

## The Use of Generative Artificial Intelligence in the Planning of Teaching Practices in Inclusive Special Education

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### Abstract

*The use of Artificial Intelligence (AI) can facilitate personalised activities tailored to students' specific needs, promoting greater engagement and meaningful learning. This paper presents a case study reporting on the application of generative AI in the planning of inclusive and personalised teaching practices for a 14-year-old boy diagnosed with an Intellectual Disability (ID), within the context of Specialised Educational Support (AEE), enrolled in year 8 of primary school at a state school in the interior of Rio Grande do Sul, Brazil. These actions were developed as part of the Pilot Project: Development of the EduEsp Pocket Guide prototype to assist in teaching practices with students with ID and/or Autism Spectrum Disorder (ASD), developed under the Institutional Programme for Introduction to Teaching (PIBID) at the Federal University of Santa Maria (UFSM-Brazil), in partnership with the Federal University of Paraná (UFPR-Brazil) and the Polytechnic Institute of Bragança (IPB-Portugal). Whilst preserving the anonymity of the student and the school, specific student information was used as a reference to develop targeted prompts that simulate learning situations and guide the creation of individualised activities and teaching strategies tailored to the student, thereby contributing to the development and implementation of Individualised Education Plans (IEPs). The results indicated significant potential to integrate AI and pedagogical planning to enhance teaching practices, reduce barriers to learning, and promote greater educational equity, thereby contributing to teacher training for work in technology-mediated, inclusive contexts. In addition, the study included a critical analysis of different available technologies, as well as the selection of consistent theoretical frameworks to guide the ethical and safe use of AI in education. This aspect has recently been corroborated by the Brazilian Artificial Intelligence Plan (BAIP), which helps define guidelines for the safe use of AI in education and encourages research to demonstrate its effectiveness.*

**Keywords:** Artificial intelligence, AI in Education, GenAI, EduEsp Pocket Guide, Intellectual Disability, Autism.

### 1. Introduction

This article presents a case study within the framework of the "Pilot Project: Development of the EduEsp Pocket Guide Prototype", designed to support teaching practices with students with intellectual disabilities (ID) and/or autism spectrum disorder (ASD). The project was developed under the Institutional Program for Teaching Initiation Scholarships (PIBID), at the Federal University of Santa Maria (UFSM - Brazil), in partnership with the Federal University of Paraná (UFPR - Brazil) and the Polytechnic Institute of Bragança (IPB - Portugal). The EduEsp Pocket Guide prototype is based on AI and aims to assist teachers in personalising instruction for students with ID and/or ASD, ensuring inclusive and accessible teaching practices, which are increasingly in demand in a digital society characterised by inclusion and diversity.

The activities are carried out by students enrolled in the Special Education program at UFSM who are currently working in Specialised Educational Services (AEE) at a K-12 school in the municipality of Santa Maria, Rio Grande do Sul, Brazil. In short, they are near-future professionals.

The Institutional Program for Teaching Initiation Scholarships (PIBID) [1] is an initiative within the National Teacher Training Policy of Brazil's Ministry of Education (MEC). Administered by the Coordination for the Improvement of Higher Education Personnel (CAPES), which awards grants to Higher Education Institutions (HEIs) that select scholarship recipients for their approved subprojects, with the aim of fostering the initiation into teaching, contributing to the strengthening of teacher training at the higher education level and to the improvement of the quality of Brazilian public basic education. The program facilitates the integration of undergraduate students or academics into the daily life of

public schools, promoting collaboration between universities and basic education through supervised practical experiences [2].

Currently, the PIBID/UFSM Inclusive Special Education subproject operates through two centres, each with 24 teaching initiation scholarship recipients (students from Special Education programs), three supervising teachers (teachers from partner schools), and one coordinating teacher (a university professor). It carries out activities with specific objectives, in which students' involvement facilitates direct contact with the potential and challenges of planning inclusive and personalised pedagogical practices in the school context, as adapting activities to meet students' specific needs within a regular classroom setting has been a challenge for teachers. Thus, the report presented here addresses an initiative developed by Core 1 of the Inclusive Special Education subproject.

In the school context, the objective of developing the EduEsp Pocket Guide prototype is to create and implement an Artificial Intelligence (AI)-based prototype to assist teachers in decision-making and in personalising instruction for students with intellectual disabilities (ID) and/or autism spectrum disorder (ASD), ensuring inclusive, accessible, and efficient pedagogical practices. The proposal is justified by the need to serve an increasingly large population of students with learning difficulties, as confirmed by diagnoses, enrolled in elementary and secondary schools.

Brazilian law guarantees the right to education in an inclusive educational system for students with disabilities, autism spectrum disorder, and high abilities/giftedness, based on equal opportunities and without discrimination [3], [4]. According to the Statute of Persons with Disabilities, a person with a disability is defined as someone who has a long-term physical, mental, intellectual, or sensory impairment that, in interaction with one or more barriers, may hinder their full and effective participation in society on an equal footing with others [5].

In this context, special education is offered across all levels, stages, and modalities, with the aim of ensuring educational resources and services that support, complement, and supplement the schooling process.

Specialised Educational Services (AEE) should serve as a support to ensure conditions for access, participation, retention, and learning for students in the special education population within regular education. The objective of AEE is not to replace the traditional curriculum, but to complement the schooling of people with disabilities and/or supplement the schooling of highly skilled/gifted individuals, with a view to eliminating barriers to inclusion.

Professionals working in Special Education must have the necessary training to teach and undergo continuing education in inclusive education. To identify the students to be served, the law requires conducting case studies to inform the Specialised Educational Service Plan (PAEE) and the Individualised Educational Plan (PEI). The PAEE and PEI are mandatory individualized pedagogical documents designed to guide the work to be carried out in the general classroom; the work carried out within the scope of Specialized Educational Support (AEE); collaborative activities at the educational institution; and intersectoral coordination efforts [4], always taking into account, when necessary, the Brazilian Artificial Intelligence Plan (BAIP) [6] and the National Common Core Curriculum [7].

However, one of the challenges faced by teachers is developing accessible activities that do not distance students from the curricular proposals developed by the class. In this scenario, Generative Artificial Intelligence can serve as a tool to support instructional planning, assisting in the adaptation of texts, the simplification of language, the creation of visual materials, and the diversification of teaching strategies, avoiding the infantilization of content and materials that may occur when using these technologies [8] and adhering to Universal Design for Learning (UDL) [9].

Generative Artificial Intelligence (GenAI) is the branch of AI focused on creating new content—texts, images, audio, videos, and code—based on patterns learned from large training datasets [13], [15]. Unlike traditional systems, GenAI tools rely on Large Language Models (LLMs), which operate probabilistically, predicting sequences of words or pixels based on statistical correlations [1]. This architecture underpins tools such as ChatGPT, Gemini, Copilot, Claude, DALL-E, Suno, and Pictory, among others, which are gradually being incorporated into everyday educational practice.

In the field of education, GenAI has established itself as a resource to support the personalization of teaching, curriculum adaptation, and the development of accessible instructional materials [1], [13], [16], with significant potential for Inclusive Special Education by generating activities aligned with the Individualized Education Plan (IEP) and tailored to students' cognitive characteristics, interests, and age groups. However, generative models operate through statistical inference and can produce plausible yet inaccurate or biased responses, which is why ethical, critical, and teacher-mediated use is an indispensable condition [1], [16].

The BAIP, launched in 2025, aims to guide the development, use, and regulation of AI in Brazil with a focus on addressing major national, social, economic, environmental, and cultural challenges, in order

to ensure security and individual and collective rights, social inclusion, the defense of democracy, information integrity, the protection of labour and workers, national sovereignty, and the nation's sustainable economic development [6].

Regarding the positive impacts and challenges of AI in inclusive education, studies published between 2021 and 2024 highlight that AI improves accessibility by providing adapted materials and helps alleviate educators' administrative burden, allowing them to prioritise pedagogical guidance. As for the challenges, there remain shortages of AI training, inadequate infrastructure, and ethical concerns related to privacy and equitable access to technology [12].

The effectiveness of GenAI tools depends on the quality of the prompts used in interacting with the model. Prompt Engineering is defined as the systematic process of designing, refining, and evaluating natural language instructions to obtain more accurate, relevant, and pedagogically aligned responses from LLMs [14], [17]. According to the literature, a well-structured prompt includes four central elements – instruction, context, examples, and constraints [17] – and can employ techniques such as zero-shot, few-shot, role prompting, and chain-of-thought prompting [14].

In the educational context, it is through Prompt Engineering that the teacher exercises their pedagogical authorship over the product generated by AI [13], [14]. In Inclusive Special Education, describing the student's skills, potential, interests, and learning barriers in the prompt guides the AI to produce materials aligned with the Individualised Education Plan (IEP), respecting the age group and avoiding infantilization. It is, therefore, a new teaching competency, linked to the critical evaluation of the generated outputs and adherence to ethical principles regarding privacy, equitable access, and respect for diversity [14], [15].

## 2. Methodology

The scientific methodology is a rigorous and systematic approach that serves as the basis for producing reliable, verifiable knowledge, grounded in precise and demonstrable findings. Consequently, we present the participants, the location, the instruments and the procedures adopted in a case study.

**Participants:** The study involved students from the Special Education course at UFSM, together with their supervising lecturers and project partners. For the case study, based on the observations, a student was selected (here referred to as Rafael) to preserve his anonymity. He is a 14-year-old adolescent diagnosed with an Intellectual Disability (ID), enrolled in the 8th year of primary school. Rafael demonstrates a high degree of independence in his home life, but experiences difficulties with reading, writing, comprehension and social interaction. Specifically:

- Communication: speaks softly, is shy, uses gestures;
- Reading/writing: recognises letters and numbers up to 20;
- Socialisation: keeps to himself at break time, interacts in small groups in the Multifunctional Resource Room (MRR);
- Independence: takes care of his own meals, personal hygiene and clothing.

**Location:** The activities were carried out at a primary and secondary school located in a socially vulnerable area of the municipality of Santa Maria, Rio Grande do Sul, Brazil. Within the school, the activities took place in two main areas: the Multifunctional Resource Room (SRM), where Specialised Educational Support (AEE) is provided, and the mainstream classroom during lessons in specific subjects.

**Instruments:** For the functional assessment of the student, the SIS-A (Support Intensity Scale – Adult Version, currently in the final stages of validation in the Brazilian context) was used. To develop the pedagogical activities, a comparative analysis was conducted of various available Artificial Intelligence tools, namely ChatGPT, Gemini, Copilot, NotebookLM, Para Casa Inclusivo, and Suno, to identify which one(s) were most suitable for the student's educational context. Interaction with these tools occurred through the creation of targeted prompts that simulated learning situations and guided the development of individualised activities and teaching strategies tailored to the student.

The following are used for assessment and monitoring: quarterly descriptive reports; a portfolio with photographs and written records; interdisciplinary teaching meetings; participatory class councils; and, where possible, reassessment using SIS-A.

**Procedure:** The activities began in October 2024. The students attended the school for two sessions per week and, during one of those sessions, participated in study and planning meetings at the university. Each week, the activities carried out at the school were discussed in meetings with the supervising teachers and project partners. Initially, observations of students were carried out in the AEE and SRM, and monitoring took place in the mainstream classroom during lessons in specific subjects.

During the observations, the students' skills, potential, difficulties and needs were considered. Following the initial assessment period, a case study was selected from which Rafael's profile was created. Concurrently with the observation phase and the collection of information about the student, studies were carried out at the University, involving the selection of reliable theoretical sources to provide a foundation, the comparison of available technologies, and the choice of the most appropriate Artificial Intelligence tool to support the personalisation of teaching and the making of more assertive pedagogical decisions for the case. Based on Rafael's profile, the following objectives were established: to ensure active and meaningful participation in learning activities covering the content of the Brazilian National Common Core Curriculum (BNCC), delivered in mainstream classrooms [7]; to promote communicative and socio-emotional skills; to foster autonomy and self-esteem; and to implement the principles of the Individualised Educational Plan (IEP) and, where possible, to develop Universal Design for Learning (UDL). The most frequently used methodological strategies were structured, pre-planned routines; the use of concrete materials (bottle caps, images, games); small-group activities, always mediated; and oral, practical, and descriptive assessments. Whilst preserving the anonymity of the student and the school, specific information about the student was used as a reference for developing targeted prompts that simulate learning situations and guide the creation of individualised activities and pedagogical strategies tailored to Rafael. The design of these activities was discussed at length by the team and then implemented at the school with the student.

### 3. Results

In the results section, we will present the prompts and outputs generated by GenAI. Next, two detailed examples are presented: Portuguese Language (Table 2) and Science (Table 3), which show the planned subjects, proposed or to-be-proposed topics, pedagogical objectives, requested adaptations, and the GenAI used.

**Table 1.** Description of the plan for using GenAI in the teaching activities devised by the team.

Subject	Theme/Proposal	Objective	Adaptation	AI tool
Portuguese	Text comprehension	Oral and visual comprehension	Text with pictograms + read-aloud	Chat GPT, Gemini
Mathematics	Decimal numbers	Understanding quantities up to 100	Bottle caps + visual aids	DALL-E, ChatGPT
Science	The water cycle	Understanding and distinguishing the physical and chemical states of water	Real objects and music	DALL-E, Canva, Voicemod
History	The culture of Brazil's indigenous peoples	Respect for cultural diversity	Illustrated comic strips	Pictory, Lumen5
Physical Education	Motor skills	Body and spatial awareness	Visual and verbal activities	Soundrwr, Synthesia

To illustrate the activities, the planned practices for the Portuguese and science courses will be presented. As an example of an activity for the Portuguese Language course (Table 2), the objective was defined as oral and visual comprehension, with a focus on text interpretation. For Activity 1, the following sequence of prompts was devised, which generated the following outputs.

**Table 2.** Sequence of prompts and outputs for creating an adapted activity for Portuguese.

Prompt 1
"Write an educational text in Portuguese for Year 8 pupils, using simple, short and straightforward sentences. The topic is 'Separating Organic and Recyclable Waste'. The text should explain: what organic waste is, what recyclable waste is, examples of each, and how separating them helps the city and the environment. The text should be no more than 150 words and use language that is accessible to students with intellectual disabilities."
Answer 1
"Title: Managing Waste: Organic and Recyclable

Every day, we produce waste at home and at school. This waste can be divided into two main types: organic and recyclable. Organic waste comes from food scraps, such as fruit and vegetable peelings and bread crusts. This waste can be turned into compost for plants. Recyclable waste consists of materials such as plastic bottles, paper, tins and glass. When recycled, they can be turned into new objects and help reduce pollution. Sorting waste is an act of caring for the environment. When we put waste in the right place, we help keep the city cleaner and contribute to the health of nature and people."

### Prompt 2

"Rewrite the text using emojis as pictograms to represent key words. The text should be simple, with short sentences, and accessible to a 14-year-old student with an intellectual disability.  
Topic: Waste sorting.  
Use pictograms for: rubbish, organic waste ( 🍌 🥕 🍞 ), recyclable ( 🗑️ 📰 🍻 ), city ( 🏙️ ), nature ( 🌳 ), people ( 👨‍👩‍👧 )."

### Answer 2

"Title: 🌍♻️ Managing Waste  
🗑️ We produce waste every day.  
👉 This waste can be of two types:  
1️⃣ Organic waste 🍌🥕🍞  
➡️ Food scraps (peels, fruit, bread).  
➡️ Can be turned into 🌱 compost for plants.  
2️⃣ Recyclable Waste 🗑️📰🍻  
➡️ Paper, plastic bottles, tins, glass.  
➡️ Can be turned into new objects.  
🌟 Sorting your rubbish helps:  
✔️ Keep the city clean 🏙️  
✔️ Look after nature 🌳  
✔️ Improve people's lives 👨‍👩‍👧"

### Prompt 3

"Create a series of nine images in a children's educational style, using bright colours and simple lines, in Portuguese, on the theme of 'Waste Management'. Each panel should feature a short, clear sentence and an illustrative pictogram.  
Panel 1: 'We produce waste every day' (a boy throwing rubbish into a bin).  
Panel 2: 'Organic Waste' (banana peel, carrot, bread).  
Panel 3: 'It can become compost' (plant growing).  
Panel 4: 'Recyclable Waste' (bottle, paper, tin).  
Panel 5: 'Sorting rubbish helps' (city and trees) and "Keeping the city clean" (clean city) (green tree).  
Panel 6: 'Keeping the city clean' and 'Caring for nature' (three smiling children)."


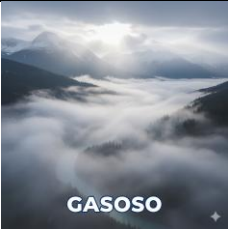



### Answer 3 (English version and original Portuguese version)

CARING FOR WASTE		CUIDANDO DO LIXO	
<p>🕒 Every day we make waste.</p> 	<p>1. ORGANIC WASTE</p>  <p>Food scraps, fruits, vegetables, leaves, etc. COMPOST</p>	<p>🕒 Todos os dias fazemos lixo.</p> 	<p>1. LIXO ORGÂNICO</p>  <p>Restos de comida (cassas, frutas) pão.</p>
<p>2. Use fertilizer for plants.</p> 	<p>2. RECYCLABLE WASTE</p>  <p>Paper, plastic, cans, glass.</p>	<p>2. Pode virar adubo para plantas</p> 	<p>2. LIXO RECICLÁVEL</p>  <p>Papéis, garrafas plásticas, latas, vidros.</p>
<p>🌟 Separating waste helps:</p>  <p>✔️ Keep the city clean.</p>	<p>✔️ Keep the city clean. ✔️ Take care of nature.</p> 	<p>🌟 Separar o lixo ajuda:</p>  <p>✔️ Deixar a cidade limpa</p>	<p>✔️ Deixar a cidade limpa ✔️ Cuidar da natureza</p> 

Images created and translated in ChatGPT

For the science module (Table 3), the aim was to understand and distinguish the physical and chemical states of water; in this activity, the goal was to use real images for matching exercises and music with a rhythm of the student's choice.

**Table 3.** Sequence of prompts and outputs for designing an adapted Science activity.

Prompt 1 for image pairing (Gemini)			
<p>"Create six high-quality, photorealistic images, maintaining a consistent visual style. Each image must depict one of the three states of water (solid, liquid, gaseous), with two examples for each state: one from everyday life and one from nature. The word corresponding to the state of water ('SOLID', 'LIQUID', 'GAS') must be displayed in all images using the same font style.</p> <p><b>For the Solid state:</b> An ice cube and a frozen winter mountain landscape</p> <p><b>For the Liquid state:</b> A river in the rain with visible raindrops in the water and in the air, and a clear glass filled with water with condensation droplets on the outside, without ice</p> <p><b>For the Gaseous state:</b> A kettle on the hob, emitting a large amount of dense steam, and a mountainous valley covered in thick fog or low-lying clouds.</p>			
Answer 1			
 <p><b>SÓLIDO</b> SOLID</p>	 <p><b>GASOSO</b> GASEOUS</p>	 <p><b>LÍQUIDO</b> LIQUID</p>	 <p><b>LÍQUIDO</b> LIQUID</p>
 <p><b>GASOSO</b> GASEOUS</p>			
Prompt 2 for children's pop music (Suno)			
<p>Children's pop song (1–1.5 mins) about the water cycle and the states of water. The lyrics explain that water is everywhere and changes form! Liquid, solid, gas. Links: evaporation, condensation, precipitation. Chorus: continuous transformation. Young, clear, enthusiastic voice; children's choir. Aim: to memorise and understand the water cycle. In Brazilian Portuguese.</p>			
Answer 2 - Song lyrics: The Water Cycle			
<p>[Verso 1] Água no copo Água no rio Cai do céu Faz um desafio Chove na terra Escorre no chão O ciclo começa Presta atenção</p> <p>[Pré-refrão] Evapora no calor do sol Sobe ao céu Vira um lençol</p> <p>[Refrão] Transformação contínua Sem parar Água é mágica Sempre a mudar De líquido a vapor Vai condensar Volta em chuva Pra recomeçar</p>	<p>[Verse 1] Water in a glass Water in a river Falls from the sky It's a challenge It rains on the earth Runs down the ground The cycle begins Pay attention</p> <p>[Pre-chorus] Evaporates in sun's heat Rises to the sky Turns into a blanket</p> <p>[Chorus] Constant transformation Non-stop Water is magic Always changing From liquid to vapour It condenses Returns as rain To start all over again</p>	<p>[Verso 2] Lá nas montanhas O gelo a brilhar Neve que cai Sólido a formar Vapor da chaleira Nuvem no ar Neblina na manhã Vem nos abraçar</p> <p>[Pré-refrão] Condensa lá no alto Vira gota a cair Precipita de novo Pra vida surgir</p> <p>[Refrão] Transformação contínua Sem parar Água é mágica Sempre a mudar De líquido a vapor Vai condensar Volta em chuva Pra recomeçar</p>	<p>[Verse 2] Up in the mountains The ice glistens Snow falls Solid forms Steam from the kettle Clouds in the air Morning mist Come and embrace us</p> <p>[Pre-chorus] It condenses up above Becomes a falling drop Falls once more For life to emerge</p> <p>[Chorus] Constant transformation Non-stop Water is magic Always changing From liquid to vapour It condenses Returns as rain To begin anew</p>

### 3. Discussion

The use of prompts based on systematic observations of the student enables the creation of activities that are more accessible and tailored to the adolescent's specific needs, thereby encouraging the adolescent's participation and learning. This process aligns with the view that working with students with intellectual disabilities requires individualised, collaborative planning that is grounded in the student's reality and built around clear goals. The detailed description of skills, potential, and learning barriers in the prompts transformed pedagogical observation into direct input for the personalisation of teaching, a function that, according to Arruda (2024), constitutes one of the most promising contributions of Generative AI to teaching practice [1].

In this regard, it was possible to observe that AI tools complement one another, as exemplified by the creation of comic strips, where prompts needed to be adjusted several times to ensure they were age-appropriate for the student to avoid infantilising the proposed activities. The iterative process of refining commands to avoid infantilising the activities corresponds to what Röhe and Santaella (2023) characterise as an inherent condition of GenAI use, particularly in image generation tasks, which require progressive refinement and multiple attempts at adjustment [13]. Such vigilance is pedagogically fundamental: Camargo (2022) warns that treating adolescents with intellectual disabilities as children, by proposing activities outside their age-appropriate context, leads to demotivation and compromises the full development of their potential [8].

Activities such as comics, word searches, crosswords, and quizzes, recommended by AI tools as teaching strategies, have proven particularly engaging and effective for students with reading difficulties, aiding their comprehension of the content. The effectiveness observed with the use of comic strips, word searches, crosswords and quizzes is consistent with the studies by Lima, Sena and Serra (2024); Magnago and Nunes (2024), which demonstrate that playful resources and gamification elements contribute to the cognitive, social and linguistic development of students with intellectual disabilities, enhancing intrinsic motivation and promoting personalised learning [10], [11].

The diversification of teaching strategies promotes student engagement and their participation in the proposed activities. The activities planned based on the content that mainstream classroom teachers are working on – and thus tailored to the class's real-world context, where all students can participate – align with the most current principles of inclusive education. The diversification of teaching strategies aligns, for example, with the principles of Universal Design for Learning (UDL) – a curricular approach that advocates multiple forms of presentation, expression and engagement [9]. From this perspective, the use of GenAI to generate variations of the same content (pictograms, audio, images, video and simplified text) serves as an operational resource for implementing UDL in teaching practice.

## Final Remarks

Artificial Intelligence tools can be used as allies in inclusive education, enabling teachers to analyse pedagogical data, identify learning patterns, suggest curricular adaptations, recommend personalised strategies for each student, and draw up Individualised Education Plans, thereby enhancing active participation and meaningful learning. The creation of personas with AI supports undergraduate students in their initial training when discussing inclusive strategies to cater to students with intellectual disabilities (ID) and/or autism spectrum disorder (ASD), as well as classes with diverse profiles.

Furthermore, the use of AI in pedagogical planning has demonstrated potential to optimise time spent developing materials and activities, allowing teachers to prioritise more meaningful and contextualised practices for students, particularly those in special education. The activities produced with the support of digital tools proved to be more accessible, visually appealing and aligned with students' interests, fostering greater engagement, participation and autonomy.

Thus, integrating Artificial Intelligence and pedagogical planning can improve the quality of education for students with ID and ASD, reducing educational inequality through personalised learning, with teachers better equipped to work with technology and inclusion. However, it should be emphasised that it is necessary to respect the ethical principles governing the use of AI in the creation of accessible teaching materials, considering students' real needs and avoiding the production of childish materials, especially for adolescents and young people in special education.

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