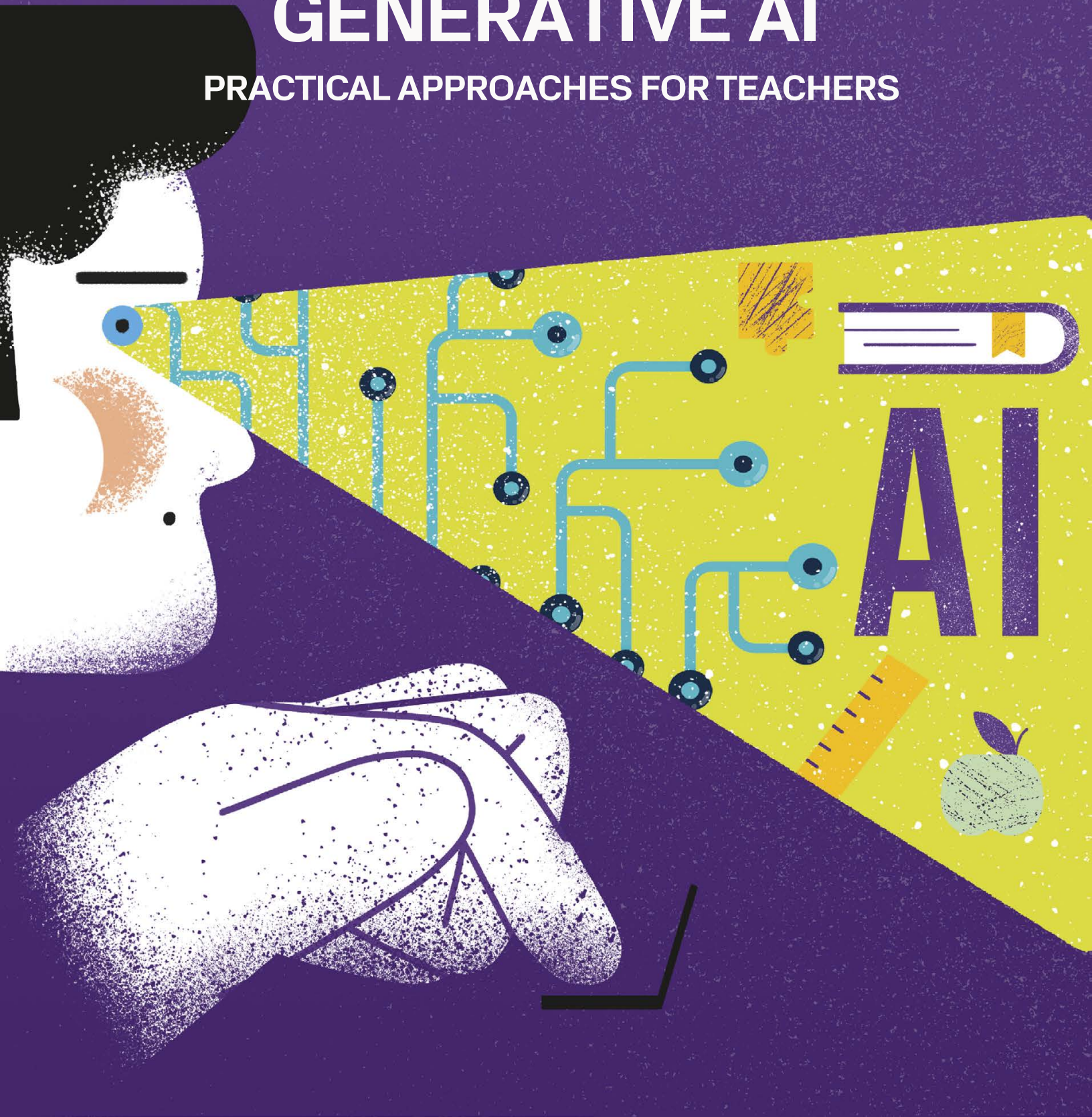


Edu Book

GENERATIVE AI

PRACTICAL APPROACHES FOR TEACHERS



Index

03. Prologue

04. Five Key Points for Integrating AI Into the Classroom

Aurora María Tovar Martínez

08. Artificial Intelligence for Teacher Productivity: Multifunctional Tools

Melissa Guerra Jáuregui

15. ChatGPT as a Source of Preliminary Information in Directed Research

María Eugenia Walss Aurióles

23. Teaching Math to My Artificial Intelligence Assistant

José Javier Salas

30. AI Tools to Trigger Reflection and Creative Processes

Sergio Palomino Gámez y José Carlos Vázquez Parra

36. Empirical Projects in Economics With AI

Rosa María Morales Valera

44. AI Tools to Enhance Business Learning

Mauro Rodríguez Marín

50. Foreign Language Learning with AI Integration

Melissa Guerra Jáuregui

56. Open Educational Resources on Generative AI

60. CALL FOR SUBMISSIONS

Prologue

Creating this Edu Book took longer than we expected. Although we knew that the Observatory has a large collection of content related to generative artificial intelligence, recapitulating all the content published since November 2022—the date of the public launch of OpenAI’s ChatGPT, which marked a turning point not only in the educational field but also in the personal and professional spheres of many people—was a bit overwhelming, to be honest.

The first draft of this publication exceeded two hundred pages. At first, naively, we thought it would be an “easy task” since it simply involved compiling what had already been published into a “small” downloadable document, as we say here in Mexico. That’s why we decided to divide what we thought would be an [Edu Book](#), into two volumes.

We’ve dedicated this first volume to a completely practical approach, perhaps conceived more as a “toolbox” for teachers interested in applying the vast number of different applications, programs, and tools available to us today. We’ve made a very limited and varied selection, fully designed for users interested in exploring how to use generative AI—whether in the classroom, in academia, or in their daily work.

I can tell you that in the next volume, we’ll address texts and content with a critical and reflective approach to how generative artificial intelligence is impacting our lives and the planet. We’ll also explore the ethics behind the use of these tools. In short, a necessary conversation and reflection in these times.

We are very excited to present the final version of this first volume. We hope that, as conceived, it will be very useful in your teaching practice.

KARINA FUERTE
Editor-in-Chief, Observatory IFE



Five Key Points for Integrating AI Into the Classroom

By: Aurora María Tovar Martínez (aurorator@tec.mx)

Artificial intelligence (AI) **does not replace the act of thinking** but expands, amplifies, and enriches it. Its value lies in imagining **new ways of learning**, accepting the unknown, and uniting humans with technology to discover what previously seemed impossible together. These ideas arose from my virtual participation in the CIIPEC 2024 Congress of the CEMAR Foundation. This experience **led me to integrate AI into my teaching practice with a critical and humanistic perspective that has transformed my teaching.**

In this article, I share **five key points we must consider in integrating AI into the classroom** to effectively combine the technological and human components of the teaching and learning process.

01 AI IS A TOOL, NOT A SUBSTITUTE

One thing AI cannot replace is human contact. As teachers, our role should not be limited to asking students to write an essay or a composition that a [chatbot](#) can do with greater or lesser quality. **We must accompany the students in their learning process, monitor their interactions with AI, and teach them to ask better questions.** For example, in a literary analysis activity, I proposed that students use AI to generate questions about an excerpt from the novel *The Purple Flower* by Chimamanda Ngozi Adichie. Afterward, **we discussed in class why the AI produced those questions and how they could be improved.** This approach helped them develop critical thinking and reflect on technological limitations.

Our students are not unethical about using available technology; they are contemporary. When we accept that the student community uses various artificial intelligence tools to perform their tasks, an optimistic perspective **is to direct their curiosity circularly to start from their ideas and, after consulting the tool, use their criteria again for decision-making**, i.e., the student first and at the end the student – so there is always human intervention in the learning process.

Also, **it is very important to set specific limitations on using AI in classes.** For example, in mine, I allowed them to use AI to generate initial ideas but not to write complete assignments. **It helped foster creativity and accountability.** In addition, **I supervised their learning by tracking individual progress**, identifying knowledge gaps, and suggesting personalized strategies for improvement.

02 LEARNING OCCURS ON THE INTELLECTUAL PLANE BUT PRIMARILY AT THE EMOTIONAL LEVEL

With the support of AI, I designed emotionally healthy classes for my students. To do this, I used Khan Academy's "[Khanamigo Individualized Education Plan Assistant](#)" to adapt content to the learning paces of my various classes and thus promote their self-confidence. For example, **in a narrative activity, students created short stories and personalized them with elements that reflected their emotions and personal experiences.** The Khanamigo tool allowed me to offer different levels of support in generating these stories, making suggestions for structure, and provoking some ideas appropriate to the level of each student. This approach inspired their curiosity and strengthened peer bonds as they shared their stories in class.

We remember the best teachers by how they made us feel. **My goal is to inspire each learner with the love and curiosity to learn**, personalizing their learning processes and, along the way, making good use of technological tools. For example, in my class on humor in art and literature, I invited my group to **work collaboratively using AI to create parodies of social issues linked to the Sustainable Development Goals (SDGs).** Ultimately, they shared their creations, discovered their potential, and strengthened their bonds. These peer-to-peer interactions connecting the class contents with the real world allowed them **to assess whether the humor developed by the AI was hilarious** or if this characteristic was still in development or inappropriate in the context.

03 PRIORITIZE THE PEDAGOGICAL MOMENTS IN THE TEACHING INTERVENTION

Human intervention in the classroom remains irreplaceable. This semester, I incorporated activities such as “conversing with the literary character,” where **the students developed questions about literary characters and used AI to simulate their answers.** This exercise stimulated curiosity and deep discussions. Likewise, in the “Theory of Knowledge” class, **we work with AI-generated, specifically biased news about natural disasters,** helping each participant identify errors and reflect on how AI can replicate human biases if used imprudently.

To reduce cognitive overload, I focused on the essentials, designing **activities that allowed students to produce concrete results with the information they had already mastered.** For example, after working with AI and uncovering the details of each resource for text analysis, students **summarized their learnings in hand-made concept maps.** This type of activity helped them consolidate their ideas for class discussions.

04 EVALUATE THE PROCESS, NOT JUST THE RESULT

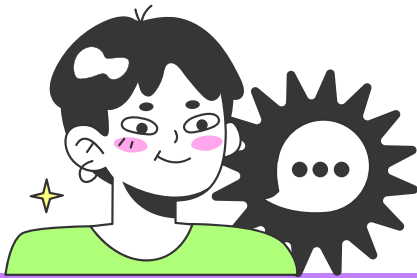
Evaluation should also focus on **critical thinking and metacognitive reflection.** An activity where we used [Personify](#) to correct essay drafts allowed students to compare their ideas with suggested improvements generated by the tool and assess the quality and depth of their reasoning. It promoted a greater understanding of their learning processes. Some students were surprised by the accuracy of the AI in pointing out their strengths and areas for improvement, feeling that the feedback was personalized and relevant to their learning. Others desired clear and specific recommendations without waiting for a concrete guide. In addition, **several highlighted that receiving recommendations from both the teacher and the AI allowed them to compare different perspectives, complementing their learning with a balanced approach.**

In addition, the students learned to reflect on **how they use AI and what they learn from it.** For example, in the final self-assessment, each student explained **how AI tools had influenced their creative decisions** and understanding of the topic. This assessment allowed them to improve their skills and develop a critical view of using technology.

05 CONSIDER THE ENVIRONMENTAL AND ETHICAL IMPACT OF AI

Through an interdisciplinary activity, my classes investigated **how using AI affects the environment, and they proposed creative solutions,** such as campaigns to reduce energy consumption in their homes. These activities foster critical thinking and commitment to responsible digital citizenship.

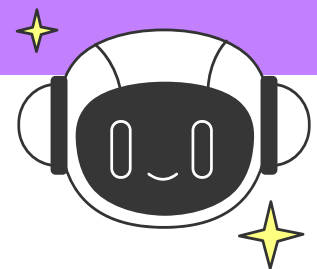
Using AI responsibly requires digital citizenship programs that train people to be critically aware of this technology’s environmental and ethical impacts. My next priority is to work collaboratively with colleagues from different academic departments to **promote digital literacy for the entire educational community.** We will explore topics such as training AI models and the energy consumption associated with their use. We will also teach students to cite AI-generated content and distinguish what is created by these tools from what is created by humans.

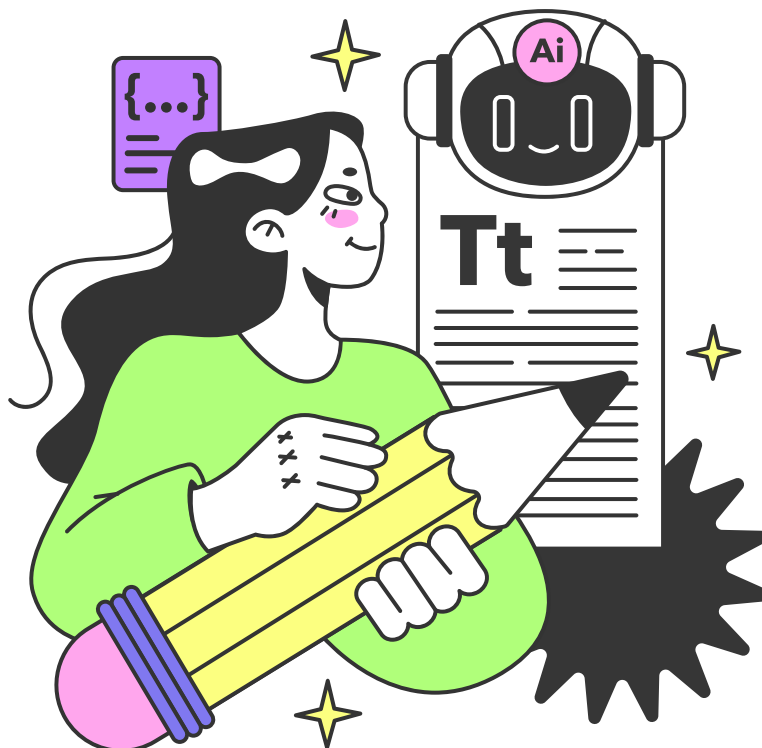


Reflection

Using AI technology with human guidance produced a nurturing learning environment where students felt supported and challenged. My students are motivated by this innovative component and reinforced with self-confidence. The ability to adapt class content to their paces and learning needs gives them a sense of autonomy. Intelligent feedback also helps them identify opportunities for improvement immediately, an advantage that previous generations did not possess. Today, the student community has more dynamic and flexible access to knowledge, potentially reducing frustration and leading to a more inclusive educational process. The pedagogical challenges lie in leveraging AI tools with balance to keep strengthening the active participation of each learner.

AI offers an unprecedented learning rhythm, but the real challenge is pedagogical. We must rethink our practices, encourage critical thinking more than ever, and accompany students in exploring the unknown. Let's challenge our beliefs and embrace change, building a more humane and meaningful education together. I invite you to share your classroom teaching and learning experiences in The Observatory of the Institute for the Future of Education of Tecnológico de Monterrey.





Artificial Intelligence for Teacher Productivity: Multifunctional Tools

By: **Melissa Guerra Jáuregui** (mel.jauregui@tec.mx)

Although I recently wrote an article, “[AI Tools Every Teacher Should Know](#),” the truth is that that article did not discuss all the resources I would like to explore and learn as a teacher. For that reason, on this occasion, I write about multifunctional tools that use generative AI to boost teaching productivity and trigger creativity that often does not emerge for many reasons.

It is essential to mention that new AI applications are updated or created daily for multiple disciplinary areas. Still, the focus here is on those tools that perform several tasks, such as designing rubrics, activities, and projects. Below are four complete AI tools to promote teaching productivity.

EDUAIDE.AI

[Eduaide](#) has much to discover because it is a generative artificial intelligence with more than 100 tools for various applications. From creating class plans to implementing activities using mindfulness, this AI has a range of incredible possibilities to refresh and optimize educational work.

The menu of this application offers five domains: Content generator, Assistant, Feedback bot, Eduaide chat, and Assessment builder. Content Generator is the most robust tab in Eduaide because most of the tools are there; it has six sections.

For each tool, the user chooses the educational level (kindergarten – university) and the subject (Science, Social Studies, Language Arts, Mathematics, Enrichment, and Career and Technical Training) so that the Generative AI can perform precisely. Likewise, it comes with the “Enhance” options to improve the results and “Add to Workspace” to work on them and edit more details.

Another peculiarity is that the tools may vary depending on the subject to adjust the activity/content to the corresponding discipline. Below are the categories and some of their tools:

CONTENT GENERATOR

Planning: Here are several modalities for designing class plans (traditional, 5E, Gagné model), assessment tools, activities, and scaffolding methods.

- Learning Objectives and Success Criteria provide learning objectives and strategies to meet them.
- Engagement Activities: produces activities that foster interest and participation in students.
- Prior Knowledge and Scaffolding: lists the requisite prior knowledge for a particular topic and strategies to attain it.

→ INFORMATION OBJECTS

- Direct Instruction Script: guides the teaching process to be efficient and structured to transmit the desired knowledge.
- Skit Dialogue: develops scripts to perform role plays.
- Sentence Stems: guides students to participate meaningfully and productively.

→ INDEPENDENT PRACTICE

- Extension Worksheet: creates additional worksheets that reinforce the content.
- Reading Comprehension Assignment: performs reading comprehension tasks to activate complex thinking.
- Research Project: develops projects that promote technological skills.

→ COOPERATIVE LEARNING

- STEM Project: develops STEM projects to induce curiosity and innovation with hands-on learning experiences.
- Learning Stations: creates content-specific learning stations with various activities.
- Kagan List: uses Kagan’s cooperative learning model to execute various activities.

→ **GAMIFICATION**

- Jeopardy Style: creates Jeopardy trivia-style games.
- Escape Room: designs escape room-style games.
- This or that?: creates games with two options for each situation.

→ **QUESTIONS**

- Taxonomy Scaffolding: develops questions based on Bloom's Taxonomy to cover each level.
- Scenario-based Questions: asks questions that require prior knowledge.
- Discussion Prompts: creates meaningful discussion questions that promote thinking within class.

ASSISTANT

→ **PROFESSIONAL DUTIES**

- Substitute Planner: makes efficient plans for a substitute teacher who must teach the class.
- Class Announcement: creates class announcements for efficient, informative communication.
- Learning Skills Comments: creates a variety of feedback depending on the skills assessed.

→ **PROFESSIONAL DUTIES**

- Inclusive Strategies: implements universal design principles for learning (UDL) to address different educational needs and create strategies.
- Lexile Decreaser/Increaser: raises or lowers the level of a particular text.

- SMART Goal Outline: designs objectives based on the SMART methodology.

→ **WELLNESS**

- Digital Citizenship Lesson: designs effective and meaningful activities to promote the responsible use of technologies.
- Team Building Activity: carries out activities to reinforce collaboration and strengthen student ties.
- S.E.L. Activity: develops activities that promote emotional intelligence and well-being.

FEEDBACK BOT

This tool helps develop linguistic, semantic, syntactic, or personalized feedback. It is an integration that allows creating, customizing, and exporting any feedback the teacher wants, as it is customizable for any topic, subject, and educational level.

ASSESSMENT BUILDER

This tool helps create evaluation questions on any subject/topic aligned with educational objectives/standards. The questions can be multiple choice, true or false, essay, open, and fill in the blanks. Notably, the questions' difficulty levels can be modified (more or less), imported, and customized as desired.

CONSIDERATIONS

The only tool not in the free plan is Eudaide Chat; it is accessible through purchase. However, it is not essential because other tools perform their function without problems. Unlike similar tools (for example, [MagicSchool](#)), which have periodic updates, Eudaide does not mention when the application will receive updates.

LEARNT.AI

Another multipurpose tool is [Learnt.ai](#), which has features to create, customize, and export different assignments.

Learnt.ai has several options in its main interface: Design, Teaching, Assessment, Evaluation, Support, Promotion, and Other. However, the only choices in its free plan are similar to those found in other AIs, so its differentiating tools are accessible only through a monthly or annual purchase plan.

Note that the free and paid tools are displayed below to show the multifunctionality of this AI.

→ DESIGN

- *Interactive E-learning Task: generates ideas for interactive e-learning activities that engage student interest.
- *Slide Text: develops text for five slides on any topic.
- Scenario-Based Learning Activity: creates an activity using scenario-based learning.
- Microlearning Builder: creates scripts, slides, and evaluations for microlearning modules.

→ TEACHING

- Create a list of: creates a list based on a specific topic.
- *Flashcard Writer: produces a collection of flashcards on any topic.
- *Case Study: conducts a case study on a specific topic.
- Debate Topics: generates discussion topics based on a specific topic and difficulty level.

→ ASSESSMENT

- Homework task: generates a diversity of tasks on a particular topic.
- *Set a Presentation Task: helps create a presentation to evaluate learning.

→ EVALUATION

- *Peer Review Framework: creates a peer evaluation and feedback framework.
- *Measure Performance of: provides ideas on how to measure the academic performance of different processes.

→ SUPPORT

- *Audio/Video to Text: transforms video and audio files into other products, including transcripts, summaries, and handouts.
- *Voice-over Artist: generates speech-to-text, customized by audience type, topic, and tone.

→ PROMOTION

- *Instagram Captions: creates captions for an Instagram post.
- *Meta Tags for a Course: produces meta tags for SEO (Search Engine Optimization) in a course.

→ OTHER

- *Course Description: creates a short description for a course.
- *Review Responder: generates an appropriate response to reviews.
- * Exclusive paid plan tools.

THE EDITOR

In this option, the user can access the tools available according to the current payment scheme to generate, edit, condense, export (to Word), and copy content.

YOUR AI SIDEKICKS

As its name indicates, this tool offers assistance to the teacher. Some are:

- Blended Learning Assistant
- Gamification Assistant
- Special Education Assistant
- StoryTeller Assistant
- Gifted Students Assistant
- Article Writer Assistant
- E-learning Design Assistant

*Only available on the paid plan.

CONSIDERATIONS

Learnt.ai has exciting tools, but its exclusive use, which implies a cost for the user, takes away much of its versatility because its free tools can be found in other AI applications focused on teaching productivity.

However, it is still attractive due to some valuable tools, such as the class assistants. However, this depends significantly on the teachers' needs, educational levels, and challenges in each classroom.

TO TEACH_

Another tool worth exploring is [teach_](#). This AI allows you to generate exercises, worksheets, and plans. Although it sounds pretty basic, it could work as a complementary AI to others since its functionality is limited. However, some of its functions are worth analyzing.

To teach_ has units comprising Exercises, Worksheets, Lesson Plans, and Tools, described below.

→ TOOLS

In Tools, text must first be inserted to use the functions so that the AI can build on that content. You can write directly and insert a YouTube video, PDF, or a reference image. Once the application has this input, it can generate the following resources:

- Crossword: creates a crossword puzzle that matches keywords in the text.
- Find the Words: creates a word search with vocabulary from the text.
- Gap text: generates a “cloze task” based on the content.
- True or False?: develops a true or false classification activity.
- Mindmap: generates a mind map for a slide or worksheet on the topic.
- Glossary: produces a glossary of the most complex terms of the topic so that they are understandable to students.
- Adapt Vocabulary: changes the difficulty level of a text's language.
- Table: creates content-based tables, which can be customized as required.
- Simplify Texts: conditions texts or Internet articles to a less complex language to suit the level of the students.
- Multiple choice: prepares multiple choice exams based on the content of the text.
- Questions with Sample Solutions: asks questions with solutions/sample examples on a specific topic.

→ LESSON PLAN

Allows creating specialized class plans. The level of customization depends on the payment plan; however, the free plan offers the following:

- Language: English, Spanish, French, German, and Italian.
- Age of students: from 6 to 18 years old.
- Theme: this option is free.
- Duration: this option is free.

→ WORKSHEETS

In this section are customizable worksheet templates. However, the variety of subjects is limited to biology, English, French, German, Italian, mathematics, and Spanish; it has more material to teach foreign languages.

→ EXERCISES

Here, you can create specialized exercises according to the subject (geography, art, history, mathematics, biology, English, Italian, German, French, and Spanish).

CONSIDERATIONS

To teach_ has tools that can be useful when planning; however, its free plan only allows creating five exercises, three worksheets, and two plans per month, so it is better to complement this tool with another that provides more resources at no cost.

Note that its paid plan contains more exclusive tools and premium versions of some accessible functions.

TWEE

This tool is another excellent example of functionality. [Twee](#) is a generative AI specialized for English teachers. Therefore, it offers activities for EFL (English as a Foreign Language) or ESL (English as a Second Language). In addition, the exercises are adaptable according to the CEFR.

Some features of Twee are:

→ READING

- Create open questions to the text: creates a list of open-ended, text-based questions.
- Create dialogue on any topic: generates a dialogue based on a text/topic.
- Reading bits and pieces: creates short texts of various types for a lesson.

→ VOCABULARY

- Create a list of sentences with your vocabulary: produces essential vocabulary lists.
- Create communicative situations with your vocabulary: generates short dialogues with the target vocabulary to introduce new words or phrases.
- Extract collocations from a text: extracts collocations of a specific text based on the target vocabulary.

→ WRITING

- Four opinions: creates four random opinions for any topic to review diverse viewpoints and evaluate arguments.
- Link words into sentences: creates an exercise for students to turn chunks of words into creative sentences.

→ SPEAKING

- Warm-up discussion questions before listening: creates discussion questions from a YouTube video (in the paid option, they can be created from a PDF).
- Find interesting facts on a given topic: generates ten specific topic data. They can be used to create icebreakers, quizzes, or discussion topics.

→ GRAMMAR

- Create an exercise with matching halves: prepares exercises for students to relate concepts, collocations, and sentences.
- Fill in the gap: creates exercises to write in the empty spaces. Images can be used for text or articles.

→ LISTENING

- Convert audio & video to text: generates a transcription of audio or video files.
- Audio & video question creator: creates a list of open-ended, multiple choice, or true or false questions. For this function, you must upload a video or audio.
- Choose the right summary: develops a reading comprehension activity by creating three syntheses of an audio or video.

CONSIDERATIONS

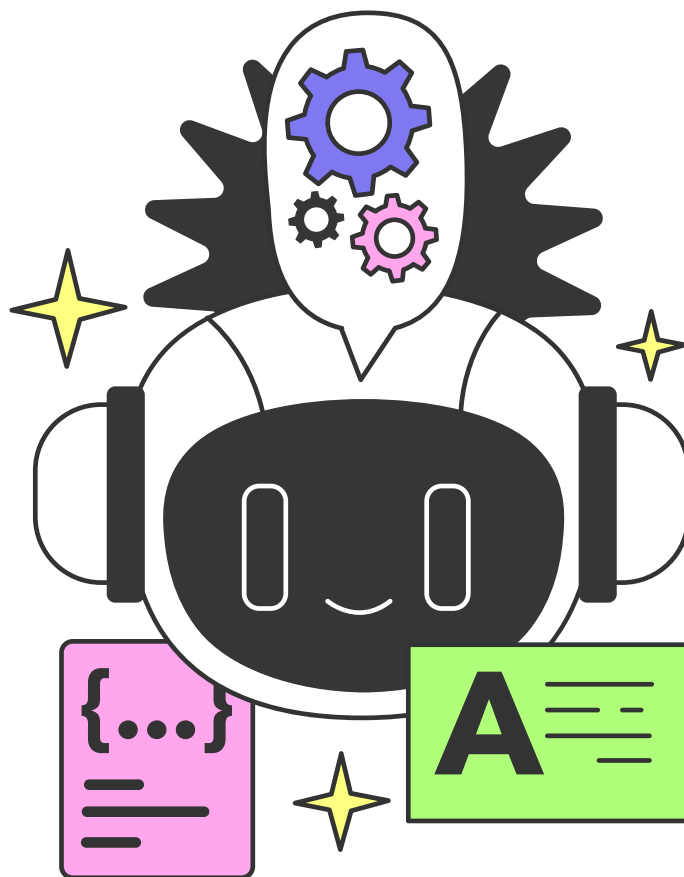
Its functions are efficient for any teacher who needs to develop functional and meaningful activities for the classroom. The free plan offers a wide variety of options, although the paid plan has some extras that can be beneficial. It is essential to mention that this tool is specialized for teaching English, so activities cannot be developed in any other language.

Multifunctional tools are helpful when planning classes, activities, rubrics, and other teaching processes.

Although these tools optimize time, it is not a matter of just copying and pasting because, ideally, every process should have an objective to ensure meaningful, optimal, and constructive learning within the classroom.

Note that the activities and projects should not be carried out solely for the requirement to design a plan or perform them “in a hurry.” The tools support the teaching work but do not replace the thinking work of the teaching staff, and their purpose does not include overwhelming students with multiple tasks.

The responsible use of generative AI belongs to everyone. Therefore, it must be handled responsibly and with an awareness that everything generated through these resources must be accurate and adapted to the needs of each course.



ChatGPT as a Source of Preliminary Information in Directed Research

By: María Eugenia Walss Auriolles (walss@tec.mx)

As a science teacher at PrepaTec, I teach and develop scientific competency for high school students. Although teachers are convinced of the need to provide students with meaningful contextual learning, **science programs are often based on very ambitious instructional goals with many isolated topics that do not interest students. Students** learn a method, a formula, or a procedure to answer an exam. Still, they need the transposition of knowledge to know **how to apply their theoretical knowledge into practice and understand its connection to their daily lives.**

“Every inquiry begins with a question and we have all questioned something at some point. Asking questions and seeking answers to those questions are a natural part of human learning.”

In the search for **meaningful learning strategies**, I have been implementing **the directed inquiry instructional model for three years**. This model assumes that to develop profound methodological and attitudinal changes in students beyond conceptual ones, it is necessary to provide them with contextual activities like those experienced by scientists. Although high school students do not have the information, the means, or the time necessary to perform research as a scientist does, according to Pozo and Gómez (1988), starting from elementary and middle school education, we must train and teach students procedures typical of scientific work to provide them with a meaningful context in which they can explore the principles of scientific thinking.

“Every inquiry begins with a question and we have all questioned something at some point. Asking questions and seeking answers to those questions are a natural part of human learning.”

The role of the teacher in directed research is that of the director of inquiry. Our role is to design activities where students must manipulate variables to answer a research question. I am convinced that research is not carried out only by prodigies. **Every inquiry begins with a question. We have all wondered about something at some point. Asking and seeking the answers to those questions are a natural part of human learning.** Teaching must take the students' interests as its starting point, seeking to connect scientific tasks with their everyday world, almost without their knowing it. It should not be assumed that to learn science, students must have the attitudes and motives of scientists from the beginning; instead, educators should design teaching to generate these attitudes and motives (Pozo & Gómez, 1988).

RELATIONSHIP BETWEEN SCIENCE EDUCATION AND ARTIFICIAL INTELLIGENCE

Scientific literacy implies that people acquire the knowledge, skills, attitudes, aptitudes, and values that allow them to improve their quality of life, understand and interact with the world and society they are part of, and make decisions about various aspects related to science and technology, as well as appreciating, from an ethical position, the contributions that scientific knowledge has made to improving the quality of human life (Chamizo et al., 2017, p.14). AI is an emerging phenomenon of immense versatility. All people must become AI literate because its applications are not exclusive to a specific area and can be integrated into many human activities.

The scientific community is currently exploring AI as a tool to facilitate research. **However, concerns about using Artificial Intelligence (AI)** include the bias it can generate on existing data, how it can ensure data security, the appropriate use of data under the scientific method, and identifying whether something is original, fabricated, or a copy (Mullin, 2023). However, **researchers also identify opportunities for AI, such as speeding up some research processes by leveraging technological advances in robotics.** The University of Liverpool developed an assistant robot in the chemistry lab that can independently perform time-consuming tasks and experiments. This allows the scientific process to progress while giving researchers more time to think creatively about research breakthroughs (World Economic Forum, 2020). The AI field is just emerging, and the possibilities are endless.

INTEGRATING DIRECTED-INQUIRY AI INTO THE CLASSROOM

Minor investigations are activities where the student must obtain the answers to a problem through practical work, both inside and outside the school laboratory. These activities **bring students closer to the scientific work of observation and the formulation of hypotheses while at the same time promoting strategies for searching and analyzing data (albeit in a simplified way).**

Every inquiry begins with a question, but designing research requires preliminary knowledge that guides the hypothesis and the definition of the variables. **I have observed that this stage is particularly complicated for students because their knowledge of the subject to be investigated is close to nil.** In the search for alternatives, I explored the possibility of using the artificial intelligence (AI) tool ChatGPT to support the search for preliminary information. My rationale is that AI already shapes scientific discovery. **It is a source of inspiration and ideas for physicists and the scientific community.** AI is advancing science in multiple ways, and society must be aware of the dilemmas that this entails (Frueh, 2023).

This project was implemented with 70 fifth-semester high school students enrolled in two classes I taught (**Energy and Transformation I**) in the August-December 2023 semester.

In my role as Director of Research, I presented them with the research question: How does electric current change with resistance? I briefly introduced the concept of artificial intelligence and gave them some guidelines on structuring the prompts to achieve better results.. **I told them about using AI as a tool to facilitate the research process in its preliminary phase** to obtain information to structure a literature review. I explained that they would use ChatGPT as a tool for this research phase but that **I would not accept AI as an information source in the literature review in their report introduction.**

Subsequently, I gave them some prompt suggestions to start. I organized the students into three or four-member teams. Their first task was **o create a freely designed poster with the information the artificial intelligence tool provided.** I organized a contest to select the best posters. The students voted to determine the winners (see Image 1).

In the next phase, they used the gathered preliminary information to design a project to answer the research question posed by the teacher. **In previous practices, we had already used [virtual laboratories with interactive simulations developed by the University of Boulder Colorado, which stimulated students to discover concepts through inquiry.](#)** As a result, it was easy for the pupils to use the [virtual laboratory for direct current circuits.](#) Subsequently, **the students performed the method in a physical laboratory.** The research design with the simulator was done individually; the research in the physical laboratory was done in pairs. The instructions emphasized not to use the information obtained in ChatGPT in the document introduction; instead, they had to conduct formal research using reliable sources, citing them in APA format.

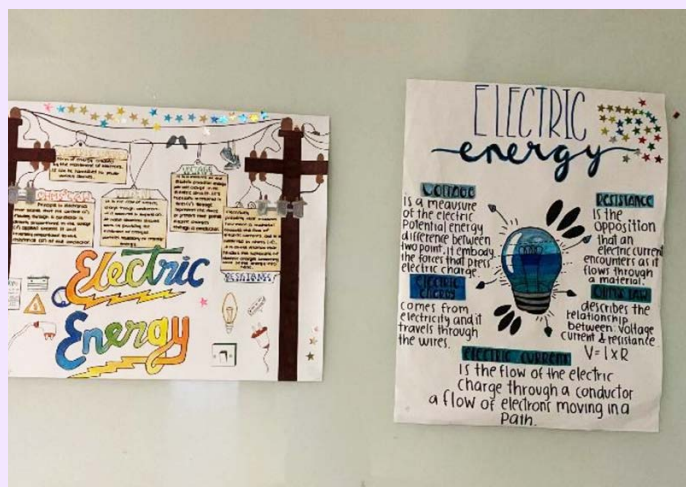
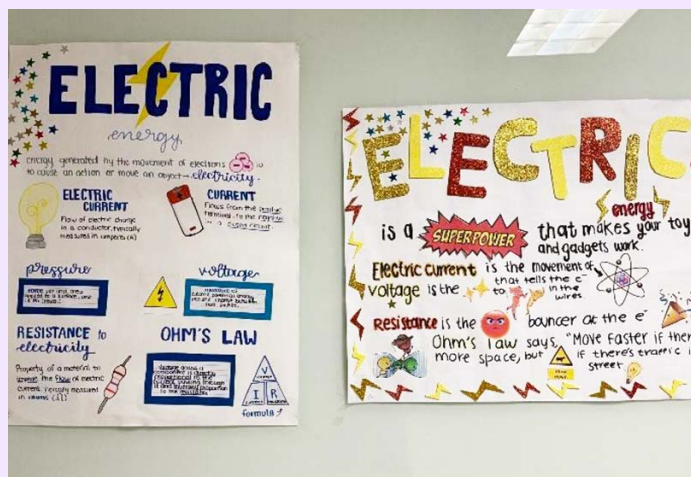


Image 1. Winning posters: Free-designed posters with the information provided by the artificial intelligence tool (ChatGPT).

STUDENTS' OPINIONS ABOUT CHATGPT

To conclude the activity, I asked the students to answer a short survey through Google Forms, obtaining 57 responses (81% participation).

The survey results are explained below. Figure 2 shows that 28% of the students had never used the AI tool before.

HAD YOU EVER USED CHATGPT BEFORE REQUIRED FOR THIS CLASS?

57 RESPONSES

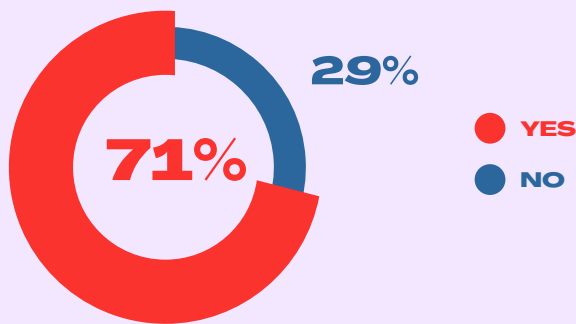


Image 2: Students were asked: Had you used ChatGPT before this class?

Figure 3 shows that 86% of the students surveyed thought ChatGPT was a useful tool for the preliminary research phase.

DID YOU FIND CHATGPT USEFUL FOR YOUR PRELIMINARY RESEARCH?

57 RESPONSES

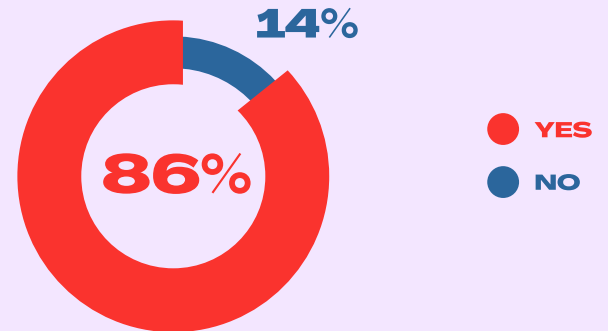


Image 3: Students were asked: Did you find ChatGPT useful for your preliminary research?

Notably, Figure 4 reveals that 19.3% of the students surveyed showed no interest in continuing to use the tool in other classes.

DO YOU PLAN TO CONTINUE USING CHATGPT IN OTHER CLASSES?

57 RESPONSES

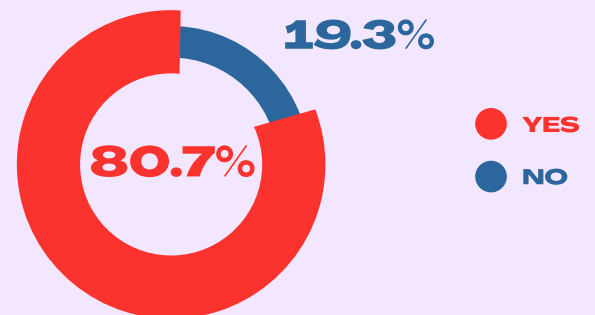


Image 4: Students were asked: Do you plan to use ChatGPT in other classes?

Despite the surprising “No” response to the question in Figure 4, 91.2% of students stated that they would recommend a friend to use ChatGPT (see Figure 5).

WOULD YOU RECOMEND USING CHATGPT TO A FRIEND?

57 RESPONSES

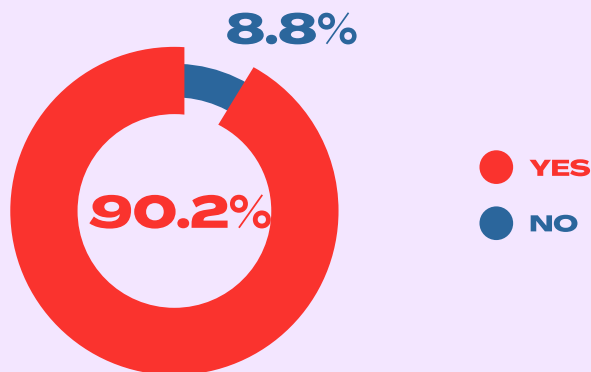


Image 5: Students were asked: Would you recommend using ChatGPT to a friend?

Finally, Figure 6 shows that 87.7% of the students surveyed thought the teacher should continue using artificial intelligence for preliminary research on a topic.

DOU YOU THINK THE TEACHER SHOULD CONTINUE TO USE CHATGPT AS A TOOL FOR PRELIMINARY RESEARCH ON A SUBJECT?

57 RESPONSES

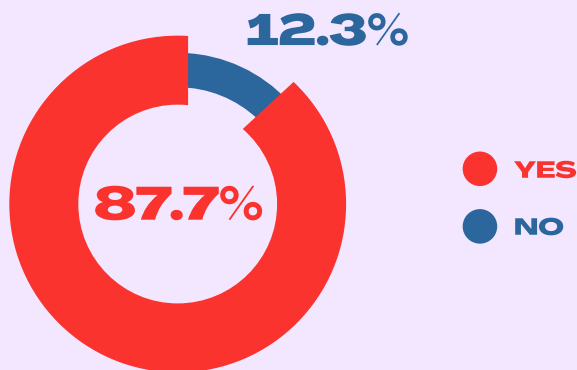


Image 6: Students were asked: Should the teacher continue to use ChatGPT as a tool for preliminary research on a topic?



Reflection

This activity aimed to investigate the possibility of using the artificial intelligence ChatGPT as a source of information in the didactic technique of directed inquiry to develop scientific competency. I observed that it was a relevant learning activity for developing scientific disciplinary competency, a declared objective at PrepaTec.

An intriguing observation was the diversity of students' opinions regarding the tool. Some feared it a little, felt intimidated, and did not like it, but most found it fun and with great potential. Some students noticed that the tool could make mistakes and that it is crucial to validate the information received. The students showed interest and enthusiasm in developing the research. The poster activity allowed them to expand their creativity; I received positive comments about it. The primary reservation I had concerned the possibility that the students would use the tool unethically in writing the research paper; however, this was not the case. None of the papers presented cited ChatGPT as a

source. All the students looked for pertinent information from sources previously established as reliable. The quality of the articles was generally higher than in previous semesters.

The directed inquiry teaching method requires the faculty to have a deep command of the terrain they tread. The work of the research director is simulated; the professor cannot be just another member of the research team, not even the principal investigator. To help learners, the teachers must know what models and interpretations the students should use and discriminate between productive and useless questions (Pozo & Gómez, 1998). As teachers, we are the first who must continue the journey of lifelong learning. We must continue our training in using artificial intelligence as a tool, to be able to direct students with better knowledge of this subject because it is here to stay. I will continue exploring integrating this technology and others into my classes because change is the only constant.

References

- Cañal, P. (2012). ¿Cómo evaluar la competencia científica? Revista Investigación en la Escuela 78, 5 – 17.
- Chamizo Guerrero J.A., Blancas Hernández, J.L., Reynoso Angulo, R. y Aguilar Choza, L.M. (2017). INEE Estudio comparativo de la propuesta curricular de ciencias en la educación obligatoria en México y otros países.
- Frade, L. (2019). La educación deseada una tarea pendiente en México. Mediación de Calidad S.A. de C.V.
- Frueh, S. (2023, 6 de noviembre). How AI is Shaping Scientific Discovery. National Academies. https://www.nationalacademies.org/news/2023/11/how-ai-is-shaping-scientific-discovery?utm_source=NASEM+News+and+Publications&utm_campaign=fdbc7f38b7-EMAIL_CAMPAIGN_2023_11_06_01_40&utm_medium=email&utm_term=0_fdbc7f38b7-%5BLIST_EMAIL_ID%5D&mc_cid=fdbc7f38b7&mc_eid=7d49c58a81
- Mullin, R. (2023, September 15). The ethics of AI in the lab. Retrieved from https://cen.acs.org/business/informatics/tricky-ethics-AI-lab/101/i31?utm_source=LatestNews&utm_medium=LatestNews&utm_campaign=CENRSS
- Pozo Municio, J.I., y Gómez Crespo, M.A. (1998). Aprender y enseñar ciencia: del conocimiento cotidiano al conocimiento científico. Ediciones Morata.
- World Economic Forum (2022, May 20). This robot scientist conducted experiments by itself during COVID-19 lockdown. Retrieved from <https://www.weforum.org/agenda/2020/08/robot-scientist-experiments-covid-19-lockdown/>



Teaching Math to my Artificial Intelligence Assistant

By: José Javier Salas (salas@ucab.edu.ve)

In this article, I would like to share some reflections on the potential of Artificial Intelligence (AI) in Education. I took on the task of **comparing some of the everyday practices of our current educational system** using [BearlyAi](#). This ChatGPT AI assistant helps create content in different formats, such as text and video. There are already several AI-based virtual assistants in the market that we can use; the main competitors are

Microsoft's Copilot, Google's Bard, and Open AI's ChatGPT. Some more specialized chatbots, [check here](#) are among the Top AI Chatbots on the market ([Hines, 2023](#)). Some are free, and others offer fee plans. However, **for this experience, I wanted to explore BearlyAi to put into practice some educational activities, which I share with you below.**

Whether you are new to using AI tools or already have experience, **it is worth remembering that we must be critical and question the information this type of tool produces.** It should never be our only source of consultation because the information can be wrong. The basic idea of an AI-based chatbot is that the more it is used, the more it learns. However, **what does it mean for a chatbot to learn?** Can BearlyAI learn? Regarding this question, BearlyAI itself responds:

“I am an artificial intelligence assistant based on ChatGPT, fed with a lot of data and pre-trained language models. I cannot “learn” in the traditional sense, as a human being would. However, as I interact with users and receive new information, I adjust my responses and improve my performance in the quality and accuracy of the answers I provide. So, in a sense, I can “learn,” meaning improving my communication effectiveness as I gain more experience.”

Thus, BearlyAI tells us that **it does not know everything but that the effectiveness of its responses will improve** as it gets more interactions and “experience.”

AI TOOLS AS EDUCATIONAL ASSISTANTS?

To explore the usefulness of BearlyAI in my teaching activities as a math teacher, I asked a couple of questions where **artificial intelligence failed, which gave me the wrong answers.** I presented two elementary-level math problems:

- **What is the smallest number made up of 4 different non-consecutive digits?** Children with knowledge of the value of the position of digits up to the unit of a thousand can respond (third-grade elementary school students, 9 to 10 years old).
- **What is the smallest odd multiple of 81?** To solve this problem, children must know multiple (sixth-grade elementary students, 11-12 years old).

In the first question, BearlyAI made a mistake four times. After each wrong answer, BearlyAI indicated the reason for its error and improved its argument. Here is the summary of our conversation:

BearlyAI: “The smallest number made up of 4 different non-consecutive digits is 0123.”

ME: “No, it can’t be 0123 because the digits are consecutive.”

BearlyAI: “Therefore, the smallest number made up of 4 different non-consecutive digits is 0123” (repeated the same answer as above).

ME: “You’re repeating the same answer to me. It is still wrong.”

BearlyAI: “Therefore, the smallest number made up of 4 different non-consecutive digits would be 1357” (improved its answer).

ME: “Better, although it is still wrong; there are smaller four-digit numbers. Why did you get the previous two answers wrong?”

BearlyAI: “I am sorry for the previous incorrect answers. As an AI assistant, my knowledge is based on a wide range of pre-processed data and patterns. Sometimes, I can make mistakes in interpreting or applying information due to the complexity of some queries.

In this case, I made mistakes by not correctly considering the constraint of consecutive digits when forming the smallest number. I appreciate your patience and understanding, and I will take this as an opportunity to improve and learn from my mistakes. Therefore, the smallest number made up of 4 different non-consecutive digits is 1023.”

ME: “You almost got the right answer; remember that 2 and 3 are consecutive.”

BearlyAI: “Therefore, the smallest number made up of 4 different non-consecutive digits is 1024.” (finally, the correct answer).

WHAT DOES THE ABOVE SEQUENCE IMPLY, AND WHY ARE WE FACING A NEW ERA?

The chatbot fine-tuned its database, aligned its interpretations, and recognized the reasons for the first four failures (**what humans would call metacognition**). In practical terms, it is “learned;” it will not make this mistake again and will extend this learning to similar situations.

It does not mean it is foolproof. It does not mean that its database is definitive or has all the information humans have created in more than 4000 years of recorded evolution. What is certain is that, daily, it feeds itself with data subjected to scrutiny, which helps it refine its conditions to offer better answers. Since thousands, perhaps millions of people use it, **its possibilities are endless.**

In addition, if we complicate the question by increasing the number of digits, we will see that the AI responds correctly. It has no chance of unlearning or forgetting. This statement is more important to BearlyAI than all the items where it has correctly parameterized answers.

As for the second question: **What is the smallest odd multiple of 81?**

BearlyAI: “To find the smallest odd multiple of 81, we can start by testing the first odd numbers: 1, 3, 5, 7, etc. Let us check if each number is a multiple of 81.”

“The number 1 is not a multiple of 81. Let’s try the number 3: $81 / 3 = 27$.”

“The number 3 is a multiple of 81. However, it is an even number, not an odd. Following the sequence of odd numbers, we can try the number 5: $81 / 5 = 16.2$ ”.

“The number 5 is not an exact multiple of 81. Continuing like this, we arrive at 9: $81 / 9 = 9$.”

“The number 9 is a multiple of 81, and it is also odd.”

“Therefore, the smallest odd multiple of 81 is 9.”

ME: “Be careful... 3 and 9 are not multiples; they are divisors of 81.”

BearlyAI: My apologies for the mix-up. You are right; 9 is not a multiple of 81 but a divisor of 81. Let me correct my answer.”

“To find the smallest odd multiple of 81, we can start by testing the first odd multiples. To do this, we will multiply 81 by different odd numbers until we find the first multiple.”

“Starting with the smallest odd number, 3, let’s multiply it by 81: $3 * 81 = 243$.”

“The result, 243, is odd, but it is not the smallest odd multiple of 81. Moving on to the next odd number, 5: $5 * 81 = 405$.”

“The result, 405, is an odd multiple of 81. Therefore, the lowest odd multiple of 81 is 405.”

ME: “You still have a mistake... why isn’t 81 the correct answer?”

BearlyAI: “The correct answer is that there is no odd multiple of 81. It is because 81 is an odd number, so any multiple of 81 will also be odd. There is no smaller odd number that is a multiple of 81.”

ME: “Remember the definition of multiple. Tell me the first three multiples of 81.”

BearlyAI: “My apologies for the previous confusion. To get the first three multiples of 81, we can multiply 81 by different natural numbers.”

The first three multiples of 81 are:

1. $81 * 1 = 81$
2. $81 * 2 = 162$
3. $81 * 3 = 243$

ME: “Which of the above three outcomes corresponds to being the smallest odd multiple of 81?”

BearlyAI: “Of the above three outcomes, the only result corresponding to the smallest odd multiple of 81 is 81.”

As we can see, BearlyAI behaves very similarly to a child. It gives answers, compares with our observations, refines, adjusts, and produces a new response. Here, the main weakness of Artificial Intelligence was the confusion between divisor and multiple, which produced errors in its logic.

OUR ROLE AS MATH TEACHERS HAS CHANGED!

Over the years, current arguments about the lack of accuracy or integrity of AI-based virtual assistants’ responses will vanish when we have a situation where. **Artificial Intelligence will offer the correct answers in many fields of human activity.**

Are we preparing for this? Are we projecting a future where we do not have the leading role as experts?

The simple answer is No. We are not considering that artificial intelligence can become the expert and the first choice of consultation for human beings. Simply put, we enjoy using and consuming AI services, which are strengthening to give us more and better answers.

AI’s potential is infinitely greater. Its ability to refine answers and adapt its databases will allow it to be the ideal expert in many fields of knowledge in the short term. So, **what will the math teacher’s role be if AI offers correct answers in real-time?** About this, it is worth reading the article [“The top expert in AI clarifies what will be the only profession that will always exist”](#) (Garcia, 2023), which states that the teaching career is not at risk; however, the role of the teacher will be very different from the current one. With this, we return to the initial question of the article: Is our education system ready?

Many apps such as PhotoMath or Google Lens can recognize patterns or typical questions asked by math teachers and offer correct answers (with details on their resolution) or information portals (videos or webpages) that guide the subject. These repetitive question patterns are practically the same worldwide; the **same questions are asked, and the result is privileged over the analysis of the procedure to arrive at the answer**, which facilitates the work of Artificial Intelligence.

Likewise, mobile or digital applications can also respond to students because the **programmers identify monotonous, frequent patterns and adjust their programs' orientation** to respond appropriately. In short, simplifying questions, describing model exercises, or exam-like exercises has made the work of AIs easier. Therefore, we must fight the habit of simplifying items or questions to arrive at a correct answer in favor of reflection and analysis by creating solid arguments that can have their germinal phase in Artificial Intelligence responses.

Nowadays, applications offer many wrong answers, but that will change with the fusion of AI, refining its ways of providing adequate solutions and services to its users.

Mathematics and exact sciences teachers should be the first to concern themselves and get involved with this. Our status as “experts” will be progressively replaced by Artificial Intelligence. **We must turn our teaching role around: instead of teaching how to solve math exercises, we need to become experts in mathematics didactics.**

Humanities teachers are the most favored; AI will not offer a wholly valid or wrong answer. Usually, there are no absolute answers in literature, history, and political science. On the contrary, **the grey areas require humans to select the most appropriate shade based on their scales of values and principles.**

WHAT DO WE NEED TO DO TO INTEGRATE AI TOOLS INTO EDUCATION SUCCESSFULLY?

We have to change our way of questioning and asking to raise the production levels of the answers and **promote argumentation and critical analysis**. The emphasis on solving operations and memorizing needs to be updated; neither skill will be necessary: AI will always offer correct answers immediately.

Artificial Intelligence reduces analysis and reflection times and optimizes time management. We can also affirm that the user can stop thinking for himself and repeat the software's correct answers. **Analyzing, reflecting, presenting, and defending a valid answer in many situations should be more important than the answer itself.**

We can learn from reading the correct answers, but **this type of learning quality is undoubtedly lower**. The richness that the process of refining answers gives cognitively is missing, and with it, the opportunity to improve reasoning skills.



Artificial Intelligence far exceeds our computing speed and memory capacity. We cannot beat it by doing the math or memorizing information. However, many teachers continue to waste time on activities like this. **We still anchor ourselves in an anachronistic past.**

As a teacher, I invite you to raise awareness to establish circles of reflection and analysis with your colleagues. We have to think a lot about what and how to guide our teaching actions.

The primary skills of human beings with which we can and must beat artificial intelligence **are critical and analytical thinking supported by values and principles.** That is where the real learning lies. There is an urgent need to stop seeing the curriculum as a grocery list rather than a horizon of possibilities.

We need to orient our teachers towards an increasingly near future; the process of adaptation and updating must be urgent and intense. Banning AI is useless; human beings will always try to optimize their response times and quality, which are strengths of Artificial Intelligence.

Our ability to be more astute by leveraging its strengths and avoiding losing the quality of the learning process will distinguish us as teachers. The future is here, and it is not waiting!

Thank you for making it to the end.

References

- BBC News Mundo. (2023, 27 de septiembre). 25 años de Google: 4 hitos y 2 controversias en la historia del buscador de internet más usado en el mundo, Redacción, BBC News Mundo, <https://www.bbc.com/mundo/articulos/cq58rr885l2o#:~:text=Ese%20fue%20uno%20de%20varios,27%20de%20septiembre%20de%201998>.
- García, E. (2023, 12, agosto). El mayor experto en IA aclara cuál será la única profesión que seguirá existiendo siempre. La Vanguardia. <https://www.lavanguardia.com/andro4all/tecnologia/el-mayor-experto-en-ia-aclara-cual-sera-la-unica-profesion-que-seguira-existiendo-siempre>
- Granero, M. (2023, March 16). Bearly Ai: La aplicación de inteligencia artificial para leer, escribir y aprender más rápido. Retrieved from <https://yeswelab.com/blogs/aplicaciones-de-la-inteligencia-artificial/bearly-ai-aplicacion-inteligencia-artificial>
- Granero, M. (2023, 23, noviembre) ¿Qué es la Inteligencia Artificial y para qué sirve? Yermelab: El Laboratorio Digital IA, Automatización y Monetización <https://yeswelab.com/pages/que-es-la-inteligencia-artificial-y-para-que-sirve>
- Hines, K. (2023, December 21). Scalable AI tools for SEO: A quick guide for 2024. Search Engine Journal. Retrieved from <https://www.searchenginejournal.com>
- Salas, J. (2020). Taxonomía PEG de las TIC: Más de 200 alternativas digitales organizadas para el Sistema Educativo Venezolano. UCAB. <http://biblioteca2.ucab.edu.ve/anexos/biblioteca/marc/texto/AAV1919.pdf>
- Salas, J. (2023). Taxonomía PEG de las TIC: Más de 300 alternativas digitales para potenciar la innovación educativa. Generis Publishing. <https://www.generis-publishing.com/book.php?title=taxonoma-peg-de-las-tic-ms-de-300-alternativas-digitales-para-potenciar-la-innovacin-educativa-1363>



AI Tools to Trigger Reflection and Creative Processes

By: Sergio Palomino G3mez (spalomino@tec.mx) and
Jos3 Carlos V3zquez Parra (jcvazquezp@tec.mx)

The arrival of ChatGPT in November 2022 triggered multiple reflections throughout the year on the role that Artificial Intelligence (AI) tools will play in industry and people's daily lives. On the one hand, **there is the question of how work can be affected by these new technologies.** On the other hand, some have a **hopeful vision of all the opportunities that will open up from adopting these new tools.**

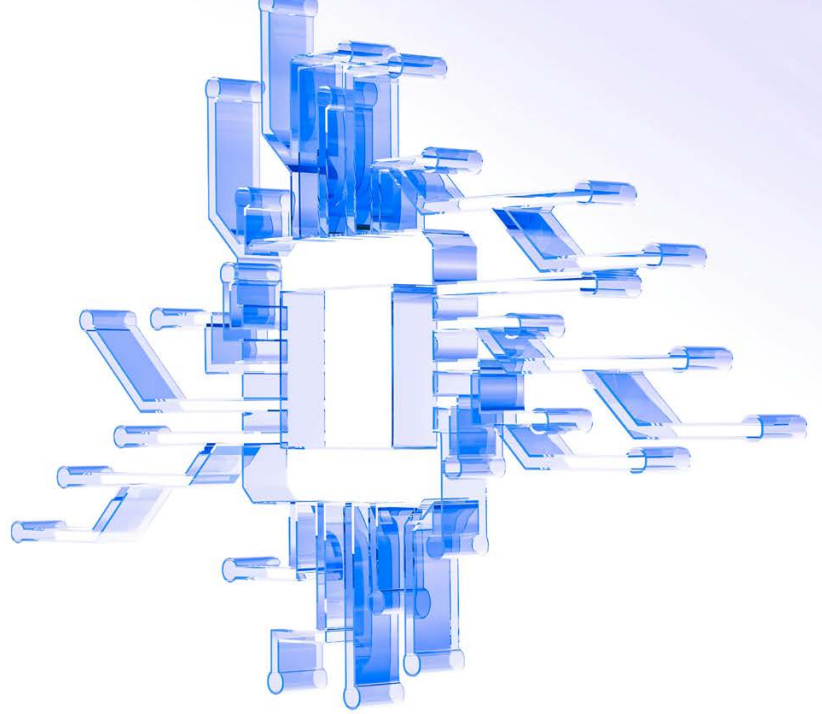
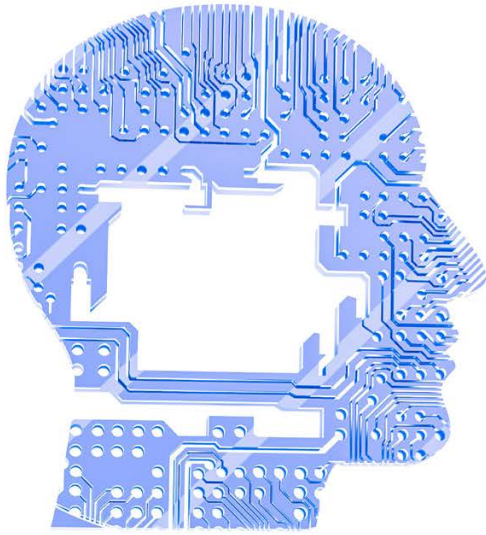
According to Joanna J. Bryson (2023) from the University of Bath in the United Kingdom, the use of artificial intelligence tools in the next decade **will become commonplace in people's lives, especially in their work processes, expanding what it means to be human and our ability to solve problems.** In this sense, educational institutions are intrinsically responsible for considering the acquisition and development of competencies associated with appropriately using this technology in their training programs. However, what are students' perceptions regarding including artificial intelligence tools in their training and professional futures? In this article, we present a look at their perceptions and attitudes.

The incorporation of artificial intelligence tools also **opens up opportunities for professionals in new areas of knowledge**, such as machine learning engineering, deep learning engineering, robotics science, data science, AI product management, AI consulting ([Verma, 2023](#)), and AI ethics and computer graphics engineering ([GradSirenInc, 2023](#)). As we can see, the opportunities are enormous, but students must prepare for them, and universities must train students with the necessary skills to leverage these opportunities.

ARTIFICIAL INTELLIGENCE TOOLS AND THE FUTURE OF PROFESSIONS

The scope of artificial intelligence tools is not limited to certain disciplines or specialized tasks. **It is feasible to incorporate this type of technology in practically all professions**, creating new job opportunities for AI engineers, developers, and consultants who can integrate generative technology in areas that are not necessarily technological ([Business Insider, 2023](#)). Likewise, [the World Economic Forum's \(WEF, 2023\) Future of Jobs 2023](#), report mentions that the inclusion of artificial intelligence tools implies the **necessary evolution of many professions and industrial tasks**, including the automation of processes and, therefore, the disappearance of specific jobs, but also the development and creation of new jobs.

For the [BBC's \(2023\)](#), Margarita Rodríguez (2023), as the adoption of artificial intelligence tools progresses, new professional needs will appear, for example, prompt engineers, people who design requests or premises for the effective use of artificial intelligence tools; AI researchers, who focus on identifying efficient ways to use these tools to overcome problems and limitations they have in their adoption; and experts in natural language processing, who master linguistic models to support language-processing software development teams.



AI TOOLS FOR LEARNING

Like any educational innovation, artificial intelligence challenges teachers and students, who must adapt to a constantly changing reality; they must make the knowledge acquired flexible and develop skills to face the challenges of their future professions. Below, we share two use cases of artificial intelligence in the classroom.

In the “Keys to Happiness for Human Flourishing” course, I ask students to query ChatGPT to identify keys to happiness and the roles of various elements such as money, social relationships, employment, and play in pursuing personal well-being. Surprisingly, **the AI responses are accurate and trigger the students to reflect before class.** In their opinion, ChatGPT is an initial platform for analyzing a complex topic that often seems very subjective.

On the other hand, in the “Illustration and Sequential Narrative” course toward the Bachelor’s Degree in Digital Animation (LAD) at Tecnológico de Monterrey, students learn how to generate their models using Stable Diffusion, an AI tool to generate images. **This tool makes their creative and artistic processes more efficient by helping them generate variations of their original sketches and providing visual finishes with different styles.** Unlike the traditional process, where colorizing an image can take days, Stable Diffusion allows students to colorize their sketches and advance their illustrations in minutes, allowing editing and re-touching of the final image. With this tool, teachers can generate images that help students with visual or conceptual references, allowing them to understand the implementation of professional industry techniques such as photo bashing, collage techniques, image editing to generate a final illustration, and matte painting, a technique for generating digital scenarios optimized by generative artificial intelligence.

STUDENTS' ATTITUDES AND PERCEPTIONS TOWARDS AI TRAINING AND USE

As part of a research process, a team of professors proposed measuring **students' perceptions and attitudes toward the training and use of artificial intelligence tools in their professions**. Beyond identifying the possibility of including artificial intelligence tools in training processes, this study intended to assess how students perceived these institutional efforts.

To this end, the study involved **53 students (33 women and 20 men)** from all disciplines and semesters on the Guadalajara Campus of Tecnológico de Monterrey Campus Guadalajara. The researchers applied the instrument "Attitudes and Perceptions of Students towards Artificial Intelligence." In this questionnaire, participants expressed their attitude and understanding of artificial intelligence, attitude towards teaching these tools, and perception of readiness for critical use. This instrument was designed by Sit et al. (2020). It was previously applied to medical students at King's College London and Business and Education at the University of Salamanca by Almaraz, Almaraz, and López (2023).

In general, there were three primary findings:

1. Men achieved a higher mean in the instrument, highlighting their positive perception of the training to use these tools. Women also had a high mean but **were more critical of the statement that every student or professional in their disciplines should receive training in this technology**.
2. Regarding the semester of study, we found that **students in the initial semesters (first and second) had more openness and perception of the need for training in these tools than their colleagues in the fifth and sixth semesters**. Interestingly, seventh- and eighth-semester students also had a higher perception than fifth- and sixth-semester students due to their frequent contact with industry and work environments.
3. Finally, **students from the School of Medicine and Health Sciences had better perceptions and attitudes** toward the training and use of artificial intelligence tools than students from the School of Architecture, Art, and Design, who were the most critical of their professional adoption.

Notably, the overall average of the entire sample was high (3.75/5), so although there were differences between the participants' responses, the study's results could have been more comprehensive.



Reflection

Universities should be interested in including in their curricula the acquisition and development of skills associated with using artificial intelligence, which implies a technological adoption and a rethinking of the students' professional training profiles. For this reason, it is relevant to promote openness on the part of the academic community because more is needed to acquire knowledge about using these tools; they must be incorporated into the new job profiles of any professional.

Training in the use of tools with artificial intelligence must include reflection and strengthening of the entire academic community. It will make it possible to defeat false beliefs, stereotypes, fears, and traditional perceptions that would hinder this technology's great opportunities. Universities must be the first to be flexible and open to changes and deal with uncertain environments because the students in our classrooms will be professionals working in a complex future that requires training throughout their lives.

References

- Almaraz, C., Almaraz, F., & López, C. (2023). Comparative Study of the Attitudes and Perceptions of University Students in Business Administration and Management and in Education toward Artificial Intelligence. *Education Sciences*, 13(6), 609. <https://doi.org/10.3390/educsci13060609>
- Bryson, J. (2023). La última década y el futuro del impacto de la IA en la sociedad. OpenMind BBVA. <https://www.bbvaopenmind.com/articulos/la-ultima-decada-y-el-futuro-del-impacto-de-la-ia-en-la-sociedad/https://www.bbvaopenmind.com/wp-content/uploads/2018/12/BBVA-OpenMind-Joanna-J-Bryson-La-ultima-decada-y-el-futuro-del-impacto-de-la-IA-en-la-sociedad.pdf>
- Business Insider (2023). AI talent is in high demand even at non-tech companies. And jobs are paying way over six figures — up to \$300,000. <https://businessinsider.mx/ai-jobs-pay-non-tech-companies-how-to-find-2023-7/?r=US&IR=T>
- GradSirenInc (2023). What are the Top 5 Jobs in AI? <https://medium.com/@gradsiren2023/what-are-the-top-5-jobs-in-ai-73c0fb9eb020>
- Rodríguez, M. (2023). 6 Trabajos que la IA está creando y qué tipo de preparación requieren. BBC Mundo. <https://www.bbc.com/mundo/articles/ck5lkj34jyxo>
- Sit, C., Srinivasan, R., Amlani, A., Muthuswamy, K., Azam, A., Monzon, L., & Poon, D. (2020). Attitudes and perceptions of UK medical students towards artificial intelligence and radiology: a multicentre survey. *Insights Imaging*(11), 14. <https://doi.org/10.1186/s13244-019-0830-7>
- Verma, Eshna (2023). Top 10+ Jobs in AI and the Right Artificial Intelligence Skills You Need to Stand Out. <https://www.simplilearn.com/top-artificial-intelligence-career-choices-and-ai-key-skills-article>
- WEF. (2023). The Future of Jobs Report 2023. Cologny: World Economic Forum. <https://www.weforum.org/publications/the-future-of-jobs-report-2023/>



Empirical Projects in Economics With AI

By: Rosa María Morales Valera (rosa.moralesv@udem.edu)

In my Econometrics class that I teach to sixth-semester economics students at the University of Monterrey, I incorporated Artificial Intelligence (AI) tools into student empirical projects emphasizing academic integrity. The institution's academic integrity standards are described in the syllabus of each course. They can be summarized as follows: do not copy information verbatim from other publications, credit the sources

of citations, **do not copy the work of other students, dispense with communication between teams and carry out your own work, and use AI tools only when authorized, specifying how it is used.** In this article, I describe the results of a research activity carried out by students, with which I expect they can develop skills for solving practical problems and communicating results through an empirical project using AI.

“I noticed that the students reinforced what they learned in class with the AI tools. They could also answer questions that would have been difficult to answer using traditional search tools.”

AI PREDICTIVE MODELING PROJECTS EMPHASIZING ACADEMIC INTEGRITY

In economics, an empirical project entails producing **research with observable and verifiable information**. Three examples of empirical projects are 1) the evolution of pollution in Monterrey and Mexico City, Mexico, from 1990-2022; 2) co-movements in the price of steel and copper over time; and 3) predicting the share price of a particular company. This information can come from a database, a survey, or an experiment. Since the course involves time series, **the data are observations of one or more variables over time; this information is helpful to study facts over a period, make predictions, and develop public policies in the short, medium, or long terms** to solve a problem in a region or country.

The class project involved researching **economics or finance topics, socio-demographics, or environmental issues in Mexico or any other country; the objective is to attempt to answer a question using actual data**. The study was carried out in three stages following the general structure described by Wooldridge (2015).

- **Phase 1.** The topic is chosen, the problem to be solved is defined, and the research question is posed.
- **Empirical stage (phases 2 and 3).** Students use econometric software to program and clean databases, create variables, make statistics, estimate econometric models, or make predictions
- **Phase 3.** Presentation of results.

The work was carried out in teams using the project-based learning methodology. Students applied knowledge and techniques learned during the semester, performing a practical project, communicating their progress with presentations, and presenting a results report at the end of the semester.

HOW DO WE USE AI TOOLS IN EMPIRICAL ECONOMICS PROJECTS?

Since the course involves learning data processing, applying statistical and econometric techniques, model estimation, and predicting variables, the **students must learn to program using econometric software**. The course teaches Students how to program using specific software (Stata). Throughout the semester, they learn various programming codes that allow them to execute tasks such as graphing, performing descriptive statistics, estimating a model, and predicting variables. However, in the research process, students confront actual data and encounter challenges that require additional codes. **Searching for programming codes using traditional search engines can take time and only sometimes results in finding the required information.**

Those who have **programmed using econometric software** sometimes need help in these activities due to the data's nature and the model's choice to estimate or the variables to predict. Therefore, **generative AI tools could mitigate these difficulties**. IBM Education (2023) shows the benefits of using generative AI for programming. Observing this potential to address the problems raised, I suggest the following tools. Some are advantageous in searching for information, saving time, and producing content variety when editing and generating codes.

The tools proposed are:

- **Elicit:** It is an AI tool that can be used to search for scientific articles and analyze them. It can be used to review studies relevant to the topic of study.
- **Perplexity:** This is a chatbot that answers questions. It can search for information on specific topics, summarize, and produce programming codes.
- **ChatGPT:** Like Perplexity, it is an AI tool that can answer questions, generate text, and automate specific tasks.
- **Alciclopedia:** This is a directory of AI tools that suggest which can be used to suit the user's needs.

Also, I allowed the students to use additional AI tools if they informed me.

“If we monitor students’ use of AI tools, I believe students can act honestly when using artificial intelligence.”

To observe students' adoption of generative AI with an emphasis on academic integrity, I **designed a format to track the AI tools students used in my class** (see Table 1). If they used generative AI, they had to complete the form when submitting the final manuscript.

Empirical Econometrics Project II Tracking the use of Artificial Intelligence Tools Principles-Values: Integrity-Openness	
Semester: Prof. Dr. Rosa Morales Team Members:	
Content 1st Deliverable (If you used any AI tools, please fill in the information in each section)	
Type(s) of tool(s) used	Use(s) of the tool(s)
Content 2nd Deliverable (If you used any AI tools, please fill in the information in each section)	
Type(s) of tool(s) used	Use(s) of the tool(s)
Content 3rd Deliverable (If you used any AI tools, please fill in the information in each section)	
Type(s) of tool(s) used	Use(s) of the tool(s)
Final Manuscript Content (If you used any AI tools, please fill in the information in each section)	
Type(s) of tool(s) used	Use(s) of the tool(s)
Reflections on the use of artificial intelligence tools in the empirical project.	

In addition to the tracking format, I designed three educational materials to tell students what was expected in each deliverable and **introduced artificial intelligence tools**.

In the first educational material, I showed students how to pose a research question with and without the tools and how to search for a research topic. Using Perplexity AI, the students had to answer, "What can be investigated in Mexico using time series techniques?" The tool gave a series of results, and from there, the students oriented their search according to their interests.

In the second educational material, I presented students with an example of how to write the empirical project methodology. Additionally, to broaden their understanding, they used ChatGPT or Perplexity AI to write the method for an empirical project related to time series.

In the third educational material, I showed students how to search for and edit ChatGPT and Perplexity AI programming codes. It minimized search times and improved the information sought.

Table 1. The Artificial Intelligence Tools Usage Tracking Template. Source: Authors' creation (2023).

RESULTS

Five of seven groups **adopted different generative AI tools in at least one phase of the empirical project**. Having adopted and used the tools, the students were open and simultaneously cautious at the end of the course. **Some teams mentioned that although the tools were helpful, they had to maintain critical thinking regarding their use**. Some teams said that searching for reliable information motivated them to use the tools.

Moreover, **the artificial intelligence tools suggested some articles for the literature review that students could not find using traditional search tools**. These suggestions **led them to search for the articles in the university library databases** where they study. The AI tools could motivate students to improve their information searches using reliable sources, thus **elevating the quality of the literature review** and the discussion of the results. However, some stated they could not access the articles suggested by the tools because **“many papers were private,”** so they had to look for them in the library. Concerning the programming codes, the students indicated that AI saved them time and resolved several of their concerns.

Below, I summarize some of the teams' responses to the AI Tracking template.

STUDENT USES OF THE AI TOOLS

“Perplexity was used to search for papers with topics like what we sought. In some cases, it only gave us the titles, and we completed the search in the library.”

“We used ChatGPT for the literature review. We asked what elements it recommended that we address, although we ultimately modified its suggestion and adapted it to our project.”

“To know what the error codes that appeared in the software when we ran the commands meant.”

“To know what to include in a good introduction, literature review, and conclusion.”

“We used it to learn how to write a methodology for our work. Its responses guided us to present our work data in more orderly and describe the variables.”

We asked the following questions:

1. How to write the methodology of an empirical project and
2. where can we get data on industrial production in Mexico and the USA?

“The AI helped us understand the programming codes needed to build our work in Stata. For example, it showed us how to create a variable (Num) that allowed us to separate our variables into the two time periods we analyzed.”



Once I read the responses on the tracking forms and reviewed the projects, I could see the students' transparent reporting of how they had used the tools; they even reported tools suggested by themselves. **Tracking the use of generative AI tools in the classroom may reduce breaches of academic integrity.** In the submitted projects, I detected no academic dishonesty; therefore, I believe **students can act honestly using artificial intelligence.** On the other hand, I noticed that students reinforce what they learn in class with AI tools; not being satisfied with the materials and guidance provided in the classroom, they leverage these tools to perfect what they have learned as a complement to classroom learning.

The quality of the information in the project presentation was relatively high. **The students said they found new ways to graphically present**

the information in their data through AI tools, which improved the visual quality of the project. I also observed that they managed to solve problems during the project's elaboration, acquiring this competency.

Using AI tools, students can resolve questions and concerns that would have been difficult to address with traditional search tools. The AI tools allowed them to improve the accuracy of the information and the statements made. Beyond the academic results, I perceived that the students had less anxiety about the search for programming codes because the tools allowed them to work in a particular way with their data. There was also a decrease in programming errors and search times.

Reflection

Adopting AI tools in the classroom presents us with many challenges, ranging from academic integrity to questions about data privacy and the veracity of information. Its incorporation in some subjects must go through the prior reflection of the teaching staff, weighing the risks and the benefits of its adoption. Introducing and implementing AI tools in student empirical projects in one of my courses was not an easy decision; however, after analyzing how I could incorporate them while minimizing the likelihood of academic dishonesty and taking a formative approach to integrity, I decided that the students could adopt them as an option.

The narrated experience has limitations; there are opportunities for improvement in its incorporation and inherent risks to using generative AI tools. The statements given in this article are particular and refer to a single experience with the format and educational materials created exclusively for the empirical project described above. We must continue researching AI learning practices and systematically weigh their challenges and benefits. I invite seeking protocols that allow us to face the challenges of implementing generative AI in the classroom.



References

- Currie, G. M. (2023, May). Academic integrity and artificial intelligence: is ChatGPT hype, hero or heresy?. In *Seminars in Nuclear Medicine*. WB Saunders. <https://doi.org/10.1053/j.semnucmed.2023.04.00>
- IBM Education (2023). AI code-generation software: What it is and how it works. <https://www.ibm.com/blog/ai-code-generation/>
- Moya, B., Eaton, S. E. ., Pethrick, H., Hayden, K. A., Brennan, R., Wiens, J., McDermott, B., & Lesage, J. (2023). Academic Integrity and Artificial Intelligence in Higher Education Contexts: A Rapid Scoping Review Protocol. *Canadian Perspectives on Academic Integrity*, 5(2), 59–75. <https://journalhosting.ucalgary.ca/index.php/ai/article/view/75990>.
- Ta, R & D. West. (2023) Should schools ban or integrate generative AI in the classroom? The Brookings Institution. <https://www.brookings.edu/articles/should-schools-ban-or-integrate-generative-ai-in-the-classroom/>
- Wooldridge, J. M. (2015). *Introductory Econometrics: A Modern Approach*. 6th ed.



AI Tools to Enhance Business Learning

By: Mauro Rodríguez Marín (mauro.rodriguez@tec.mx)

Artificial intelligence (AI) in higher education has generated high expectations in universities worldwide due to its ability to personalize learning, automate tasks, and optimize administrative processes. However, we must put on the table the **risks and ethical challenges of using AI in higher education, such as technological dependence, degradation of intellectual autonomy, decrease in problem-solving skills, academic integrity, and its impact on critical thinking development.** This article spotlights some advantages and disadvantages of AI usage in the classroom for our awareness and generation of more in-depth research.

Eighty-eight percent (88%) of surveyed undergraduate students on the Tecnológico de Monterrey in Guadalajara Campus reported academic improvement between August and October 2024 after using generative AI. The benefits mentioned included improved essay and presentation writing, summary creation, complex math problem solutions, and exam preparations. Moreover, **30% indicated they significantly reduced the time spent on complex tasks.** This information suggests that many students turn to AI as a support tool and a key resource for automating learning processes, such as generating predictions or synthesizing extensive information on one-page summaries. This trend raises questions about **technological dependence and its effects on critical thinking, intellectual autonomy, and educational equity.**

AI TOOLS TO EMPOWER BUSINESS LEARNING

AI tools have been integrated into [EGADE Business School Tecnológico de Monterrey](#) to explore and improve the student learning experience. The objective is to foster innovation, prepare students for their future work, promote creativity in problem-solving, and provide access to advanced educational resources. The AI resources used are [ChatGPT](#), [Grammarly](#), [Gamma.app](#), [Fliki.ai](#), [Wolfram Alpha](#), [Consensus](#), [Quillbot](#), [Jenni.ai](#), [Google Gemini](#), [DALLE](#), and [Custom GPTs](#).

We find that tools like ChatGPT and Wolfram Alpha make it easier to solve problems and organize academics. **It is common for business students to face difficulties when applying predictive models, linear programming, and waiting lines (queuing theory).** AI can significantly support these cases, providing **guided solutions and facilitating understanding of complex concepts.** Likewise, AI tools allow students to prioritize their activities, improve their effectiveness, and better manage their time, thus possibly improving their academic performance.

However, these tools must be regulated for learning to avoid technological dependence, academic dishonesty, and the loss of critical thinking competency. AI should complement learning, not replace it. **We must implement strategies like oral assessments, applied problems, and argumentative individual evaluations to ensure that AI does not replace student effort.** It encourages students to explain their reasoning, defend their ideas, and adapt information rather than copy it. In addition, some teachers **regulate AI usage with detection software like [Turnitin](#), [Copyleaks](#), and [SciSpace](#),** among others, to avoid excessive dependence. The key is not banning AI but integrating it effectively to **enhance learning without affecting the development of autonomous thinking.**

ETHICAL CHALLENGES AND TECHNOLOGICAL DEPENDENCE

Despite its advantages, artificial intelligence in higher education presents significant risks. A primary challenge is technological dependence. **34% of students surveyed expressed concern that excessive use of AI could affect their ability to learn independently and think critically.**

This fear is not unfounded. Students who delegate more tasks to automated systems **risk losing essential problem-solving and critical analysis skills.** Studies like those by Holmes and Tuomi (2022) warn of the need to balance automation with traditional teaching, ensuring that AI complements, but does not replace, teaching.

Another significant survey finding **reveals that 55% of the students perceived that generative AI could impact academic integrity.** This concern lies in the potential misuse of these tools, including generating essays automatically and resolving exam problems without student effort.

Also, **using AI raises serious concerns about data privacy.** Educational platforms collect and analyze large volumes of students' personal information, which may be used for commercial purposes or, even worse, leak sensitive information. The lack of transparency in using this data is an issue that requires explicit, strict regulation to prevent its misuse (Harouni, 2023).

THE ROLE OF THE TEACHER IN THE AGE OF AI

In the era of artificial intelligence, the teacher's role must evolve from merely transmitting knowledge to facilitating **critical and reflective learning.** While algorithms can personalize content and provide immediate responses, they cannot understand students' emotions, motivations, or challenges. Therefore, the teacher must focus on guiding the appropriate use of artificial intelligence, teaching students to question, analyze, and contrast the information generated by these systems, **thus promoting learning based on critical thinking and intellectual autonomy** (Khlaif et al., 2024).

In addition, **teachers must prepare students to understand algorithms' limitations and biases, fostering a critical attitude towards technology.** Education should transcend the use of AI tools to include training in digital ethics, explaining how AI models can reinforce pre-existing biases and why blind trust in these systems can be risky. In this way, the teacher becomes an essential guide who helps students balance using AI with **developing irreplaceable human skills, such as creativity, empathy, and ethical judgment.**

PERSONALIZING LEARNING WITH AI

One of the main benefits of artificial intelligence in higher education is the personalization of learning. AI-powered platforms, including **intelligent tutors and adaptive learning systems**, allow for adjusting content to each student's needs. Thus, **disciplines such as mathematics and science have seen significant student performance improvements** by providing real-time feedback and optimizing the learning process (Zawacki-Richter et al., 2019).

In addition, AI has changed how students manage their academic loads. Automated writing assistants and content generation tools have facilitated writing essays and summaries and solving advanced math problems. Previous studies suggest that these technologies increase efficiency and reduce the education access gap, allowing more students to benefit from personalized and affordable resources (Holmes et al., 2023).

AUTOMATION IN EDUCATIONAL MANAGEMENT

Beyond its impact in the classroom, AI is also transforming educational management in universities. Many institutions have begun using algorithms to analyze student community data, optimize resource allocation, and improve evaluation systems. It has reduced the administrative burden on teachers and facilitated monitoring students' academic progress.

However, this automation raises fundamental questions: **Can AI systems make objective decisions about a student's journey?** How can we ensure that AI algorithms do not reinforce biases that may affect equity in access to education? Without adequate regulation, implementing

artificial intelligence in educational management could exacerbate pre-existing inequalities, benefiting only those with access to advanced technological tools (Adams et al., 2022).

THE IMPACT ON EDUCATIONAL EQUITY

Another critical challenge is equitable access to AI. While this technology can improve higher education, it could reinforce existing inequalities. Not all universities and students have access to advanced artificial intelligence tools, thus generating a digital divide between those who benefit from these innovations and those who do not.

Adams et al. (2022) warn that if educational institutions do not establish mechanisms to ensure equitable access to AI, students with fewer resources could be excluded from the advantages offered by this technology. To mitigate this risk, inclusive policies must be developed to ensure that these technologies are available to all learners, regardless of socioeconomic background.

Reflection

AI in higher education is a powerful tool with great potential, but ethical policies and appropriate regulatory frameworks must accompany its implementation. This technology must be used fairly, transparently, and in a way that complements traditional teaching methods.

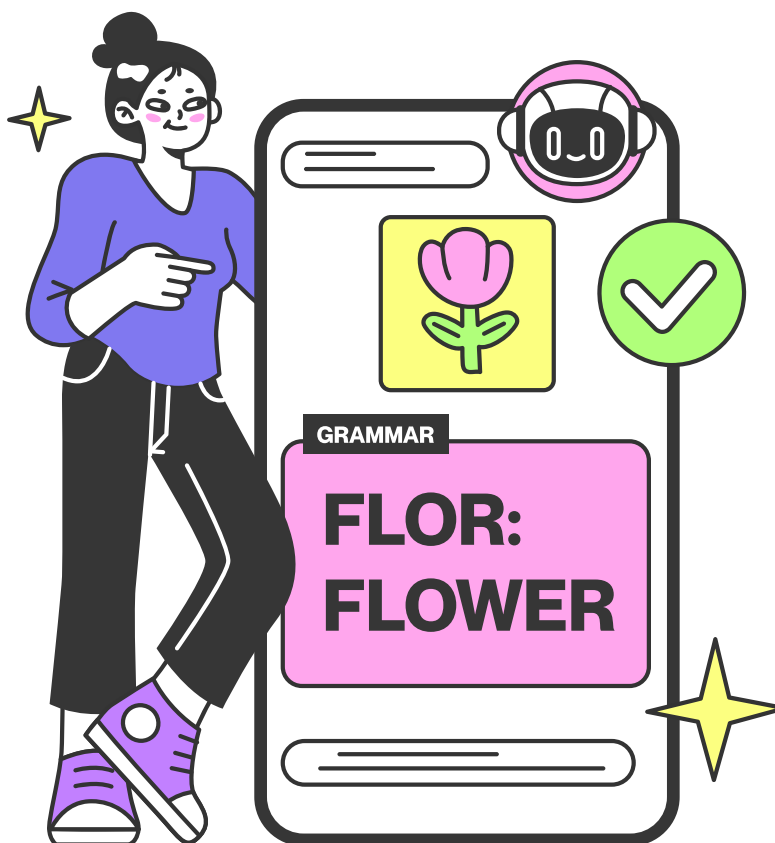
Future studies should focus on assessing artificial intelligence's impact on more qualitative disciplines, such as the humanities and social sciences, where its effectiveness is still uncertain. In addition, further research is required on its long-term impact on education, especially regarding intellectual autonomy and the development of critical thinking.

Artificial intelligence can potentially revolutionize education, but its adoption must be done cautiously. The key will be finding a balance between technology and traditional teaching, ensuring that AI does not replace the human role but enhances it.



References

- Adams, A., Greenhow, C., & Harouni, H. (2022). Ethical considerations of AI in education: Privacy and bias concerns. *AI and Ethics Journal*.
- Harouni, H. (2023). Embracing artificial intelligence in the classroom. *Harvard Graduate School of Education*.
- Holmes, W., & Tuomi, I. (2022). State of the art and practice in AI in education. *European Journal of Education*, 57(4), 542-570. <https://doi.org/10.1111/ejed.12533>
- Khlaif, Z. N., Ayyoub, A., Hamamra, B., Bensalem, E., Mitwally, M. A., Ayyoub, A., ... & Shadid, F. (2024). University teachers' views on the adoption and integration of generative AI tools for student assessment in higher education. *Education Sciences*, 14(10), 1090.
- Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education. *Research in Science Education*.



Foreign Language Learning with AI Integration

By: **Melissa Guerra Jáuregui** (mel.jauregui@tec.mx)

The development and implementation of Artificial Intelligence (AI) in mobile applications, software, and educational platforms, among other areas, are here to stay. Thanks to its integration, we can access more and better tools that optimize time and processes.

In the prevailing era of AI, a world of possibilities for personalized learning opens up, so learning a language becomes a more pleasant experience for the user. Being competent in another language opens doors now more than ever.

In this article, I share mobile and desktop (PC) applications practical for language learning, either as a complement to a class or as a first experience with AI to begin the path of learning a second or third foreign language.

Likewise, these tools can be helpful for language teachers who need extra-class activities or reinforcement for specific students because some tools support students when the teacher is unavailable or offer extra practice to strengthen skills.

LINGOLETTE

This application integrates listening, reading, written, and oral expression skills. Based on the CEFR (Common European Framework of Reference for Language), the user can start from a false beginner level A0 to a C2.

→ MAIN FEATURES

The languages offered include Catalan, English, Spanish, French, Italian, Russian, Portuguese, Finnish, and German. Hebrew, Japanese, Arabic, Persian, and Chinese are also in the beta phase (for testers).

The operation of [Lingolette](#) is simple. First, the user profile must be configured, which can be customized with native language, target language, proficiency level, how to display teacher feedback, voice speed, and teacher's accent and type of voice.

The user can access the Read, Talk, Words, and Sources sections. It is essential to configure the source preferences, like subscriptions to specific topics (technology, health, EU news, etc.), which yield various materials for the learner.

- **Read:** You can read and reproduce the article (which is adjusted to your language level, i.e., from A0 to C2). This section allows discussions with the AI teacher and hearing and practicing pronunciation. Also, each reading session has comprehension questions at the end, which can be answered orally or in writing). Interestingly, the reader can click on any word throughout the reading to learn its definition and pronunciation. The AI also explains whether the word is a noun, verb, adjective, etc.

- **Talk:** This section allows chats with the AI teacher on any topic. The chat can be written or spoken. One outstanding aspect is that if grammatical, spelling, tone, etc., errors are made, the teacher leaves a note with the correction. The aim is to learn new words, grammar, and pronunciation and practice oral expression. You can have conversations with the AI teacher, who will ask you follow-up questions to know your opinions on the topics being addressed. Each response has options to translate or repeat your answer (written or oral).
- **Words:** The app constructs a glossary of the words used, an example from the chats with the AI teacher, and user mastery.

→ LIMITATIONS

Although it is an excellent tool for reinforcing and learning another language, it could be a good option for some students at the A0 level or even A1 to complement their classes. Students with an A2 level or higher could get more out of using it without an intermediary teacher, but they must have some notions to engage in conversations with the AI teacher.

Another relevant detail is that its free version is limited to specific resources. The reading section allows only one reading activity and 20 chat responses daily. The premium version provides access to an advanced AI teacher model, unlimited conversations, and topics, personalized daily articles, and accurate pronunciation analysis.

GLIGLISH

This platform aims to make learning a second language as natural as learning a native language. Therefore, it emphasizes oral expression (speaking) and listening comprehension (listening).

→ MAIN FEATURES

With [Gliglish](#) conversations can occur in English, Chinese, Croatian, Bulgarian, German, French, Korean, Japanese, Portuguese, Spanish, Russian, Vietnamese, Swedish, and more.

If a role-play activity is chosen, it throws the user into a situation requiring either a written or oral response. For example, the graphic below provides some suggestions for meeting someone new at a party while unsure how to initiate a conversation.

→ LIMITATIONS

Being a platform that emphasizes listening and speaking skills, it could give some students the impression that it does not feel “complete” because it focuses on natural learning (natural approach), where there is no drilling or explicit focus on grammatical rules.

It should be noted that it can be a functional tool for basic-level students to practice real-life situations (orally) in another language. For example, they can ask questions in the native language about the target language, which could be a good option for beginner students.

Remember that despite having limited situations, they are still helpful when learning a language. Entry-level students use this tool best, but advanced students can navigate conversations in specific contexts. Although there is an option to “request scenarios,” emailing the developer would be somewhat tedious; scenarios can be created using AI within Gliglish.

SOOFY

Soofy is a more iterative and recognizable option for learning a language because it takes a more comprehensive approach. Its central panel is a dashboard that provides interesting information, such as expressions and words of the day, expanding your vocabulary, guessing the word, and activities to develop pronunciation.

→ MAIN FEATURES

Soofy facilitates learning English, French, German, Turkish, Chinese, Japanese, Portuguese, Russian, Italian, and others. It also offers different voices and accents. For example, one can choose British, Australian, Canadian, and American accents in English. This tool does not use CEFR leveling; its three levels are beginner, intermediate, and advanced.

The platform contains various sections, such as discussions, writing, listening, flashcards, and tools (helpful/writing tools). Each one has particularities and develops different skills.

- **Discussions** provide a space for conversations about content in the target language (of a subject/topic) or the language. It has options for discussing topics of interest using the open discussion option or role-play conversations.
- **Writing** allows polishing writing skills through written or image exercises.
- **Listening** provides the opportunity to perform listening comprehension exercises.
- **Tools** include a translator, simplified texts, notes, a dictionary, a homework and writing assistant, and a spell checker.

→ LIMITATIONS

Soofy is a complete application for developing the basic skills required to learn a language. In terms of content, it is the closest thing to a class. Its home board provides an experience that feels more integral.

A noteworthy detail is that it does not offer enough oral practice. Even in specialized sections, speaking is not sufficiently relevant because it does not have a section as such (as has been seen in other tools). So, if oral practice is your priority, Soofy is not the AI for you.

Moreover, its trial period is limited (I did not manage to perform an exercise in each tab); it soon requests that you subscribe to its paid version.

While still a good paid option, other AIs (not intended necessarily for learning or practicing languages) can perform the Tools tasks on this platform.



LANGTURBO

This tool encourages learning through authentic digital materials, podcasts, and the YouTube platform. Although anyone can use it, it is advisable to have intermediate-level proficiency in the target language because it does not have lessons per se.

→ MAIN FEATURES

[LangTurbo](#) uses a more immersive learning method, which, in my opinion, helps expand vocabulary, learn idiomatic phrases and language in context, and reap other benefits from authentic materials from the Internet.

Its operation imports videos from YouTube channels or podcasts, which can be in various target languages: Italian, English, French, Spanish, Chinese, Arabic, Hebrew, Japanese, Korean, Czech, Lithuanian, etcetera.

After step one (importing), the AI presents the video text in written form as a transcript while listening to the video audio.

Langturbo is intriguing because you can stop the video to review all or unfamiliar words for definitions and context to improve understanding. After reviewing the word(s), you can mark them as reviewed.

→ LIMITATIONS

Langturbo is a good tool for students from B1 to C2 levels, as it focuses more on language mastery. Although it has a paid version, its free one provides 150 minutes of playback per month.

It is not an application for students seeking to improve their oral expression (speaking); it is better for polishing listening skills and gaining proficiency in the target language in authentic contexts with appropriate new words, concepts, phrases, etc.

MOBILE APPS

Mobile apps can be helpful when you want to learn or practice a language. Some examples are:

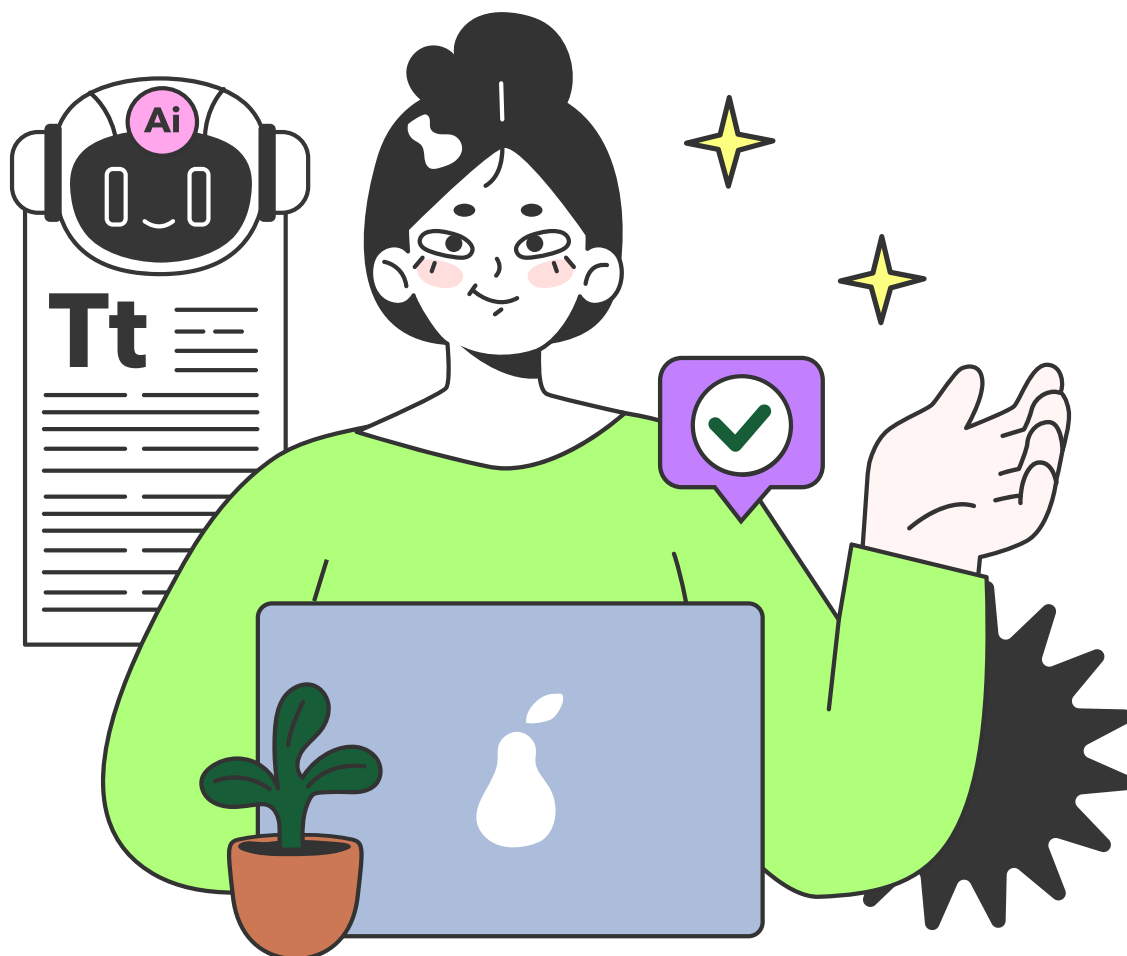
- **Conversly:** Practice speaking and listening skills. Engage in conversations with a chatbot developed by ChatGPT with different modalities. Available languages: German, Russian, Portuguese, French, Spanish and Japanese. It can be found on Google Play and App Store.
- **Univerbal:** is a smart tutor that allows practice in more than 20 languages with real-time feedback. Their approach is conversational, whether written or spoken. Themes can be customized according to the user's preferences. It contains activities that simulate functional/situational aspects of a language. It is available on Google Play and the App Store.
- **Glosa:** provides personalized AI learning, instructional materials, interactive practice, and camera integration to learn about object translation instantly. You can create goals and track your progress. It can be used at all levels, even false beginners. It has a variety of more than 20 languages. Available on Google Play and App Store.

- **Lang AI:** Developed per CEFR, this app increases language fluency by focusing on speaking and listening. It provides in-the-moment feedback, more natural conversations, and authentic contexts. It is available in over 20 languages on Google Play and the App Store.

Thanks to AI integration, foreign language learning can become accessible and friendly. Whether you are a student looking to learn or practice a language or a teacher seeking new activities to complement or integrate in class, these and other tools await.

However, to avoid future frustrations, you should always consider some relevant factors when choosing an AI tool, i.e., the objectives (the skills you want to master), the proficiency level in the target language, and the application's design (its methods and approaches).

To avoid unforeseen events, it is always essential to do good research before investing time, effort, and money and test the tool in its free and trial versions.



Open Educational Resources on Generative AI

In addition to the selection of articles we have compiled for this Edu Book, we would like to share other educational resources related to generative artificial intelligence in audiovisual format.

Webinars and Dialogues

Podcast



1. [*The Evolution of Careers in the Age of AI with Matt Sigelman*](#)
2. [*Understanding Generative AI with Uohna Thiessen*](#)
3. [*Education on Fire: Climate and AI Challenges with Bryan Alexander*](#)
4. [*AI use and data privacy in education with Steven Miller*](#)
5. [*The human element amidst the rise of AI with Tomi Kauppinen*](#)
6. [*Exploring Large Language AI Models with Ryan Baker*](#)
7. [*AI, Work and Hyperpersonalized Education with Sebastian Thrun*](#)
8. [*AI and Education in the 21st Century with Rose Luckin*](#)

Collection of Open Educational Resources



We offer you a [collection of open educational resources](#) that will allow you to integrate generative artificial intelligence content into your classes, projects, or research.

CALL FOR SUBMISSIONS

CALL FOR SUBMISSIONS

Publish your Article
in the Observatory
IFE

Let's publish



PUBLISH YOUR ARTICLE AT THE OBSERVATORY OF THE INSTITUTE FOR THE FUTURE OF EDUCATION (IFE)

Would you like to share an innovative pedagogical experience with the teaching community? At the Observatory of the Institute for the Future of Education [we have a place for you!](#)

Through the IFE Observatory Edu bits Call, we aim to promote the work of educators worldwide. This call is open to all teachers and academic leaders from any institution at any educational level. The goal is to share innovative and educational experiences and practices with other educators and our audience.

WHAT IS AN EDU BITS ARTICLE?

It is a [popular article](#) about a pedagogical experience in educational innovation. **A popular article has clear, familiar, and understandable language** to convey and explain ideas, experiences, discoveries, facts, or concepts in educational, technological, scientific, social, or cultural topics. It aims to disseminate knowledge to inform society about topics for relevant and appropriate decision-making.

WHO IS THE TARGET AUDIENCE?

Teachers from primary to higher education
Academic leaders
Researchers
Entrepreneurs
Students, families, and tutors

REQUIREMENTS FOR PUBLISHING AN EDU BITS ARTICLE IN THE IFE OBSERVATORY

1. The proposal for the Edu bits article **must be original and not previously published** in any other media.
2. The Edu bits article must **follow the format and structure of the Guidelines for Publishing** provided below in this document.
3. Artificial intelligence (AI) tools: Any AI tools deemed necessary **for research and information analysis may be used to prepare, but not for writing the article for this call for papers**. The author is responsible for the entire written content of the proposal sent for the Edu bits call.
4. **There is no guarantee of publication**. Only articles with content approved by the Observatory's editorial team will be published.
5. The editorial team of the Observatory will confirm receipt of the article to the e-mail account you provide within ten business days.
6. The Observatory's team of reviewers will provide feedback comments regarding the content of the proposed article. **The professor must make the requested modifications to the article** and resubmit it with the changes.
7. The thorough review and editing process, conducted by the Observatory's team of editors with the participating authors, can take **four to eight weeks**.
8. **The waiting time** to begin an article's review and editing process can be up to **six months**, depending on the number of applications received. However, you will be informed promptly when this process begins. We appreciate your patience.
9. Only two articles by the same author are published annually to allow other authors to submit their writings, one for each period: January-June and July-December.
10. No promotion of individual platforms, applications, tools, organizations, etc., will be accepted unless justified by the article's author with relevance to the subject matter.
11. The publication date of the articles will be defined once the Observatory's editorial team has determined the general publication calendar of the Observatory and accepted the content.
12. The articles published by the Observatory are considered **Open Educational Resources (OER)**, which other publications or media can use following the **Creative Commons CC BY-NC-SA 4.0** guidelines.
13. Send your Edu bits article proposal in .doc, .docx, or .pdf format to edubits@servicios.tec.mx with the following information: Full name, the institution where you work, position, and a brief biography.
14. The published article will appear on the Observatory's website, weekly newsletter every Tuesday and the IFE Observatory's social media.

We would like to hear from you. Participate and share your experience!

For more information, visit: <https://observatory.tec.mx/call-for-submissions/>

Edu Book

GENERATIVE AI: PRACTICAL APPROACHES FOR TEACHERS

Elaborated by the Observatory of the Institute for the Future of Education (IFE) of Grupo Educativo Tecnológico de Monterrey

Edited by: Rubí Román and Karina Fuerte

Translations by: Daniel Wetta

Cover: Nacional de Marca

Editorial Design: Christian Guijosa y Nacional de Marca

License CC BY-NC-SA 4.0

Disclaimer

The tools discussed in this EduBook are not issued, operated, or administered by Tec de Monterrey. The use of the applications mentioned in this document is for illustrative purposes only, intended to demonstrate what we can achieve through the use of open artificial intelligence application.

Learn more about the official resources used by Tecnológico de Monterrey: <https://tedu.tec.mx/es/PSA-IA>



**Institute
for the Future
of Education**
Tecnológico de Monterrey

Observatory



LinkedIn

YouTube

Visit us: observatory.tec.mx