Applicability of artificial intelligence in the teaching and learning process

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ABSTRACT
This scientific article aims to analyze the use of the artificial intelligence Chat GPT as a pedagogical support tool in the teaching-learning process, through a literature review. The research aims to understand how Chat GPT can be used to assist teachers in the teaching and learning process, considering its characteristics, advantages and challenges. The literature review identified that Chat GPT can be used to personalize the learning process, adapting the pace and content according to the individual needs of each student. The use of chatbots and virtual assistants also allows interaction between the student and the system in a natural and intuitive way, which can increase student engagement in activities. However, it is important to note that these tools do not replace the role of the teacher, but rather complement their work, allowing greater flexibility and personalization of content and activities.

Keywords: Chat GPT, Artificial intelligence, Teaching-Learning.

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INTRODUCTION

Technology has been increasingly present in people's daily lives, transforming the way information is accessed and how knowledge is acquired. In the field of education, the use of educational technologies has become a reality, enabling the creation of new pedagogical resources and strategies, especially with the use of artificial intelligence (SOUZA, 2021).

According to Lund and Wang (2023), artificial intelligence (AI) is an area of computer science that aims to develop systems capable of performing tasks that traditionally required human intelligence to perform. In other words, AI seeks to create machines that can learn, reason, make decisions, and solve problems autonomously, without the need for human intervention.

In education, AI has been used to create educational technologies that offer innovative pedagogical resources and strategies. One of the main applications of AI in education is the personalization of the learning process. With AI, it is possible to analyze the performance data of each student and adapt the pace and content of learning according to the individual needs of each one (BARBOSA, 2023).

Among the various educational technologies available, the use of chatbots and virtual assistants, such as Chat GPT, stands out for pedagogical support in the teaching-learning process. These tools allow the interaction between the student and the system in a natural and intuitive way, through natural language conversations, allowing the customization and adaptation of content according to individual learning needs and rhythms (SANTOS; 2023; COPPI; CARVALHO, 2023).

As Irigaray and Stocker (2023) reiterate, Chat GPT is a conversational system that uses natural language processing technology to interact with the user. Developed by OpenAI, Chat GPT is capable of answering questions, providing information, performing tasks, and even creating texts from an interaction with the user.

However, it is important to emphasize that the use of educational technologies, such as chatbots and virtual assistants, does not replace the role of the teacher in the teaching-learning process. These tools should be used as a complementary resource to the pedagogical work, allowing for greater flexibility and personalization of content and activities, but always under the guidance and supervision of the teacher (VELÁSQUEZ, 2023).

In this context, this research aimed to analyze the use of Chat GPT as a pedagogical support in the teaching-learning process, through a literature review. The research sought to understand how Chat GPT can be used as a tool to support teachers in the teaching and learning process, considering its characteristics, advantages and challenges.

To this end, the bibliographic research method was adopted, as the data were collected from different sources of information, including official documents, scientific articles, theses,

dissertations, books and reports from governmental and non-governmental organizations, corroborating what Gil (2011) suggests.

From the literature review, it is expected to contribute to the deepening of knowledge on the subject and to the development of more innovative and effective pedagogical practices with the use of advanced artificial intelligence, which can promote a more personalized education adapted to the needs of students.

DEVELOPMENT
HISTORICAL CONTEXTUALIZATION OF CHAT GPT

The emergence of Chat GPT is a direct consequence of the advancement in the area of natural language processing, which has allowed the development of increasingly sophisticated conversational systems capable of understanding the natural language used by users. This advancement has been driven by the increase in computational processing capacity and the availability of large datasets that can be used to train machine learning models (SOUZA, 2021).

Chat GPT is a conversational system developed by the technology company OpenAI. OpenAI was founded in December 2015 by a group of renowned entrepreneurs and scientists in the field of artificial intelligence, including Elon Musk, Sam Altman, Greg Brockman, Ilya Sutskever, among others. The company was created with the objective of developing advanced artificial intelligence technologies in a safe and responsible way, seeking to maximize the benefits of the technology while minimizing potential risks (SILVA; PACHECO; PUGLIESI, 2021).

Since its inception, OpenAI has been dedicated to conducting cutting-edge research in areas such as natural language processing, robotics, reinforcement learning, and other areas of artificial intelligence. The company's mission is to promote the democratization of artificial intelligence knowledge and tools, with the aim of accelerating scientific and technological progress and making technology more accessible to companies and individuals around the world (CARMO; CARMEL; MELO, 2022).

OpenAI is considered, according to Souza (2012), one of the leading technology companies in the world, with a team of highly qualified data scientists and artificial intelligence specialists. The company has collaborated with other organizations on research and development projects for advanced artificial intelligence technologies, and has also been involved in debates on ethical and safety issues related to the advancement of the technology.

In the year 2018, OpenAI released the first model of GPT (Generative Pre-trained Transformer), which is a neural network capable of generating texts from examples given to it. This model was trained on a vast amount of data from the internet and subsequently refined with the aim

of generating coherent and understandable texts. GPT-1 is a large-scale language model based on a deep learning neural network called Transformer (BENEVENTO; MEIRELLES, 2023).

Transformer is a neural network architecture that allows the language model to be trained on a large scale using a technique called language pretraining. In this technique, the model is trained on a large amount of unlabeled data (natural language text), and then refined on specific tasks. Thus, GPT-1 was trained on a dataset with more than 40 GB of text, including news, books, and web articles. The model was designed to generate coherent and compelling text, and it showed promising results in tasks such as completing sentences and answering questions (REYES, 2021).

The following year, in 2019, OpenAI released GPT-2, which is an improved version of the previous model, capable of generating longer and more complex texts, with a higher level of cohesion and coherence. GPT-2 was trained on an even greater amount of data, which allowed it to generate high-quality texts on a variety of topics and styles (WILLEMART, 2021).

GPT-2 was trained on an even larger dataset than that utilized in GPT-1, with more than 1.5 terabytes of unlabeled text collected from the web. The model has 1.5 billion parameters, which means it is able to learn more complex patterns and generate even more convincing and coherent texts. One of the key features of GPT-2 is its ability to autonomously generate text without the need for human input. This means that the model can create articles, stories, and other types of text from a small initial text input, such as a title or a question (WILLEMART, 2021).

In 2022, GPT-3 was launched, which was elaborated on an even larger dataset than that used in GPT-2, with more than 570 GB of unlabeled text collected from the web. The model has a staggering 175 billion parameters, which means it is able to learn more complex patterns and generate even more convincing and coherent texts. Like previous versions of the model, GPT-3 has the ability to generate text autonomously, without the need for human input (BENEVENTO; MEIRELLES, 2023).

GPT-3's ability to produce text is, according to Lund and Wang (2023), even more impressive than previous models, being able to perform tasks such as machine translation, answering questions, generating code, and even writing full articles with a high level of quality and coherence.

HOW CHAT GPT WORKS

Chat GPT is a conversational system developed by OpenAI that uses natural language processing (NLP) technology to create a more natural and fluid conversational experience between humans and machines. This system is capable of interpreting the natural language used by users and generating relevant and coherent responses based on a vast base of prior knowledge (KING, 2023).

Chat GPT is, according to Lund and Wang (2023), trained on a large volume of texts to learn human language and recognize speech patterns, allowing it to generate responses that look like they

were written by a human. In addition, Chat GPT is able to adapt to the user's language style, making the conversation even more personalized and natural, especially due to the use of the Transformer model.

The Transformer model is a type of neural network that allows Chat GPT to process and understand sequences of words and phrases with high accuracy and speed. The language model used by Chat GPT is trained on a large volume of text data, such as news articles, books, web pages, and other natural language content sources. This data is used to teach Chat GPT to understand the structure and meaning of natural language and to generate relevant and accurate responses (SANT'ANA; SANT'ANA; SANT'ANA, 2023).

In the perspective of Irigaray and Stocker (2023), Chat GPT is also able to continuously learn and adapt over time as it interacts with more users and receives more data for training. This allows it to constantly improve its responsiveness and its quality of conversation. Chat GPT can be customized to meet the specific needs of a particular user or business, for example, through training with specific data or adjusting parameters. This allows the system to be adapted for different conversational scenarios and to meet different business objectives.

According to Benevento and Meirelles (2023), Chat GPT works based on state-of-the-art neural networks and a large volume of training data, being based on three main steps, which are: input, processing, and output. The following subtopics further detail these three steps.

Entry phase

In the entry phase, the user sends, according to Benevento and Meirelles (2023), a natural language message to Chat GPT, which is then processed by the system. In this step, the user sends a natural language message to Chat GPT through a conversational interface, such as a chatbot or virtual assistant. The message sent by the user may contain a question, a request, a statement, or any other information that the user wishes to share with Chat GPT. The message sent by the user can be typed or spoken, depending on the type of conversational interface used.

After receiving the user's message, Chat GPT performs pre-processing to clean up and format the text of the message, removing special characters, punctuation, and other unnecessary information that may affect the processing of the message. Therefore, the Chat GPT input step is responsible for receiving the user's message and preparing it to be processed by the system. Because of this, there is pre-processing and analysis of the message sent by the user, with the aim of extracting relevant information that will be used by the system to generate an appropriate response.

The first step of the sign-in step is to receive the user's message, which can be sent through a conversational interface, such as a chatbot or virtual assistant. The message then goes through preprocessing to remove unnecessary information, such as punctuation, special characters, and

whitespace. After pre-processing, the message is subjected to natural language processing (NLP) techniques for analysis and extraction of relevant information. This involves using named entity recognition (NER) algorithms to identify information such as names, dates, times, and locations, as well as syntactic and semantic analysis to comprehend the meaning of the user's message.

Syntactic analysis is responsible for identifying the grammatical structure of the message, such as subject, verb, and object, while semantic analysis focuses on the meaning of the words and phrases used in the message. Combined, these techniques allow Chat GPT to correctly understand the user's intent and identify the relevant information needed to generate an appropriate response, thus initiating the second phase, which is processing.

Processing phase

In the processing stage, Chat GPT analyzes, according to Benevento and Meirelles (2023), the user's message and uses its language model to generate an appropriate response. The first step of processing is the representation of the user's message in a form that can be understood by the Chat GPT language model. To do this, the message is converted into a mathematical representation, such as a vector or matrix, which contains information about the meaning and context of the message.

Then, Chat GPT's language model is used to generate the response. The model is trained on large datasets of text, such as books, articles, and conversations, and uses machine learning techniques to identify patterns in natural language. Based on these patterns, the model is able to generate new sentences that have a coherent grammatical and semantic structure.

Chat GPT uses a transformer-based natural language generation approach, which allows the model to take into account the context of the conversation and generate more accurate and relevant responses. This means that the response generated by Chat GPT is not a simple match to the user's message, but rather an interpretation of the message in a broader context.

During the response generation process, Chat GPT may use additional techniques, such as generating multiple response options and assessing the quality of the generated response. This helps to ensure that the response is relevant, coherent, and useful to the user.

Output Phase

In the output stage, the response generated by Chat GPT is sent, according to Benevento and Meirelles (2023), back to the user. In the output step, the response generated by Chat GPT is sent back to the user. In this phase, Chat GPT produces a response that is coherent with the user's message and contextualized with the ongoing conversation. The response is generated by Chat GPT's language model, which uses advanced natural language processing and artificial intelligence techniques to produce a relevant and accurate response.

The generated response can be sent to the user through various communication channels, such as a chatbot on a web page, a messaging app, or a virtual assistant on a smart device. In this case, the response is formatted to fit the communication channel used, and can include elements such as images, links, and other information relevant to the conversation. Chat GPT can also provide additional options for the user, such as suggestions for related questions or pre-defined answer options. This can help the user continue the conversation more easily and efficiently.

THE USE OF CHAT GPT AS A PEDAGOGICAL SUPPORT IN THE TEACHING-LEARNING PROCESS

Chat GPT is, according to Sant'Ana, Sant'Ana and Sant'Ana (2023), an artificial intelligence-based tool that can be used as a pedagogical support in the teaching-learning process. Said artificial intelligence can bring several advantages to students, from quick and accurate responses, personalization of learning, constant feedback, stimulation of creativity, and access to relevant information.

By utilizing Chat GPT, students can get accurate and reliable answers to their queries about a particular subject. This ability is especially useful for students who need immediate help answering questions or understanding specific concepts. Chat GPT is able to provide accurate and reliable information, which can help students focus on specific topics and better understand the content (COPPI; CARVALHO, 2023).

As Isotani et al. (2023) reiterate, Chat GPT can be programmed to personalize learning based on each student's individual needs. Based on the student's previous interactions with Chat GPT, it can tailor its responses and recommendations to meet the specific needs of each student. This can help students focus on the topics they need the most help with and make faster progress in their learning.

Also according to the authors, another advantage of Chat GPT is that it can provide constant feedback to students, allowing them to quickly identify their mistakes and fix their problems. This can help students learn from their mistakes and focus on areas where they need to improve. Constant feedback can be especially helpful for students who struggle with certain subjects.

As a consequence, Chat GPT can stimulate students' creativity by generating ideas and suggestions on how to approach a specific problem or topic. This can encourage the exploration of different approaches, helping students develop their critical thinking skills and learn how to solve problems more effectively (SANTOS, 2023).

For Barbosa (2023), students will find relevant information on a specific topic, which can save time and increase research efficiency. This can help students find information faster and focus on specific topics that are relevant to their learning.

It should also be noted that Chat GPT can be a useful tool for students who have difficulties expressing themselves verbally, as they may find in such artificial intelligence a more comfortable and familiar way to communicate and obtain information. Chat GPT is that it can be used in different formats, such as text, voice, and video, which can help meet individual student needs. Students who have difficulty reading, for example, may choose to use the voice or video option to obtain information (COPPI; CARVALHO, 2023).

Finally, it should be noted that Chat GPT can be accessed anytime and anywhere, which can be especially useful for students who need help outside of class hours or when they don't have access to a teacher or tutor. It can be a useful tool for autonomous learning, allowing students to have access to more effective teaching (BENEVENTO; MEIRELLES, 2023).

MAIN CHALLENGES OF USING CHAT GPT IN THE TEACHING-LEARNING PROCESS

The use of Chat GPT as a pedagogical support in the teaching-learning process has proven to be an interesting possibility for teachers who are looking for new ways to engage students in their school activities. However, the application of this technology also presents some challenges (ALKAISSI; MCFARLANE, 2023).

One of the main challenges is the need to have a large volume of data available to train the natural language model. This is because Chat GPT uses a machine learning approach, that is, it learns from examples and therefore needs a large dataset to be trained. This can be a problem in school settings, where there is not always a sufficient amount of data available (VELÁSQUEZ, 2023).

According to Barbosa (2023), another challenge is related to the need to adapt Chat GPT to the particularities of the educational environment. It is necessary to consider that the language used by students and teachers may be different from that used in other situations, which can lead to poor performance of Chat GPT. In addition, it is important that Chat GPT is able to handle the diversity of subjects and disciplines present in the school environment.

Also regarding the adaptation of Chat GPT to the educational environment, Quintans-Júnior et al. (2023) emphasize that it is important to highlight the need to take into account the age group of students. Children and teens may have difficulties expressing their ideas clearly and objectively, which can affect the quality of interaction with Chat GPT. In this sense, it is important that Chat GPT is able to recognize and interpret the different forms of expression used by students.

Finally, another challenge to consider is the need to ensure the privacy and security of student data. It is important that Chat GPT is developed in a way that protects student information and ensures compliance with data protection laws. Therefore, it is essential that these challenges are addressed so that technology can be used effectively in the school environment. (VELÁSQUEZ, 2023).

CONCLUSION

In the face of increasing technological evolution, education has sought to adapt to the new tools and possibilities offered by artificial intelligence. In this context, this research aimed to analyze the use of Chat GPT as a pedagogical support in the teaching-learning process, through a literature review.

Through the review, it was possible to identify that Chat GPT can be used as a tool to support the teacher in the teaching and learning process, offering advantages such as the personalization of learning, interactivity and immediacy of responses.

However, some challenges were also identified, such as the need for training and constant improvement of the system, as well as ensuring the ethics and security of student data. The use of Chat GPT as a pedagogical support can promote a more personalized education, adapted to the needs of students and more effective. The system is able to identify the individual difficulties and interests of each student, creating a more inclusive and collaborative learning environment.

Therefore, it is hoped that this research can contribute to the deepening of knowledge about the use of Chat GPT in education, encouraging the creation of more innovative and effective pedagogical practices with the use of advanced artificial intelligence. It is necessary for teachers and researchers to be aware of the challenges and opportunities offered by technology, so that they can use this tool ethically and effectively, promoting a more inclusive education adapted to the needs of students.

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