UDL CRITERIA, INDICATORS AND STRATEGIES TO MAKE STUDY CONTENT ACCESSIBLE TO THE UNIVERSITY

CRITERI, INDICATORI E STRATEGIE UDL PER RENDERE I CONTENUTI DI STUDIO ACCESSIBILI ALL'UNIVERSITÀ

Philipp Botes
Roma Tre University
philipp.botes@uniroma3.it

Virginia Benedetti
Roma Tre University and University of Macerata
virginia.benedetti2@uniroma3.it

Martina De Castro
Roma Tre University
martina.decastro@uniroma3.it

Ines Guerini
Roma Tre University
ines.guerini@uniroma3.it

Andreina Orlando
Roma Tre University
andreina.orlando@uniroma3.it

Barbara De Angelis
Roma Tre University
barbara.deangelis@uniroma3.it

Barbara Centrone
Roma Tre University
barbara.centrone@uniroma3.it

Fabio Bocci
Roma Tre University
fabio.bocci@uniroma3.it

Double Blind Peer Review

Citation
Botes, P., De Castro, M., Orlando, A., Centrone, B., Benedetti, V., Guerini, I., De Angelis, B., & Bocci, F. (2025). Udl criteria, indicators and strategies to make study content accessible to the university. *Giornale italiano di educazione alla salute, sport e didattica inclusiva*, 9(2).

Doi:
https://doi.org/10.32043/gsd.v9i2.1364

gsdjournal.it
ISSN: 2532-3296
ISBN: 978-88-6022-510-8

ABSTRACT
In recent years, universities have witnessed increasing student diversity, prompting a need to rethink educational pathways through an inclusive lens. Universal Design for Learning (UDL) offers a proactive approach to accessibility, but its application remains limited. This paper presents an initiative within the PRIN D.A.N.T.E.-U project, aimed at supporting faculty in adopting UDL principles to promote accessible teaching that fosters participation, academic success, and a sense of belonging for all.

Negli ultimi anni, l'università ha visto una crescente eterogeneità degli studenti, imponendo un ripensamento inclusivo dei percorsi formativi. L'Universal Design for Learning (UDL) propone un approccio proattivo all'accessibilità, ma è ancora poco applicato. Il contributo presenta un'azione all'interno del PRIN D.A.N.T.E.-U, che mira a supportare i docenti nell'adozione dell'UDL, promuovendo lezioni accessibili che favoriscano partecipazione, successo accademico e appartenenza per tutti.

KEYWORDS
University, UDL, Accessibility
Università, UDL, Accessibilità

Received 30/04/2025
Accepted 16/06/2025
Published 20/06/2025

Introduction

The university represents not only a key institution for the production and dissemination of knowledge, but also a cultural and social construct that has historically contributed to the reproduction of social inequalities (Aiston & Walraven, 2024; Bordieu & Passeron, 1974). Although today it is largely perceived as an open and democratic educational environment, higher education has long preserved exclusive traits, catering primarily to a restricted and socioeconomically privileged student body. This configuration has shaped the university as a space resistant to diversity, reinforcing dynamics of social selection and stratification (De Angelis, 2025).

In recent decades, however, higher education has undergone a process of expansion and democratization, driven by social and political transformations that have enabled wider access to diverse segments of the population (Bocci, 2018).

Consequently, the student body has become increasingly heterogeneous: adult learners, working students, parents, people with disabilities, students with migrant backgrounds or students coming from families without academic experience populate nowadays university classrooms (De Angelis, Botes & Orlando, 2025). This diversity of students' backgrounds and trajectories has led to the emergence of new analytical categories, among which the notion of non-traditional students stands out, representing a growing yet often overlooked population within institutional practices (Pinnelli et al., 2024).

Faced with this complexity, universities are now required to rethink their educational and organizational frameworks, moving beyond models designed for a so-called "standard" student and embracing inclusive perspectives capable of addressing the wide array of educational needs currently present. In this context, there is a spread need for learning design that does not merely offer compensatory measures after the fact, but that incorporates accessibility and equity from the outset (De Angelis, 2025).

One of the most promising responses to this challenge is the Universal Design for Learning (UDL) framework, which offers a systemic and proactive vision of inclusion as it will be discussed in this paper. Before presenting its criteria, indicators and strategies our attention will be focused on its origins which go back to late 1980s and deal with the architecture field where a theory named Universal Design (UD) developed.

According to UD, accessibility increases as a context/object designed for special needs is used by many people (Conn-Powers et al., 2006; Bianquin, 2022). Seven principles guide this theory:

- Equitable use.
- Flexibility in use.
- Simple and intuitive use.
- Perceptible information.
- Tolerance for error.
- Low physical effort.
- Size and space for approach and use.

Equitable use means that the design of objects/contexts is useful and marketable to people with diverse abilities. Therefore, any users are not segregated or stigmatized. According to the principle of *flexibility in use*, the design of objects/contexts accommodates a wide range of individual preferences and abilities. Just to make an example, this principle means that chairs in university classrooms (or in general those dedicated to training) should accommodate right- or left-handed access and use, since there are people used to writing with their left hand and/or others who wish to have the PC on the left side rather than on the right one.

Simple and intuitive use implies that use design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level. Therefore, design should:

1. Eliminate unnecessary complexity.
2. Be consistent with user expectations and intuition.
3. Accommodate a wide range of literacy and language skills.
4. Arrange information consistent with its importance.
5. Provide effective prompting and feedback during and after task completion.

Perceptibility refers to the need to provide information through different modalities: not only verbal, but also tactile and pictorial; regardless of the sensory needs of the recipient of information. *Tolerance for error* means that "the design minimizes hazards and the adverse consequences of accidental or unintended actions" (Conn-Powers et al., 2006, p. 3).

Moreover, *low physical effort* refers to the fact that the design is such that the use of the space/object is comfortable (with minimal exertion, therefore). Finally, *size and space for approach and use* implies that the dimensions and spaces are

adequate to be reached and used easily, regardless of the posture, mobility, and build of the person using them. Just to make an example, to easily exit from the underground, requiring a minimum of effort of those who (for instance) push a stroller, carry a heavy suitcase, or move using a wheelchair, subway turnstiles should open by sliding the doors rather than by pushing a bar manually.
UD theory was (and still is) very important as it focused the attention on the accessibility of objects/spaces not their adaptability based on the individual differences or the "special need" as they commonly are called. This importance was later grasped by the Center of Applied Science Technology (CAST) which in fact thought the seven principles of Universal Design could be used also in educational environment to make learning experience enjoyable and successful for all learners. Universal Design for Learning (UDL) was thus born.

1. Universal Design for Learning and its absence at university

Grounded in neuroscience and developmental psychology, UDL promotes the diversification of teaching and assessment methods by offering multiple means of accessing content, expressing knowledge, and engaging with learning.
UDL intends flipping the idea that an 'average' brain exists and "empower everyone to have agency over their own learning" (CAST, n.d.). In fact, the aim is not to adapt teaching to isolated "special needs," but rather to design flexible and welcoming learning environments that consider variability as the norm (Savia, 2016). Therefore, trough UDL is possible to design and organize flexible curricula "to enhance and take account of individual diversities" (Morganti & Bocci, 2017, p. 22, our translation).
The interesting aspect of Universal Design for Learning is that it "promotes, in the name of recognizing human differences in learning, universal instructional design, that is, providing for the possibility of understanding, processing and expressing knowledge and skills through a plurality of codes and pathways" (Demo & Veronesi, 2019, p. 31) as it will more discussed later in this paper.
It was CAST itself that was responsible for drafting guidelines that promote access to and participation in educational experiences with full respect for individual differences. The guidelines it proposed are the following:

- Design multiple means of engagement.
- Design multiple means of representation.
- Design multiple means of action and expression.

Version 1.0 of the Guidelines dates to 2008 but, as they evolve in a manner consistent with the latest research and practitioner feedback, they have undergone numerous revisions over the years. 3.0 is the most recent version and it was released in July 2024. It emphasised the idea that there is a multiplicity of identity variables that intersect to give rise to individuals whose identities are different from each other. For each principle, the themes emphasised are:

"*Engagement*

- Centering, affirming, and sustaining learners' interests and identities.
- Emphasizing the role of belonging in teaching and learning.
- Promoting the role of joy and play for learners and educators alike.
- Cultivating empathy and repairing harm with restorative practices.

Representation

- Authentically representing a diversity of identities, perspectives, and narratives as they relate to learners.
- Considering perceptions of people, cultures, and languages.
- Valuing multiple ways of knowing and making meaning.

Action and Expression

- Honoring and valuing a wide variety of forms of communication.
- Centering and valuing forms of expression that have been overlooked or ignored by addressing biases.
- Challenging exclusionary practices to build more accessible, inclusive spaces and systems" (CAST, n.d.).

As it is immediately apparent, to adapt academic curricula to the principles of UDL, it is necessary to break down stereotypes and prejudices inherent in the education/ instructional system. For a very long time, for example, it was believed that only elites had access to secondary education. In the West, until the mid-19th century, this privileged group consisted exclusively of white men and aristocrats, while women, people from the lower classes, black people and disabled people were excluded. Subsequently, these social groups were firstly 'accepted' into the school system in segregated classes according to sex/gender, race, dis/ability and, only with some slowness and a good deal of resistance, they were integrated into the classes 'of all' (which, really, were 'of a few').

Nevertheless, even today this idea that education should be something exclusive and exclusionary is quite widespread: it is not uncommon to hear sentences such as "not everyone is suited to study" (which refers to the idea education is something exclusive) or "the problem in the Italian school are students with

migrant or disabled backgrounds included" (which refers to the idea education is something exclusionary). In fact, at university homogeneity (of knowledge, of skills, of learning styles, of identities) continues to be valued around the *why* of learning (Engagement), in that of the *what* of learning (Representation), and in that of the *how* of learning (Action and Expression).

This type of expectation of the average student, however, is in contrast with the real characteristics of the university population, which is increasingly differentiated and fluid in terms of identity and economic and socio-cultural characteristics (Fiorucci et al., 2025). Therefore, as the characteristics of the students who move through and experience the academic spaces become less and less traditional, the didactics proposed by those who hold power and deliver knowledge should also consistently change. In this sense, UDL could be a valuable ally in the creation of inclusive and customised academic curricula, which are designed in an almost sartorial manner, that is, to be "tailored" to the actual academic users.

Yet, despite theoretical soundness and transformative potential of UDL, its application in higher education settings remains limited and insufficiently systematized. Existing literature predominantly focuses on primary and secondary education, while university-level studies remain relatively scarce and fragmented (Fiorucci et al., 2025). Moreover, UDL is often reduced to a set of instructional techniques, overlooking its value as a comprehensive conceptual framework.

Another critical issue is that UDL is frequently examined in connection with students holding certified disabilities, leaving out other vulnerable groups, particularly non-traditional ones. This gap leaves a substantial portion of the student population unaddressed individuals whose university experience is often hindered by rigid educational structures and implicit barriers.

This article aims to address part of this gap by offering a critical reflection on the applicability of UDL within higher education, with particular emphasis on the condition of non-traditional students. One of the objectives is to contribute to the development of genuinely inclusive teaching strategies capable of promoting participation, academic success, and a sense of belonging for all students.

Since, as just affirmed, there are still very few studies that focus on the application of UDL in university contexts, in the following pages we will present the initial outcomes of a relevant project of national interest named D.A.N.T.E.-U. (Design Accessibility Network to Enjoy University) in which we have been involved as a research group of the Roma Tre University.

2. The Italian National Research Program D.A.N.T.E. – U.

In today's higher education landscape, universities are increasingly called upon to transcend their traditional role as providers of knowledge to become active agents in the development of critical, responsible, and socially engaged citizens. Within this framework, inclusive teaching practices are of paramount importance, particularly in response to the growing diversity of student populations.

It is in this context that the D.A.N.T.E.-U Project was conceived. Funded under the 2022 Italian National Research Program (PRIN), the project aims to innovate university teaching by integrating the principles of Universal Design for Learning with a focus on promoting equity and educational quality. Coordinated by the University of Salento, and involving the Universities of Perugia, Roma Tre, Padua, and Bolzano, the initiative supports university faculty in designing learning experiences that are inclusive and accessible to all students, with particular attention to non-traditional learners. This category includes working students, caregivers, individuals with non-certified disabilities, as well as those from disadvantaged backgrounds or with discontinuous educational paths. These learners often encounter systemic barriers linked to rigid teaching methods that fail to accommodate diverse educational needs.

The DANTE-U project addresses these challenges through the creation of a digital platform for faculty development. Planned as a dynamic environment for professional learning and instructional design, the platform provides resources, operational guidelines, and practical tools to support the implementation of flexible, student-centred, and universally accessible pedagogies.

The project is grounded in the UDL framework (CAST, 2006), which promotes a proactive approach to teaching using multiple means of representation, engagement, and expression. Additionally, the project draws on the Index for Inclusion (Booth & Ainscow, 2011) to support systemic analysis of learning environments, emphasizing the interrelated dimensions of inclusive cultures, policies, and practices. The integration of the Index into the project allows participating universities to engage in reflective self-assessment and continuous improvement, aligned with the principles of inclusion and social justice.

In its initial phase, the project undertook a comprehensive mapping of existing Faculty Development (FD) initiatives at partner institutions and conducted an in-depth analysis of non-traditional student populations. Current efforts are focused

on the development of the digital platform and the drafting of guidelines for inclusive and accessible teaching in higher education.

The project's added value lies in its dual impact: on one hand, it promotes pedagogical innovation by equipping university faculty with the tools to address the complexity of contemporary classrooms; on the other hand, it enhances students' academic wellbeing and participation, fostering equitable access to learning opportunities and academic success.

DANTE-U represents a forward-looking initiative aligned with European and international policies on equity in higher education. It offers a scalable and replicable model for supporting more inclusive, accessible, and human-centred universities, committed to unlocking the full potential of all learners.

The work presented in next section is part of the second phase of the PRIN project, which involves the development of guidelines aimed at the creation of a digital platform for university-level teaching. This phase is critical for defining the operational and functional principles that will inform the subsequent stage of platform prototyping.

The guidelines are now under development and focus on identifying strategies and tools capable of supporting a wide range of educational needs, with the goal of designing a learning environment that is inherently accessible and inclusive from the outset. The guidelines will include recommendations on the following key areas:

- Definition of learning objectives, structured to be flexible and accessible to students with diverse cognitive styles and cultural backgrounds.
- Instructional methodologies, designed to foster active engagement, collaborative learning, and adaptability to individual learners' needs.
- Didactic materials, to be developed according to digital accessibility criteria (e.g., alternative formats, multimodal resources).
- Assessment strategies, conceived to be inclusive and formative, and to recognize the multiple ways in which students can demonstrate their competencies.

The overarching aim is to overcome the structural limitations embedded in traditional university curricula, which are often characterized by implicit barriers that hinder the full participation of all students—particularly those with disabilities or special educational needs. In this regard, the Universal Design for Learning framework offers both a theoretical and practical foundation for guiding instructional design toward equity, flexibility, and educational effectiveness.

3. Possible applications in university didactics

The Roma Tre Research Group has worked to develop a detailed and in-depth description of the presentation principle of the new UDL Guidelines 3.0, with the aim of making the text accessible to university professors who do not necessarily have expertise in UDL. In this context, we have articulated the sub-points (the considerations) so that they can be easily understood and applied in any discipline. For each consideration, we have written a list of operational directions and suggested examples of practical activities that can be adopted in different academic contexts, regardless of the teaching discipline[1].

In the context of UDL, the principle of "Design Multiple Means of Representation" is identified as essential to ensure that learning is accessible to all students, regardless of their specific cognitive, physical, identitarian, and cultural characteristics. As illustrated in fig.1, this principle is articulated in several considerations. These considerations range from the need to stimulate different ways of perceiving and understanding content to the promotion of inclusive and non-discriminatory language. They also extend to the enhancement of students' personal experiences as an integral part of the educational process.

UDL Guidelines 3.0

Design Multiple Means of REPRESENTATION

Design Options for **Perception**

- **1.1** Support opportunities to customize the display of information
- **1.2** Support multiple ways to perceive information
- **1.3** Represent a diversity of perspectives and identities in authentic ways

Design Options for **Language & Symbols**

- **2.1** Clarity vocabulary, symbols, and language structures
- **2.2** Support decoding of text, mathematical notation, and symbols
- **2.3** Cultivate understanding and respect across languages and dialects
- **2.4** Address biases in the use of language and symbols
- **2.5** Illustrate through multiple media

Design Options for **Building Knowledge**

- **3.1** Connect prior knowledge to new learning
- **3.2** Highlight and explore patterns, critical features, big ideas, and relationships
- **3.3** Cultivate multiple ways ok knowing and making meaning
- **3.4** Maximize transfer and generalization

Fig. 1 Declination of the objective "design multiple means of Representation" from UDL Guidelines 3.0. https://udlguidelines.cast.org/more/about-guidelines-3-0/

[1] In our work, we have prioritized accessibility and inclusivity, avoiding the use of the overused masculine and preferring neutral terms such as "people," "learners," and "individuals" to simplify language. We also adopted an intersectional approach that guided the choice of terms and strategies to reflect the diversity of experiences and identities in an educational context.

3.1 Guidelines 1 and 2: “Perception” and “Language & Symbols”

Firstly, consideration 1.1 underscores the significance of presenting content in a manner that engages multiple sensory channels, thereby enhancing the accessibility and engagement of learning for a diverse array of cognitive and perceptual styles. Gardner’s theory of multiple intelligences (2005) underscores the notion that individuals may possess distinct talents that manifest through varied channels, including linguistic, visual, logical-mathematical, spatial, musical, bodily, intrapersonal, interpersonal, and naturalistic domains. Therefore, an instructional approach that incorporates diverse visual, auditory, and tactile media has the potential to markedly enhance comprehension (Consideration 1.4). This objective can be achieved by presenting materials that engage different perceptual channels. For example, written texts stimulate linguistic intelligence, while videos and pictures engage visual-spatial intelligence, and graphs and charts activate logical-mathematical intelligence. A useful activity might involve a lecture supported by multimedia materials, such as slides, images, and videos, along with online discussions via Moodle platform. This approach allows students to explore a variety of materials and encourages reflection outside the classroom. Students should be prompted to connect their learning to real-life scenarios, such as analyzing case studies or designing practical solutions. This approach not only enhances learning but also makes it more meaningful and relevant.

In the context of university learning, it is important to ensure that accessibility goes beyond the content and includes the mode of assessment and evaluation. This can be achieved by offering flexible examination options, such as written tests, interactive presentations, or oral interviews, allowing students to demonstrate their knowledge in a way that works best for their abilities.

In addition, it is crucial to present general information, like exam arrangements and invitations to seminars or conferences, in a clear and accessible manner. This can be done by using easy-to-read (Guerini, 2024; Guerini et al., 2025) or pictograms (such as CAA, Augmentative Alternative Communication) for nonverbal students, or those with reading or communication difficulties. It is also important for resources to be compatible with mobile devices, enabling remote use and ensuring that any barriers to access are eliminated.

Consideration 1.2 complements this concept by suggesting that teaching needs to use multiple different learning channels and employ diverse materials that promote in-depth content across different types of intelligence. For example, before, during,

and after the lecture, the lecturer can support his or her speech with slides, videos, and graphics that are also visible on devices, and text resources that are compatible with digital readers. This would give students the opportunity to access materials before the lecture and begin to pose ideas and questions for discussion in the classroom and continue learning after the lecture independently, either individually or in groups.

The second point is about “design options for language and symbols”. Language, along with symbols, formulas, and disciplinary conventions, is a powerful means of communicating and constructing knowledge, but it can become a barrier if not carefully designed. Therefore, it is essential to present content in multiple formats to facilitate access and reduce inequalities in learning (Centrone et al., 2025). Multi-media illustration (2.5) addresses the need to overcome the dominance of written text by enhancing visual and multimodal elements that facilitate learning. This implies:

- Clarifying vocabulary, symbols and language structures (2.1).
- Providing tools such as glossaries, visual representations, text descriptions, subtitles and translations, concept maps, visual diagrams and contextualized explanations to clarify technical or specialized vocabulary.
- Linking the symbols and languages used to authentic contexts, integrating different cultural references to promote a truly inclusive educational environment.

It is equally important to support the decoding of texts, mathematical notations and symbols (2.2), and to prevent them from becoming barriers to understanding, by considering strategies that go beyond mere translation or simplification of content. This means promoting ways of developing the ability to decode texts through analysis exercises, guided comprehension activities, and collaborative strategies such as shared reading or peer tutoring. For example, professors might propose a lesson where students work in small groups to paraphrase complex academic texts or solve math problems graphically.

This principle aligns with contemporary scholarly works in the field of Disability Studies and the neurodiversity movement (Valtellina, 2025), which critique the notion of a singular “correct” manner of learning and functioning, conceptualizing knowledge as a situated, relational, and pluralistic process. These approaches advocate for a critical pedagogy that not only values but also acknowledges cognitive, cultural, and sensory differences (De Castro, 2023). This is not merely an issue of equity; rather, it is a prerequisite for the collective production of

meaningful knowledge. In this framework, knowledge is not constructed in a linear or standardized way, but rather through multiple pathways, tools, and modes of signification. A critical component of this process is the collaborative construction of knowledge, which occurs through dialogue, interaction between perspectives, and the emergence of shared yet non-standardized meanings. This approach aligns with Damian Milton's dual empathy theory, which posits that the challenges in communication between neurodivergent and neurotypical individuals are not attributable to a deficit but rather to a deficiency in reciprocity and mutual understanding (Milton, 2012; Marocchini, 2025). In environments characterized by true inclusivity, the collaborative construction of knowledge becomes a forum for acknowledging and appreciating differences in cognitive processes, educational approaches, and the interpretation of the world.

Precisely because of the awareness that accessibility also means not taking anything for granted and disambiguating, “Cultivate understanding and respect across languages and dialects” (consideration 2.3) involves a focus on the use of discipline-specific language registers, stimulating critical reflection on their meaning and use in different contexts. Professors should encourage the active use of disciplinary language through activities such as writing short scientific papers, collaborative glossaries or oral presentations.

Moreover, in reference to language, an important innovation introduced by the updated guidelines relates to the realization that promoting respect between languages and dialects (2.3) is fundamental to recognizing linguistic plurality as an educational and identity resource. In academic settings, the adoption of a dominant language can exclude those from diverse linguistic backgrounds, exacerbating already existing inequalities. In parallel, it is crucial to “Address biases in the use of language and symbols” (consideration 2.4). This includes using people’s chosen names and pronouns, avoiding stereotypical or discriminatory language, and ensuring that different perspectives and identities are represented. Effective activities in this regard may include critically analyzing existing teaching materials to identify any biases or collectively constructing guidelines for respectful and inclusive language. Not only that: addressing biases in language and symbols also means recognizing that these convey cultural and social values, and these latter are never neutral (Moraga & Anzaldúa, 1981; Bourdieu, 1991; Giovine, 2024; Farina & Lavazza, 2024). Only conscious and critical use can counter stereotypes and create truly equitable environments where all identities are respected and represented.

Connected to these considerations is the 1.3 one: “Represent a diversity of perspectives and identities in authentic ways”. People involved in the apprehension process inhabit and traverse public spaces with their bodies. They mirror the multitude of identities that characterize our societies. Depending on the variables that characterize them (sex/gender, race, ethnicity, sexual orientation, disability, social class...) and the ways in which they choose to perform them, we can come across people who proudly claim to be part of a certain minority and others who instead act out strategies to try to appear more adherent to standards of “normality.” Since, as we know, that of “normality” is a cultural construct based on power relations and capable of determining a range of social inequalities (Chapman, 2023), it is our task to promote contexts that are respectful of identity multiplicities. This can be done by using gender-differentiated language and avoiding making ourselves the spokesmen of sexist, racist, ableist, homolesbobitransphobic, fatphobic, and aporaphobic stereotypes and prejudices with our language and behaviors (Gheno, 2023).

Education, moreover, plays a pivotal role in socializing individuals to adopt specific social roles in accordance with the expectations of the majority. Consequently, professors must acknowledge the influence of partial and culturally contingent narratives in shaping the social roles that periodically emerge. Afro-descendant authors, including bell hooks (2014), have denounced the tendency of educators to reread foundational events (e.g., slavery as the basis of the capitalist system) through the lenses of white, ableist, colonialist, and Western interpretive frameworks. This practice often results in these events being undervalued or quickly dismissed (Bocci & De Castro, 2024). The concept of hegemonic domination is fully realized when even members of minority groups begin to identify with the dominant group in the social sphere. To adequately honor the individuality of each person, it is imperative to reject the assumption that the culture in which we have been socialized—Western and white culture—is the sole culture. Consequently, it is essential to incorporate diverse cultural perspectives and interpretations into our educational curriculum.

In the pursuit of effective communication, language must be crafted with a high degree of inclusivity, eschewing expressions that may lead to the restriction or exclusion of certain groups. The employment of broad language, devoid of exclusive references to male or female, and the utilization of generic expressions such as “person” or “subjects” fosters an educational environment that respects gender

and identity diversity[2]. The addition of symbols such as the asterisk or schwa symbol to encompass all gender identities in written and verbal communications is a gesture that fosters genuinely inclusive language (Gheno, 2024; Baiocco et al., 2023). However, it is imperative to acknowledge that not all digital readers possess the capability to synthesize these symbols. Learning activities, such as debates and role-playing, are excellent tools for stimulating the use of broad language. During a debate, for example, students can practice using inclusive language, not only for gender identities but also for other diversities, such as physical and mental abilities. This activity also helps to raise students' awareness of non-ableist and non-racist language, encouraging them to avoid stigmatizing terms. Another example would be organizing activities in which students are asked to avoid ableist, racist, fatphobic, or homolesbobiatranspoliphobic[3] locutions during the exam test or in daily confrontations.

3.2 Guideline 3: Building Knowledge

Within the domain of pedagogical practices, the principle of representation is intricately linked with the promotion of reflection and metacognition. The third subpoint specifically addresses "providing options for constructing knowledge". The process of knowledge construction is characterized by its active and dynamic nature, extending beyond the mere acquisition of information. It encompasses a series of intricate cognitive operations, including the establishment of connections between concepts, the synthesis of information, the formulation of questions, the integration of new information with prior knowledge, strategic categorization, and the active memorization of information.

The scientific literature in cognitive science posits that the process of attributing meaning and transforming accessible information into usable knowledge for future application does not passively occur (Rasouli et al., 2025). Rather, it necessitates active involvement on the part of the learner. Given the heterogeneity in prior

[2] In Italian, the language traditionally uses two grammatical genders: masculine and feminine. The masculine is often used in a generic sense, even for professions or roles traditionally associated with women, a practice known as "masculine generic". This use of the masculine has contributed to the invisibility of women and non-binary individuals. In recent years, this issue has prompted various linguistic experiments aimed at achieving more inclusive language, such as the use of the schwa (e.g., "studentə" instead of "studente" or "studentessa"), the asterisk (e.g., "avvocat" instead of "avvocato") or truncation of words to reflect a wider range of gender identities.

[3] Hate and discrimination against gay, lesbian, bisexual, transgender, asexual and polyamorous people.

knowledge, familiarity with different forms of knowledge, and learning strategies, instructional design must involve multiple representations of information and intentionally differentiated methodologies. As stated in Consideration 3.1, it is essential to "Connect prior knowledge to new learning". This principle urges the activation and enhancement of learners' personal and contextual knowledge through activities that connect theoretical knowledge to practice. Such activities encourage self-reflection, meta-reflection, and critical thinking. Activities such as writing journals, developing digital portfolios, conducting research, or case studies related to real problems enable students to construct personal meanings from disciplinary content. Group reflection, in which participants discuss and analyze their own experiences to identify connections with new knowledge, is a particularly effective strategy for developing profound and meaningful learning. This process entails the acknowledgment of knowledge that remains unstandardized or unrecognized within academic settings, as it is viewed through a decolonial and intersectional lens. Similarly, as stated in Consideration 3.2, "Highlight and explore patterns, critical features, big ideas, and relationships" involves moving beyond mnemonic teaching methods.

This promotion of critical and systemic thinking is facilitated using visual and digital tools, such as concept maps and charts, which assist in organizing and connecting information. Collaborative activities, such as the creation of maps or infographics, have been shown to promote active learning and are especially beneficial for neurodivergent students, who may develop unconventional conceptual schemes, such as arborescent or picture-based thinking. As stated in Consideration 3.3, "Cultivate multiple ways of knowing and making meaning", the importance of fostering learning environments that value a diverse array of cognitive paradigms is crucial. These environments must prioritize the integration of narrative, experiential, bodily, and visual knowledge. This approach, which challenges traditional epistemic norms, aligns with a queer and crip pedagogy that celebrates plurality and instability as cognitive resources (Pié-Balaguer et al., 2020).

Finally, "Maximizing transfer and generalization" (Consideration 3.4) requires designing contexts and activities that allow students to apply what they have learned in new and complex situations. This promotes autonomy, reflective thinking, and cognitive flexibility. Recognizing that transfer is not automatic and that some people need explicit strategies to generalize learned concepts is an integral part of inclusive education. Again, it is important not to assume the

neurotypical cognitive framework as neutral, but to provide alternative and adaptable tools to support different ways of learning and applying knowledge.

By integrating all these strategies and considerations, the principle of representation in UDL becomes a fundamental tool for building learning environments in universities that are equitable, sensitive, and capable of valuing the plurality of intelligences, experiences, and ways of knowing. Representation, understood in this way, is not just a means of accessing information, but a pedagogical act that acknowledges subjectivities, makes connections, and promotes transformative and equitable education.

Author contributions

The paper is the result of joint work between the authors. For the sole purpose of individual contributions, where required, it is specified that Introduction was written by Fabio Bocci and Barbara De Angelis, sections 1 and 3.2 were written by Martina De Castro and Ines Guerini, sections 2 and 3 were written by Philipp Botes and Andreina Orlando and section 3.1 was written by Virginia Benedetti and Barbara Centrone.

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