LatIA. 2024; 2:106
doi: 10.62486/latia2024106
ISSN: 3046-403X

SHORT COMMUNICATION

Digital skills in the use of artificial intelligence tools for the formulation of formative research projects from the TECSIS Research Seminar

Habilidades digitales en el uso de herramientas de inteligencia artificial para formulación de proyectos de investigación formativa desde el Semillero de Investigación TECSIS

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Cite as: Cardenas Espinosa RD, Caicedo J, Epifanía Huerta AD. Digital skills in the use of artificial intelligence tools for the formulation of formative research projects from the TECSIS Research Seminar. LatIA. 2024; 2:106. https://doi.org/10.62486/latia2024106

Submitted: 05-02-2024 **Revised:** 10-05-2024 **Accepted:** 06-07-2024 **Published:** 07-08-2024

Editor: Prof. Dr. Javier González Argote

ABSTRACT

Artificial intelligence (AI) has promoted a change in the way research and innovation (R&D) is performed bringing new perspectives, automating time and routine tasks contributing to the generation of knowledge. To take full advantage of the potential of AI, it is proposed to develop strategic digital skills for the use of artificial intelligence tools in the formulation of formative research projects from the TECSIS Research Seminar. The methodology corresponds to qualitative research with a descriptive analytical approach with a cross-sectional approach in four stages: analysis, design, evaluation and dissemination. The population under study includes the students of the special programs of Computer Engineering and Systems Technology of the University of Caldas. The expected result is the characterization of strategic digital skills of use for the formulation of formative research projects. This project will contribute in the development of a methodological route that exposes in a practical and applied way the strategic digital skills of use of AI tools for the formulation of formative research projects for the special programs of the University.

Keywords: Artificial Intelligence; Research; Innovation; Digital Skills; Project Formulation.

RESUMEN

La inteligencia artificial (IA) ha promovido un cambio en la forma en que se realiza la investigación e innovación (I+D) aportando nuevas perspectivas, automatizando tiempo y tareas rutinarias contribuyendo a la generación de conocimiento. Para aprovechar al máximo el potencial de la IA se propone desarrollar habilidades digitales estratégicas para el uso de herramientas de inteligencia artificial en la formulación de los proyectos de investigación formativa desde el Semillero de Investigación TECSIS. La metodología corresponde a una investigación cualitativa con enfoque analítico carácter descriptivo con corte transversal en cuatro etapas: análisis, diseño, evaluación y divulgación. La población objeto de estudio abarca los Estudiantes de los programas especiales Ingeniería en Informática y Tecnología en Sistemas de la Universidad de Caldas. El resultado esperado es la caracterización de habilidades digitales estratégicas de uso para la formulación de proyectos de investigación formativa. Este proyecto contribuirá en el desarrollo de una ruta metodológica que expone de forma práctica y aplicada las habilidades digitales estratégicas de uso de herramientas IA para la formulación de proyectos de Investigación formativa para los programas Especiales de la Universidad.

Palabras clave: Inteligencia Artificial; Investigación; Innovación; Habilidades Digitales; Formulación de Proyectos.

INTRODUCTION

The use of Digital Skills to promote innovation in Computer Science and Information Engineering (CSE) has gained relevance in the 21st century. This is because digital technologies are becoming increasingly sophisticated and used in various applications. As a result, there is a growing demand for CSE professionals with skills in using digital technologies to solve complex problems and develop innovative solutions.[1] In May 2022, the Colombian Ministry of National Education (MEN)[2] published the Technical Note National Ecosystem for Educational Innovation and Digital Transformation as a proposal to articulate the efforts of the different actors in the Colombian education sector to drive educational innovation and digital transformation. This involves incorporating and appropriating digital tools, improving learning processes, and social mobilization. In this way, the development of digital skills in the educational community will be promoted to students, teachers, and managers so that they can take full advantage of the opportunities offered by digital transformation.

Research question

How can strategic digital skills be developed for using artificial intelligence tools in formulating formative research projects?

According to,[3] *digital skills* are defined as "a combination of a digital mindset (hardware, software, information, systems, security, and innovation), knowledge (theoretical understanding and comprehension), competence (cognitive and practical knowledge), and attitude (values and beliefs)". Other definitions of digital skills, according to,[4] refer to the functional skills of operating and using technologies for different expressive, social, and imaginative purposes, along with the strategic understanding of how Information and Communication Technologies (ICT) contribute to and are persuaded by commercial and social aspects.

The research of[4] presented four types of digital skills: critical, social, creative, and technical skills because this encompasses the most common types of skills identified in discussions on new literacies,[5] whose categorization refers to the operational areas (creative and technical), strategic understanding of risks and opportunities (social and critical).

Digital skills in the 21st century have become an essential part of human life, as the world is becoming increasingly digital due to the acceleration of factors such as COVID-19 that have enhanced this process, making it imperative to use technology effectively to succeed both at work and in life. Despite the multiple definitions of existing digital skills, these are divided into two categories: technical skills (specific to the use of computers and other digital devices) that include Using a computer or mobile device, Accessing and using the Internet, Using email and other communication tools, Using software applications, Creating and editing digital content; and non-technical skills (more general and applicable to any digital context) such as critical thinking, problem-solving, creativity, collaboration, communication, information literacy, and digital citizenship.

Research by [6] identified four categories of digital skills, as follows:

1. Basic and operational skills (necessary to use digital technologies, such as turning on and off a computer, using a keyboard and mouse, surfing the web, among others)
2. Formal skills (correspond to the ability to use digital tools to create and process information, such as the use of word processing programs, spreadsheets, and databases)
3. Informational skills (equivalent to the ability to search, select, evaluate, and use online information effectively and efficiently, as well as the ability to use digital resources to obtain information)
4. Strategic skills (using technology to set and achieve objectives effectively and efficiently to improve productivity, communication, and collaboration)

More recent research presents the following five types of digital skills:

1) Digital literacy: the ability to use digital tools and understand their use [7] and includes the ability to search, evaluate, use, and create information using digital tools;[8]

2) Computational thinking: the ability to solve problems using logic and algorithms, has been defined as "Bringing computational thinking to K-12: What does it entail and what is the role of the computer science education community?";[9]

3) Digital communication: the ability to use digital media to interact with others and convey information effectively;[10]

4) Information management: the ability to effectively search, evaluate, and use information essential to address ethical issues in a digitized world[6] importance of developing critical skills to assess the veracity and reliability of online information; and

5) Digital security: the ability to protect oneself from online threats, such as viruses or cyberattacks, to protect against cyber threats and guard one's data.[11]

The results of the systematic review of Digital Skills indicated that it is still in its early stages. Highlights were:

I made good use of digital tools but needed to improve my learning. Positive attitude towards digital learning, which corresponded to a quantitative approach applied to students in Mexico. Used in educational policies and practices in Mexico.[15]

It counted a good level of use of digital tools and deficiencies for teaching and learning. Positive attitude towards digital learning with barriers to using digital technologies in their teaching. Mixed research was applied to teachers in Spain. Used in educational policies and practices in Spain.[16]

Presented a good use of digital tools but needs to improve in teaching and learning. Positive attitude towards digital learning with barriers to using digital technologies in their teaching. Corresponded to a quantitative research applied in Switzerland. There is no significant difference in gender or place of residence. There is a significant difference in creative skills between urban and rural youth.[17]

Nowadays, innovation leads to the development of new technological projects that are necessary and in demand, which, thanks to the Internet of Things (IoT) and Arduino, embedded systems designed to fulfill one or several functions based on microcontrollers in real-time have gained great popularity in the world of education and applied research. In this context, the ChatGPT Artificial Intelligence model is key in advancing these areas.

ChatGPT is an Artificial Intelligence (AI) model trained as an interactive conversational software (chatbot) capable of responding to prompts in various text formats;[18,19] this model works with GPT-3 (Generative Pre-Trained Transformer-3); it has the hidden technology to its ability to understand and generate text. This means the application can elaborate functions with more sophisticated responses to user input, including search and explanation with follow-up questions, hidden definitions, assertions, and questioning of hypotheses.

There are clear similarities to academic reports, including producing and evaluating student papers, conference talks, and academic publications.[20] Although chatbots and AI have been around for approximately 60 and 70 years, respectively,[21] ChatGPT is different. It will have a transformative effect on higher education, especially on student writing and work.

METHODS

The methodology corresponds to qualitative research with a descriptive-analytical approach and a cross-sectional approach in four stages: analysis, design, evaluation, and dissemination. The study population includes students in the Computer Engineering and Systems Technology special programs at the University of Caldas.

The procedure according to the stages is as follows:

1. *Analysis:* characterizing strategic digital skills for using artificial intelligence tools in formulating formative research projects is performed.
2. *Design:* compilation and structure of a bank of artificial intelligence tools applicable to formulating formative research projects.
3. *Evaluation:* corresponds to the field validation of applying strategic digital skills for using artificial intelligence tools in formulating informatics projects in the local context.
4. *Dissemination:* corresponds to the socialization of the project results through a poster.

RESULTS

Expected Results

Characterization of strategic digital skills of use for the formulation of formative research projects.

Develop a methodological route that exposes, in a practical and applied way, the strategic digital skills of IA tools for the formulation of formative research projects for the university's special programs.

This project contributes to the scientific production from the TECSIS Research Seminar in the research line Education, Engineering and Information and Communication Technologies of the Research Group ReNuevaTe Science, Technology and Innovation through the design of Information Technology Solutions to problems of the local context.

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FUNDING

None.

CONFLICT OF INTEREST

None.

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