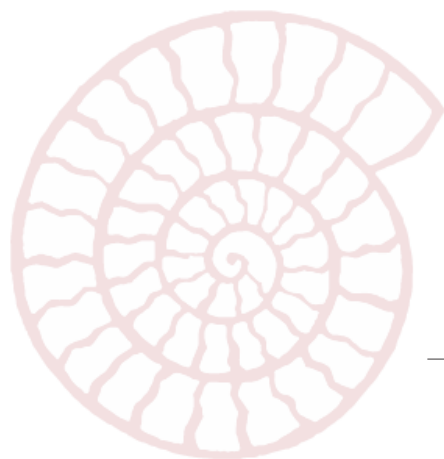




Simplex didactics and teacher training: An exploratory study to improve inclusive processes

Didattica semplice e formazione docenti: Uno studio esplorativo per migliorare i processi inclusivi

Emanuela Zappalà

Department of Humanities, Philosophy and Education; University of Salerno (Italy); ezappala@unisa.it
 <https://orcid.org/0000-0002-4804-071X>

Alessio Di Paolo

Department of Humanities, Philosophy and Education; University of Salerno (Italy); adipaolo@unisa.it
 <https://orcid.org/0000-0002-3044-0491>

Naomi La Manna

Department of Educational sciences, cultural heritage and tourism; University of Macerata (Italy); n.lamanna@unimc.it
 <https://orcid.org/0009-0002-6538-9523>

Maurizio Sibilio

Department of Humanities, Philosophy and Education; University of Salerno (Italy); msibilio@unisa.it
 <https://orcid.org/0000-0003-1322-7776>



DOUBLE BLIND PEER REVIEW

ABSTRACT

As maintained by both Bakker and Morin, the classroom is a complex system shaped by multiple factors that influence teaching and learning. Current scholarship acknowledges teachers play a crucial role in addressing such complexity through reflective and adaptive practices. Sibilio's Simplex didactics, grounded in Alain Berthoz's theory of simplicity, provides a theoretical framework for simplifying without reducing complexity, thereby fostering flexibility, creativity, and coherence between theory and practice. In particular, the study presents data collected during the "Special Education: Metacognitive and Cooperative Approach" lectures from the 8th cycle of Specialisation courses for future support learning teachers held at the University of Salerno. Results highlight significant changes in participants' perceptions of complexity that were increasingly understood as a process to be interpreted and addressed through adaptive and reflective decision-making. The training seems to have improved some dimensions of teachers' professional competence, such as their capacity to reconsider usual responses, anticipate possible developments and adapt didactic action to contextual variability. The qualitative analysis of the exercises also suggests an increased ability to integrate disciplinary objectives with forms of mediation attentive to learner variability. These findings show that training based on simplex Didactic may support future teachers in developing reflective and adaptive competences with potential implications for inclusive didactic design.

Come sostenuto sia da Bakker che da Morin, la classe costituisce un sistema complesso, caratterizzato da molteplici fattori che influenzano i processi di insegnamento e apprendimento. Studi attuali riconoscono che i docenti svolgono un ruolo centrale nell'affrontare tale complessità attraverso pratiche riflessive e adattive. La didattica semplice di Sibilio, fondata sulla teoria della semplicità di Alain Berthoz, offre un quadro teorico finalizzato a semplificare senza ridurre la complessità, promuovendo flessibilità, creatività e coerenza tra teoria e pratica. In particolare, lo studio presenta i dati raccolti durante le lezioni dell'insegnamento "Pedagogia speciale: approccio metacognitivo e cooperativo", svolte nell'ambito dell'VIII ciclo dei corsi di specializzazione per la formazione dei futuri docenti di sostegno presso l'Università degli Studi di Salerno. I risultati evidenziano cambiamenti significativi nelle percezioni della complessità da parte dei partecipanti, progressivamente intesa come un processo da interpretare e affrontare attraverso decisioni adattive e riflessive. La formazione sembra aver migliorato alcune dimensioni della competenza professionale dei docenti, quali la capacità di riconsiderare le risposte abituali, anticipare i possibili sviluppi e adattare l'azione didattica alla variabilità del contesto. L'analisi qualitativa delle esercitazioni suggerisce, inoltre, una maggiore capacità di integrare gli obiettivi disciplinari con forme di mediazione attente alla variabilità dei discenti. Tali risultati mostrano come una formazione fondata sulla didattica semplice possa sostenere i futuri docenti nello sviluppo di competenze riflessive e adattive, con potenziali implicazioni per la progettazione didattica inclusiva.

KEYWORDS

Simplex didactics, Non-linearity, Teaching-learning process, Inclusion
Didattica semplice, Non linearità, Processo di insegnamento e apprendimento, Inclusione

Citation: Zappalà, E., Di Paolo, A., La Manna, N., & Sibilio, M. (2026). Simplex didactics and teacher training: An exploratory study to improve inclusive processes. *Formazione & insegnamento*, 24(3), Article 8693. <https://ojs.pensamultimedia.it/index.php/siref/article/view/8693>

Copyright: © 2026 Emanuela Zappalà, Alessio Di Paolo, Naomi La Manna, Maurizio Sibilio.

License: Attribution 4.0 International (CC BY 4.0).

Conflicts of interest: The Authors declare no conflicts of interest.

Editor's note: Online First articles are published in full before final issue assembly. Their definitive position, pagination and table of contents are not yet available. For further details, see the relevant [journal policy](#).

Authorship: The article is the result of a joint collaboration between the authors. Attributions: Section 1 (A. Di Paolo); Sections 2–3 (N. La Manna); Sections 4–5 (E. Zappalà); Sub-section 4.6 (A. Di Paolo). Scientific coordination: M. Sibilio.

URL: <https://ojs.pensamultimedia.it/index.php/siref/article/view/8693>

Submitted: March 7, 2026 • **Accepted:** July 27, 2026 • **Published online:** August 11, 2026

Pensa MultiMedia: ISSN 2279-7505 (online)

ONLINE FIRST

1. Didactic design as a non-linear, symbolic and creative trajectory in teaching practice

Conceiving didactic design within the contemporary complexity of education requires leaving the linear, prescriptive paradigm and embracing instead a symbolic and creative trajectory that unfolds in the dynamic interplay between intentionality and contingency. In this view, the teacher is not a mere transmitter of pre-structured content but a reflective *artifex* engaged in a dialogical process where, as Watzlawick famously observed, “one cannot not communicate” (Watzlawick et al., 1967, p. 51). Every communicative act inevitably shapes and is shaped by the relational field, making planning less a static blueprint than a living organism, capable of reconfiguring itself in response to the ever-changing dynamics of the classroom. Within this adaptive process, Schön’s conception of the *reflective practitioner* becomes a constitutive dimension of pedagogical artistry: the teacher, immersed in “reflection-in-action” (Schön, 1983, p. 68), navigates a space where anticipation and improvisation coalesce, moving between *praeparatio*, the deliberate forethought that frames the path of learning, and *inventio*, the creative emergence of solutions prompted by the unpredictability of the moment. This hermeneutic tension is underpinned by Lakoff’s (1993) claim that “our conceptual system is largely metaphorical” (p. 203), reminding us that metaphors are not mere linguistic ornaments but cognitive architectures that structure how the teacher perceives and enacts the didactic trajectory. A lesson imagined as a *journey* or as *cultivation* does not merely sound different; it is realised differently, with distinct rhythms, priorities, and relational modes. This metaphorical scaffolding operates within the reciprocity that Boscolo (2006) identifies in the teacher-learner dyad, a “circuit of mutual influence” (p. 112) in which the teacher’s symbolic framing of the lesson is refracted through the learner’s interpretative responses. Didactic design thus becomes the co-authored weaving of an unfolding narrative, a *locus communis* where the teacher guides yet is guided, shapes yet is shaped, and where both agents participate in the symbolic construction of knowledge.

Gardner’s (2006) notion of *synthetic thinking* enriches this perspective, describing the ability “to integrate ideas from different disciplines or spheres into a coherent whole” (p. 46). In the *non-linear* didactic trajectory, this synthesis allows the teacher to merge disciplinary content, contextual contingencies, and learner feedback into a design that is coherent yet open to transformation. This is not eclecticism but disciplined adaptability, a form of *phronesis* that reconciles *ordo* with *creatio*, where the teacher’s wisdom lies in knowing when to stabilise form and when to dissolve it into new configurations. In the convergence of these perspectives, didactic design emerges as a non-linear, symbolic, and creative act, a *circulus hermeneuticus* in which planning and enactment, theory and practice, self and other continually inform and transform each other. Each communicative choice can redirect the shared path; each reflective pause reshapes the symbolic map; each metaphor animates the possible futures of the lesson; each learner’s contribution refracts the teacher’s intention into unanticipated directions. To embrace this model is to accept that *nullum consilium sine mutatione*, no plan without transformation, is not merely a methodological precaution but a professional ethos. The teacher becomes simultaneously architect and navigator, constructing frameworks sufficiently robust to provide direction yet sufficiently porous to accommodate the unforeseen. Didactic design, thus understood, is less the execution of a fixed script than the co-creation of

a symbolic space in which meaning is negotiated, creativity enacted, and learning unfolds as an ever-renewed dialogue between intentional form and emergent possibility.

Within this framework, the objective of this study is to explore how a training course based on the Simplex Didactics approach may provide teachers with theoretical and methodological tools that support the co-creation of non-linear didactic action to recognise, address and overcome the complexity of educational contexts. This study may contribute to the literature because it empirically investigates the integration of simplex didactics and divergent thinking within initial teacher education, a combination that has previously been addressed only theoretically in previous studies (Zappalà et al., 2025; Zollo et al., 2015; Zollo et al., 2018). Moreover, it provides quantitative and qualitative evidence on how this integrated model may influence future support teachers’ adaptive competences and it operationalises simplex principles through concrete didactic transpositions, offering a bridge between theoretical constructs and classroom practices.

2. Complexity, simplicity and divergent thinking in teacher education

Current educational contexts may be understood as an *ecosystem* of high-density complexity, arising from the synergistic interaction of heterogeneous factors of an individual, social, political, economic, and cultural nature (Bakker, 2016; Morin, 1994; Osberg, 2010). It also extends to the dynamic interplay between educational practice, policy and research (Van Geert & Steenbeek, 2014). This complexity, far from constituting a mere backdrop, exerts a significant influence on the morphology and dynamics of the classroom system, compelling teachers to adopt instructional frameworks characterised by operational flexibility, critical reflexivity and the capacity for continuous adaptation to the plural and constantly evolving demands of learners. Within this framework, educational research has progressively oriented itself towards theoretical paradigms capable not only of decoding but also of inhabiting and enacting such complexity, privileging non-linear approaches that are firmly centred on the teacher’s professional praxis (Aiello et al., 2023; Sibilio, 2014).

Based on these premises, the educational field requires epistemological and methodological frameworks that integrate insights emerging from both the human and natural sciences. The former allow exploration of the subjective, intentional and relational dimensions of the teaching-learning process, whereas the latter offer objective insights, particularly into the neurophysiological mechanisms that shape and influence pedagogical action (Sibilio, 2017). In this regard, one of the most heuristically fertile conceptual references is the theory of *simplicity* (Berthoz, 2011), which offers a reading of complexity through simplifying devices that avoid any form of reductionist simplification. The transposition of this perspective into the pedagogical domain has led to the development of *Simplex Didactics*, conceived as a set of rules and operational properties that may enable teachers to act with rapidity, situational adaptability, targeted selectivity and meaningful intentionality, all within *non-linear* pedagogical trajectories (Sibilio, 2023; Sibilio & Zollo, 2016). Research in this field tends to converge towards the design of a training model aimed at promoting metacognitive practices that may foster the effectiveness of teaching by critically deconstructing linear and rigidly sequential instructional approaches.

This exploratory study is situated within that theoretical and practical framework and aims to investigate the impact of

a training course inspired by the principles of simplex didactics and integrated with the paradigm of divergent thinking, designed for future learning support teachers. Rather than being conceived as distinct frameworks, Simplex Didactics and divergent thinking share a common epistemological ground based on the rejection of linearity and the valorisation of *adaptability*, *creativity*, and *reflective intentionality* in teaching (Aiello et al., 2017; Sibilio, 2014). Both perspectives respond to the need for educational models capable of inhabiting complexity rather than reducing it, promoting in teachers a dynamic interplay between *theoretical* awareness and *practical* transformation (Davis & Sumara, 2012).

From this standpoint, divergent thinking may be understood as a cognitive and methodological complement to simplex didactics. While the latter provides an operational grammar grounded in the properties and rules of simplicity, the former activates the creative dimension of didactic action, fostering the capacity to generate multiple and original solutions in response to unforeseen events (Gardner, 2006). Within the simplex framework, divergent thinking supports teachers' ability to navigate between intention and contingency, transforming unexpected situations into opportunities for meaningful learning and inclusion (Di Tore et al., 2020). Thus, simplex didactics operates not only as a theoretical construct but as an evolving model of pedagogical action. When intersected with divergent thinking, it provides teachers with cognitive, emotional, and operational tools to engage with educational complexity through intentional creativity and adaptive awareness, thus embodying the vision of a reflective practitioner capable of navigating non-linear trajectories in contemporary inclusive education.

According to these premises, the present study explores how this integrated teacher training model may influence future support teachers' perceptions, professional orientations and didactic design choices, analysing changes that emerged from a pre- and post-intervention questionnaire and from the exercises developed during the training (Zollo et al., 2018).

Combining the metacognitive orientation of simplex didactics with the creative potential of divergent thinking, the training may encourage participants to view teaching not as a sequential application of methods but as a reflective and adaptive process rooted in intentional decision-making and openness to transformation. Through this integration, the research contributes to the broader reflection on the strategic role of initial teacher education as a means of promoting professional practices that are inclusive, dynamic, and consciously complexity-oriented (Aiello et al., 2023).

Moreover, the concept of inclusive processes, in this paper, is understood according to a process-oriented model of inclusion, rather than as a condition that can be considered definitively reached. Drawing on Ainscow (2005) and Florian (2022), inclusion is conceived as the continuous identification and reduction of barriers that may limit students' access to learning, participation in shared educational activities and opportunities to participate fully in classroom life. From this perspective, learners' heterogeneity is interpreted as a constitutive feature of every educational context and not as an exceptional condition requiring interventions external to "ordinary teaching". Inclusive processes therefore concern the ongoing reorganisation of teaching objectives, methods, materials, interactions and learning environments in response to the different ways in which students participate and learn. This interpretation is also consistent with the simplex perspective on teacher education, according to which educational

action should remain intentional and coherent while being open to adaptation, mediation and transformation (Aiello et al., 2016; Aiello et al., 2023). Simplex Didactics is not assumed to constitute an inclusive model per se; rather, its principles and properties may provide teachers with operational resources for recognising emerging barriers, reconsidering habitual responses and designing multiple pathways towards common educational purposes. Accordingly, the expression "inclusive processes" refers in this study to teachers' capacity to promote accessibility, participation, responsiveness to learner variability, cooperation, and meaningful engagement within a shared learning environment. These dimensions represent the theoretical and interpretive framework through which changes in future support teachers' adaptive and reflective competences are examined. They should not, however, be understood as student outcomes directly measured by the questionnaire.

3. Simplicity in didactics: a paradigm for deconstructing linearity in teachers' action

Over the past decade, the intrinsic complexity of educational processes has established itself as a cornerstone of reflection and practice within Italian school contexts (Chiappetta Cajola & Ciraci, 2013; Mialaret, 2011; Rivoltella & Rossi, 2017; Sibilio, 2014), fostered by a variety of interconnected factors: social, political, economic and cultural transformations, the evolution of educational technologies, the emergence of new learning styles and preferences, and the varied conceptual and operational configurations of "difference" and "diversity." Within this scenario, overcoming causal *linearity*, conceived as an expression of a deterministic and mechanistic view of the teaching-learning process, becomes indispensable. The research trajectories developed in this direction, from Enactive Didactics (Rossi, 2011), to Neurodidactics (Rivoltella, 2012) and up to Simplex Didactics (Aiello et al., 2013; Sibilio, 2014), operate within a transdisciplinary framework, converging on the urgent need to adopt a "non-linear" mode of thought as both an interpretative and operational tool to consciously address formative complexity (Frauenfelder et al., 2013).

Didactic action, understood as a process aimed at constructing a meaningful interaction between teacher and learners, requires the educator to adapt and "*tune in*" to a multiplicity of relational and cognitive dynamics that are shaped by students' individual learning tools and cognitive repertoires (Sibilio, 2020). From this perspective, a reciprocal circularity arises, embodied in the concept of "*didactic agreement*", the dynamic space where teacher, students and environment interrelate (Brousseau & D'Amore, 2008).

The overcoming of didactic linearity is a preliminary step toward opening educational interaction to evolving logics, rather than static ones. Situated within an epistemological perspective inspired by theories of complexity (Gell-Mann, 1995; Le Moigne, 1984; Lewin, 1999; Morin, 2000) and systems theories (von Bertalanffy, 1971), *linearity* reveals its limitations by constraining learning to rigid relationships among actors, tools and situations (Sibilio, 2017; Sibilio & Zollo, 2016). It may appear as *theory-practice linearity*, which reduces teaching activity to a sequential and rigid application of theoretical models, in opposition to the "practice model" proposed by Altet (2002), where praxis is recognised as generative of new meanings.

It may also take the form of *egocentric linearity*, wherein the teacher projects their own cognitive style, resulting in

relational blindness and misalignment; *action-schema linearity*, marked by repetitive and predictable teaching sequences that lead to homogenisation; and finally, *linearity in outcome perception*, where didactic effectiveness is measured by standardised results, neglecting the uniqueness of individual learning pathways.

Considering these reflections, teacher education emerges as a privileged space for transforming educational practice (Aiello et al., 2023). Training oriented toward the simplex perspective may equip teachers with cognitive and operational tools to harness resources in a “non-linear” manner and to deconstruct rigid, stereotyped teaching models. The transposition of simplex theory to Didactics has shaped a highly metacognitive model of teaching aimed at enhancing teachers’ capacity to adapt and operate effectively within the dynamic flow of the educational process, through constant reflective practice in action that guides intentional and pedagogically informed interventions. This has led to the construction of a formative model that encourages the adoption of “non-linear” practices grounded in the principles and properties of simplicity, attentive to practical knowledge as the generative matrix of emergent contextual knowledges, thereby fostering an “acted knowledge” (Damiano, 2006).

Within this framework, the relationship between subject-specific didactics and special education requires particular attention. In this paper, these domains are not considered as two separate, parallel or sequential forms of teaching. Subject-specific didactics concern the epistemological structure of disciplinary knowledge, the identification of educational objectives and the selection of the languages, representations and activities through which disciplinary content may become accessible to all learners. Special education contributes theoretical and methodological knowledge concerning individual functioning, learner variability, barriers to participation and the forms of mediation that may support meaningful engagement in shared learning experiences.

Their relationship is therefore dynamic and recursive. Considerations emerging from special and inclusive education may lead teachers to reconsider not only the accessibility of disciplinary content, but also the ways in which that content is selected, represented, experienced and assessed. Conversely, the epistemological and methodological characteristics of each discipline may influence the selection of appropriate inclusive mediations. Inclusive teaching is possible only thanks to the interaction between disciplinary intentionality and attention to learner variability from the initial stages of didactic design. In this sense, the theory of simplicity may serve as a *trait d’union* between general, subject-specific and special education didactics (Zollo, 2018; Zollo et al., 2021). Its properties and principles may allow the teachers to maintain coherence with common disciplinary objectives while modifying pathways, resources, interactional structures, communicative channels and forms of participation. The relationship between subject-specific didactics and special education is thus understood as a process of reciprocal transformation where inclusive mediation may modify the disciplinary proposal, while the structure of disciplinary knowledge may give educational meaning and direction to the mediation itself.

Within this framework, as clarified in the following lines, the application of simplex theory to didactic practice (Aiello, 2012, 2013; Sibilio, 2012, 2015a, 2015b, 2023) may orient educational action in complex and inclusive contexts through the

adoption of specific operational properties. Firstly, *specialisation* and *modularity* may enable the categorisation of complex tasks into simpler, manageable units that, when appropriately recomposed, generate coherent and meaningful outcomes. Translated into teacher education, this dynamic becomes the capacity to design teaching pathways articulated into interdependent phases that gradually guide students toward complex learning goals without losing coherence and purpose. Then, *Rapidity* emerges as a strategic competence to promptly respond to unforeseen events and signs of distraction or disengagement by adopting immediate solutions that maintain the continuity of the formative process. During initial educational processes, this may be supported through exercises simulating real scenarios, training future teachers to rapidly intervene without losing sight of pedagogical objectives. Likewise, *reliability* pertains to minimising errors and maximising opportunities for success by differentiating teaching strategies and assessment modes according to students’ diverse cognitive and learning styles. In teacher education, this property entails developing a repertoire of inclusive practices that guarantee each learner encouraging conditions for achieving educational objectives. Similarly, the trio of *flexibility*, *vicariousness* and *adaptation to change* expresses the necessity of selecting, among a broad array of options, the strategy most appropriate to stimuli emerging from the context and modifying it as needed to suit students’ interests and inclinations.

Teacher training, in this sense, becomes a space for experimentation and reflection aimed at consolidating the capacity to modulate educational action in real time. Moreover, *memory* is a fundamental resource for didactic action, as it enables drawing from prior experience to anticipate problematic behaviours and prepare a range of effective responses. In teacher education, this competence is nurtured through critical reflection on experiences and case analysis, facilitating the construction of a transferable strategy repertoire. Finally, *generalisation*, understood as the ability to transfer interaction models and operational solutions from one context to another, allows capitalising on acquired knowledge and skills to address emerging situations, a hallmark of inclusive classrooms. In training pathways, this means supporting teachers in recognising analogies and differences between contexts, transforming experience into transversal and reusable competence. These properties, framed within the theory of simplicity, are not merely distinctive traits of effective didactic action but constitute strategic objectives for both initial and ongoing teacher education, guiding professional development toward an operational mastery capable of sustaining teaching in all its complexity.

Closely connected to the operational properties of simplicity, the rules underpinning its educational application provide further coordinates for guiding teachers’ actions in complex contexts, contributing to defining a professional stance capable of integrating methodological rigour with creative adaptability. The rule of *inhibition* and *rejection* expresses the need, in the decision-making process, to exclude or inhibit all unselected alternatives. In educational settings, this implies suspending automatic and habitual solutions, thereby opening space for creative pathways and the construction of original strategies, a skill that initial teacher education can cultivate through activities stimulating divergent thinking and critical reflection on professional routines. The rule of *specialisation* and *selection* refers to the capacity, characteristic of living organisms, to parsimoniously select essential information for achieving a purpose. In didactic practice, this

translates to proposing stimuli capable of capturing students' interests and organising information in a targeted manner, thus avoiding cognitive dispersion. In teacher education, this competence manifests as the ability to design environments and educational materials calibrated to formative needs, balancing completeness with focus. The rule of *cooperation and redundancy* emphasises the value of integrating information from multiple sources to ensure coherence and reliability, while redundancy guarantees repeatability and reduces error margins. In teacher education, this translates to orchestrating diverse resources, languages, and tools to construct a robust and inclusive didactic fabric, wherein strategic reiteration of content strengthens learning without devolving into mere repetition. The rule of *probabilistic anticipation* manifests in the planning of didactic activities when the teacher formulates predictions about educational outcomes, weighing the advantages and risks of different choices. Initial teacher education can foster the development of predictive competences grounded in a careful analysis of variables, promoting a conscious and flexible decision-making approach. The rule of *deviation* introduces the possibility of making *non-linear* choices by adopting complex solutions to render a problem manageable or sometimes to simplify its management. In training, this means encouraging teachers to explore alternative paths, overcoming rigid constraints and experimenting with innovative modes of organising learning. Finally, the rule of *sense* highlights the ordering function of goals and purposes, establishing a profound link between action and the intention that sustains it. In training pathways, this rule provides opportunities for future teachers to practise intentional design, ensuring that every didactic choice is supported by clear coherence among objectives, content, and methods. Taken together, these principles offer an operational grammar that, intertwined with the properties of simplicity, helps shape a teaching professionalism capable of acting within complexity with awareness, flexibility and critical sense, transforming the challenges of educational contexts into opportunities for growth and innovation.

4. Methodology

4.1. Objective

This study aims to explore changes in future support teachers' perceptions of their didactic practices before and after attending a training course on Simplex Didactics and completing related exercises. More specifically, it investigates whether the training may contribute to the development of reflective and adaptive competences associated with the principles and properties of simplicity.

The training was designed to encourage participants to reconsider their didactic decision-making in relation to contextual variability, disciplinary objectives and learners' different forms of participation. Therefore, the study examines whether simplex-oriented training may support forms of didactic design with potential implications for inclusive processes. It does not directly assess changes in students' participation, learning outcomes or inclusion.

The hypotheses tested were as follows:

H₀: There is no significant difference between pre-training and post-training scores.

H₁: There is a significant difference between pre-training and post-training scores.

4.2. Sample

The sample comprised 295 future learning support teachers who voluntarily and anonymously participated in the study. All participants were informed about the aims of the research and provided their consent before completing the questionnaire. Data were collected and analysed in aggregate form, ensuring confidentiality and compliance with ethical standards for educational research.

This study specifically presents the results of data gathered in the 2020–2021 academic year. In fact, participants were enrolled in the eighth cycle of the Specialisation course for those wishing to obtain the qualification required to work as learning support teachers in Italian schools^[1].

The sample consists of 295 participants. Regarding gender, 213 participants (72.2%) identified as women and 46 participants (15.6%) as men, while 36 participants (12.2%) preferred not to specify their gender. In terms of age, 80 participants (27.1%) were aged 20–25 years, 90 (30.5%) 26–30 years, 65 (22.0%) 31–35 years, 40 (13.6%) 36–40 years, and 20 (6.8%) were over 40. As for educational qualifications, 120 participants (40.7%) reported holding a bachelor's degree, 110 (37.3%) a master's degree, and 65 (22.0%) other teaching qualifications or professional certifications. Teaching experience varied considerably within the sample: 50 participants (16.9%) reported no prior teaching experience, 70 (23.7%) had one year of experience, 85 (28.8%) had between two and four years, and 90 (30.5%) had been teaching for five or more years.

Finally, considering the school level at which participants were working or intended to work, 80 participants (27.1%) were associated with secondary education, 50 (16.9%) with primary education, 95 (32.2%) with preschool, and 70 (23.7%) with other levels of education.

4.3. Instrument

The questionnaire used consists of 32 items that measure the properties and principles of simplex teaching (Zollo et al., 2018), using a 5-point Likert scale ranging from "not at all relevant" to "very relevant".

The questionnaire comprises two sections: the first is designed to gather information on the socio-demographic characteristics of the participants. The second consists of 32 items, 29 of which were developed based on the properties and principles of simplicity applied to teaching, while the other 3 items describe characteristics of teaching that are not covered by the simplex approach and are included for control purposes only.

4.4. Procedure

A 30-hour training course was held as part of the module "Special Education: metacognitive and cooperative approach", focusing on themes related to divergent thinking and the simplex approach.

At the beginning of the course, each participant was asked to complete the questionnaire designed to assess their current teaching practices.

The first ten hours were then dedicated to the topic of cooperative learning and divergent thinking. This was followed by training on simplex teaching, consisting of five hours of theoretical classes on simplicity and the Simplex Didactics framework (Berthoz, 2011; Sibilio, 2014) and fifteen hours of hands-on activities. During the practical sessions,

participants engaged in exercises where they were asked to apply the properties and principles of simplicity within general, special, and subject-specific teaching contexts.

In the exercises, these dimensions were not presented as separate areas of intervention. Participants were asked to maintain a common disciplinary learning purpose while identifying the mediations required to respond to learner variability and support participation in the shared activity. Moreover, each participant based their work on a classroom scenario of their own choosing.

The exercises were completed individually but were accompanied by periodic group discussions and feedback sessions with peers and the teacher. After completing the training activities, participants were asked to complete the same questionnaire again, to evaluate any changes in their teaching practices resulting from the training.

4.5. Data Analysis

The data analysis explored participants' responses to the questionnaire and their application of simplex principles and properties within subject-specific and special education didactics.

More particularly, descriptive statistics were first employed to summarise the key characteristics of the data, providing an overview of central tendencies and variability (Table 1). Then, inferential statistics (Table 2) were conducted to explore any differences between pre- and post-training scores within the same group. Descriptive statistics and t-tests indicated significant changes following the training. In fact, several items showed highly significant differences between pre- and post-test scores, leading to rejection of the null hypothesis of no change. Firstly, participants seemed to change their perceptions of the importance of acting rapidly (Q5, $t = -9.66$; $p = 5.83e-18$; Median increase from 3 to 4) taking greater account of learners' demands and needs during didactic interaction. With an equivalent median shift and a modest reduction in dispersion, a similar trend also emerged for the ability to inhibit action (Q18), suggesting increased awareness of the importance of a reflective stance. This is important because it may foster the development of self-regulated teaching, helping future learning support teachers to avoid *linear forms of teaching* (Sibilio & Zollo, 2016) and move beyond routines through more intentional and context-responsive practices that may allow them to align teaching strategies with the complexity of the educational setting and the heterogeneity of educational needs. Lastly, the competence of probabilistic anticipation (Q25) also reached statistical significance. This result may suggest that the training may also strengthen teachers' ability to act according to predictive planning, anticipating the expected outcomes of the teaching-learning process and assigning anticipatory meaning to specific elements. Overall, rapid decision-making and inhibition effectively seemed to be fostered by the training encouraging more consistent and adaptive professional reasoning within complex educational contexts.

In contrast, several items showed minimal or no change between pre- and post-training phases, indicating that specific competencies may already be consolidated or may require more extended practice to be significantly developed. The ability to intentionally employ multiple teaching actions to address a shared goal showed a trend toward statistical significance but did not reach the threshold (Median = 4), with a marginal reduction in variability. Likewise, the competence to modify objectives during the teaching process

remained unchanged, maintaining a high median and a slight decrease in standard deviation, suggesting participants' prior mastery of adaptive goal setting. Lastly, the capacity to attribute meaning to didactic interactions showed no variation in central tendency but a modest increase in dispersion, indicating a variation of interpretive perspectives.

In general, these findings suggest that, while the training may have reinforced flexibility and reflection, in line with Schön's (1983) concept of reflective practice, other dimensions of adaptive competence may already have been well internalised or may require more extensive training and practical experience.

Instead, the selection of teaching proposals generated by students during the practical exercises was analysed according to their alignment with the theoretical frameworks underpinning disciplinary didactics and special education didactics (Table 3–6). This quali-quantitative approach served as a tool to monitor and explore how effectively participants integrated core didactic principles and operational features into their pedagogical choices.

4.6. Qualitative outcomes of the exercise of simplicity

The qualitative analysis of the exercises conducted during the training phase reveals a coherent enhancement in teachers' capacity to operate within non-linear and adaptive didactic frameworks consistent with the theoretical principles of simplex didactics. The examples developed by participants, as reported in Tables 3–6, show that the application of simplex properties and principles, particularly those concerning *speed, inhibition and rejection, flexibility and adaptation to change*, led to a more dynamic and inclusive conception of teaching, where responsiveness, intentionality and creativity were harmoniously integrated into structured pedagogical action.

A first significant outcome concerns the property of *speed* (Table 3), which emerged as one of the most markedly transformed dimensions following the training. The qualitative examples produced by participants suggest an increasing ability to translate theoretical understanding of rapidity into effective classroom practice. In the case of the literature lesson focused on bullying and cyberbullying, the teacher's capacity to perceive students' disengagement and reconfigure the activity in real time, moving from passive viewing of multimedia materials to the active creation of short sketches, exemplifies this property. The shift from reception to production motivated students and transformed the lesson into a participatory and emotionally resonant experience. In the corresponding special education example, the teacher's prompt adjustment of communicative channels according to students' sensory profiles shows how rapidity does not imply haste but rather the timely calibration of didactic strategies in response to contextual feedback. This balanced and mindful responsiveness represents the essence of simplex rapidity, a form of action that maintains coherence with educational goals while adapting fluidly to evolving conditions.

The rule of *inhibition and rejection* (Table 4) also displayed a tangible evolution in participants' work. The examples highlight a growing metacognitive awareness of the pedagogical value of restraint and self-regulation. In the geometry lesson based on the Tangram, the teacher's decision to suspend a purely theoretical exposition in favour of a tactile and game-based experience illustrates the principle of rejecting ineffective methods when faced with students' declining attention. The cognitive shift lies in the teacher's readiness to inhibit habitual instructional impulses such as verbal repetition and

Simplex properties and rules		Pre-Course			Post-course		
		M	Mdn	SD	M	Mdn	SD
Q1	Function separation and modularity	4.00	4	0.842	4.16	4	0.833
Q2	Control	3.83	4	0.982	3.93	4	0.892
Q3	Function separation and modularity	3.45	4	0.949	3.78	4	0.913
Q4	Function separation and modularity	3.52	4	0.968	3.91	4	0.883
Q5	Speed	2.67	3	1.271	3.99	4	1.082
Q6	Speed	4.49	5	0.778	4.45	5	0.799
Q7	Control	4.02	4	0.953	3.98	4	1.020
Q8	Flexibility and adaptation to change	4.64	5	0.627	4.59	5	0.608
Q9	Flexibility and adaptation to change	4.77	5	0.450	4.68	5	0.568
Q10	Reliability	3.65	4	1.015	4.05	4	0.893
Q11	Control	3.29	3	1.048	3.64	4	1.016
Q12	Probabilistic anticipation	3.81	4	0.982	4.07	4	0.905
Q13	Memory	3.91	4	0.937	4.25	4	0.775
Q14	Memory	4.07	4	0.818	4.22	4	0.755
Q15	Cooperation and redundancy	3.97	4	0.925	4.13	4	0.807
Q16	Generalization	3.49	4	0.997	3.72	4	0.997
Q17	Generalization	3.61	4	0.973	3.95	4	0.847
Q18	Inhibition and rejection principle	2.69	3	1.326	3.48	4	1.305
Q19	Specialization and selection	4.38	5	0.912	4.35	5	0.835
Q20	Inhibition and rejection principle	4.03	4	0.881	4.23	4	0.838
Q21	Specialization and Selection	4.60	5	0.556	4.43	5	0.655
Q22	Probabilistic anticipation	3.93	4	1.029	4.30	4	0.735
Q23	Probabilistic anticipation	3.78	4	0.829	4.12	4	0.780
Q24	Inhibition and rejection	3.93	4	1.067	4.23	4	0.858
Q25	Probabilistic anticipation	3.44	4	1.023	4.02	4	0.897
Q26	Flexibility and adaptation to change	4.60	5	0.668	4.48	5	0.641
Q27	Deviation	4.77	5	0.475	4.55	5	0.674
Q28	Cooperation and redundancy	3.95	4	0.931	4.19	4	0.789
Q29	Cooperation and redundancy	4.53	5	0.622	4.41	5	0.703
Q30	Cooperation and redundancy	4.11	4	0.919	4.24	4	0.894
Q31	Sense	4.57	5	0.581	4.55	5	0.649
Q32	Sense	4.24	4	0.823	4.43	5	0.663

Table 1. Data Analysis.

Property and rule	Item	T-test	P-value
Function separation and modularity	Q1	-1.85	0.065900
Control	Q2	-0.97	0.331800
Function separation and modularity	Q3	-3.44	0.000738
Function separation and modularity	Q4	-3.94	0.000116
Speed	Q5	-9.66	5.83×10^{-18}
Speed	Q6	0.46	0.649000
Control	Q7	0.40	0.691000
Flexibility and adaptation to change	Q8	0.79	0.433000
Flexibility and adaptation to change	Q9	1.68	0.095400
Reliability	Q10	-4.00	0.000301
Control	Q11	-3.00	0.002220
Probabilistic anticipation	Q12	-2.00	0.014100
Memory	Q13	-4.00	0.000396
Memory	Q14	-2.00	0.085100
Cooperation and redundancy	Q15	-2.00	0.079200
Generalization	Q16	-2.00	0.043100
Generalization	Q17	-3.00	0.000742
Inhibition and rejection principle	Q18	-6.00	1.71×10^{-8}
Specialization and selection	Q19	0.00	0.741000
Inhibition and rejection principle	Q20	-2.00	0.029800
Specialization and selection	Q21	3.00	0.012000
Probabilistic anticipation	Q22	-4.00	0.000224
Probabilistic anticipation	Q23	-4.00	0.000138
Inhibition and rejection principle	Q24	-2.80	0.005660
Flexibility and adaptation to change	Q25	-5.56	1.00×10^{-7}
Control	Q26	1.64	0.102000
Deviation	Q27	3.65	0.000346
Cooperation and redundancy	Q28	-2.61	0.009850
Cooperation and redundancy	Q29	1.76	0.080000
Cooperation and redundancy	Q30	-1.26	0.208000
Sense	Q31	0.43	0.670000
Sense	Q32	-2.30	0.022500

Table 2. T-Test results.

Subject Teaching	Special Education
Literature. On the occasion of the international day dedicated to bullying and cyberbullying, the teacher shows the class a digital presentation with images and videos to facilitate understanding and internalization of the topics. Shortly after, the teacher notices that students are not very interested in the projected content; to regain attention, he/she “transforms” them into real “directors” , asking them to write and produce sketches that respect the theme. Then, the students present their work to the class; later, using role-playing methodology, they choose actors to perform the most representative scene of cyberbullying.	The teacher, to stimulate the attention of a student with mild cognitive difficulties, will quickly change the explanation method based on feedback. He/she will show images and short videos on the interactive whiteboard and involve the class in a practical activity of reproducing graffiti and cave paintings. For a hearing-impaired student, the teacher will adapt communication using visual stimuli and guide them in a group activity. For a visually impaired student, the teacher will use voice tone and simple videos to explain the steps of the activity, supported by peers and the teacher. Students will manipulate clay to create small statues of prehistoric “Venuses.” This guided discovery will allow all students to produce their own cave artworks.

Table 3. Property of Speed: some examples of Didactic transposition of the most influenced simplex properties.

Subject Teaching	Special Education
Geometry. The teacher begins a lesson on equivalent and isoperimetric figures. Noticing a loss of interest, the teacher quickly changes the approach, offering concrete experiences that open students’ minds to mathematical thinking, favouring visual, tactile, and playful activities. The topic is explained using the Tangram game, an ancient Chinese puzzle made of seven geometric shapes. Students create the pieces and use them to form various figures, all occupying the same surface area.	Hearing impairment, technical drawing, second grade. The teacher must further inhibit the impulse to directly intervene in the student’s drawing, especially since verbal guidance is not possible. Instead, the teacher may guide the student’s hand on a separate sheet to demonstrate pressure and technique, then allow the student to work independently on their own drawing.

Table 4. Rule of Inhibition and Rejection: Some examples of Didactic transposition of the most influenced simplex rules.

to embrace an alternative approach that privileges active construction of knowledge. The second case, involving a hearing-impaired student in a technical drawing class, develops this reflection further. Here, the teacher deliberately resists the instinct to correct the student’s work directly, opting instead for indirect demonstration through kinaesthetic mediation. This strategy reflects the internalisation of simplex logic, where the deliberate exclusion of immediate but potentially counterproductive actions fosters autonomy and self-confidence in learners. In this sense, inhibition becomes a pedagogical strength, a sign of intentional control rather than omission, allowing the teacher to manage complexity through selective restraint.

The property of flexibility and adaptation to change embodies the essence of the simplex approach, where the teacher acts as an adaptive organism balancing structure and improvisation. In physical and special education contexts (Table 5), flexibility manifests through variable activities, task substitution, and creative responses to unforeseen conditions, transforming unpredictability into learning opportunities. Similarly, in music education (Table 6), guided improvisation exemplifies adaptive teaching by integrating cooperation, digital tools, and multimodal engagement. For students with sensory or motor challenges, rhythmic and communicative adjustments maintain coherence while promoting inclusion as a creative process rather than mere compensation. Across all exercises, teachers evolved from reactive adjustment to proactive adaptability, perceiving classroom complexity as a living system to engage with. Flexibility, combined with the simplex properties of speed and inhibition, enables rapid yet reflective decision-making, fostering a professional identity that is strategically fluid, responsive, and grounded in coherent educational purpose.

Furthermore, the relationship between subject-specific didactics and special education emerging from the exercises represents a central element of the qualitative findings. The presentation adopted in Tables 3–6 should not be interpreted as evidence of two separate forms of teaching (one addressed to the class and another specifically addressed to students with disabilities or special educational needs). Rather, it constitutes an analytical tool proposed to make visible

the reciprocal contribution of disciplinary intentionality and inclusive mediation within the same process of didactic design.

The subject-specific dimension identifies the disciplinary content, the common learning purpose and the epistemological characteristics of the activity. The special and inclusive education dimension highlights the potential barriers emerging from learner variability and the mediations through which participation, accessibility, autonomy and meaningful engagement may be supported. The two dimensions remain interdependent. More specifically, mediation modifies the way in which disciplinary content is represented and experienced, whereas the disciplinary objective inhibits the inclusive intervention from becoming a generic or merely compensatory activity.

The examples suggest that participants progressively interpreted inclusion as an intrinsic quality of teaching rather than as an additional intervention to be implemented after disciplinary planning. Through the application of simplex properties and principles, they attempted to maintain common educational purposes while differentiating communicative channels, materials, interactional structures, levels of support, and modes of participation. In this sense, Simplex Didactics appears to support movement between unity and differentiation, disciplinary coherence and contextual adaptation, enabling teachers to respond to individual needs without separating learners from the shared educational experience.

Taken together, the qualitative outcomes indicate that the training in simplex didactics promoted a shift from linear planning toward emergent and reflective design. Participants showed growing confidence in reconfiguring their didactic actions in response to real-time feedback and in employing inhibition and flexibility as complementary strategies. The examples of literature, geometry, physical education, and music reveal how simplex properties can transform classroom uncertainty into a pedagogical opportunity, fostering inclusion through adaptive intentionality. What finally emerges is the image of a reflective practitioner who acts swiftly yet consciously and adapts without losing direction, embodying the simplex principle that complexity can be navigated not through reduction, but through intelligent simplification.

Subject Teaching	Special Education
During physical education lessons, students experience flexibility through various playful activities, such as throwing objects of different shapes and weights, aiming at moving targets, or running to changing rhythms. The teacher must also be flexible in adapting to unexpected situations, such as uneven team numbers or a student's difficulty in performing a task.	In cases of ASD, cognitive rigidity may hinder flexibility. A common strategy is the use of illustrated strips showing daily activities. In case of sudden changes, the student can replace a task card with another. The teacher must also adapt to other daily challenges, like weather changes. For example, if a student enjoys rain and is distracted by it, the teacher can incorporate math tasks related to puddles seen outside the window.

Table 5. Property of Flexibility and Adaptation to Change (1): Some examples of Didactic transposition of the most influenced simplex properties or rules.

Subject teaching	Special education
The professional profile of a lower secondary school teacher is complex, requiring motivation and the creation of engaging learning environments. A music teacher might conduct a workshop focused on guided improvisation, using idiomatic figures and fixed positions on instruments to foster dialogue and mutual support. Students with sensory-motor difficulties could play a simplified rhythmic pattern, feeling responsible and motivated. This approach values individual abilities and stimulates multiple intelligences (Gardner). The teacher acts as a facilitator, promoting self-evaluation and cross-disciplinary musical skills aligned with European and citizenship competencies.	If students show little interest, the teacher may change the methodology using ICT. In a group music lesson, the teacher could analyze Bach's "minuet in G major" to explain classical music structure and tonal language. After listening, students share impressions and engage in brainstorming to analyze rhythm, tonality, and form. This interdisciplinary approach connects music with history and geography. For special education, a student with psycho-sensory issues could listen via the interactive whiteboard, sing by imitation, and learn rhythm through clapping and wooden sticks. Students could then form small groups for a rhythmic dialogue game, promoting respect and listening.

Table 6. Property of Flexibility and Adaptation to Change (2): Some examples of Didactic transposition of the most influenced simplex properties or rules.

5. Discussion and future perspectives

The results show significant pre- and post-training differences in selected dimensions associated with adaptive competence and professional decision-making. Changes emerged in relation to rapidity of action, inhibition and probabilistic anticipation. These findings suggest an association between participation in the Simplex Didactics training and changes in how future support teachers perceived and represented their didactic decision-making. Given the exploratory design of the study and the absence of a control group, these differences cannot be interpreted as evidence of a causal effect of the training. Nevertheless, they may provide indications that simplex-oriented teacher education may support the development of reflective and adaptive orientations relevant to complexity-sensitive teaching. Such approaches can also contribute to inclusive didactic design by assisting teachers in anticipating challenges, reconsidering habitual responses, and adapting instructional paths while remaining in line with shared learning objectives.

Simplex properties (like inhibition, probabilistic anticipation and rapidity of action) showed significant improvements, suggesting that the capacity to control teaching action in response to contextual factors may have improved. These modifications are particularly pertinent in the context of complexity-oriented education, where instruction should be considered as a dynamic, adaptive and context-sensitive process rather than being reduced to linear, preset sequences (Sibilio, 2014; Sibilio & Zollo, 2016). Furthermore, as stated by several researchers (Aiello et al., 2023; Ainscow, 2005; Florian, 2022), effective teaching in inclusive systems requires teachers to continuously anticipate, adjust and reorganise their actions in response to changing educational needs. More precisely, gains in quick decision-making (Q5) correspond with the simplex property of speed and showed a better capacity to react to learners' needs in a timely and cohesive manner. This aptitude is a crucial requirement for preserving consistency and continuity in the teaching-learning process, especially in inclusive settings that are marked by unpredictability and variability. Similarly, increases in the capacity to inhibit action (Q18) suggest a developing understanding of the strategic importance of breaking automatic or habitual reactions for more

deliberate decisions. This is consistent with the theoretical framework of Simplexity (Berthoz, 2011) and Simplex Didactics (Sibilio, 2020; Sibilio & Zollo, 2016) where the rule of inhibition in teaching highlights the significance of avoiding routines to enhance creative and adaptive pedagogical responses (Aiello et al., 2023; Giaconi et al., 2024; Jordan, 2016; Loi & Dillon, 2006; McKinnon, 2013; Su et al., 2004; Zollo et al., 2015).

Additionally, the increased consistency in probabilistic anticipation (Q25) may be a sign of a growing predictive competence, which is defined as the capacity to plan instructional activities and mentally model potential outcomes (Berthoz, 2011; Sibilio, 2020; Sibilio & Zollo, 2016). As demonstrated by Kunde et al. (2007), acting without anticipation is impossible and, within the educational field, it is pivotal to support teachers in reflecting, before and during action, on how to anticipate possibilities, outcomes and contingencies in teaching in order to foster both learning and the full participation of all students. Moreover, according to Aiello et al. (2023), anticipation is a crucial tool that educators may employ to manage uncertainty and turn experience into a predictive tool that directs decision-making according to contextual peculiarities. A teacher's professional development as an adaptable agent capable of handling the inherent complexity of educational environments may also benefit from this competency.

However, the minor improvements observed in specific properties and principles might imply that certain competencies have already been largely developed or that they may require a longer training period and ongoing opportunities for application in real-life educational environments. The findings are consistent with the view that teachers' professional competences develop progressively through repeated experiences of reflection before, during, and after action (Schön, 1983).

Furthermore, findings support the view that Simplex Didactics training may promote more flexible and adaptive teaching methods that take into account the educational complexities that characterise inclusive classrooms and, in general, the teaching-learning process. These competences may contribute to inclusive processes by enabling teachers to anticipate possible barriers, diversify forms of mediation, and respond to learner variability without losing sight of common educational purposes. However, the study does

not provide direct evidence of changes in classroom practice, students' participation, or learning outcomes. The findings should therefore be interpreted in light of the exploratory pre- and post-training design, the absence of a control group, the reliance on self-reported questionnaire responses, and the analysis of didactic proposals rather than observed classroom practices.

Further studies will be conducted to explore the long-term effects of simplex-oriented training using longitudinal designs that may examine how this approach can be applied in different educational settings.

Endnotes

1. In Italy, the specialization course for future learning support teachers comprises 60 ECTS credits, structured as follows: 2 ECTS are dedicated to Didactics and Special Pedagogy of Developmental Disorders, specifically focusing on Autism Spectrum Disorder (ASD); 18 ECTS cover broader areas of Didactics and Special Pedagogy, including classroom management in inclusive settings, the design of individualized education plans and life projects, strategies to support students with sensory impairments and intellectual disabilities, as well as metacognitive approaches and cooperative learning. Additionally, 9 ECTS are allocated to laboratory-based activities, and 6 ECTS are assigned to the indirect practicum (apprenticeship), which incorporates training in Information and Communication Technology (ICT). For further details, see DM 249/2010 and DM 30 September 2011, Annexes B–C; see also the related discussion (Aiello et al., 2014). ↑

References

- Aiello, P. (2012). *Il cammino della ricerca didattica sul corpo in movimento verso la semplicità: Aspetti epistemologici e metodologici*. Pensa.
- Aiello, P. (2013). La semplicità del transmedia digital storytelling per promuovere l'apprendimento della lingua inglese negli studenti dislessici. In M. Sibilio (Ed.), *La didattica semplice*. Liguori.
- Aiello, P., Corona, F., & Sibilio, M. (2014). Ipotesi di evoluzione funzionale dell'insegnante di sostegno in Italia. *Italian Journal of Special Education for Inclusion*, 2(2), 21–34. <https://ojs.pensamultimedia.it/index.php/sipes/article/view/1509>
- Aiello, P., Di Gennaro, D. C., Sibilio, M., & Zollo, I. (2017). Il concetto di autodeterminazione in una prospettiva semplice: Possibili implicazioni per l'agire didattico dei docenti. *Educational Reflective Practices*, 2017(1), 96–109. <https://doi.org/10.3280/ERP2017-001007>
- Aiello, P., Di Tore, S., Di Tore, P. A., & Sibilio, M. (2013). Didactics and simplicity: Umwelt as a perceptive interface. *Education Sciences & Society*, 2013(1), 27–35. <https://doi.org/10.1400/214334>
- Aiello, P., Pace, E. M., & Sibilio, M. (2023). A simplex approach in Italian teacher education programmes to promote inclusive practices. *International Journal of Inclusive Education*, 27(10), 1163–1176. <https://doi.org/10.1080/13603116.2021.1882056>
- Aiello, P., Sharma, U., & Sibilio, M. (2016). La centralità delle percezioni del docente nell'agire didattico inclusivo: Perché una formazione docente in chiave semplice? *Italian Journal of Educational Research*, 16, 11–22.
- Ainscow, M. (2005). Developing inclusive education systems: What are the levers for change? *Journal of Educational Change*, 6(2), 109–124. <https://doi.org/10.1007/s10833-005-1298-4>
- Altet, M. (2002). Une démarche de recherche sur la pratique enseignante: L'analyse plurielle. *Revue française de pédagogie*, 138, 85–93. <https://doi.org/10.3406/rfp.2002.2866>
- Bakker, C. (2016). Professionalization and the quest how to deal with complexity. In C. Bakker & N. M. Montessori (Eds.), *Complexity in education* (pp. 9–29). Brill. https://doi.org/10.1007/978-94-6300-764-1_2
- Berthoz, A. (2011). *La semplicità*. Codice.
- Boscolo, P. (2006). *La motivazione ad apprendere*. Il Mulino.
- Brousseau, G., & D'Amore, B. (2008). I tentativi di trasformare analisi di carattere meta in attività didattica: Dall'empirico al didattico. In B. D'Amore & F. Sbaragli (Eds.), *Didattica della matematica e azioni d'aula: Atti del XXII Convegno Nazionale "Incontri con la matematica", Castel San Pietro Terme, 7–9 novembre 2008* (pp. 3–14). Pitagora.
- Cajola, L. C., & Ciraci, A. M. (2013). *Didattica inclusiva: Quali competenze per gli insegnanti?* Armando.
- Damiano, E. (2006). *La nuova alleanza: Temi, problemi e prospettive della "nuova ricerca didattica"*. La Scuola.
- Davis, B., & Sumara, D. (2012). Fitting teacher education in/to/for an increasingly complex world. *Complicity: An International Journal of Complexity and Education*, 9(1), 30–40. <https://doi.org/10.29173/cmplct16531>
- Di Tore, S., Aiello, P., Sibilio, M., & Berthoz, A. (2020). Simplex didactics: Promoting transversal learning through the training of perspective taking. *Journal of e-Learning and Knowledge Society*, 16(3), 34–49. <https://doi.org/10.20368/1971-8829/1135259>
- Florian, L. (2022). Preparing teachers for inclusive education. In M. A. Peters (Ed.), *Encyclopedia of teacher education* (pp. 1374–1379). Springer Nature. https://doi.org/10.1007/978-981-16-8679-5_39
- Frauenfelder, E., Rivoltella, P. C., Rossi, P. G., & Sibilio, M. (2013). Bio-education, simplicity, neuroscience and enactivism: A new paradigm? *Education Sciences & Society*, 2013(1), 11–25. <https://doi.org/10.1400/214332>
- Gardner, H. (2006). *Five minds for the future*. Harvard Business School Press.
- Gell-Mann, M. (1995). Let's call it plectics. *Complexity*, 1(5), 3. <https://doi.org/10.1002/cplx.6130010502>
- Giacconi, C., Taddei, A., Del Bianco, N., Alesi, B., Domi, A., & Santoro, A. (2024). Progettazione di percorsi inclusivi per una qualità della vita. *FOR. Rivista per la formazione*, 2, 24–26. <https://doi.org/10.3280/for2024-002oa18488>
- Jordan, M. E. (2016). Teaching as designing: Preparing pre-service teachers for adaptive teaching. *Theory Into Practice*, 55(3), 197–206. <https://doi.org/10.1080/00405841.2016.1176812>
- Kunde, W., Elsner, K., & Kiesel, A. (2007). No anticipation—no action: The role of anticipation in action and perception. *Cognitive Processing*, 8(2), 71–78. <https://doi.org/10.1007/s10339-007-0162-2>
- Lakoff, G. (1993). The contemporary theory of metaphor. In A. Ortony (Ed.), *Metaphor and thought* (2nd ed., pp. 202–251). Cambridge University Press. <https://doi.org/10.1017/CBO9781139173865.013>
- Le Moigne, J. L. (1984). The intelligence of complexity. In *The science and praxis of complexity* (pp. 35–61). United Nations University. <https://unesdoc.unesco.org/ark:/48223/pf0000067103>
- Lewin, K. (1999). The dynamics of group action. In M. Gold (Ed.), *The complete social scientist: A Kurt Lewin reader* (pp. 285–291). American Psychological Association. <https://doi.org/10.1037/10319-011>
- Loi, D., & Dillon, P. (2006). Adaptive educational environments as creative spaces. *Cambridge Journal of Education*, 36(3), 363–381. <https://doi.org/10.1080/03057640600865959>
- McKinnon, J. (2013). The pedagogy of adaptation: Using specialised disciplinary knowledge to develop creative skills. *Journal of*

- Perspectives in Applied Academic Practice*, 1(2), 54–60. <https://doi.org/10.14297/jpaap.v1i2.41>
- Mialaret, G. (2011). Savoirs théoriques, savoirs scientifiques et savoirs d'action en éducation. In J. M. Barbier (Ed.), *Savoirs théoriques et savoirs d'action* (pp. 161–187). Presses Universitaires de France. <https://doi.org/10.3917/puf.barbi.2011.01.0161>
- Morin, E. (1994). La sfida della complessità. *Lettera internazionale: rivista trimestrale europea*, 39-40, 102–104.
- Morin, E. (2000). *La testa ben fatta: Riforma dell'insegnamento e riforma del pensiero*. Raffaello Cortina.
- Osberg, D. (2010). Taking care of the future. In D. Osberg & G. Biesta (Eds.), *Complexity theory and the politics of education* (pp. 153–166). Brill. https://doi.org/10.1163/9789460912405_014
- Rivoltella, P. C. (2012). *Neurodidattica: Insegnare al cervello che apprende*. Raffaello Cortina.
- Rivoltella, P. C., & Rossi, P. G. (2017). *L'agire didattico: Manuale per l'insegnante*. ELS La Scuola.
- Rossi, P. G. (2011). *Didattica enattiva: Complessità, teorie dell'azione, professionalità docente*. FrancoAngeli.
- Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. Basic Books.
- Sibilio, M. (2012). *La dimensione semplessa dell'agire didattico: Traiettorie non lineari nella ricerca. Nuovi scenari interdisciplinari*. Pensa.
- Sibilio, M. (2014). *La didattica semplessa*. Liguori.
- Sibilio, M. (2015a). La didattica semplessa: Una traiettoria non lineare della ricerca educativa. *Revue de Synthèse*, 136(3–4), 477–493. <https://doi.org/10.1007/s11873-015-0284-4>
- Sibilio, M. (2015b). La funzione orientativa della didattica semplessa. *Pedagogia Oggi*, 13(1), 327–334.
- Sibilio, M. (2017). *Vicarianza e didattica: Corpo, cognizione, insegnamento*. La Scuola.
- Sibilio, M. (2020). *L'interazione didattica*. Morcelliana.
- Sibilio, M. (2023). *La semplessità: Proprietà e principi per agire il cambiamento*. Morcelliana.
- Sibilio, M., Aiello, P., & Corona, F. (2013). Una didattica “semplessa” per i disturbi specifici dell'apprendimento. In *DSA: Elementi di didattica per i bisogni educativi speciali* (Vol. 1, pp. 53–67). ETAS-RCS Libri.
- Sibilio, M., & Zollo, I. (2016). The non-linear potential of didactic action. *Education Sciences & Society*, 7(2), 51–70. <https://doi.org/10.3280/ess2-2016oa3947>
- Su, J. M., Tseng, S. S., Chen, C. T., & Tsai, W. N. (2004). Adaptive learning environment to meet pedagogical needs. *Journal of Information Science and Engineering*, 20(6), 1057–1077. <https://doi.org/10.1688/JISE.2004.20.6.2>
- von Bertalanffy, L. (1971). *Teoria generale dei sistemi*. Istituto Librario Internazionale.
- Watzlawick, P., Beavin, J. H., & Jackson, D. D. (1967). *Pragmatics of human communication: A study of interactional patterns, pathologies, and paradoxes*. W. W. Norton.
- Zappalà, E., Viola, I., Di Paolo, A., La Manna, N., & Sibilio, M. (2025). Semplessità, pensiero laterale e formazione docenti: Uno studio esplorativo. *Mizar*, 23(1), 110–128. <https://doi.org/10.1285/i24995835v2025n23p110>
- Zollo, I. (2018). Il rapporto tra didattica generale e didattiche disciplinari: La teoria della semplessità come possibile trait-d'union. *Educational Reflective Practices*, 2018(2), 258–271. <https://doi.org/10.3280/ERP2018-002017>
- Zollo, I., Di Gennaro, D. C., Girelli, L., & Sibilio, M. (2018). Formazione docente e non linearità: Prospettive semplesse. *Education Sciences & Society*, 9(2), 20–38. <https://journals.francoangeli.it/index.php/ess/article/view/7100>
- Zollo, I., Di Gennaro, D. C., & Sibilio, M. (2021). La semplessità come possibile guida operativa per favorire la relazione tra didattica generale e didattica delle discipline: Descrizione di un'esperienza di ricerca. *Annali online della Didattica e della Formazione Docente*, 13(21), 22–37. <https://doi.org/10.15160/2038-1034/2324>
- Zollo, I., Kourkoutas, E. E., & Sibilio, M. (2015). Creatività, pensiero divergente e pensiero laterale per una didattica semplessa. *Educational Reflective Practices*, 2015(1), 5–17. <https://doi.org/:null>