DIGITAL AFFECTIVE LITERACY AND ALGORITHMIC MEDIATION IN THE RECONFIGURATION OF EDUCATIONAL RELATIONSHIPS IN HIGHER EDUCATION

Antonella Coppi[1]
Università telematica degli Studi IU
a.coppi@iuline.it

Sabrina Lucilla Barone
Telematic University Pegaso
sabrinalucilla.barone@unipegaso.it

Double Blind Peer Review

Citation
Coppi, A., & Barone, S. L. (2026). Digital affective literacy and algorithmic mediation in the reconfiguration of educational relationships in higher education. *Italian Journal of Health Education, Sports and Inclusive Didactics, 10*(3).

Doi: https://doi.org/10.32043/gsd.v1i3.1806

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gsdjournal.it
ISSN: 3103-5744

ABSTRACT
In higher education, generative AI introduces new forms of mediation within students' practices, reshaping the educational relationship between embodied presence and algorithmic interaction. This study examines how students' knowledge and use of AI, in relation to flipped learning and UDL, inform relational configurations in university settings. Using a mixed-methods design based on a transnational sample, it analyses perceived autonomy, inclusion, and ethical awareness from socio-relational and critical pedagogical perspectives. Findings reveal ambivalent configurations in which enhanced agency and perceived inclusion coexist with emotional outsourcing and dependency, redefining proximity, responsibility, and pedagogical roles. The study calls for affective-digital literacy in teacher education and proposes "algorithmic affective mediation" as an interpretive pedagogical lens grounded in students' AI practices.

KEYWORDS
Digital affective literacy; AI in education; educational relationships.

Received 30-06-2026
Accepted 17-09-2026
Published 30-10-2026

[1] Author contributions

This article is the result of the joint work of the two authors. However, the sections "Introduction" and "Conclusions, limitations and future prospects" may be attributed to Antonella Coppi, who provided the fundamental research orientation, the overall conceptual framing, and the final reflections of the study. The sections "State of the art and research questions", "Methodology", "Results", and "Discussion", may be attributed to Sabrina Lucilla Barone.

1. Introduction

In the private time of university study, generative artificial intelligence (generative AI) opens up a new form of dialogue with knowledge. The artificial response intervenes when the student seeks orientation, when understanding encounters an obstacle and when intellectual work requires a first form of clarification. The pedagogical question arises from this unprecedented presence, capable of inserting itself at the fragile point of learning and changing the way the subject asks for help, evaluates error, and measures their autonomy. In fact, the literature on Generative Artificial Intelligence in education invites us to read interactions with language models as conversational and social processes that shape meaning construction and the negotiation of understanding (Sharples, 2023).

Generative AI is not just about making access to information faster. It produces language, returns apparently personalised answers and takes on a dialogic form that can appear close, available, and almost accompanied. Precisely for this reason, its integration into university contexts requires pedagogical and ethical criteria that guide its use within a vision centred on the person, transparency, and educational responsibility (European Commission, 2022; UNESCO, 2023). Technological personalisation becomes educational only when it supports judgment, fosters critical capacity, and preserves the student's responsibility for their own cognitive path.

This passage shapes the problem addressed by the present study. The competence required of students concerns not only the correct use of digital tools or the recognition of limits, biases, and opacities. Interacting with generative AI also involves trust, perceived effectiveness, desire for confirmation, relationship with feedback, and the risk of delegation. The literature on Artificial Intelligence Literacy (AI literacy) is expanding its field towards ethical, social and affective dimensions, showing that the relationship with intelligent systems crosses the cognitive sphere and the emotional posture of the student in front of knowledge (Cuomo, Biagini, & Ranieri, 2022; Pretorius & Cahusac de Caux, 2024).

This contribution takes up this knot through the category of digital affective literacy, understood as a pedagogical competence oriented toward understanding what happens in the subject while interacting with an artificial response. This competence concerns how the student accepts the error, interprets the support received, exercises autonomy, and retains the direction of their own thought. The teaching function, therefore, becomes decisive: the

teacher mediates the student's algorithmic experience, giving educational measure to the automatic response and preserving the difference between immediate help and mature understanding. The tradition of educational care and professional reflexivity allows us to read this function as responsibility for the growth of the other and custody of judgment (Fabbri, Striano, & Melacarne, 2008; Mortari, 2015; Schön, 1983).

The research analyses these dynamics using a questionnaire administered to university students from different international contexts. Generative AI is investigated in relation to the practices of the flipped classroom and the principles of Universal Design for Learning (UDL), chosen because they make two central hubs of contemporary education observable: accompanied autonomy and designed accessibility. Flipped practices allow you to read the relationship between individual preparatory work and the need for support; UDL allows us to interpret inclusion as a didactic responsibility, linked to the flexibility of materials and meaningful participation (Abeysekera & Dawson, 2015; CAST, 2024; Rose & Meyer, 2002).

Finally, the study proposes Algorithmic Affective Mediation (MAA) as a pedagogical lens to understand how intelligent systems, entering into the practices of study, feedback, and orientation, modulate the student's relationship with knowledge, with error, with the teacher figure, and with their own learning vulnerability. MAA makes it possible to situate the presence of generative AI within a properly educational question: how to train students capable of inhabiting algorithmic mediation without ceding responsibility for judgment, speech, and one's own subjectivity to it.

2. State of the art and research questions

Pedagogical reflection on artificial intelligence in education has undergone a significant transformation with the spread of generative systems. Artificial Intelligence in Education (AIED) had already directed a significant part of the research towards personalisation, adaptive tutoring, timely feedback and monitoring of learning paths. With generative AI, however, the centre of gravity shifts. Technology enters the production of language, the construction of text, and the very perception of competence, accompanying the student through the passages in which comprehension takes shape. The pedagogical interest then focuses on the quality of the training experience that the tool helps to generate, as well as on its functional efficiency (Skinner, 1958; Luckin et al., 2016).

This passage requires an ethical and pedagogical framework that can guide innovation. The main international indications underscore the need to maintain the use of artificial intelligence within a vision centred on the person, rights, transparency, and educational responsibility (European Commission, 2022; UNESCO, 2023). Research on the ethics of AIED has shown that intelligent systems incorporate learning principles, value criteria, and decision-making approaches that affect the operations of educational institutions (Holmes & Porayska-Pomsta, 2022). In the Italian debate, algorithmic pedagogy makes it possible to read artificial intelligence as a cultural and educational phenomenon, capable of changing study practices, attention and the imagery of efficiency (Panciroli & Rivoltella, 2023). From here emerges a first decisive point: training in the use of artificial intelligence means educating judgment, even before training in the tool's technical mastery.

The literature on AI Literacy helps us untangle this knot. Cuomo, Biagini and Ranieri (2022) interpret this competence as a multidimensional construct in which technical knowledge, critical awareness and social responsibility are intertwined with the ability to understand automation within students' cultural and educational lives. Pretorius and Cahusac de Caux (2024) further expand the field, placing an affective domain of AI literacy alongside the foundational, conceptual, social and ethical domains. This expansion is central to the present study, because interaction with generative AI involves trust, a sense of effectiveness, fear of error, a desire for confirmation and a perception of one's autonomy. The competence required of the student, therefore, also concerns how he emotionally inhabits the artificial response.

The philosophy of emotions offers a useful foundation for understanding this dimension. Emotions participate in the perception of value and orient the way in which the subject interprets what he encounters. When the student experiences uncertainty, relief, or fear of making mistakes, he measures his relationship to knowledge and to the image of himself as a subject capable of understanding. Affectivity can be read, in this sense, as an evaluative form of experience and as access to meaning (de Sousa, 2004; Nussbaum, 2001). Generative AI enters this sensitive area, as it offers words in moments when the student is looking for order, support and confirmation.

However, algorithmic responsiveness must be distinguished from educational care. A generated response can appear useful, clear, and encouraging; pedagogical care entails memory of the path, attention to singularity, responsibility for the other's growth, and the ability to preserve the formative value of error (Mortari, 2015). The distinction proposed by Biesta between qualification, socialisation and subjectivation allows us to specify this difference

further. Artificial intelligence can support the acquisition of content and procedures, while university education retains responsibility for making the student the author of their own relationship with knowledge, with others, and with the common world (Biesta, 2020). The question, therefore, concerns not only access to the answer but also the formation of a subject capable of questioning, reworking, and assuming their own word.

From this need derives the importance of the teaching function. The university professor mediates the student's algorithmic experience, making thinkable what the machine makes available. His task concerns the quality of the question, the critical reading of the answer, the care of feedback and the transformation of error into a formative opportunity. Professional reflexivity allows us to understand this function as the ability to interpret complex situations and generate knowledge starting from experience (Fabbri, Striano, & Melacarne, 2008; Schön, 1983). Feedback is a particularly significant juncture, because the automatic response can support the study's progress, while formative feedback clarifies expectations, accompanies the review, and supports authorial responsibility (Boud & Molloy, 2013; Hattie & Timperley, 2007). Along these lines, frameworks such as the Artificial Intelligence Assessment Scale help to make explicit the levels of integration of AI into assessment practices, transforming assessment into a transparent training pact (Perkins et al., 2024).

Flipped practices and Universal Design for Learning (UDL) allow us to observe these transformations empirically. The flipped classroom distributes the instructional work between individual preparation and shared elaboration, making the relationship among autonomy, cognitive load, and teacher accompaniment more readily apparent (Abeysekera & Dawson, 2015; Baig & Yadegaridehkordi, 2023). UDL assumes student variability as an ordinary condition for learning and orients design towards the plurality of modes of involvement, representation, action and expression (CAST, 2024; Rose & Meyer, 2002). In the present study, such frames do not constitute separate backgrounds but rather two sites for observing algorithmic mediation. The flipped classroom makes visible who supports the student during individual preparatory time; UDL allows algorithmic personalisation to be interrogated as a potential accessibility resource when inscribed within a conscious didactic design.

A precise gap emerges from this reconnaissance. The literature has produced solid contributions on the ethics of educational AI, AI literacy, algorithmic pedagogy, care, teacher reflexivity, feedback, the flipped classroom and UDL. The point at which these lines meet in the ordinary life of university study

remains underexplored: generative AI becomes a linguistic presence capable of sustaining difficulty while exposing the student to forms of entrustment, delegation, or cognitive superficiality. The MAA is proposed to name this process, i.e. the way in which intelligent systems, entering into study and orientation practices, modulate the student's relationship with knowledge, with error, with the teacher and with their own learning vulnerability.

The MAA is divided into three analytical dimensions. Functional proximity refers to the experience of an immediate, accessible response. Distributed affective regulation concerns the use of the tool to sustain uncertainty, cognitive fatigue and the need for confirmation. Stratified subjectivity indicates the coexistence of personal elaboration and algorithmic mediation in the same learning process. This category does not attribute educational intentionality to the machine; rather, it allows us to observe how interaction with artificial intelligence affects the way the student navigates difficulty, exercises judgment, and guards their authorial responsibility.

From this gap derive the research questions.

The first investigates how university students perceive the role of generative AI in personalising learning, improving the quality of feedback, and building autonomy.

The second examines how flipped practices and UDL principles make accessibility, participation and the need for teacher accompaniment observable in technological mediation.

The third explores the extent to which interaction with artificial intelligence configures an MAA capable of supporting learning difficulties and exposing them to forms of delegation, dependence or cognitive superficiality.

3. Methodology

The study adopts a mixed-methods, exploratory design to understand how university students perceive the use of generative AI in learning processes and how this use relates to perceived autonomy, inclusion, ethical awareness, and the educational relationship. The blended approach integrates the descriptive reading of closed items with the interpretation of open-ended answers, enhancing both the quantitative distribution of perceptions and the lexicon through which students attribute meaning to their learning experience (Creswell & Plano Clark, 2018).

The digital questionnaire was administered voluntarily to 168 university students, with responses collected between October 10, 2025 and April 3, 2026. The sample is non-probabilistic and serves an exploratory purpose, aimed at identifying perceptual configurations, recurring meanings, and interpretative lines useful for understanding the relationship among generative AI, flipped practices, UDL, and educational mediation. The results are therefore not used for inferential, predictive, or causal purposes, but rather as a descriptive basis for analysing emerging orientations.

The sample includes 100 students enrolled in three-year courses (59.5%), 55 in master's courses (32.7%) and 13 in doctoral or postgraduate level (7.7%). Age is mainly concentrated in the 18-21 age group (88 respondents, 52.4%) and the 22-25 age group (48 respondents, 28.6%). The gender distribution includes 100 female respondents (59.5%), 67 male respondents (39.9%), and 1 respondent in the other/prefer not to specify category (0.6%). Geographically, after a response normalisation procedure, Ireland (72 responses, 42.9%) and Italy (67 responses, 39.9%) stand out, followed by Bulgaria and the United Kingdom (10 responses each, 6.0%). The United States and multiple countries each collect 3 answers (1.8%), while Romania, Spain, and France each have 1 answer (0.6%). The answers indicating multiple countries have been maintained as an autonomous category, so as not to force the national attribution of training courses characterised by mobility or dual affiliation.

The socio-demographic profile of respondents is summarised in Figure 1.

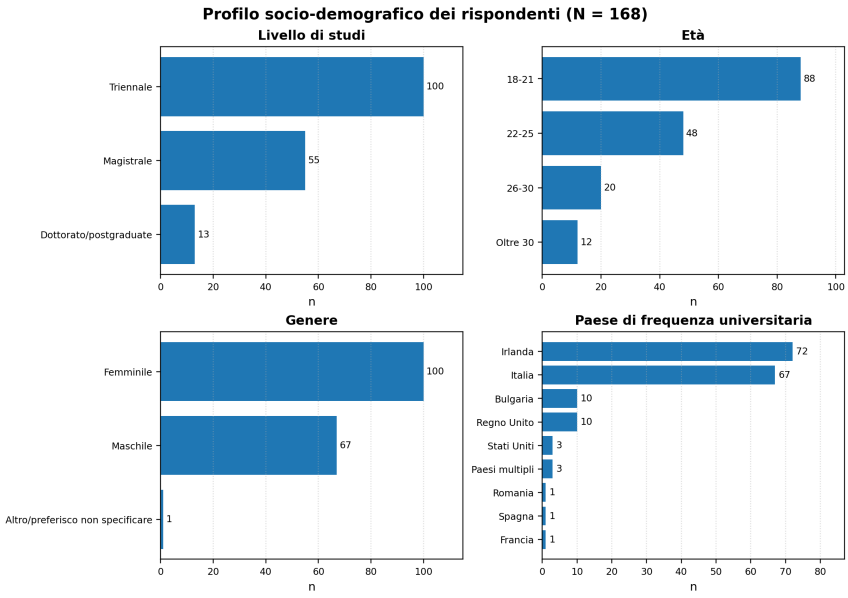


Figure 1: Socio-demographic profile of respondents

The tool included a personal-descriptive section, a categorical question about experience with flipped activities, 36 closed-ended items on a five-point Likert scale, and 6 open-ended questions. Table 1 summarises the structure of the questionnaire and the analysis procedures adopted.

Table 1: Instrument structure and analysis procedures

Tool Area	Questions	Survey Focus	Analysis procedures
Personal-descriptive section	Q1-Q6	Age, gender, country of university attendance, subject area, level of study	Frequencies and percentages
Experience with flipped activities	Q7	Stated familiarity with flipped teaching practices	Frequencies and percentages
Item Likert on flipped practices	Q8-Q15	Autonomy, preparatory work, participation, cognitive load and teacher support	Means, standard deviations, high agreement and disagreement
Item Likert on Inclusion and UDL	Q16-Q20, Q29-Q33	Accessibility, flexibility, inclusive design and familiarity with UDL	Means, standard deviations, high agreement and disagreement
Item Likert your generative AI	Q21-Q27, Q38-Q41	Knowledge, use, feedback, personalisation, ethical awareness, and critical skills	Means, standard deviations, high agreement and disagreement
Item Likert on AI integration, flipped classroom and UDL	Q35-Q37, Q42-Q44	Relationship between smart technologies, autonomy, inclusion and sustainable learning	Means, standard deviations, high agreement and disagreement
Open questions	Q28, Q34, Q45-Q48	Opportunità, rischi, esempi d'uso, criticità ed esperienze significative	Exploratory thematic analysis

The quantitative analysis was conducted using descriptive statistics, including frequencies, percentages, means, and standard deviations for Likert-scale items. Responses 4 and 5 were considered a high agreement area; answers 1 and 2, an area of disagreement; answer 3, an intermediate position. This choice made it possible to make the prevailing orientations readable without attributing an inferential significance to the data. The gap between ethical-critical awareness and perceived personal preparedness was treated as a

descriptive indicator of the digital affective literacy gap, comparing the aggregate mean of items Q25, Q26 and Q38 with item Q40. This indicator has exploratory value and does not constitute a validated scale.

The qualitative analysis of open-ended answers was conducted using an exploratory thematic procedure inspired by Braun & Clarke's (2006) thematic analysis. The answers were read in full and organised around semantic recurrences referable to study support, personalisation, accessibility, dependence, cognitive superficiality, ethics, teacher-student relationship and learning responsibility. Generative AI was used to support the initial aggregation of lexical and thematic recurrences; the interpretative categories were subsequently checked, reformulated, and situated by the authors within the theoretical pedagogical framework. In this way, the use of the tool did not replace the interpretative work, but supported a preliminary phase of ordering the textual material.

4. Results

The presentation of the results proceeds by thematic nuclei consistent with the survey tool: experience with flipped activities; inclusion and UDL; knowledge and use of AI; integration of AI, flipped classroom, and UDL; and open answers. Data are presented in descriptive form, in accordance with the exploratory nature of the study.

4.1 Flipped practices

Familiarity with flipped teaching activities is uneven. Of 168 respondents, 80 students report no experience with this model (47.6%), 60 report occasional experience (35.7%), 21 report frequent experience (12.5%), and 7 report systematic experience (4.2%). Almost half of the sample, therefore, approaches items on flipped practices without consolidated direct familiarity; this factor must be considered when interpreting perceptions of autonomy, workload, and teacher accompaniment.

The responses outline a favourable orientation towards the value of preparatory work and adaptation to individual rhythms. The highest values concern Q15, referring to the adaptation to the individual rhythm (M = 4.15; high agreement 76.8%), and Q8, relating to the value of preparatory work (M = 4.07; high agreement 76.8%). Collaborative participation and the development of transversal skills are also positive, while the items related to autonomous learning and cognitive involvement have more intermediate results. The lowest

figure concerns Q13, which relates to teacher support in managing the study load (M = 3.04; high agreement 34.5%; disagreement 31.0%).

Students, therefore, seem to recognise the formative potential of flipped practices, but indicate that the presence of an accompaniment capable of supporting individual preparatory work is more fragile (Table 2).

Table 2: Descriptive statistics – practical items flipped. M = average; SD = standard deviation. High Chord: 4-5 responses; Disagree: Answers 1-2.

Item	Analytical label	M	SD	High Chord %	Disagree %
Q15	Adaptation to individual rhythm	4,15	0,97	76,8	6,0
Q8	Value of preparatory work	4,07	0,94	76,8	7,7
Q9	Collaborative participation	3,87	1,17	66,7	15,5
Q14	Development of soft skills	3,82	1,05	63,7	10,1
Q12	Autonomous learning support	3,63	1,11	53,0	12,5
Q10	Perceived cognitive engagement	3,54	1,19	54,2	18,5
Q13	Teacher support in the study load	3,04	1,19	34,5	31,0

4.2 Inclusion, accessibility and UDL

The items related to inclusion, accessibility and UDL show a particularly favourable orientation towards the accessible design of materials and the flexibility of pathways. The highest value of the entire questionnaire concerns Q18, referring to the importance of accessible design (M = 4.45; 86.9% high agreement), followed by Q32, relating to flexibility of times and methods (M = 4.20; 80.4% high agreement), and Q16, which recognises digital technologies as a possible inclusive resource (M = 4.05; 74.4% high agreement). These data indicate that students perceive accessibility as a relevant condition of educational quality, even before it becomes a technical device.

Alongside this orientation, more uncertain signs emerge. The items relating to the accessibility of digital environments, the recognition of different needs and the inclusive value of flexible paths are in the middle of the list, while Q17 and Q31, both with M = 3.23, show a more contained perception of university strategies for the enhancement of diversity and the application of inclusive design principles. The lowest figure concerns Q29, relative to the declared familiarity with the concept of UDL (M = 1.96; high agreement 16.1%; disagree 70.2%).

The results highlight a relevant distinction between knowledge of UDL terminology and practical recognition of its principles. Students place a very high value on accessible design, but they perceive its translation into institutional strategies and systematic teaching practices more weakly. The gap between Q18, which concerns the importance of accessible design, and Q17, which addresses university strategies for enhancing diversity, is 47.6 percentage points in terms of high agreement. This distance signals a significant tension between inclusion as a recognised value and inclusion as an experience fully perceived in university life (Table 3).

Table 3: Descriptive statistics – item inclusion, accessibility and UDL. M = average; SD = standard deviation. High Chord: 4-5 responses; Disagree: 1-2 responses

Item	Analytical label	M	SD	High Chord %	Disagree %
Q18	Importance accessible design	4,45	0,84	86,9	3,0
Q32	Flexibility, times and methods	4,20	0,93	80,4	4,2
Q16	Digital technologies as an inclusive resource	4,05	0,98	74,4	7,1
Q20	Accessibility of digital environments	3,73	1,07	61,9	12,5
Q30	Recognition of different needs	3,58	1,04	54,8	11,9

Item	Analytical label	M	SD	High Chord %	Disagree %
Q33	Inclusive value flexible pathways	3,51	1,01	47,6	11,3
Q17	University Strategies for Diversity	3,23	1,13	39,3	28,6
Q31	Application of inclusive design principles	3,23	1,02	39,3	19,6
Q29	Familiarity with the concept of UDL	1,96	1,32	16,1	70,2

4.3 Knowledge and use of artificial intelligence

The section on artificial intelligence shows students' significant familiarity with generative tools and, at the same time, a strong demand for ethical and educational orientation. Q21, referring to the general knowledge of AI and its educational applications, has a high value (M = 4.11; high agreement 78.6%), while Q22, relating to the declared use of tools such as ChatGPT, Copilot or Gemini for the study and processing of content, records M = 4.02, with a high agreement of 73.8%, revealing that generative AI has already entered ordinary study practices, at least as a perceived and declared resource.

The highest values of the bloc, however, concern responsible training and critical awareness. Q26, relating to the need for training for responsible use of AI, reaches M = 4.37, with a high agreement of 84.5%; Q25, referring to awareness of ethical risks, presents M = 4.30, with a high agreement of 80.4%; Q38, relating to critical AI-related skills, ranks at M = 4.21, with a high agreement of 78.0%. Familiarity with the tools, therefore, is not accompanied by a naïve perception of technology: students show that they feel the need for criteria, guidance and responsibility.

A further relevant element concerns the relationship between personalisation and feedback. Q23, referring to the potential of AI for personalised learning, presents M = 4.06, with a high agreement of 75.6%; Q24, relating to the perceived quality of feedback generated by AI, instead records the lowest value of the block (M = 3.68; high agreement 59.5%). The gap between the two items suggests that students recognise the usefulness of AI as an operational and personalising support, but evaluate its ability to offer a fully formative return

with greater caution. This data marks a turning point in the discussion, as it allows us to question the distinction among automatic response, immediate clarification, and educational feedback (Table 4).

Table 4: Descriptive statistics – item artificial intelligence. M = average; SD = standard deviation. High Chord: 4-5 responses; Disagree: Answers 1-2. Q22 measures the reported use of AI tools for studying, not the daily or weekly frequency of use.

Item	Analytical label	M	SD	High Chord %	Disagree %
Q26	Need for responsible training	4,37	0,93	84,5	5,4
Q25	Awareness of ethical risks	4,30	0,96	80,4	6,0
Q38	Critical AI-related skills	4,21	1,00	78,0	5,4
Q21	General knowledge of AI in education	4,11	0,93	78,6	6,5
Q23	AI's potential for personalised learning	4,06	1,04	75,6	11,3
Q22	Stated use of AI tools for study	4,02	1,21	73,8	13,1
Q41	Metacognitive awareness in the use of AI	4,02	1,11	70,8	11,3
Q27	Need for guidance in the use of AI	3,83	1,19	64,9	12,5
Q24	Perceived quality of AI-generated feedback	3,68	1,20	59,5	16,1

4.4 Integration between AI, flipped practices and UDL

The items dedicated to the integration of AI, flipped practices, and UDL confirm an overall favourable orientation towards a university design that connects intelligent technologies, autonomy, and inclusion. The highest value concerns Q44, relating to inclusion as a founding component of university culture (M = 4.27; agreement high 81.5%; disagreement 1.8%), followed by Q42, referring to digital and metacognitive skills for sustainable learning (M = 4.15; agreement high 78.0%). Q43 and Q35, respectively dedicated to the relationship between flipped methodologies and student autonomy and to the enhancement of flipped practices through AI, also record positive values, both with M = 3.91.

Alongside this favourable stance, some areas warrant greater caution. Q40, relating to perceived personal preparation for the responsible use of AI, reaches M = 3.85, with a high agreement of 67.9%; Q36, Q37 and Q39 are between M = 3.76 and M = 3.79. In particular, Q39 reports that the risk of addiction in AI-supported learning is perceived by a non-marginal share of students (high agreement 60.7%). The overall picture, therefore, does not reflect naïve adherence to technological integration but rather a more ambivalent configuration in which trust in AI's potential and awareness of its risks coexist (Table 5).

Table 5: Descriptive statistics – AI integration items, flipped practices and UDL. M = average; SD = standard deviation. High Chord: 4-5 responses; Disagree: Answers 1-2.

Item	Analytical label	M	SD	High Chord %	Disagree %
Q44	Inclusion as a founding component of university culture	4,27	0,82	81,5	1,8
Q42	Digital and metacognitive competences for learning	4,15	0,87	78,0	3,6
Q43	Flipped methodologies and student autonomy	3,91	1,01	69,6	6,5
Q35	AI as an empowerment of flipped practices	3,91	1,06	69,0	9,5
Q40	Personal preparation for the responsible use of AI	3,85	1,00	67,9	11,3
Q36	AI's contribution to accessibility and inclusion	3,79	1,10	65,5	11,3
Q37	AI, UDL and route personalisation	3,76	1,05	60,7	8,9
Q39	Risk of addiction in AI-supported learning	3,76	1,17	60,7	11,9

The comparison between ethical-critical awareness and perceived personal preparation helps identify a descriptive gap in digital affective literacy. The aggregate average of Q25, Q26, and Q38, referring to awareness of ethical risks, the need for responsible training, and critical skills related to AI, is 4.29, with a high average agreement of 81.0%. Q40, relating to personal preparation for the

responsible use of AI, is instead at M = 3.85, with a high agreement of 67.9%. The difference is equal to 0.44 points on the Likert scale and 13.1 percentage points.

This gap is one of the most significant results. Students clearly recognise the importance of critical and responsible use of AI, but perceive their personal preparation as more restrained. The distance between awareness and preparation not only signals an information need but also indicates a training space in which digital affective literacy can become the subject of university planning (Table 6).

Table 6: Descriptive indicator of the digital affective literacy gap. The indicator is descriptive and exploratory. It does not constitute a validated scale.

Indicator	Item	M	Accordo alto %
Ethical-critical awareness	Q25, Q26, Q38	4,29	81,0
Personal preparation for responsible use	Q40	3,85	67,9
Gap	The difference between the two indicators	0,44	13,1

4.5 Open-ended answers

The open-ended answers complete the descriptive framework, allowing students to observe the vocabulary they use to name opportunities, risks, and training needs related to generative AI. Table 7 summarises the main thematic recurrences that emerged from the six open questions.

Table 7: Key thematic occurrences in open-ended answers. The table summarises exploratory thematic recurrences and does not report direct textual quotations.

Question	Answers	Analytical Focus	Main thematic anniversaries
Q28	165	AI and learning enhancement	Further explanations; synthesis; schemes; maps; examples; feedback; personalized paths; clarification of complex topics
Q34	151	Practices consistent with UDL	Concept maps; video; visual materials; speech synthesis; plurality of channels of representation; Material Adaptation

Q45	80	Opportunities for the integration of AI, flipped classroom and UDL	Customisation; immediate feedback; inclusion; support for self-study; flexibility of routes
Q46	81	Risks of integration	Over-reliance; loss of critical thinking; inequalities of access; privacy; cognitive overload; Lack of training
Q47	72	Meaningful experiences with technologies	Exam preparation, understanding of topics, construction of quizzes, support materials; Permanence of the need for teacher mediation
Q48	58	Final Remarks	31 answers equivalent to “no additional comments”; Residual observations on the integration of technologies, the value of traditional study and the importance of human mediation

Open-ended answers confirm an ambivalent configuration. Generative AI is described as a resource for clarifying content, organising study work, building supporting materials, and personalising pathways. At the same time, students cite risks related to overreliance, loss of critical thinking, access inequalities, privacy concerns, and cognitive overload. The qualitative data, therefore, do not reflect simple adherence to technology but yield a more articulated perception, in which operational utility and the need for pedagogical guidance coexist.

The recurrences related to the flipped classroom and UDL help clarify the interpretative framework that emerged from the data. Flipped practices bring the theme of accompanied autonomy to the forefront, since individual preparatory work requires reliable tools, orientation criteria and a recognisable educational presence. The UDL makes the gap between accessibility as a declared value and inclusion as an experience designed, supported and practised in university life legible. In this convergence lies the interpretative space of Algorithmic Affective Mediation: a form of mediation that can support learning difficulties and expand the possibilities of access to the task, provided that it is oriented by critical training, teacher care and authorial responsibility, maintaining algorithmic support at the service of the student’s judgment and subjectivity.

5. Discussion

The results that emerged from the questionnaire outline a pedagogically relevant configuration. Generative AI has now entered university study practices as a resource for clarification, organisation and personalisation. Alongside this operational familiarity, students report a high level of concern about the ethical, cognitive and relational risks associated with its use. Technology appears useful, sought after, integrated into learning routines, and, at the same time, placed within an explicit request for guidance, criteria, and formative responsibility. This configuration confirms what the most recent literature on AI literacy highlights: the competence required to inhabit educational environments crossed by AI includes knowledge of the tool, ability to use it, critical evaluation, ethical awareness and, in university contexts, a progressive maturation of the student's epistemic responsibility (Ng et al., 2021; Laupichler et al., 2022; Pretorius & Cahusac de Caux, 2024).

The most relevant data concerns the gap between ethical-critical awareness and perceived personal preparation for the responsible use of AI. The aggregate average for items related to awareness of ethical risks, the need for responsible training, and critical skills is 4.29, with a high agreement of 81.0%; the perceived personal preparation for responsible use is 3.85, with a high agreement of 67.9%. The difference of 0.44 points on the Likert scale and 13.1 percentage points indicates a precise educational space. Students recognise the educational stakes of technology and feel the need for more robust tools to engage with it safely and critically. This result aligns with reviews on AI literacy in higher education, which describe a field still in its consolidation phase and highlight the need for training courses, evaluation criteria, and tools that support non-specialist users in conscious interaction with intelligent systems (Laupichler et al., 2022). In this distance between awareness and actual competence, digital affective literacy takes on importance as a competence capable of sustaining relationships with error, feedback, autonomy, and the responsibility of judgment.

The first research question was about how students perceive the role of AI in personalising learning, quality feedback, and building autonomy. The data indicate a favourable evaluation of AI as a study aid. The item relating to the personalisation of learning averages 4.06, with a high agreement of 75.6%; the declared use of AI tools for the study averages 4.02, with a high agreement of 73.8%. AI is perceived as a resource that can make cognitive work more accessible, especially when a student needs to clarify content, organise

materials, build summaries, or generate examples. This evidence is part of the opportunities recognised for large language models in educational contexts, including personalisation, writing support, material generation, adaptive explanations and support for self-study, provided that these possibilities are governed by critical skills and explicit pedagogical design (Kasneci et al., 2023).
The data on feedback introduces a decisive clarification. The perceived quality of the AI-generated feedback is the lowest in the block, with an average rating of 3.68 and a high agreement of 59.5%. The distance between personalisation and feedback makes it possible to distinguish operational help from the return on training. The first intervenes quickly to address an obstacle, provides continuity to the work, and makes the study's progress smoother. The second enters the task's history, clarifies expectations, accompanies the revision, and gives the student a sense of the path he is taking. The literature on formative feedback has long shown that effective feedback is not merely the availability of a response, as it requires criteria, guidance, dialogue with the process, and the possibility of revision (Boud & Molloy, 2013; Hattie & Timperley, 2007). In light of this distinction, AI can support the acquisition of content and procedures, while subjectivation requires the student to remain the author of their own question, interpretation and word (Biesta, 2020).
Open-ended answers reinforce this reading. Students describe AI as a useful tool for explanations, maps, summaries, quizzes, and support materials; in the same lexicon, excessive reliance, loss of critical thinking, and lack of training emerge. Autonomy then appears as a skill to be built, supported by the availability of tools and the ability to maintain their use as a matter of personal responsibility. From this perspective, AI expands the possibilities for study when the student retains control of their own learning. This outcome aligns with the literature on large language models in education, which recognises the potential of generative systems while also recalling the need for fact-checking, human supervision, awareness of biases, and the development of adequate literacies (Kasneci et al., 2023).
The second research question asked how flipped practices and UDL principles make accessibility, participation, and the need for teacher accompaniment observable in technological mediation. The results on flipped practices show strong appreciation for adapting to individual rhythms and preparatory work, with a high level of agreement (76.8%). The most fragile point concerns teacher support in managing the study load, with an average of 3.04, a high agreement of 34.5%, and a disagreement of 31.0%. Flipped teaching makes visible a central tension of the contemporary university: autonomy becomes a formative

experience when it is designed, accompanied and supported; entrusted solely to individual initiative, it exposes the student to the preparatory load and to the solitary search for support. This data dialogues with the literature on the flipped classroom, which recognises the value of active learning and individual preparation, highlighting the role of cognitive load, motivation and quality of design in making the model's potential effective (Abeysekera & Dawson, 2015; Baig & Yadegaridehkordi, 2023).

UDL offers a second lens to read technological mediation. Reported familiarity with the framework is low, with an average of 1.96 and disagreement of 70.2%; the accessible design of materials, on the other hand, reaches an average of 4.45, with a high agreement of 86.9%, and flexibility in learning times and methods is at 4.20, with a high agreement of 80.4%. Students have limited knowledge of the theoretical vocabulary of UDL and strongly recognise the value of the practices that embody its principles. The gap between the importance attributed to accessible design and the perception of university strategies for enhancing diversity, at 47.6 percentage points, signals the distance between inclusion as a recognised value and inclusion as a fully perceived experience. The figure confirms the centrality of inclusive design: accessibility becomes a criterion for university quality when the plurality of materials, times, methods of participation, and forms of expression is permanently integrated into educational design (CAST, 2024; Rose & Meyer, 2002).

Generative AI can therefore expand access, forms of support, and possibilities for personalisation when it is included in an educational design that connects technology, meaningful participation, and teacher accompaniment. Flipped practices make visible the need for accompanied autonomy; the UDL recalls the need for designed accessibility. Both perspectives help to understand that the educational value of AI depends on the quality of the educational framework that guides its use. Technology takes on educational importance when it is inscribed in a pedagogical culture of planning, evaluation and care, capable of transforming automatic support into an opportunity for responsible learning.

The third research question questioned the possibility of reading interaction with AI as MAA. The data support this proposal in an exploratory form. Functional proximity emerges in requests for explanations, summaries, maps, examples, and personalised support. Distributed affective regulation appears when AI is sought out in times of uncertainty, cognitive fatigue, or a need for confirmation. Stratified subjectivity takes shape when personal elaboration and algorithmic mediation are intertwined in the same study process, making the

boundary between matured understanding and received response more complex. The affective domain of AI literacy allows this dynamic to be read as an integral part of the competence required of students, since interaction with intelligent systems involves not only operational skills, but also trust, perception of effectiveness, possible dependence and emotional posture in the face of knowledge (Pretorius & Cahusac de Caux, 2024).

MAA takes on interpretative force because it allows us to name this area of contact between cognitive support, responsive tone and learning vulnerability. AI generates responses, produces language, and delivers business continuity; The educational relationship preserves responsibility, memory of the path and care of judgment. The proposed category allows us to read the interaction with intelligent systems as a situated experience, in which the algorithmic support addresses the student's difficulty and, precisely because of its immediate effectiveness, requires pedagogical mediation to guide its use. In this perspective, MAA does not describe an internal trait of the machine but an emergent relational configuration: the point at which the system's availability, the student's exposure to difficulty, and the university's educational responsibility come into contact.

The teaching function is at the centre of this mediation. The teacher becomes a mediator of algorithmic mediation: he makes the use of AI thinkable, educates the student to question the answer, verify the sources, recognise the quality of the argumentation, and distinguish linguistic fluency and effective comprehension. The tradition of educational care allows us to read this function as a responsibility for the other's growth, especially when learning involves error, uncertainty, and the need for confirmation (Mortari, 2015). Evaluation is also a particularly sensitive junction. The data on the perceived quality of the feedback generated by AI, which is more contained than personalisation, indicates that students understand the difference between receiving a useful response and receiving formative feedback. Frameworks such as the Artificial Intelligence Assessment Scale can help make explicit the levels of AI integration in assessment activities, transforming assessment into a transparent training pact among learning, responsibility, and the conscious use of technology (Boud & Molloy, 2013; Hattie & Timperley, 2007; Perkins et al., 2024).

Taken together, the results allow us to answer the three research questions through a single pedagogical thesis. Students perceive AI as a resource for personalising, clarifying and supporting study, attributing a more properly formative density to feedback than automatic response. Flipped practices and

UDL make visible the conditions within which AI acts: accompanied autonomy, designed accessibility, and inclusion made experience. The MAA makes it possible to name the intertwining of functional proximity, affective regulation and responsibility for judgment. The algorithmic university requires students capable of critically inhabiting technological mediation and teachers capable of reflective care. The educational challenge consists of transforming the presence of AI into an opportunity for human, critical, and responsible formation, while maintaining immediate support for the student's speech, judgment, and subjectivity.

6. Conclusion, limitations and prospects

The present study explored how generative AI contributes to the reconfiguration of university educational relationships by interrogating students' perceptions of personalisation, feedback quality, autonomy, inclusion, ethical awareness, and accountability. The data describe a student population already exposed to generative AI and capable of recognising the pedagogical delicacy of its use. AI emerges as a resource for clarifying content, organising materials, constructing syntheses and supporting personalised pathways; together, it is associated with an explicit demand for responsible training, critical skills and ethical orientation.

The main contribution of the study is the proposal of Algorithmic Affective Mediation as a pedagogical lens for reading what happens when intelligent systems enter the study's living time. The MAA allows us to name a transformation that goes beyond the instrumental use of technology and reaches the student's posture in front of knowledge. Generative AI intervenes in moments when learning encounters uncertainty, hesitation, a desire for confirmation, and a need for support, configuring a functional proximity that can make the task more accessible and change the relationship among autonomy, trust, and responsibility. In this sense, the proposed category is part of the dialogue among AI literacy, the affective domain of learning, educational care, and judgment formation (Biesta, 2020; Laupichler et al., 2022; Mortari, 2015; Ng et al., 2021; Pretorius & Cahusac de Caux, 2024).

Four pieces of evidence guide the closure of the work.

The first concerns the relationship between personalisation and feedback: automatic support and training feedback belong to different registers, and in

this difference lies the role of the teaching function, called upon to safeguard the quality of the question, the value of the error and authorial responsibility.

The second concerns accompanied autonomy: flipped practices make visible the possibility of more flexible study, while individual preparatory work requires a recognisable pedagogical direction.

The third concerns inclusion: students place great value on the accessibility and flexibility of the paths, while demonstrating limited knowledge of UDL technical vocabulary. Inclusive principles appear as concrete training needs even before becoming a fully internalised theoretical framework.

The fourth concerns the digital affective literacy gap: students show high awareness of ethical risks and the need for critical skills, while perceiving their personal preparation as more contained.

This gap indicates a specific training space, in which the university is called upon to educate students capable of using AI while maintaining its own intellectual direction.

The study has limits that specify its perimeter. The sample is a convenience sample with a prevalence of Irish and Italian respondents; the data are based on self-reported perceptions and have a descriptive scope; the qualitative component was addressed through an exploratory thematic procedure, without calculating inter-coder agreement. The indicator of the digital affective literacy gap should be treated as a preliminary descriptive measure rather than a validated scale. These limits define the function of the study: to identify emerging configurations, to build a theoretical-methodological basis for subsequent research and to propose an interpretative category to be subjected to further validation.

Prospects develop along three trajectories. The first concerns the theoretical and empirical validation of MAA through tools capable of detecting functional proximity, distributed affective regulation and stratified subjectivity. This trajectory requires closer dialogue with the constructs of AI literacy, self-regulation, metacognition, self-efficacy, epistemic trust, and perceived quality of feedback, to transform MAA from an exploratory interpretive lens into an empirically assessable heuristic device (Laupichler et al., 2022; Ng et al., 2021). A future line of research could develop a multidimensional scale of digital affective literacy, capable of distinguishing operational skills, critical postures, affective orientations and forms of authorial responsibility.

The second trajectory concerns teacher training. The algorithmic university requires teachers capable of designing learning environments in which AI is made visible, questionable and formative. The skills in prompts, bias, authorship, feedback, evaluation, and ethical responsibility must be integrated with a more appropriate pedagogical capacity: reading students' affective postures in front of the machine, recognising the signs of addiction, supporting revision, and transforming the artificial response into an opportunity for critical questioning. Teacher training can thus become the place where AI ceases to be an external variable and becomes the object of didactic design, professional reflexivity and educational care. Assessment represents a decisive juncture, since frameworks such as the Artificial Intelligence Assessment Scale enable explicit articulation of the degrees of integration of AI into evaluation practices and the development of a transparent training pact among students, teachers, and generative technologies (Perkins et al., 2024).

The third trajectory concerns the design of university laboratories of digital affective literacy. These laboratories could be configured as spaces where students and teachers analyse generated responses, compare human and artificial feedback, discuss algorithmic errors, rewrite texts, explain evaluation criteria, and reflect on the relationship between the help received and the responsibility of thought. The prompt would become a trace of a cognitive intention; the AI's response, discussion material; error, an opportunity for judgment; revision, an exercise in authorship. A design of this type would make it possible to overcome the binary between spontaneous use and prohibition, orienting the algorithmic experience towards practices of responsibility, verification, argumentation, and care for speech.

A fourth, more advanced perspective concerns the construction of longitudinal devices capable of observing how students' relationship with AI changes over time. Future research could follow university cohorts over entire semesters, analysing the evolution of trust, dependency, review skills, demand quality, and authorial awareness. In this direction, the MAA could become a lens for studying not only the use of AI but also the progressive transformation of learning postures in environments saturated with algorithmic mediations. The decisive step would be to observe how students learn to distinguish support and substitution, clarification and understanding, linguistic fluency and reasoned thinking.

The research gives a clear indication. Generative AI can expand access, personalisation, and learning support when the university can transform it into

a reflective experience. Algorithmic Affective Mediation shows that the heart of the matter concerns the educational form that the university imprints on the algorithmic presence. In the time of instantaneous answers, the highest task of university education consists in educating for the question, for the slowness of judgment, for the responsibility of speaking, for the care of relationships, and for the freedom to think with the tools, fully preserving one's own voice.

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