Universal Design 2026: Advancing an Inclusive and Sustainable World for Everyone
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Mapping teachers' uses of generative AI: a regional descriptive survey for designing inclusive professional development [1]

Daniele Bullegas[a,2], Silvio Marcello Pagliara[a], Gianmarco Bonavolontà[a], Antioco Luigi Zurru[a], and Antonello Mura[a]
[a]*University of Cagliari*
ORCiD ID: Daniele Bullegas, https://orcid.org/0000-0002-5796-4869,
Silvio Marcello Pagliara, https://orcid.org/0000-0002-0175-5160,
Gianmarco Bonavolontà, https://orcid.org/0000-0001-7818-8865,
Antioco Luigi Zurru https://orcid.org/0000-0001-7783-0393,
Antonello Mura https://orcid.org/0000-0003-3470-1916

Abstract. Generative artificial intelligence (GenAI) is increasingly entering teachers' professional practices, requiring pedagogical interpretation, critical evaluation, and inclusive instructional design. This paper presents the initial survey phase of the PEPPE-AI project, conceived as a needs-analysis step for designing situated professional development and school-based experimentation within the framework of UD principles. An online regional survey was administered to 978 teachers working across school levels in Sardinia. The 30-item questionnaire examined six dimensions of GenAI use: teacher management, creation of teaching materials, student assessment, student empowerment, attention to diversity, and student motivation. Descriptive findings show that teachers mainly use GenAI to prepare, adapt, and enrich teaching materials, while assessment, inclusive evaluation, and systematic student-centred uses remain less consolidated. The observed patterns suggest training priorities related to output reliability, curriculum alignment, inclusive adaptation, ethical classroom use, and students' critical AI literacy. The study provides an empirical basis for designing targeted, inclusion-oriented professional development actions within the PEPPE-AI pathway.

Keywords. Generative AI, teacher professional development, inclusive education, instructional design, needs analysis.

1. Generative AI, Inclusion and Teacher Professional Development

Generative artificial intelligence (GenAI) is rapidly entering educational settings, reshaping how teachers access information, design instructional materials, differentiate activities, support participation, and organize professional work [1–4]. From a didactic

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[2] Corresponding Author: Daniele Bullegas, Department of Languages, Literature and Cultural Heritage, University of Cagliari, Via Is Mirrionis 1, 09123 Cagliari, Italy. E-mail: daniele.bullegas@unica.it

perspective, its educational value depends on teachers' capacity to interpret, verify, and transform AI-generated outputs into meaningful learning opportunities. Recent research and policy reports emphasize that GenAI integration requires pedagogical purpose, professional judgment, ethical responsibility, and adequate institutional conditions [2,3,5–7]. This issue is particularly relevant for inclusive education, where AI use should be examined in relation to accessibility, differentiation, participation, and the removal of barriers to learning, including for students with disabilities and specific educational support needs [8–14]. Generative tools can support teachers in adapting materials, varying reading levels, generating alternative explanations, creating scaffolds, supporting multilingual access, and offering multiple formats for student expression, in ways that are potentially consistent with Universal Design for Learning (UDL) [10,11,13,15]. At the same time, inclusion requires teacher mediation: AI-generated outputs may be inaccurate or biased, standardize responses, simplify learning objectives, or produce superficial adaptations that fail to address learner variability. These risks require critical review of generated content, attention to privacy and responsible data use, and the preservation of teacher judgment when AI-supported materials and activities are aligned with students' needs and curricular aims [2,7,11,12,16].

Teacher professional development therefore requires a multidimensional approach to AI use, combining operational competence, pedagogical design, ethical responsibility, and inclusive adaptation. It should support teachers in formulating meaningful prompts, evaluating the reliability and relevance of outputs, revising generated materials, aligning them with curriculum goals, and adapting them to student variability, inclusive and ethical requirements, and classroom participation. In this sense, GenAI also calls for reflective professional practice, requiring teachers to reconsider how learning opportunities are designed, mediated, and evaluated. This perspective is consistent with a dialogical interpretation of Universal Design, connecting AI competence with a human-centred mindset, accessibility, learner participation, and ethical pedagogical responsibility [6,16].

Within this framework, the paper focuses on the initial survey phase of the PEPPE-AI project—Proficiency for Inclusive Education using Special Pedagogy for Professional Empowerment—developed within the University of Cagliari's research trajectory on inclusive education, teacher education, educational technologies, UDL, and artificial intelligence in education (AIED). The survey examines teacher-reported uses of GenAI across key areas of professional practice to identify patterns that can inform training priorities in pedagogy and inclusive education. As a needs-analysis tool, it provides an empirical basis for designing targeted professional development and school-based experimentation aimed at expanding access, participation, and learning opportunities for diverse learners, including students with disabilities and specific educational support needs.

2. Method: A Regional Descriptive Survey

Taking a regional research perspective, the study maps teacher-reported uses of generative AI across key areas of professional practice and identifies emerging training priorities for its responsible integration into teaching. More specifically, it addresses three research questions: RQ1. How do teachers report using GenAI across different areas of professional practice? RQ2. Which areas of GenAI use appear more consolidated

and which remain weaker? RQ3. What training priorities can be inferred from teacher-reported uses of GenAI, particularly in relation to inclusive instructional design?

The questionnaire was administered online through LimeSurvey between January and April 2026 to in-service teachers working in Sardinian schools. Participation was voluntary and anonymous, and respondents were informed about the study aims, research use of data, and their right to discontinue completion. The survey adopted a non-probability convenience sampling strategy, with participants recruited through school networks, institutional mailing lists, and regional teacher communities. The analytic sample included 978 teachers who provided completed and valid responses to the AI-use questionnaire. Given the voluntary recruitment procedure, the sample is non-probabilistic and should be interpreted as a situated regional mapping rather than as statistically representative of all teachers.

The survey was based on the instrument developed and validated by Pérez-Montesdeoca et al. [17]. The questionnaire explored six dimensions of teachers' professional practice: teacher management with GenAI (TM), creation of teaching materials with GenAI (CTM), student assessment with GenAI (SA), student empowerment with GenAI (SE), attention to diversity with GenAI (AD), and student motivation with GenAI (SM). The analysis presented in this paper is descriptive and relies on frequencies, percentages, means, standard deviations, medians, and response distributions. Particular attention is given to items concerning personalization, adaptation of activities and assessment, participation, and responses to students' specific educational support needs. The present phase examines teachers' reported practices and does not directly assess students' experiences, participation, or learning outcomes. Accordingly, students, including those with disabilities and specific educational support needs, are considered intended beneficiaries of the subsequent professional development and classroom experimentation rather than participants in the present survey.

3. Descriptive Findings: Teachers' Uses of Generative AI

3.1. Sample Profile

Table 1 summarizes the main demographic and professional characteristics of the sample. Respondents were predominantly female and represented all school levels, with a stronger presence of upper secondary, primary, and lower secondary teachers. Of particular relevance to the inclusive focus of the study, 386 respondents (39.5%) were support teachers, alongside 592 curricular teachers (60.5%). This substantial presence of support teachers strengthens the relevance of the sample for examining reported GenAI practices related to differentiation, attention to diversity, and inclusive instructional design. Respondents also reported an average of 13.5 years of teaching experience (SD = 10.4), indicating a professionally experienced sample rather than one composed mainly of novice teachers.

Table 1. Demographic and professional characteristics of the analytic sample

Domain	Variable	n / value	%/dispersion
Gender	Female	798	81.6
	Male	162	16.6
	Prefer not to say	18	1.8
Age	Mean age	49.1	SD = 8.8
Highest qualification	Diploma	194	19.8

	Bachelor's degree	54	5.5
	Master's degree	433	44.3
	Postgraduate qualification	297	30.4
School level	Preschool	77	7.9
	Primary school	292	29.9
	Lower secondary school	260	26.6
	Upper secondary school	349	35.7
Professional role	Curricular teacher	592	60.5
	Support teacher	386	39.5
Teaching experience	Mean years of service	13.5	SD = 10.4

These characteristics provide the contextual basis for interpreting subsequent patterns of GenAI use.

3.2. Overall Patterns across the Six Dimensions

Dimension scores were computed as the mean of the five items in each dimension; Table 2 summarizes the resulting distributions.

Table 2. Dimension-level descriptive results for teachers' uses of GenAI[3]

Dimension	Mean	SD	Median	Low use %	Moderate use %	High use %
Teacher management (TM)	3.97	1.99	4.00	46.5	50.2	3.3
Creation of teaching materials (CTM)	4.71	2.33	5.00	31.9	58.4	9.7
Student assessment (SA)	2.99	1.99	2.40	67.6	30.1	2.4
Student empowerment (SE)	3.87	2.36	3.80	50.4	43.4	6.2
Attention to diversity (AD)	4.13	2.35	4.20	45.3	47.3	7.4
Student motivation (SM)	4.05	2.38	4.20	44.2	49.4	6.4

Overall, the results indicate an uneven, generally low-to-moderate integration of GenAI into teachers' professional practices. Use is strongest in the creation of teaching materials, while attention to diversity and student motivation follow with lower mean scores. Teacher management and student empowerment have mean scores close to the boundary between the low- and moderate-use descriptive ranges. Student assessment is the weakest area, with 67.6% of respondents falling within the low-use category.

3.2.1. Professional Uses: Management and Teaching Materials

The strongest area of GenAI use concerns the creation of teaching materials (M = 4.71, SD = 2.33), while teacher management has a lower mean score (M = 3.97, SD = 1.99). This suggests that teachers use GenAI more frequently for instructional production than for administrative or organizational tasks.

Table 3. Selected item-level results for professional uses of GenAI

Dimension	Item focus	Mean
Creation of teaching materials	Personalized teaching materials	4.88
	Innovative and engaging content	4.81

[3] For descriptive purposes, scores below 4.00 were interpreted as low use, scores from 4.00 to 7.99 as moderate use, and scores from 8.00 to 10.00 as high use. These thresholds were adopted as interpretive categories for descriptive analysis and should not be understood as externally validated cut-off points.

Dimension	Item focus	Mean
	Materials supporting understanding	4.78
	Examples and practical cases	4.75
Teacher management	Drafting teaching programs from teachers' ideas	4.75

The item-level results show that GenAI is mainly used to create, adapt, and enrich instructional resources. Teachers appear to value it especially for producing personalized materials, generating engaging content, and developing examples or practical cases for classroom use. By contrast, its use for broader management functions remains less consolidated.

3.2.2. Assessment as a Weak Area of Use

Student assessment is the least developed dimension of GenAI use in the survey (M = 2.99, SD = 1.99). Compared with material creation and inclusive adaptation, teachers report more limited use of GenAI for designing assessment tools, personalizing evaluation, correcting tests, and generating feedback.

Table 4. Selected item-level results for assessment-related uses of GenAI

Dimension	Item focus	Mean
	Designing different assessment tools	3.43
	Creating personalized assessments	3.14
Student assessment	Improving assessment tools	3.16
	Reviewing and correcting tests	2.65
	Generating immediate feedback	2.57

The lowest scores concern test correction and immediate feedback, and all assessment-related items remain comparatively low. Given the sensitivity of assessment to reliability, fairness, transparency, and professional accountability, this pattern suggests a potential professional-development priority: supporting AI-assisted assessment while preserving teacher judgment, verification, and responsibility for final evaluative decisions.

3.2.3. Inclusion, Diversity, and Student-Centred Uses

The dimensions related to inclusion and student-centred uses show uneven low-to-moderate levels of GenAI integration. Attention to diversity presents a mean score of 4.13 (SD = 2.35), followed by student motivation (M = 4.05, SD = 2.38) and student empowerment (M = 3.87, SD = 2.36). These values indicate that these uses are present in teachers' practice but remain only partially consolidated.

Table 5. Selected item-level results for inclusion and student-centred uses of GenAI

Dimension	Item focus	Mean
	Adapting activities to students' needs	4.53
Attention to diversity	Personalizing content for students with specific educational support needs	4.49
	Designing assessments for students with specific educational support needs	3.24
Student empowerment	Training students to critically evaluate AI-generated information	4.90
	Teaching students to use GenAI ethically	4.06

Dimension	Item focus	Mean
	Helping students use GenAI to manage study time	3.15

The highest scores in this area concern the adaptation of activities, the personalization of content, and the critical evaluation of AI-generated information. The contrast within the attention-to-diversity dimension is particularly relevant: personalizing content for students with specific educational support needs (M = 4.49) is reported more frequently than designing assessments for the same group (M = 3.24). This pattern makes the inclusive dimension visible in the data while showing that adaptation is more consolidated than inclusive assessment.

Student-centred uses remain uneven, particularly for inclusive assessment and study-time management. These results suggest a potential training priority around structured inclusive design, accessible assessment, ethical student use, and critical AI literacy.

4. From Survey Results to the PEPPE-AI Training Pathway

The descriptive analysis allows training priorities to be inferred. Material creation and adaptation are the most consolidated uses, making them plausible entry points for professional development. Less consolidated areas call for stronger pedagogical mediation, particularly in evaluating and revising outputs for accuracy, bias, accessibility, inclusiveness, and curriculum alignment.

Special Pedagogy provides the theoretical constructs needed to integrate UDL from an educational perspective, thereby offering a useful interpretive lens for connecting these findings to inclusive instructional design [8–10]. The questionnaire was designed to map teachers' uses of GenAI across professional domains; UDL is used here as an interpretive framework for reading how these domains relate to access, participation, and differentiated expression. The correspondence presented in Table 6 is therefore conceptual rather than psychometric and serves to clarify how the survey findings can inform the PEPPE-AI training pathway.

Table 6. UDL alignment and PEPPE-AI training priorities.

UDL principle	Questionnaire dimensions	Interpretive function	PEPPE-AI training focus
Engagement	SM; SE	These dimensions show how GenAI can support interest, participation, student agency, and meaningful engagement in learning activities.	Designing meaningful AI-supported activities; promoting participation; supporting ethical and critical student use; defining shared classroom rules for responsible GenAI use.
Representation	CTM; AD	These dimensions show how GenAI can diversify access to content through adapted materials, alternative explanations, scaffolds, examples, and differentiated mediators.	Evaluating and revising AI-generated materials; adapting texts and resources; creating scaffolds and alternative explanations; aligning materials with curriculum goals and students' needs.
Action and expression	SA; AD; SE	These dimensions show how GenAI can support flexible ways for students to demonstrate learning, receive feedback, participate, and express	AI-aware assessment; rubric design; formative feedback; accessible assessment formats; verification procedures; teacher responsibility in final evaluative decisions.

UDL principle	Questionnaire dimensions	Interpretive function	PEPPE-AI training focus
		understanding through different forms of production.	
Transversal design condition	TM	This dimension shows how GenAI can support planning, documentation, and the coherent organization of objectives, barriers, supports, activities, and assessment options.	Using GenAI for inclusive lesson planning; documenting design choices; connecting objectives, barriers, supports, activities, and assessment criteria.

The conceptual alignment with UDL suggests three training directions. Representation builds on teachers' established use of GenAI for materials, extending it toward differentiated languages, scaffolds, and levels of complexity. Engagement connects attention to diversity and motivation with structured participation, particularly for students with specific educational support needs. Action and expression address the weaker assessment dimension through accessible ways of demonstrating learning and receiving feedback. Accordingly, PEPPE-AI combines operational training, UDL-based inclusive design, ethical-critical reflection on privacy, authorship, bias, reliability, and responsible student use [2,7,16], and supervised classroom experimentation. GenAI is thus treated as a didactic instrument whose value depends on teachers' capacity to contextualize, verify, and govern its outputs within inclusive practices [7].

5. Conclusion

This paper presented the initial survey phase of the PEPPE-AI project as a regional needs-analysis study of teachers' reported GenAI practices. The descriptive mapping shows an uneven pattern of use: material creation is comparatively more consolidated, whereas assessment and some student-centred applications remain less developed. These differences provide an empirical basis for inferring professional-development priorities focussed on pedagogical validation, inclusive design, ethical responsibility, and teacher oversight.

The study should be interpreted within its descriptive and situated scope. The voluntary, non-probability sample and self-reported data do not support statistical generalization to all Sardinian teachers, and the present phase does not capture students' perspectives or directly assess effects on access, participation, or learning outcomes. Students, including those with disabilities and specific educational support needs, remain the intended beneficiaries of the subsequent training and classroom experimentation rather than participants in this survey.

Subsequent phases should therefore examine how teachers' practices change during the PEPPE-AI pathway and how AI-supported designs operate in classrooms. Longitudinal data, classroom observations, analysis of instructional materials, and accessible forms of student feedback—including evidence from students with disabilities and specific educational support needs—would make it possible to investigate whether AI-supported design actually improves access, participation, and learning opportunities. This progression from regional mapping to supervised experimentation and student-level evidence will provide a stronger basis for assessing the responsible and inclusive educational value of GenAI.

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