



The revaluation of traditional research versus Artificial Intelligence, in the generation of knowledge in the 21st century in Ecuador

La revalorización de la investigación tradicional frente a la Inteligencia Artificial, en la generación de conocimiento en el siglo XXI en el Ecuador

Víctor Tomás Gómez Bravo

Armada del Ecuador <https://orcid.org/0009-0007-9201-6745>
garfios2003@hotmail.com

Maidy Jasmín Martínez Freire

Armada del Ecuador, <https://orcid.org/0009-0006-5728-0746>
mjmfreire11@hotmail.es

Yaritza Ximena Mora González

Armada del Ecuador, <https://orcid.org/0000-0001-8296-7319>
yaritzaxmora@gmail.com

Christian René Cassagne Martínez

Armada del Ecuador <https://orcid.org/0009-0008-6525-3566>
ccassagne27@gmail.com

ABSTRACT

The creation of Artificial Intelligence is one of the greatest achievements of the present century, where, due to its benefits, it is a reliable and truthful tool for managing the vast amount of information existing in the global data network. In contrast to the technological benefits it possesses, traditional research has its preponderant place in the generation of knowledge in the 21st century, since it constitutes the personal seal of the researcher, being able to know facts and

phenomena that have only been defined in the problem found, so its value is found in the amalgamation with Artificial Intelligence, complementing each other, as well as exploiting the potential of each for the generation of knowledge, innovative ideas, and solutions to problems in the learning environment. In Ecuador, a country with little investment in education, as well as having a youth with a great acceptance of social networks and their great dependence on technology and its various applications in the global data network, makes AI a primordial element to enhance cognitive processes, so as the main result of this work, it is exposed how AI has maximized traditional research in Basic General Education, High School and University; while the main conclusion mentions how specific activities can be established by the Ecuadorian teacher-facilitator, which revalue traditional research supported by the benefits of AI, establishing its application limits for the achievement of the objectives of each assigned work or task.

RESUMEN

La creación de la Inteligencia Artificial constituye uno de los mayores logros del presente siglo, donde este por sus bondades constituye una herramienta fiable y veraz para el manejo de la gran información existente en la red mundial de datos. Frente a las bondades tecnológicas que posee, la investigación tradicional tiene su sitio preponderante en la generación de conocimiento en el siglo XXI, puesto que constituye el sello personal del investigador, al poder conocer hechos y fenómenos que sólo se han definido en la problemática encontrada, por lo que su valor se encuentra en la amalgama con la Inteligencia Artificial complementándose mutuamente, así como también explotando el potencial de cada una para la generación de conocimiento, ideas innovadoras, y soluciones a problemas en el entorno de aprendizaje. En el Ecuador, país con poca inversión en educación, así como el poseer una juventud con una gran aceptación a las redes sociales y su gran dependencia a la tecnología y las diversas aplicaciones en la red mundial de datos, hace que la IA sea un elemento primordial para potenciar los procesos cognitivos, por lo que como principal resultado del presente trabajo, se expone como la IA ha maximizado la investigación tradicional en la educación General Básica, Bachillerato y Universitaria; mientras que la principal conclusión menciona como se pueden establecer actividades específicas por parte del docente-facilitador ecuatoriano, que

revaloricen la investigación tradicional apoyada por las bondades de la IA estableciendo sus límites de aplicación para la consecución de los objetivos de cada trabajo o tarea asignada.

Keywords / Palabras clave

Artificial Intelligence, traditional research, teacher-facilitator, knowledge generation, learning process.

Inteligencia Artificial, investigación tradicional, docente-facilitador, generación de conocimiento, proceso de aprendizaje

Introduction

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The different technological advances of the 21st century have meant that access to information is no longer the privilege of a few, which has facilitated the understanding of all fields of science in various ways, aided by the benefits of the different multimedia applications that exist, the common denominator being the achievement of an active understanding of all knowledge in the shortest possible time. Due to the fact that advances in science are developing by leaps and bounds, since the COVID-19 pandemic, the creation of Artificial Intelligence has become the greatest achievement in the digital world, thanks to the multiple applications it has for recreation, science, studies and the generation of knowledge, its evolution being constant in all the aspects mentioned, thus allowing its use in an integral way in all aspects of society, being used massively by commercial companies, as well as educational centers at all levels.

One of the applications that is in vogue for Artificial Intelligence is its use for the generation of knowledge, and that specifically in Ecuador, the massive use of the internet, social networks and other online applications for education is quite accepted, which is why the use of Artificial Intelligence for academic work has become a help to students in Ecuador.

Despite this, there are still many questions about the benefits of Artificial Intelligence (AI), since traditional research is still valid, as it is still a safe, verifiable, measurable and truthful way of obtaining information, as well as offering a tangible insight into the realities of the acts being investigated, actions that Artificial Intelligence is not capable of carrying out since it only analyzes documents or activities existing in the world wide data network.

Now, what happens when artificial intelligence is overused? What are the risks to cognitive processes in students in Ecuador? How can comprehensive research be carried out in a society like Ecuador with low levels of reading and the massive use of social networks? How does the use of Artificial Intelligence affect critical thinking and comprehensive analysis in children and young people for the construction of knowledge? In the face of these questions, it is necessary to find answers adapted to the reality of education in Ecuador, which is influenced by several factors such as dependence on social networks, which are even used for political purposes, and the lack of a culture of comprehensive reading in children, young people and adults.

With the aforementioned problems, it is necessary to analyze how the massive use of Artificial Intelligence in the present century promotes the generation of knowledge in Ecuador, as opposed to the traditional methods of research that are still in force, taking into consideration that there is no formal research in Ecuador on the results of the use of AI in scientific research that allows access to reliable and concrete data in all areas of knowledge; where, to analyze the aforementioned problems, information will be obtained from open sources, by means of qualitative research, using the deductive and inductive method, seeking to revalue traditional research in harmony with the massive use of Artificial Intelligence.

Given the large amount and volume of information existing on the world wide web, as well as the constant updating of computer applications and the digitization of knowledge, which has led to the gradual disappearance of traditional reference books, as well as the great encyclopaedias of yesteryear, it was necessary for current technology to allow for the discernment, classification and management of existing information on the internet in order to generate knowledge, whether by second, third and fourth level students, and by professionals from various areas, since production and research constitute a modern skill that must be acquired by any professional who wishes to advance in their career. Therefore, competence in the handling of information, in a globalized and changing world, where knowledge and science evolve, can only be acquired through the use of computer tools which allow its classification and verification, as is the case with the help of Artificial Intelligence, this being its greatest benefit, based on the characteristics it possesses, and according to the programming or commands that can be configured in its “prompts”.

One of the benefits offered by AI is language correction or the generation of text from ideas, actions that considerably reduce the time for those who manage, classify and verify information, since it allows them to have a previous idea that helps the subsequent analysis and construction of the knowledge necessary to produce conclusions for the researcher, an action that without Artificial Intelligence could take days or even months to compile and analyze.

Due to the large volume of existing information, there is a wide range of criteria to be found in various scientific journals or various documents verified on the internet, which means that the researcher has to spend a lot of time discriminating between relevant, verified information that is up to date with the changes that exist in the modern world, the benefit of using Artificial Intelligence being vital for establishing filters to select specific information, where it is also possible to obtain a preliminary result that serves as a basis for a more in-depth analysis by the researcher in accordance with his or her proposed objectives.

Once a result has been generated by Artificial Intelligence from a search of filtered information, it can be disseminated in various ways, another application being the transformation of the results into voice, images or videos, an action that allows a better understanding of the information gathered, and that allows an active construction of knowledge both for the researcher and for students in the case of developing a research task.

The characteristics mentioned are the most common advantages of Artificial Intelligence, being more specific for areas of knowledge such as Medicine, the application of mathematical or physical calculations, in the generation of images or comparison of data applied to the design of structures, mechanical parts, etc. For these sciences, the advantages are endless, being a vital tool for establishing mathematical and statistical relationships, especially with data obtained under different conditions, or for making predictions.

Traditional research versus the use of Artificial Intelligence in the Ecuadorian education system.

Of the benefits of Artificial Intelligence that have been mentioned, it is a reliable tool for the generation of knowledge. However, it should be noted that traditional research, which includes the use of research methods, techniques and instruments, which offer an infinite number

of ways to achieve the result proposed in the objective of each work, has not lost any validity, because, as a continuous, logical and sequential process, it allows for its validation per se, as well as establishing and verifying phenomena that can only be achieved in field research or through direct observations by the researcher. Similarly, the design and selection of techniques and instruments constitutes the personal stamp of the researcher, so that all these elements together are those that enrich and keep alive the spirit of the execution of a traditional investigation, which, compared to the benefits of Artificial Intelligence, does not lose validity, since the latter only analyzes data and documents that are online or, failing that, have been uploaded to an Artificial Intelligence engine existing on the world wide web.

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Now in Ecuador, where, like in many parts of Latin America, the massive use of the internet and its applications on mobile devices is part of the life of young students and professionals, Artificial Intelligence, which is in constant evolution, allows it to be a support tool for Traditional Research, especially in the elaboration of scientific articles, projects and theses, because traditional research can be supported by AI for:

- Compilation of statistical data and its respective automatic collation and comparison.
- Searching with the filters programmed in the Artificial Intelligence search engine to obtain relevant information such as the Theoretical Framework and the State of the Art.
- Correction and editing of text in the shortest possible time, especially for long documents such as a thesis and a project that exceed 50 pages.

These advantages in the Ecuadorian education system allow Artificial Intelligence to be a tool accepted by all educational centers, with the aim of improving research processes, thus creating a culture of research and reading which has been decreasing with the massification of the internet and the reduced investment in public education by governments since 2020, investing in other sectors such as defense, social services, risk management actions due to the effects of natural and anthropic events, which is why the use of Artificial Intelligence must be oriented in such a way that it can focus educational research processes on continuous improvement, not underestimating the human factor at the middle and higher levels, since at the basic level, the child has to discover and build knowledge on his or her own based

on playful or assisted activities that allow active interaction, whether teacher-pupil, pupil-pupil, and pupil-learning environment. As a result of the use of Artificial Intelligence as a complement to traditional research, Information Management (IM) skills are developed in such a way as to allow them to be a research hotbed and to prepare them for their future job position.

This is an instruction, an order given by the user to an AI program to search for specific information.

Materials and Methods

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Given the widespread use of social networks on mobile devices by young secondary and higher education students, it is necessary for Ecuadorian teachers and educators to take advantage of this fact, which cannot be ignored. At first glance it would seem that Artificial Intelligence used on a large scale reduces the student's capacity for cognitive skills or for analysis, or prevents them from exercising their mind in the development of critical thinking. However, this tool that constitutes AI, when used in a balanced way, allows the development of classroom activities according to:

- The social and economic reality of Ecuadorian students with respect to their access to the internet.
- Their ability to use office automation and to handle information on the world wide web.
- The reading comprehension ability of each student and the research skills of each student at the middle and higher levels.

Consequently, the role of teacher-facilitator should focus on being a guide to learning where limits or specific functions are established for the use of Artificial Intelligence, or failing that, maximising its use for the construction of knowledge by means of:

- Creation of images.
- Creation of videos.
- Creation of written results and converting them into banners or infographics.

- Creation of executive documents.

Therefore, the use of Artificial Intelligence by students constitutes the personal signature that each one of them can put to the construction of their own knowledge, since it offers a space for creativity, imagination and problem solving based on learning that will only be demonstrated during the use of all the benefits that AI offers.

It is necessary to point out that, with this, the use of Artificial Intelligence results in a personalization of learning, which can be optimized by the facilitating teacher, exploiting both the cognitive capacities of the student and the technological benefits offered by the AI application. It is important to emphasize the role of the facilitating teacher, since when he or she establishes the limits of the use of AI, allows each student to develop their critical thinking, reflection and analysis as an essential element for learning by developing other activities, both group and individual, that allow individual research, collaboration and sharing of the information collected with their peers, associating the data collected with truthful and reliable information, and developing individual or collective critical thinking, as the case may be.

All the elements of active learning mentioned in the previous paragraph have as their ultimate goal the development of autonomy in thought, as well as in the self-reflection that allows the discovery of one's own and collective errors, focusing the student on the development of a process of continuous improvement that allows for inclusion, as well as the personal commitment to constant learning. In practice, the teacher-facilitator, in addition to setting the tasks to be carried out during the autonomous learning processes, must establish an internal procedure for continuous monitoring of each student's progress, both in terms of the process and the result, thus verifying the advancement and construction of knowledge with the help of AI, and also the essence of the objectives proposed in each content of the area of knowledge being studied.

Establishing the limits of the use of AI by the facilitating teacher helps the student to develop their cognitive skills and abilities in each area of knowledge based on its intrinsic nature, thus maintaining its particularities and characteristics that differentiate it from others, both in its study and evaluation procedure. Taking into consideration that AI is only a tool to aid the generation and construction of knowledge, it can only be used once the search for information or the

traditional research process has been carried out, or failing that, the tasks specific to each area of knowledge; With these activities, the teacher-facilitator can implement a myriad of methodologies that allow each student to feel engaged in their learning process, thus creating an innovative experience for both the student and the teacher, establishing a constant feedback loop for the teacher and the educational institution.

Results

With the above, the subject of the use of Artificial Intelligence can be applied in all fields of science as indicated, but specifically in its implementation for the middle and higher educational level in Ecuador, it has its particularities since, as mentioned above, in the country there is a great acceptance of social networks, and applications for technology, where it has been mentioned on multiple occasions that it has become an addiction in Ecuadorian youth, which is why it is viewed with displeasure by many teachers in the country, to the extent of suspending all kinds of support that social networks and multimedia applications can offer, since they affect the development of critical thinking, analysis and logic, accustoming students to leaving aside traditional research, to concentrate only on macro data that does not have a verified source or that only summarizes data that does not adapt to the reality of historical facts, or that have biases based on the source's own criteria.

The situation in Ecuador can be reversed by using this alleged threat to the educational process as an opportunity to enhance information management skills and research competence at the intermediate level (eighth to tenth grade of Basic Education and High School) and at the higher level (third and fourth university level), through specific activities that are focused according to their area of knowledge or grouped according to the university degree being studied; in all cases, the specific activities must have the following provisions:

- Be a learning process, clearly defining the role of the teacher and the student both in class activities and in the process of autonomous learning.
- Promote research in all facets of the activities.
- Define the activities that will be carried out through traditional research or activities of assisted or autonomous knowledge

construction, and which activities will be carried out with the help or assistance of Artificial Intelligence.

All activities involving resolution, analysis, conclusions or interpretation of results will be carried out by the student, without the help of AI.

Group exposure to activities involving collaborative work will be carried out with the help of AI, however, the analysis will be based on group intellectual production.

These provisions, followed periodically, will allow, among other things, the optimization of the great dependence of Ecuadorian youth on social networks and mobile devices, to create a virtual and interactive learning environment, using all existing applications, with AI being a complement that can be magnified to optimize time and develop innovative and creative ideas to improve the study of all areas of knowledge.

For Basic General Education, in areas such as Language and Literature, Social Sciences and Natural Sciences, the use of AI can focus on the search for verified information, so that after subsequent analysis, the conclusions are reached by cognitive processes, while knowledge-building activities are shown by means of images or videos with AI. Likewise, students can use AI to establish relationships or comparisons that allow them to associate the results obtained with other research carried out.

In the same level of basic general education, for the area of mathematics, AI can be used to search for mathematical relationships with other works on the same subject, and thus be able to adapt them to the reality of the problems to be solved based on the texts used for the national curriculum.

For Foreign Language, AI offers more possibilities for building knowledge, since there is a greater amount of information on the web that can be discriminated in a foreign language, there being a greater scope for the construction of knowledge to be effective and efficient for a better understanding, as well as creating a methodology of its own adapted to the reality of the level of foreign language knowledge in Ecuador.

For the level of Unified General Baccalaureate (BGU), in which basic skills and knowledge have already been developed, and the aim is for

the student to develop skills and knowledge to be applied for their upcoming university life, this is the period in which the use of AI can be enhanced, when carrying out work that seeks to apply to everyday life, in addition to carrying out activities focused on the study environment, so the research to be carried out in the areas of Language and Literature, Social and Natural Sciences and Mathematics have greater depth, where AI allows for greater discrimination of information due to the large volume of data to be collected, and once this task is completed, traditionally develop a deeper analysis, reflection and critical thinking on the part of the student, where the information obtained allows for the amalgamation of research methods, techniques and instruments, with the information or data collated by the AI, for its subsequent interpretation in order to draw conclusions.

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As can be seen, at the level of Basic General Education and Baccalaureate in Ecuador, traditional research can coexist with AI applications, therefore it does not lose its value and can enhance the use of social networks and AI applications, which are linked in the network, its potential being the production and generation of innovative ideas in young people between 12 and 17 years old, something that in Ecuador is not developed until they reach university, which is why the use of AI can be maximized to help individual research procedures and thus obtain the same results but in a shorter time and in a reliable way.

In Higher Education, both at Third and Fourth Level, where the learning process focuses on carrying out research and individual production work, as well as being directed towards links with the community, traditional research plays a fundamental role, due to the fact that fieldwork and direct observations of the phenomena existing in the problem defined by the student are compulsory, so, here all the help that multimedia can offer is needed to support the problem being studied, the role of AI being to search for information and data that can be compared with the state of the art in Spain or abroad that meets the researcher's needs. As mentioned, the large volume of information on the world wide web makes the support of AI necessary, so that more than a tool, it constitutes a support for the execution of the research process, providing the Theoretical Framework, the Conceptual Framework and the State of the Art, since it can compile statistical data, numerical projections, or the collation of qualitative information and transform it into numerical data that allows for interpretation, analysis and the issuing of personal criteria that help to establish the

final conclusions in research focused on the solution of national problems or in the learning environment, the main characteristic of work at university level.

With the conclusions, the researcher of any research work, be it an essay, a scientific article, a thesis or a project, can use AI to present their results, either with video or images, and can disseminate it on the world data network or through social networks in the different learning communities that exist on them.

It is necessary to indicate that the role of the teacher-facilitator for the Third and Fourth Levels of Study focuses precisely on verifying the limits of traditional research and the help of AI, where the amalgamation of both ways of obtaining information enriches the entire research process itself, which is why it is verified that traditional research does not lose its validity, these procedures being valid even in the 21st century for any type of work carried out at any level of education, being adaptable for Ecuadorian society, which, due to its great dependence on social networks and online applications, is an opportunity to optimize the learning process, the acquisition of knowledge, and to promote scientific research.

Conclusions

Artificial intelligence is currently a tool that is constantly evolving, and is increasingly assisting in everyday tasks in industry and different areas of science, with the education sector being where it has a wide field of action. It is here that its applications and basic functions allow students to exploit its benefits, to acquire data and knowledge that supports the construction of knowledge, the basis of the learning process in the 21st century.

Since the generation of knowledge is a basic skill in the 21st century, it is currently supported by the use of Artificial Intelligence in order to gather information or present it once it has been compiled, collated and analyzed. These benefits are what enable the acquisition of competence in the handling of information, which constitutes the basis for being able to carry out a correct investigation that complies with the characteristics of the 21st century, based on the collation of theory, a state of the art, and the personal criteria of the researcher.

Now, despite the existence of this tool, traditional research has a preponderant place, because it allows for fieldwork and direct observation, where the design of research strategies comes into play in order to achieve the objectives proposed in each project, applying the most appropriate method, technique and instrument for the purpose. Since, in Ecuador, young Ecuadorians are very accepting of social networks and all online applications, the use of AI should be seen as a support and a tool which allows for the development of innovation, generation of ideas, creativity and problem solving.

Consequently, the importance of AI in the Ecuadorian education system allows it to be seen as a way of maximizing and complementing traditional research at the Basic Education, Baccalaureate, Third and Fourth University Levels, and not be valued as a computer tool that reduces the capacity for analysis, reasoning and critical thinking. Consequently, due to the benefits of AI, specific activities can be established at the middle and higher levels in Ecuador by the teacher-learning facilitator, where traditional research is revalued in the Ecuadorian educational system due to its ability to obtain information that can only be obtained through its application, or that is not found in its entirety in the world data network, which is where AI obtains information, thus also establishing the importance of the human factor for the execution of analysis and conjectures that allow reaching conclusions and fulfilling the proposed objectives of any type of research.

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