

# **INFORMATION TECHNOLOGY**



# THE USE OF GENERATIVE TECHNOLOGIES IN E-EDUCATION

Loredana MOCEAN  
Miranda-Petronella VLAD

**Abstract:** *This paper explores an innovative technology capable of creating new content from existing data, capturing global attention with the launch of the first generative AI chatbot in 2022. The main types of AI and its applications are presented, with a focus on the impact in education. Various software tools integrate generative AI, including OpenAI (ChatGPT, Codex), Microsoft (Copilot, Azure AI), Adobe (Sensei, Photoshop Generative Fill), NVIDIA (Canvas, GauGAN), IBM (Watson), and Autodesk (Generative Design) .*

*Google has integrated AI into multiple applications to improve functionality and user experience: Google Vertex AI, Google Search (RankBrain, BERT), Google Assistant, Google Photos (Magic Editor), Gmail (Smart Compose, Smart Reply), Google Translate, Google Maps, Google Ads, Google Cloud AI, YouTube and Google Docs.*

*The paper's conclusion highlights the transformative potential of generative AI in education, providing significant benefits for improving teaching and learning experiences. AI can create personalized educational content, provide real-time feedback and adapt to individual learning styles. However, the integration of AI in education presents challenges such as data privacy and the need for continuous training of educators. Balancing technological advances with ethical considerations and ensuring equitable access are essential for generative AI to become a powerful ally in creating more dynamic and effective education systems.*

**Keywords:** *Generative, Application, Education, Conversational AI*

## INTRODUCTION

Generative AI is a relatively new artificial intelligence service that, unlike its predecessors, can create new content by searching with advanced filters in the vast databases of the Internet, with the help of long-established search algorithms. Its extraordinary ability to produce human-like text, images, sound and video has captured the world's imagination since the first generative AI chatbot for consumers was released to the public in the fall of 2022 [1]. The main types of AI are presented in Figure 1.

### State of the Art

There are numerous scientific articles exploring the impact and applications of artificial intelligence (AI) in education. These articles provide a broad perspective on how AI is being integrated into educational environments, the benefits it brings, and the challenges that need to be addressed. They offer valuable insights for educators, researchers, and policymakers interested in the intersection of AI and education.[4]

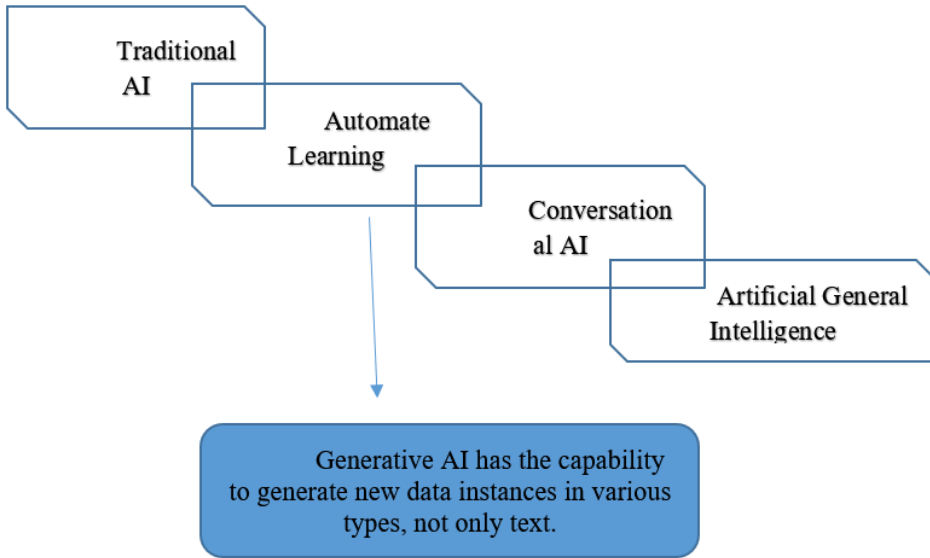


Figure 1. Types of AI, programming and machine learning

### Applications integrated with AI

Many software tools have integrated generative artificial intelligence to enhance functionalities and provide users with more advanced experiences. Here are some notable examples:

#### 1. OpenAI

- **ChatGPT:** Used for text generation, answering questions, and virtual assistance.
- **Codex:** Integrates AI into software development platforms to assist with coding.

#### 2. Google

#### 3. Microsoft

- **Microsoft Copilot:** Integrates GPT models into Microsoft

365 applications (Word, Excel) to help generate content and analyze data.

- **Azure AI:** Offers generative AI services for developers.

#### 4. Adobe

- **Adobe Sensei:** Uses AI to generate and edit images, videos, and graphic designs.
- **Photoshop Generative Fill:** Allows automatic addition and modification of image content.

#### 5. NVIDIA

- **NVIDIA Canvas:** Transforms sketches into photorealistic images using generative AI.
- **NVIDIA GauGAN:** Another tool for generating realistic images from simple drawings.

#### 6. IBM

- **IBM Watson:** Includes generative AI functionalities to help with data analysis and generating reports and predictions.

#### 7. Autodesk

- **Autodesk Generative Design:** Used in industrial design and engineering to generate multiple design options based on specified criteria.

#### 8. OpenAI

- **DALL-E:** Generates images based on textual descriptions.
- **Jukedeck:** Generates personalized music.

These tools demonstrate the power and versatility of generative artificial intelligence, which can transform the way we work, create, and interact with technology.

### Google Applications integrated with AI

Google has integrated artificial intelligence into several of its applications, enhancing functionality and user experience in various ways. Here are a few notable examples.

One of the most useful applications by Google is Google Vertex AI. It can be accessed from any browser using an account. Vertex AI is an artificial intelligence platform developed by Google Cloud that enables the development, training, and deployment of machine learning (ML) and AI models. It is designed to simplify the process of creating and managing AI solutions, offering a wide range of integrated tools and services.

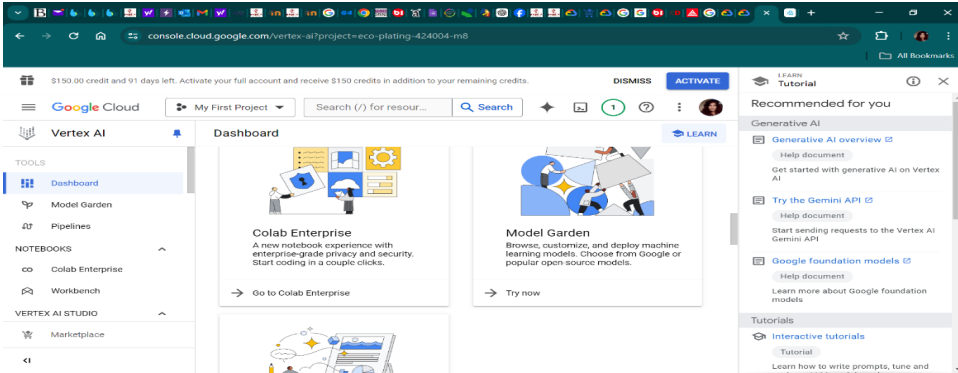


Figure 2. Google Vertex AI (<https://console.cloud.google.com/>)

In our projects, collaborators can be added on various levels, budget estimates or different alerts.

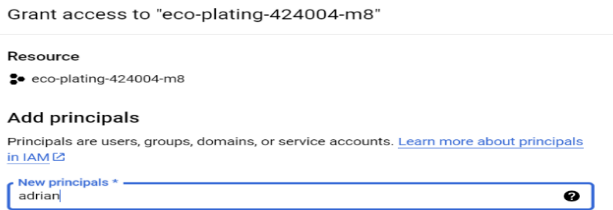


Figure 3. Edit the collaboration project in Vertex AI

For budget creation we have an automation of the process through which we can check each stage of the project. A budget allows us to track actual expenses against planned expenses.

We can view and configure cost history, current cost trends and estimated costs with intuitive reports available in the Google Cloud console. Several different reports are available for your billing data analysis needs [5].

Google has also integrated artificial intelligence into other tools and platforms to improve functionality, efficiency and user experience. Here are some of the main Google tools and platforms that benefit from AI integration:

**Google Search**, has two new modules called:

- RankBrain: An artificial intelligence system that helps understand and process complex search queries.
- BERT (Bidirectional Encoder Representations from Transformers):

A natural language processing model that improves context understanding in search queries. BERT is designed to pre-train deep bidirectional representations from unlabeled text by jointly conditioning on both left and right context in all layers.[2]

**Google Assistant** ([www.assistant.google.com](http://www.assistant.google.com)) has an AI virtual assistant that responds to voice commands, performs tasks and answers questions using natural language understanding.

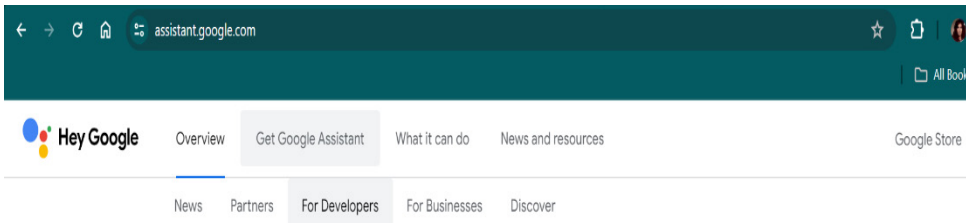


Figure 4. Google Assistant Window, for Developers

**Google Photos** uses AI to organize photos, recognize faces, create automatic albums and offer editing suggestions. Magic Editor, an AI tool incorporated in Google Photos, will become available on Android and iOS to more Google Photos users, helping you to make complex edits in an intuitive way leveraging generative AI.

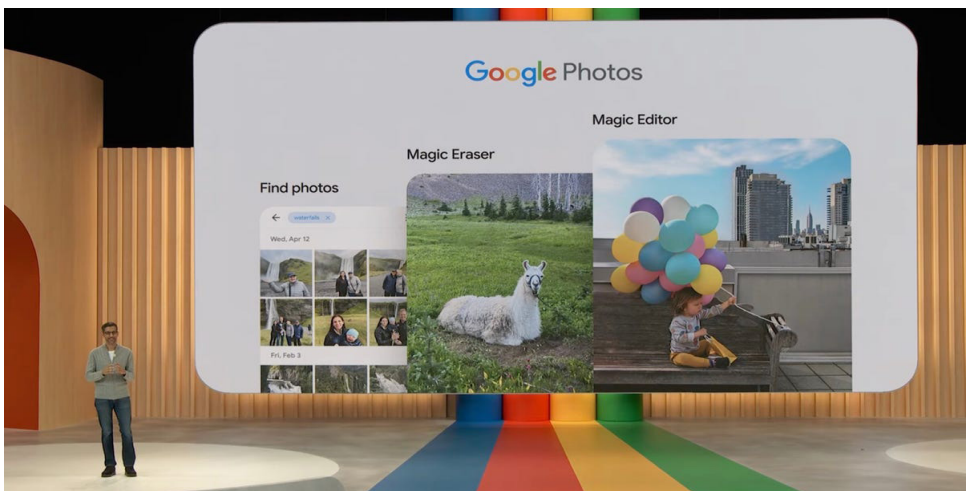


Figure 5. Google Photos with AI instruments integrated

**Classical Gmail** has two important options:

- Smart Compose and Smart Reply: Features that use AI to suggest completions and auto-reply to emails.
- Spam Filter: Spam filtering system based on machine learning to detect and block unwanted emails.

**Google Translate** uses advanced AI models for real-time text translation, language recognition and improved translation accuracy. Google Cloud’s AI-powered APIs help you translate documents, websites, apps, audio files, videos, and more at scale with best-in-class quality and enterprise-grade control and security [5]. It can translate from handwriting, voice, and camera, and outputs speech and text-over-image. Google Translate uses Google neural machine translation [3].

**Google Maps** integrates AI to provide optimal routes, real-time traffic estimates, location suggestions and reviews based on user preferences. Google Maps usually shows different locations with reviews. Following the update, users would be able to identify any listed for example, restaurant’s food items using AI along with other details like cost, availability, and nutritional value.

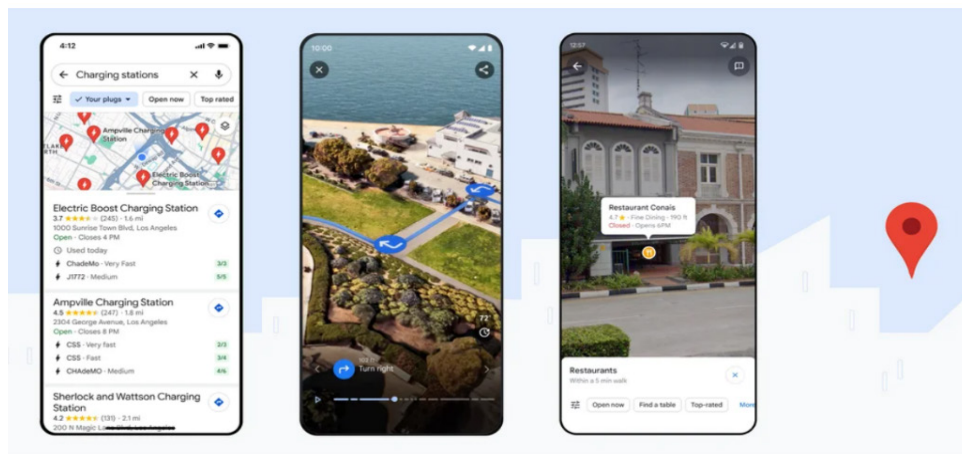


Figure 6. Google Maps with AI integrated

**Google Ads** use AI to optimize ad campaigns, target the right audiences and maximize ROI for advertisers.

**Google Cloud AI** provides various AI services including Cloud AutoML, Dialogflow for chatbot development, Vision AI for image recognition and Natural Language API for text analysis and processing.

**YouTube** uses AI for personalized video recommendations, detecting and removing inappropriate content, and improving video quality with fea-

tures like image stabilization.

**Google Docs** integrates AI for grammar and spelling correction suggestions, as well as style and wording recommendations.

Documents can be created and edited collaboratively, together with team members, in real time using quick access permission. Comments, suggestions and tasks can be used to keep the activity running without interruptions. @-mentions can be used to include relevant people, files, and events in online files and in Documents for a complex collaboration.

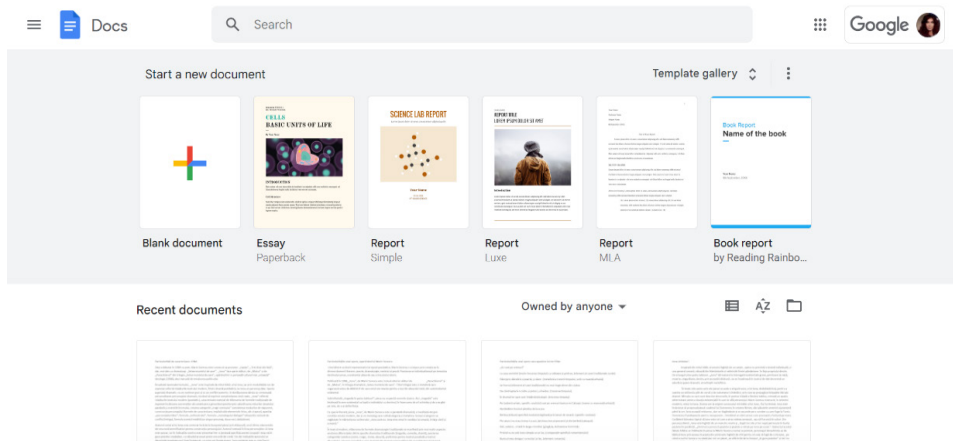


Figure 7. Google Doc window, using templates and documents

**Google Home** use AI to control smart home devices, answer questions and automate household tasks.

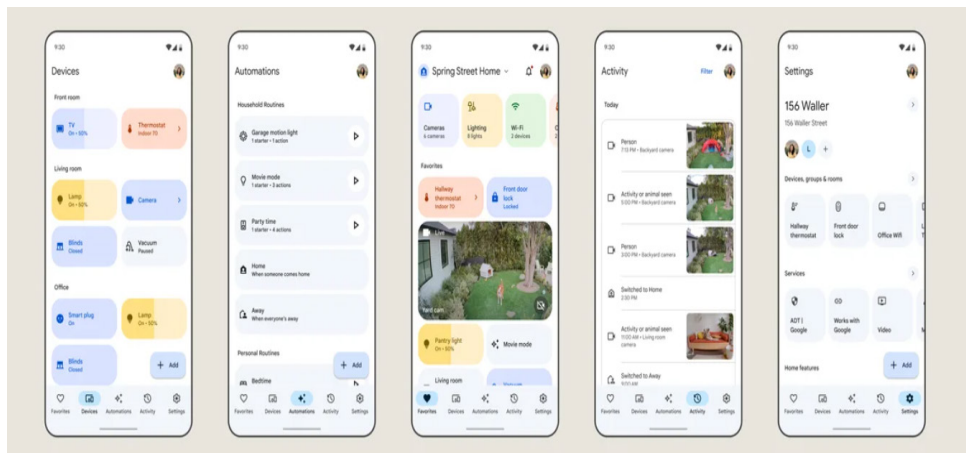


Figure 7. Google Home to easily manage your smart home

## CONCLUSION

Generative AI integrated into education holds transformative potential, offering a range of benefits that can significantly enhance teaching and learning experiences. The ability of generative AI to create personalized educational content, provide real-time feedback, and adapt to individual learning styles paves the way for more effective and engaging educational environments. By automating administrative tasks, such as grading and content creation, AI allows educators to focus more on interactive and personalized teaching methods.

However, the integration of generative AI in education also presents challenges, including concerns about data privacy, the digital divide, and the need for educators to develop new skills to effectively use AI tools. Addressing these challenges requires careful planning, robust ethical frameworks, and ongoing training for educators.

In conclusion, while generative AI offers immense opportunities for revolutionizing education, its successful integration will depend on balancing technological advancements with ethical considerations and ensuring equitable access for all students. By doing so, generative AI can become a powerful ally in creating more dynamic, inclusive, and effective educational systems.

## WEBSITES

<https://www.oracle.com/ro/artificial-intelligence/generative-ai/what-is-generative-ai/>

<https://research.google/pubs/bert-pre-training-of-deep-bidirectional-transformers-for-language-understanding/>

<https://www.lavivienpost.com/google-translate-and-transformer-model/>

<https://www.eschoolnews.com/digital-learning/2024/02/05/impact-of-artificial-intelligence-in-education/>

[www.cloud.google.com](http://www.cloud.google.com)

## *Notes on the authors*

### **Loredana Mocean**

loredana.mocean@ubbcluj.ro

Babeş-Bolyai University, Cluj-Napoca, Romania

### **Miranda-Petronella Vlad**

miranda.vlad@cantemircluj.ro

“Dimitrie Cantemir” Christian University, Bucharest, Romania