

**La estimulación de la inteligencia artificial y su
impacto en el proceso de enseñanza y aprendizaje**

**The stimulation of artificial intelligence and
its impact on the teaching-learning process**

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RESUMEN

Las exigencias del mundo contemporáneo demandan en la actualidad en todos los docentes el reto de generar valor agregado y alcanzar nuevas experticias para el consumidor, potenciadas con inteligencia artificial (IA), misma que se ha convertido en un determinante que puede propiciar ventaja competitiva empresarial, gerencial y tiene su impacto en el proceso de enseñanza y aprendizaje en cualquier contexto.

Como objetivo rector del presente nos propusimos aportar un estudio mediante una sistematización teórica respecto a las tecnologías de la IA aplicadas al marketing desde la materia de Metodología de Investigación en la Facultad de Marketing y Comunicación-Universidad Tecnológica Ecotec, con el que se beneficiarán tanto la comunidad científica, como las empresas en la toma de decisiones estratégicas para publicidad orientada a los gustos del cliente direccionada por la preparación que reciben nuestros estudiantes y lo más importante es que mediante la elaboración de los diferentes proyectos finales de investigación sea estimulada la inteligencia artificial.

En este sentido, se sistematizan los principales aportes teóricos, surgimiento, desarrollo, tendencia, perspectivas, componentes, y las contribuciones de las tecnologías de la IA en el marketing. Con este fin, se analizaron documentos en español e inglés en bases de revistas indexadas en Scopus, Scielo, Latindex, Redalyc, Dialnet, Web of Science; mismas que posibilitaron y facilitaron información actualizada y pertinente en torno a las variables abordadas en la investigación.

En el desarrollo del trabajo prevaleció la investigación cuantitativa, con diseño no experimental – transversal, teniendo como muestra a dos paralelos de Metodología de Investigación y uno de Diseño de Proyectos de Investigación, que direccionen sus investigaciones con la estimulación de la inteligencia artificial. Se utilizará la técnica de la encuesta para el proceso de recolección de datos mediante un cuestionario basado en la escala de Likert.

Palabras clave: simulación, inteligencia artificial, procesos de enseñanza aprendizaje; investigación, métodos

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Descargar para Mendeley y Zotero

ABSTRACT

Currently, the demands of the modern world calls for teachers to generate an added value for the students to achieve new expertise, enhanced with artificial intelligence (AI), which has become a determining factor as it offers entrepreneurial and managerial advantages and has an impact on the teaching-learning process in any context. As a goal, the researchers intend to contribute with a study of theoretical systematization regarding AI applied to marketing strategies of the Methods of Research subject in the Faculty of Marketing and Communications at Ecotec University. Thus, this work will benefit both the scientific community and the business community as strategical decision-making for customer-oriented publicity is addressed during their preparation and the stimulus of AI is encouraged throughout the completion of the students' final projects. With this respect, the main theories, emergence, development, tendencies, perspectives, components, and AI technological contributions in marketing have been systematized. Also, books and academic journals such as Scopus, Scielo, Latindex, Redalyc, Dialnet, Web of Science in both English and Spanish were analyzed to provide with current information regarding the investigated variables.

Quantitative research, with non-experimental, transversal design prevailed in the present work. Also, two courses on Methods of Research and one course on Project Research Design, addressing research in AI stimulus are part of the sample. Finally, data collection will be done through a survey using a questionnaire based on the Linkert scale.

Key words: stimulation, artificial intelligence, teaching-learning processes, research, methods

Introduction

During the history of mankind, it has been very common to observe innovation and development as an inherent human characteristic, as we are in a constant change and transformation. Throughout the years, we have discovered new ways to obtain food, housing, resources and have improved processes. Thus, we have advanced from the Stone Age to the steamboat and to the oil age.

This magnificent era, where humans have demonstrated their greatest potential in innovation and change, as it is human tendency to evolve, begins with the first industrial revolution, a process of economic, social, and technological transformation started from 1750 to 1840, where the first discoveries and innovations such as the substitution of hand labor and animal traction for machinery in industrial processing and for passenger and merchandise logistics took place. Also, the creation of the steamboat, ships and steam railroads as well as the internal combustion engine and electricity.

A second industrial revolution, which took place between 1850 and 1914 and was also known as the group of socioeconomic interrelated transformations, came later. In this second industrial revolution, there occurred great technical innovations focused on energy sources such as gas, oil and electricity. This event, also known as the first globalization, was mainly triggered by the transport revolution. Therefore, it is important to recall the introduction of new transportation systems such as the airplane and the automobile as well as new communication systems like the telephone and the radio.

Then, a third industrial revolution, also known as the scientific-technological revolution, emerged, and together with this, recent innovations, such as renewable energies, rechargeable batteries, electric vehicles, and others were implemented. Taking this into consideration, it is clearly visible that humans are in a constant search for innovation and evolution. As time has gone by, we have created new items, as part of development, to use in our

daily life .

Finally, we are currently witnessing a new industrial revolution, the fourth or Industry 4.0, where AI is taken as the central element of this transformation. As a result, it is relevant to know which is the influence of AI on the efficiency of the teaching-learning process for the students of Marketing and Communications at Ecotec University.

Theoretical Framework

Artificial Intelligence

Designing a software is a complex endeavor, a human activity which requires a certain knowledge in programming and comprehension of problems to combine and create a solution. Since 1990, AI has been utilized based on sequential commands to analyze the system's behavior (Hema & Thirumalaiselvi, 2014). AI offers techniques such as case-based reasoning (CBR), single-board computers (SBC) and fuzzy logic to develop systems based on knowledge that needs to apply AI to provide solutions (Hema & Thirumalaiselvi, 2014) . AI is defined as the constellation of elements like algorithms, which give the software the possibility of being intelligent like humans, capable of learning from data, with little interference from humans (Alain, 2019).

Foundations of Knowledge

This behavior of artificial intelligence is a paradigm known as case-study reasoning, where solutions are provided based on previously found solutions. The foundations of this are remembering similar situations, applying associative memory represented by algorithms that analyze if situations are similar (Febles, Febles, Estrada & Díaz, 2012) . Thus, AI can be considered as an information technology tool that helps develop learning machines (Mesquita, 2017) .

The foundations of knowledge is in charge of storing the necessary information for the system, comprising software components that extract information from different sources

to transform them into semantic statements. The advantages of counting with that information are a higher capability to discern among the different authorization levels and apply filters and comparisons, among other advantages. From the technical standpoint, it is necessary to know the origin of the information in all the life cycle of the system (Ciancarini, Messina, Poggi & Russo, 2018).

Application of AI

Bonderman (2017) proposes that informatics research in education should contribute to the developments in science. He divides the contribution of informatics to the teaching-learning process into three categories: (A) To an adequate preparation of students, (B) To knowledge management in the classroom, and (C) To the teacher preparation.

- (A) It occurs in the research by Chaundry et al. (2019), which describes the methods used to support a folder for planning, visualization, and execution of specific treatments for each patient, taking time limits and resource restrictions into consideration.
- (B) It is found in a study by Taylor (2016). It uses expert knowledge and automated learning techniques to help differentiate trembling types on Parkinson's patients.
- (C) The article of Fernández (2019) is based on decision-making for the organizational consideration of the resources. Multi-organizational tasks are new topics for artificial intelligence in the investigative educational community.

According to Fernández (2019), teachers have no reason to fear AI, as its advances do not look for replacing them; however, they propose a relief of workload. Furthermore, applying AI in education generates knowledge and transforms ancient teaching and learning models, supporting teachers and students in decision-making processes. For instance, there is AI on some smartphones that helps to detect

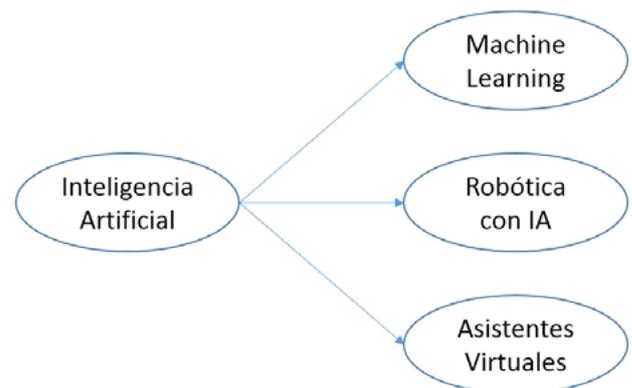
possible learning difficulties.

Branches of AI

AI is divided into three branches: Machine Learning, Robotics with AI, and Virtual Assistants.

Figure 1

Systematization of AI branches



Fuente: Ramas de la IA. Adaptado de "Tecnologías de la Inteligencia Artificial y sus Categorías", Alain Chas(2019)

Machine Learning

Chaundry et al. (2019), define Machine Learning (ML), or automated learning, as a conjunction of algorithms that can learn from registered data and perform predictions based on it. Thus, ML offers computers the capacity to learn without being explicitly programmed. Additionally, ML is the capacity a computer has for learning, making decisions and predictions based on an immense amount of information, also known as Big Data, living within it. Therefore, we can assume that thanks to ML, a machine has some notable human capacities, but it is subjected on the quality and quantity of data from which it can learn.

Amazon uses ML to predict future results, levels of satisfaction, and brand loyalty. Those predictions allow the company to make better business decisions and implement marketing strategies, client attraction, sales, and more.

The purpose of ML is to create algorithms so that a machine can use them to perform specific tasks eventually. In ML, the programmer

or engineer provides algorithms to the machine, and then those algorithms give the machine directions about how to learn autonomically.

Robotics with AI

Zhang et al. (2008) define Robotics as the science that studies the design and construction of machines capable of executing tasks performed by humans. In addition, Robotics with AI is the fusion of branches of technology. Usually, a robot is restricted to specific and repetitive tasks. Here, AI enters to great benefit as it offers robotics the capability to develop cognitive abilities commonly related to human intelligence, like listening, understanding voices, reasoning, and decision-making.

Nowadays, countries and international companies like Google invest millions of dollars investigating and developing robotics with AI. Furthermore, scientists found out that there are immense benefits for implementing this product into processes and businesses. For example, it is common in China to see robots in restaurants, taking orders from customers and bringing food to the tables, dancing synchronized choreographies, or selling products at a fashion store.

Several companies use robotics with AI products for transportation, assembly, packaging, ticketing, among other tasks. Robots do not make errors or suffer fatigue as humans do. Also, in some countries, like China or the USA, robots are used in homes to serve food, take care of elders, safeguard homes, clean activities, and repair. Furthermore, robots are used to perform hazardous tasks for humans, for instance, working in submarines thousands of kilometers under the sea, high-risk tasks like defusing bombs, and cleaning chemical contaminants. Also, in healthcare, they are used for surgeries with a demand for high precision and for assisting disabled or older adults.

Virtual Assistants

Chaundry et al. (2019) define Virtual Assistance (VA) as an interface that allows

users to receive answers to questions. VA can recognize, listen, understand, and process the human language. VA can even give answers or comments depending on the conversation. In other words, it is a program that can develop natural conversations between a human and a machine. Commonly, VA is used in cell phones, computers, or digital platforms. Besides, people and companies have been using this technology since 2011, since the implementation of Siri, which was, one might say, the first “real” VA, created by Apple and Siri Inc.

Characteristics of AI

AI is software that has skills and characteristics superior to standard software. It differs from standard software because it learns autonomously by analyzing enormous data, classifying information, and predicting possible outcomes. Nonetheless, AI is divided into three essential characteristics: supervised learning, independent learning, and reinforcement learning (Chaundry et al., 2019).

Supervised Learning

Supervised learning is when the machine follows patterns provided by algorithms. In practice, the algorithms are used to improve complex computing models, which are applicable in countless moments in our daily lives.

Independent Learning

Independent learning offers the machine data without any labeling and asks it to label or extract information, patterns, or discover insights. Later, the machine will recognize the data and compare it to previous data to label or group it correctly.

Independent learning is highly effective for finding patterns in data, especially patterns or insights that traditional techniques use for statistics of analysis of data (Chaundry et al., 2019).

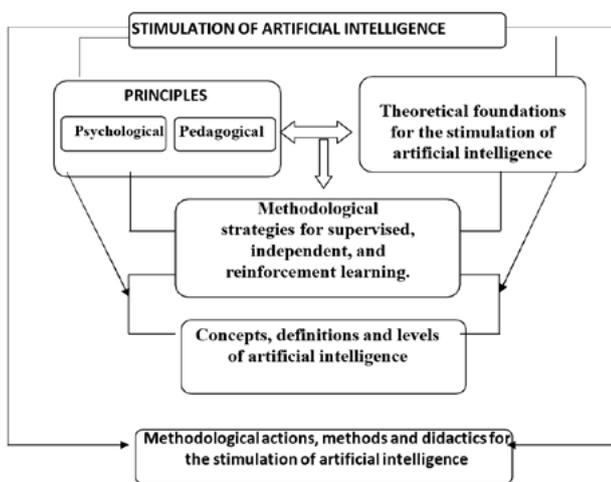
Reinforcement Learning

In reinforcement learning, the goal is

to minimize the error by using an optimization algorithm. It is responsible for optimizing and rewarding the machine's performance instead of aiming for precision. When the machine achieves the objective, an alternative algorithm will reward the machine. A practical example to better understand reinforcement learning is a puppy learning certain behaviors. When the puppy achieves a particular movement or behavior, it receives a trait.

Scheme to support the research

Figure 2



Methodological Framework

The process, the methods and the resources utilized for the present work are explained in detailed hereby. From a quantitative approach, where the data collected of analysis unit are essential for the statement of the problem and the testing of hypothesis.

According to Ballestín & Fàbregues (2019) quantitative research is based on causal description of the experience and data obtained in the surveys or observations. This approach facilitates the comprehension of the effects produced by a determined problem. In accordance with the quantitative approach the project scope is descriptive and explanatory, and non-experimental in design, whose data collection is done through predetermined instruments, numerical data and results obtained after surveys or interviews are applied. Besides, the research has a descriptive and explanatory

approach, with a documental design, and according to the objective is applied or practical as it states a proposal to solve the problems with communication in the educational field. Design is documental since it substantiates the critical analysis of the variables as according to the period and sequences of the research is transversal, to develop in a context and in a short-time.

Monje (2017) explains that the methods of research involve a series of processes that activate synchronically and systematically to reach a common goal. The method of research applied is quantitative, whose main objective is to analyze and examine the numerical information obtained from the statistics, allowing the explanation of the problem from a general approach until the particularities of the problem are met.

Other methods such as observation, deduction, and analysis were considered in the process of this research. On the one hand, observation is an action that allows to identify and recognize the problem while deduction is based on the acquiring of new knowledge and its logical explanation. On the other hand, the analytical method allows to understand the problem from the deconstruction of its parts, identifying its causes and effects from the retrieval of information, the description and the critical analysis.

Haag through Arias (2019) explains that “the application of a mix methodology is convenient as it combines both the quantitative and the qualitative method to collect, analyze and link data of the two types in a single study or investigation” (p. 22).

Among the methods, the direct observation method is described as it is key to begin this investigation, the inquiry is framed in an empiric study since it reveals through experience, the essential relations and fundamental characteristics of the educational and experimental performance where perceptions of a social reality are located.

The present research applies a mix method

of design as it allows a detailed analysis on the educational performance and its influence on the students of the Marketing and Communications Faculty at Ecotech University.

The limited population for the development of the study was a total of 214 students, a number obtained according to the students registered in the night schedule for the second semester of the Methods of Research subject at Ecotec University. According to the formula to calculate the size of the sample of a finite population, and having a total population of 214 students, a sample of 94 students was considered. This is the total number of individuals to be surveyed so the project is feasible and accurate.

Ramirez (2015) indicates that the technique of research is used to investigate and obtain more valid and coherent information along with the stated problem. A very useful technique in quatitative research is the survey, which attempts to identify the people’s perspective in a determined field, using an adequate information control and a general impulse on the acquisition of knowledge.

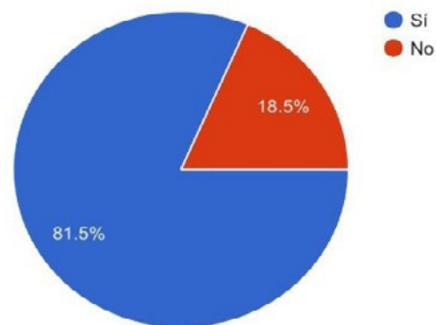
Results

To evidence the impact of AI on the teaching-learning process at Ecotech University, a survey with a questionnaire was applied to the students of three different groups. The results are shown below:

In question 1 “ Does IA influence much in the teaching-leaning process of methods of research?” The 81. 5 % of the sample answered with a “yes”, which represents more than half the sample, and although a low number, 18.5 responded with a “no”, it is pretty visible and clearly evident that the use of AI in methods of research has a high influence on the teaching-learning process.

Influye bastante la inteligencia artificial en la materia de metodología de la investigación ?

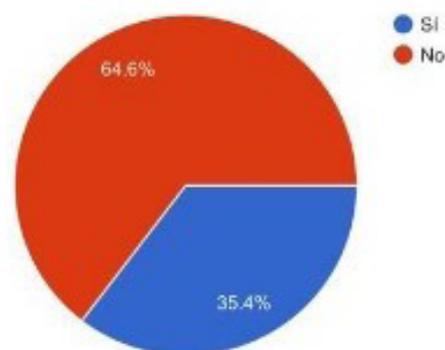
65 respuestas



Although with the answers to question 2 , ” Does any device you own use AI?”, we may consider there is little drawback as 64. 6 % of the sample responded with a “no”, and the 35. 4 % answered with a “yes”, we have to take into account that this does not directly relate to the teaching-learning process, but to a personal preference. However, the question was used to obtain information on participants as many institutions are currently using devices operating with AI and applying it to increase the teaching-learning experience in the students.

Usa algún aparato que posees inteligencia artificial ?

65 respuestas



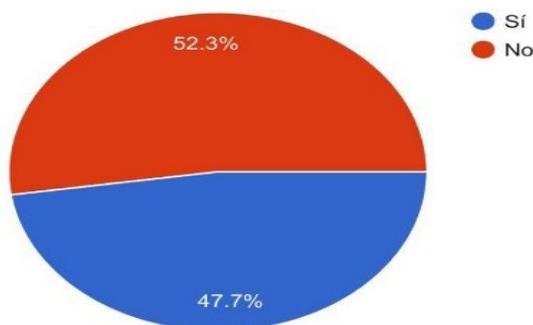
In question 3 “Are the lessons more entertaining with the help of AI?”; however, a more direct approach to the teaching-learning process and the use of AI is addressed so this number , 66, 2 % of yes answers is really a

determining factor on the impact AI has on the students' learning.

Finally, in question 4 "Do you believe that the use of AI has optimized the teaching-learning process?", the 52,3 % of the sample answered with a yes, which, again, brings about a positive result for the present study as it is once again demonstrated with evidence the impact of AI on the teaching-learning process.

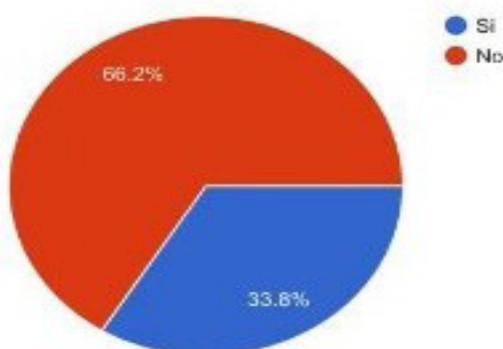
Cree usted que la inteligencia artificial ha optimizado los procesos de enseñanza

65 respuestas



La clase es más dinámica con la ayuda de la inteligencia artificial

65 respuestas



In question 3 "Are the lessons more entertaining with the help of AI?"; however, a more direct approach to the teaching-learning process and the use of AI is addressed so this number, 66, 2 % of yes answers is really a determining factor on the impact AI has on the students' learning.

Conclusions

A variety of AIs such Blackboard, Somadi, SafeAssign, Atrium among others have been implemented in the teaching-learning process for Methods of Research and other subjects at Ecotec University. These AIs' main objective is to facilitate the teaching-learning process for both the students and the teachers. As a result and according to research, we can conclude that a more constructivist, active method, along with experienced and trained teachers, and a set of AIs offered by different virtual platforms must be used to have an impact on the students. With more interactive lessons, the students will deepen into concepts, practice their new knowledge and fully exploit the investigative and scientific utility.

It has been shown that AI has a positive influence on the process of learning and teaching. Therefore, educational institutions and universities that use AI positively affect their efficiency and teaching-learning process. Therefore, AI represents an essential tool for the stimulation of thought in students as it influences their learning.

This research offers justified reasons why AI should be implemented inside classrooms to improve students' scientific and academic production. Consequently, Methods of Research classes should develop AI to help students broaden their possibilities as possible researchers. In addition, teachers must promote activities and tasks that include learning and using different forms of AI.

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