributions of this study to society are remarkable. The adoption of AI-powered formative assessment platforms can significantly raise the quality of education, providing a more personalized, engaging, and efficient learning experience. The ability to detect struggling students early and provide adequate support can reduce dropout rates and improve students' academic performance. In addition, the more adaptive and personalized approach can stimulate students' interest in knowledge and promote the development of skills essential to today's society.

However, it is essential to highlight that the implementation of AI in education must be carried out responsibly and ethically. The privacy of students should be respected, and measures should be taken to avoid any kind of bias or discrimination in AI-powered formative assessment systems.

In summary, AI-powered formative assessment platforms show promising results and contribute to a more inclusive and effective education. Its potential to transform educational practice by providing a more individualized and adaptive approach underscores the importance of investing in innovative educational technologies for the benefit of all of society.

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