



Towards Empowering Teachers with AI for Dynamic Evaluation and Assessment for Students with Special Needs

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Abstract

Supporting students with special needs requires adaptive, personalized, and continuously updated educational strategies. Traditional static approaches often fail to capture the complexity and evolution of students' learning trajectories. In this paper, we propose a dynamic-context AI-based digital platform designed to empower teachers by monitoring student progress, suggesting tailored strategies, and adapting learning materials based on real-time observations and assessments. The system also assists in the compilation and iterative refinement of the IEP (Individualised Educational Plan), offering continuous feedback through a digital co-teacher (chatbot). By providing the AI with an evolving context, the platform aims to enable more accurate and responsive educational support. A theoretical use case illustrates how the system can help teachers adjust objectives and expectations when students encounter unforeseen difficulties, fostering more inclusive and effective learning experiences.

CCS Concepts

• **Computing methodologies** → **Artificial intelligence**; • **Human-centered computing** → **Accessibility systems and tools**.

Keywords

Education, Accessibility, Generative AI, STEM, Special needs

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1 Introduction

Recent advances in artificial intelligence (AI) have focused on the potential of generative AI in many fields, including education. A survey of 353 educators from various educational levels and countries explores their experiences with generative AI in the classroom [4]. The results show that an overwhelming majority (92%) of the respondents were familiar with AI tools, with many actively integrating generative AI into their teaching practices. Students with special needs can greatly benefit from accessible learning, with materials and applications adapted to their needs, abilities, and preferences. Artificial intelligence applied to adaptive learning can be a powerful agent of inclusion for students with special needs [7, 17], as long as the relevant emerging ethical and practical challenges are addressed [9, 11] and investments are made in the creation of educational ecosystems capable of valorising every student regardless of ability. According to Holmes [9], there are more than 20 different AI-enabled technologies in education, which are classified, despite overlaps, into three distinct categories: student-focused AIED, teacher-focused AIED, and institution-focused AIED. Nonetheless, although the integration of these technologies into education is increasing, limited research assesses their efficacy. In fact, research focusses mainly on the efficacy of AI-based tools that relate to a particular objective defined within a specific contextual framework, rather than on the effectiveness of these tools in broader classroom settings, their safety with respect to student mental health and privacy, or their influence on the educational ecosystem and the teacher-student relationship [4]. Teachers are designers who, beginning with an analysis of class needs, define objectives, content and methodologies in a coherent and intentional manner, considering the social, emotional, and cognitive dimensions of students [14]. In today's digital world, they have

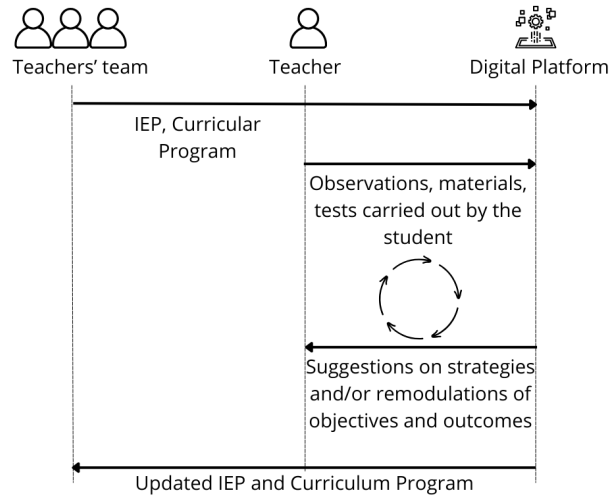


Figure 1: The sequential interaction between the teachers' team and the digital platform

become increasingly important in guiding the use of educational technologies and AI, protecting learning ethics, and preventing inequalities [1]. This paper proposes a targeted, student-centred approach that works under the supervision of teachers, without replacing their invaluable role as educational designers. Specifically, we explore how AI can be harnessed to support dynamic, personalised teaching practices that respond in real time to the evolving needs of students with special needs. The following section presents a system specifically designed to make these principles operational, integrating AI into the day-to-day work of educators to enhance inclusivity and educational responsiveness.

2 AI-based Digital Platform

We propose an AI-based digital platform for dynamic evaluation, assessment, and support for students with special educational needs (SEN), designed to help teachers provide personalised and responsive didactic support. Our approach introduces a continuously evolving context that is updated with real-time inputs such as student profiles, observational notes, and assessment results. This dynamic context enables the digital platform to adjust educational strategies and materials on-the-fly, providing recommendations that are better aligned with the student's current needs and progress. The platform thus ensures more reliable, consistent, and context-aware support for both teachers and students. Through an integrated chatbot interface, the digital platform also facilitates real-time interaction, enabling teachers to document new observations, receive instant feedback, and iteratively refine their pedagogical approach. The digital platform functions as a dynamic co-teacher, capable of supporting the entire life cycle of the Individualised Educational Plan (IEP), while providing the teacher with suggestions and/or adjustments to goals and expected outcomes. IEP is a technical document and an act of educational responsibility and protection of rights, as stated in the principles established by the Convention on the Rights of the Child [12] and the United Nations Convention on the Rights of Persons with Disabilities [13], with the

goal of creating personalised paths that remove barriers, improve abilities, and promote scholastic and social inclusion [2, 6].

Figure 1 shows the sequential interaction between the teacher(s) and the digital platform. At the beginning of the school year, the teachers' team enters the digital platform the IEP for each SEN student and the curricular programme. Thanks to the complete and consistent upload activity of the teaching team throughout the school year, the platform collects and analyses data on students' abilities, difficulties, learning styles, and behaviours (e.g., through diagnostic tests, observational notes, and academic history). By matching student profiles, the digital platform can recommend teaching methodologies, compensatory tools, and dispensatory measures that are appropriate for similar student profiles [5]. At the end of the school year, the digital platform provides the teacher with the updated IEP and the curriculum programme, based on the observations and strategies developed.

The digital platform takes a generic Large Language Model (LLM), such as OpenAI GPT-4, and specialises in the educational field thanks to a Retrieval Augmented Generation (RAG) procedure based on educational materials, curricula, validated pedagogical strategies, teaching methodologies, compensatory tools, and dispensatory measures that are appropriate for SEN students. Thanks to the RAG, the digital platform can mitigate the phenomenon of hallucination, where the outputs could be inaccurate due to the reliance on outdated or static knowledge bases [10]. Furthermore, using its built-in knowledge of best practices and formal requirements for individualised education planning, enriched with International Classification of Functioning, Disability and Health (ICF) guidelines, the digital platform can automatically verify the IEP's completeness, internal consistency, and alignment with pedagogical and administrative standards, highlighting potential omissions or discrepancies.

Figure 2 shows the architecture of the digital platform. Beginning on the left, educational materials are initially provided as input to the RAG system to create a domain-specific knowledge base. Throughout the school year, the teaching team continuously

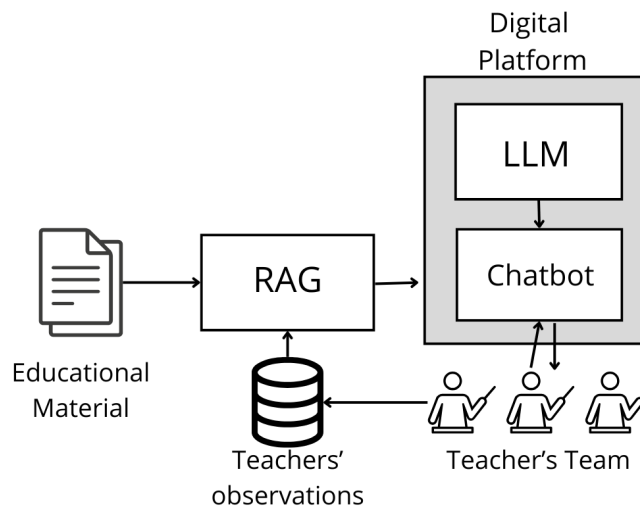


Figure 2: The architecture of the digital platform

generates new documents that are uploaded to the RAG system through the integrated chatbot interface. This process ensures that the RAG system remains up-to-date with the latest student information. The teaching team accesses the digital platform through the chatbot interface, which serves as a gateway to both the LLM and the RAG systems. We plan to implement the digital platform as a web-based solution to ensure interoperability among the different devices.

3 Use case

In this section, we describe a potential real-time adaptation of exercise tasks through the digital platform we have presented in the previous section. Alex is a fourth-grade teacher. In his classroom, Alice, a student with low vision, actively participates in learning activities supported by personalised educational strategies documented in her IEP. Alice has a normal-typical neurocognitive development, so she regularly attends lessons in class with the other students. She uses a magnifying glass as a tool, and when she is very tired, she uses a screen reader with a speech synthesizer on a laptop with headphones that she always has available on her desk.

For a classroom exercise in computer science, the teacher gives the class an exercise on a paper that leverages a visual strategy: a flowchart representing a complex algorithm in a simple way. The students are tasked with interpreting the flow chart and verbally describing the steps of the algorithm. The graphical format is intended to facilitate comprehension through an intuitive visual representation. The teacher has already prepared a digital version of the exercise for Alice, who can decide which exercise format to use (on paper or digital). Under normal and calm conditions, Alice would be able to interpret the flow chart correctly on the paper using the magnifying glass. However, unexpectedly, Alice shows difficulty in solving the exercise as proposed; this creates a state of anxiety and frustration that makes it impossible for her to carry out the exercise in the proposed structure. Recognising the situation, to not exacerbate Alice's emotional state, Alex engages with the digital platform through the platform's real-time chat interface. He

describes Alice's emotional distress and her specific difficulties in accessing and processing visual information. The digital platform, already equipped with detailed knowledge of Alice's IEP and functional profile (structured following the ICF guidelines), analyses the content of the evaluation and generates personalised adaptation suggestions. The platform recommends modifying both the exercise presentation and the response modality:

(1) Assessment presentation - instead of relying solely on the static visual representation of the flowchart, the platform suggests providing an interactive, audio-described version of the diagram. Through a screen reader-friendly structure and progressive audio prompts, Alice can explore the flowchart step by step, accessing the same logical flow conveyed by the visual diagram in a modality suited to her functional vision.

(2) Response modality - rather than requiring a verbal description of the algorithm, Alice is guided through a structured sequence of comprehension checks—such as multiple-choice questions, audio-based step ordering, or targeted scaffolded prompts—that enable her to demonstrate her understanding of the logic and structure of the algorithm without relying exclusively on visual decoding or oral production. These adaptations ensure that the exercise remains aligned with the intended disciplinary goals, while offering Alice an accessible and cognitively sustainable way to demonstrate her understanding. In summary, thanks to the immediate support provided by the digital platform, Alex is able to modify the way exercise is administered in real time, ensuring an inclusive educational experience tailored to the diverse needs of his students.

4 Discussion, Ethical Concerns, Conclusions and Future Work

The described digital platform could potentially benefit educators in different ways. First, it could accelerate SEN analysis and automate ongoing progress tracking by generating personalised real-time didactic materials, constantly updating IEP, and suggesting new strategies when objectives need to be reviewed or adapted. Using

its built-in knowledge of best practices and formal requirements for individualized educational planning, the digital platform can provide suggestions and corrections about the content of the IEP. Second, through its real-time chat interface, the platform could offer immediate support to teachers during challenging moments in the classroom, consistent with classroom activities, whether it is adapting on-the-fly to an unexpected student response, addressing behavioural difficulties, or reconfiguring an activity that is not producing the intended learning outcomes. This instant feedback loop helps educators remain responsive and confident, reinforcing their decision-making without replacing their professional judgment. Third, the digital platform could support teachers in improving their didactic materials to better align with the overarching educational goals set out in national curriculum guidelines. The platform could serve as a tool to improve instructional design and ensure that teaching practices remain consistent with systemic educational objectives. Finally, the system could be extended to assist teachers in the evaluation process by providing data-driven insights and formative assessment tools, helping them to track student progress more effectively and make informed decisions about learning outcomes and support strategies.

The creation of AI-driven content may have ethical implications that must be considered to maintain an inclusive environment, with a focus on the design and implementation of lessons structured to meet students' diverse styles and learning preferences.

The integration of AI in educational contexts presents significant risks [8], including the potential widening of the digital divide for students with limited access to technology and the compromise of privacy related to the management of personal data [3]. Other key concerns include bias and fairness; AI systems are trained on large datasets that may contain inherent biases, potentially leading to the reinforcement of stereotypes [15, 16].

The proposed digital platform should be appropriately trained to avoid this risk. A careful design with specific prompt engineering techniques and contextual training can limit these phenomena.

Privacy concerns also arise when AI systems are exposed to data that contain personal information. Protecting the privacy of individuals whose data are used in AI training is essential. A key measure involves anonymising all student documents, such as tests, evaluations, and feedback records. To address this issue, general data protection regulations should be strictly followed, ensuring compliance with ethical and legal standards.

So far, we have only designed the platform and conducted some preliminary tests with ChatGPT to assess its theoretical feasibility. To evaluate the proposed digital platform, we plan a two-step roadmap. First, we will conduct a small pilot using simulated classroom data to test the basic functions of the system and teacher interaction. Next, we will deploy the platform in one real school, observing its use in daily teaching and collecting feedback from teachers.

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