

FOSTERING INCLUSION: THE CRITICAL ROLE OF ONLINE TUTORS IN SUPPORTING STUDENTS WITH SPECIFIC LEARNING DISORDERS

SOSTENERE L'INCLUSIONE: L'IMPORTANZA DEL RUOLO DEI TUTOR PER STUDENTI CON DSA NELL'APPRENDIMENTO ONLINE



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ABSTRACT

This study, based on the compensatory scaffolding model, explores how inclusion services and tutorial support affect online learning in students with SLDs. Hierarchical regression and moderation analyses show that institutional support predicts learning quality, while tutor interaction fosters engagement among low self-efficacy learners.

Lo studio, fondato sul modello del supporto compensativo, analizza l'influenza dei servizi di inclusione e del supporto tutoriale nell'apprendimento online di studenti con DSA. Regressioni gerarchiche e analisi di moderazione mostrano che il supporto istituzionale incide sulla qualità percepita e il tutor favorisce l'engagement nei soggetti con bassa autoefficacia.

KEYWORDS

Inclusive education, SLD, engagement, e-learning, self-efficacy
Educazione inclusiva, DSA, engagement, didattica online, autoefficacia

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Introduction

In recent years, the inclusion of students with Specific Learning Disorders in higher education has gained growing importance—not only as a legal duty established by national and supranational regulations (Italian Law 170/2010; MIUR, 2011; UNESCO, 2020), but also as a strategic driver of pedagogical innovation and human-capital development. SLDs—neurodevelopmental disorders that include dyslexia, dysorthography, dysgraphia, and dyscalculia—pose distinctive challenges to education systems, especially where standardised, one-size-fits-all teaching models persist and tend to penalise cognitive heterogeneity.

As the OECD (2022) also stresses, ensuring an authentic right to study at university requires dismantling systemic barriers and actively fostering equitable, accessible, and inclusive learning environments. This involves recognising the legitimacy of diverse ways of learning and creating conditions that nurture participation, self-efficacy, and academic success for all students, beginning with those who face heightened vulnerabilities (Guaraldi, 2020; Cavalli & Mammarella, 2020).

Against this backdrop, the present contribution critically examines the factors shaping the university experience of students with SLDs, with particular attention to distance-learning contexts where educational technologies and tutoring practices play a pivotal role. The analysis is structured around five thematic axes:

1. Enrolment trends and the relationship between access, support received, and academic success (ANVUR, 2022; Hubble & Bolton, 2021);
2. Orientation practices and students' subjective experiences in the early university years (Guaraldi, 2020);
3. Inclusive e-learning design grounded in Universal Design for Learning principles (Petretto et al., 2021);
4. The strategic role of tutors as didactic and emotional facilitators, especially in online courses (Richardson, 2016);
5. The evolution of legislation and institutional guidelines that underpin university inclusion (MIUR, 2011; CNUDD, 2022; OECD, 2022).

In addition to the theoretical and documentary analysis, the paper presents an empirical study that explores how university students with SLDs perceive online learning, the support they receive, and their levels of engagement and motivation. To support the empirical analysis, seven validated psychometric instruments were employed, selected to cover the full motivational and self-regulatory cycle that can either facilitate—or hinder—success in e-learning environments (i.e. students' confidence in managing content, technology, and time-management in online courses; the individual's persistence in pursuing long-term academic goals;

perceived quality of the learning experience in terms of meaningfulness, comprehensibility, and manageability; cognitive, behavioral, and emotional engagement with course activities; the frequency and quality of tutoring practices; student satisfaction with inclusion services aimed at students with disabilities and learning disorders; the student's propensity toward stop-out or dropout prior to degree completion).

The combination of self-efficacy, dispositional traits (grit), perceived quality of the environment (LEQ, STIS, SQD), situated engagement (USEI), and behavioral intention (IPV-DO) enables a nuanced modelling of success trajectories in online education—going beyond merely descriptive approaches to academic performance.

Building on these premises, the objective of this work is twofold: on the one hand, to contribute to the academic debate by providing up-to-date and rigorous data on the effectiveness of inclusive practices in distance higher education; on the other, to propose evidence-based operational guidelines that can support universities in designing truly accessible and empowering learning environments.

Ultimately, a university education that is able to acknowledge and support the difference represented by SLDs not only fulfils an ethical and legal imperative, but also embodies the university's social responsibility. It offers a model of *pedagogy for complexity*—a pedagogical stance that enables each student to fully realise their potential (Arconzo, 2024; UNESCO, 2020).

1. University Enrollment Trends of Students with Specific Learning Disorders (SLDs)

The expansion of university access for students with Specific Learning Disorders (SLDs) represents one of the most significant developments in the contemporary landscape of higher education. This trend—clearly observable across multiple national and international contexts—reflects the intersection of regulatory, cultural, and organizational factors that have progressively reshaped the university system, fostering a greater openness to cognitive diversity.

In Italy, official data published by ANVUR (2022) and reprocessed by CNUDD show a marked evolution: in the 2020/2021 academic year, university students with SLDs numbered 19,616—a 22% increase over the previous year. This dynamic is illustrated in Figure 1, which shows a steady and linear increase in enrolments since 2010, reaching levels comparable to those of students with sensory, motor, or intellectual disabilities.

While this quantitative growth can be interpreted as a positive outcome of inclusive policies and the implementation of compensatory measures under Law 170/2010, it also raises critical questions about the quality of inclusion and the actual conditions for persistence, participation, and academic success.

At the international level, the United Kingdom offers a meaningful point of comparison. As early as the 2019/2020 academic year, 17.3% of British university students declared a disability, with SLDs—particularly dyslexia—representing the largest subgroup (Hubble & Bolton, 2021). Yet despite this apparent progress in access, data reveal that students with disabilities—including those with SLDs—still face a significantly higher likelihood of not completing their academic program compared to their neurotypical peers, even when controlling for socio-economic status and prior academic performance.

In this context, numerical growth alone cannot be considered a sufficient indicator of inclusion. As highlighted by Guaraldi (2020), genuine educational equity is achieved through the interaction of multiple support mechanisms: personalized orientation services, academic tutoring, instructional and assessment accommodations, accessible technologies, and faculty adequately trained in inclusive teaching methodologies. A longitudinal study conducted at the University of Modena and Reggio Emilia demonstrates that, where such practices are systematically implemented, dropout rates gradually decrease and completion rates increase, generating what the author defines as a “positive spiral of inclusion” (Guaraldi, 2020). In such a scenario, the increase in students with SLDs not only fails to compromise the quality of outcomes, but indeed appears to correlate with an overall improvement in academic success indicators—provided that institutions respond with appropriate and effective support measures.

Yet significant critical issues remain. International research highlights that in contexts where inclusive measures remain formalistic or fragmented, inequalities tend to widen, generating achievement gaps that translate into experiences of exclusion or symbolic failure (Hubble & Bolton, 2021). When university support services are framed in a purely functional or procedural logic rather than a relational one, students with SLDs risk being “included” in name only—while still encountering systemic barriers despite formal access to academic programs. This disconnect between access and success calls for reflection not merely on the quantity of inclusion, but on its quality, sustainability, and depth.

Strengthening inclusive policies must therefore move toward a transformative paradigm—one that goes beyond the compensatory approach and embraces a systemic and design-oriented logic. From this perspective, data from ANVUR (2022) and findings from comparative contexts (Hubble & Bolton, 2021) should be

interpreted both as signs of progress and as prompts to further pursue the implementation of structural practices grounded in *universal accessibility*.

For the university to truly serve as a space for the democratic production of knowledge, it must learn to read difference as a resource rather than a deviation to be normalized. This implies a redefinition of the entire educational ecosystem—towards a culture of educational justice, pedagogical flexibility, and institutional responsibility.

2. Learning Experiences and Orientation Practices: Enabling Conditions for the University Participation of Students with Specific Learning Disorders (SLDs)

The learning experiences of university students with Specific Learning Disorders (SLDs) are complex phenomena shaped by cognitive, emotional, and contextual variables, as well as by the effectiveness of the support and inclusion measures implemented by higher education institutions. A growing body of research highlights that access to university, in order to translate into genuine participation and academic success, requires an academic ecosystem capable of activating personalized orientation processes, inclusive teaching practices, and tutoring support tailored to individual needs (Guaraldi, 2020; Arconzo, 2024).

One increasingly consolidated and effective strategy is the provision of dedicated orientation programs and informative pathways—starting from the enrolment phase—that explicitly communicate students’ rights, available services, and institutional resources for those with SLDs. In accordance with current legislation, all Italian universities now provide a Disability/SLD Support Service, often coordinated by the Rector’s Delegate for Inclusion. This service acts as a liaison between the student and the university system, facilitating the activation of educational accommodations and supports (Arconzo, 2024). These services typically include access to personalized tutoring, compensatory software, learning mediation, support workshops, and counseling.

Law 170/2010 clearly establishes the right of university students with SLDs to benefit from compensatory and dispensatory measures that ensure equal opportunities during exams, “under the same conditions as their peers” (Guaraldi, 2020). Such measures include, for instance, extra time allowances, the use of digital tools, the segmentation of complex tasks into modular assessments, and other flexible, individualized solutions. These are not special concessions but legally

recognized instruments aimed at removing structural learning barriers and promoting student autonomy.

The literature reports numerous testimonies confirming the importance of specialized tutors in the academic success of students with SLDs (Guaraldi, 2020). In particular, tutors serve as mediators between the student and the university system, supporting study organization, facilitating interactions with faculty, and fostering the development of effective metacognitive strategies. When delivered consistently and in a well-structured manner, tutorial support becomes a powerful tool for student empowerment, helping to prevent feelings of disorientation and demotivation—especially during the early semesters (Guaraldi, 2020).

Alongside tutorial support, the quality of teaching constitutes another key axis of university inclusion. The CNUDD Guidelines encourage university instructors to adopt inclusive teaching methods and multimodal communication strategies, ensuring that content is accessible through multiple channels—written texts, visual materials, audio and video resources, and conceptual maps—and designed for universal accessibility.

Furthermore, personalizing assessment procedures, for instance by prioritizing oral or multimedia formats when appropriate, aligns with ministerial recommendations and supports a conception of assessment as a fair and formative practice (Guaraldi, 2020).

Added to this is the value of continuous feedback, understood as a pedagogical lever for monitoring learning, correcting ineffective trajectories, and strengthening students' self-efficacy. A well-calibrated feedback system allows students with SLDs to perceive their own progress, navigate assignments, build confidence in their abilities, and feel fully integrated into the academic community.

The comparison between in-person and online learning has gained increasing relevance, particularly in the wake of the COVID-19 pandemic, which accelerated the shift toward digital education. Comparative studies on this topic offer mixed results. On one hand, the online format may present specific advantages for students with SLDs: greater temporal flexibility, the ability to review materials, less anxiety-inducing environments, and easier access to assistive technologies. On the other hand, e-learning demands organizational and self-regulatory skills that are not always well-developed in this student population.

A study conducted at the University of Warsaw found that during the first COVID-19 lockdown in 2020, students with dyslexia faced greater challenges in completing exams and maintaining motivation compared to their peers (Zawadka et al., 2021). Similarly, the systematic review by Liu et al. (2023) reported that many students

with dyslexia described their online learning experience as disorienting, with negative effects on self-esteem, academic performance, and perceived well-being. These outcomes are shaped by the interaction of internal factors (e.g., anxiety regulation, type of reading difficulty) and external factors (e.g., platform design, lack of interaction, inflexible teaching methods). However, the literature also underscores that the impact of online learning is strongly mediated by the quality of instructional design. If an online course is structured according to the principles of inclusive pedagogy—with accessible materials, moderated forums, timely feedback, and dedicated tutors—students with SLDs can derive substantial benefits.

As noted by Petretto et al. (2021), e-learning has the potential to enhance attention, self-regulation, and engagement, provided that it is thoughtfully designed and personalized. Faculty training on these issues is therefore an essential prerequisite for ensuring equity in online learning environments (Petretto, 2021).

As the literature consistently suggests, the effective inclusion of students with SLDs in university—whether in face-to-face or distance contexts—requires a systemic approach that integrates initial orientation, tutorial support, quality teaching, and accessible instructional design. Only through this synergy can the university truly function as a learning space open to complexity—capable of recognising difference and transforming it into shared value.

3. Designing Inclusive E-Learning Environments: From Universal Design for Learning (UDL) to the Implementation of Accessible Digital Ecosystems

The accelerating adoption of e-learning modalities in higher education foregrounds the imperative to construct digital ecosystems that are not merely accessible in form, but substantively inclusive in function—particularly for students with Specific Learning Disorders (SLDs). This entails a paradigmatic shift from reactive accommodation toward anticipatory design, wherein educational technologies are structured to pre-emptively address a diversity of cognitive profiles through universal, flexible, and evidence-based approaches (Petretto et al., 2021).

Technical compliance with accessibility standards such as WCAG 2.x remains a foundational prerequisite, ensuring baseline usability for learners reliant on assistive technologies. However, technical accessibility alone is insufficient. The pedagogical architecture of online learning must also reflect principles of cognitive inclusivity. In this regard, the Universal Design for Learning (UDL) framework provides a theoretically grounded and empirically supported model,

operationalised through multiple means of representation, action/expression, and engagement. Rather than compensating for impairment, UDL positions neurodiversity as a pedagogical resource to be structurally embedded in instructional design (Petretto et al., 2021).

Empirical evidence underscores the importance of allowing learners with SLDs to modulate the pacing, modality, and format of instructional materials—strategies that mitigate challenges linked to working memory, decoding, and information synthesis. Nevertheless, inclusive design cannot be reduced to static features. Personalisation and adaptability emerge as critical design criteria: even technically conforming platforms may inhibit learning if they do not afford meaningful user control. Integrated support systems—such as built-in text-to-speech functionality, customizable interfaces, and embedded scaffolding mechanisms (e.g., formative feedback or self-monitoring prompts)—are necessary to reduce extraneous cognitive load and foster metacognitive regulation (Petretto et al., 2021).

Legislative and policy frameworks increasingly reflect this reconceptualisation. Italian Law 170/2010 affirms the right of university students with SLDs to compensatory and dispensatory measures in all learning contexts, including digital ones (Guaraldi, 2020), while Law 4/2004 and the national transposition of EU Directive 2016/2102 mandate universal digital accessibility across public-sector platforms. The CNUDD Guidelines (2022–2024) further articulate practical recommendations for higher education institutions, including the integration of accessible materials, assistive technologies, and staff training on inclusive design principles.

At the international level, normative convergence is evident. UNESCO's Global Education Monitoring Report (2020) calls for educational technologies to serve as instruments for dismantling systemic barriers, not amplifiers of inequity. In parallel, the OECD has begun to operationalise inclusion in digital higher education through multidimensional indicators encompassing access, engagement, and success among learners with special educational needs (Mezzanotte & Calvel, 2023).

In sum, the design of inclusive e-learning environments now constitutes a multidimensional obligation—pedagogical, juridical, and epistemic. Only digital systems that are intentionally constructed, empirically validated, and structurally responsive can reposition neurodiversity not as an exception to be accommodated, but as an axis of design around which equity in higher education is realised.

4. The Role of Tutors in Online Distance Learning: Between Instructional Mediation and Personalized Support

In the context of Online Distance Learning (ODL), the tutor plays a highly strategic pedagogical role, acting as a mediator between the student and the digital learning environment. This is particularly true for students with Specific Learning Disorders (SLDs), who, in the absence of face-to-face interactions and physical support structures, are more likely to experience isolation, disorientation, and loss of motivation. The presence of a competent, accessible tutor trained in the specific needs of students with SLDs can make the difference between passive attendance and genuine educational inclusion (Petretto et al., 2021).

In e-learning settings, the tutor is far more than a technical facilitator: they function as an activator of the learning experience. According to Bjekić et al. (as cited in Petretto et al., 2021), the tutorial role in inclusive environments involves several dimensions: coordination of learning activities, communication management, metacognitive and motivational support, instructional mediation, and personalized assistance. An effective tutor does not simply answer individual queries, but fosters an ongoing educational relationship, encourages interaction in discussion forums, structures learning into manageable modules, sends strategic reminders, and facilitates communication between students and instructors when difficulties arise. For students with SLDs, the online tutor often serves as the first point of contact and a reassuring reference figure. Tutors can detect early signs of struggle—such as difficulty interpreting a written text or understanding assignment instructions—and intervene proactively with contextual adaptations. A tutor trained in SLD-specific strategies can suggest alternative study methods, offer multimodal resources, rephrase assignments in more accessible terms, or guide students progressively toward greater independence. In this sense, personalization is not optional, but a foundational principle of tutorial quality—one that must be tailored to each student's unique functional profile.

Furthermore, in online settings, the tutorial function extends into the motivational and emotional domain. The tutor can support students during moments of frustration, offer encouraging feedback, help reduce procrastination, and reinforce self-efficacy. Through positive messages, individualized comments, and consistent contact, the tutor can establish a meaningful relationship capable of counteracting the feelings of loneliness or inadequacy often experienced by students with SLDs. Empirical evidence supports this approach. In a study conducted by Richardson (2016), academic outcomes of students with and without disabilities were compared across distance learning courses that offered two types of tutoring:

traditional face-to-face and fully online. The findings were illuminating: no significant differences emerged in exam pass rates or final grades between students with disabilities and their non-disabled peers, regardless of the type of support received. In fact, students with disabilities tended to achieve slightly better outcomes in the online setting—likely due to the greater flexibility, accessibility, and absence of immediate judgment provided by digital environments (Richardson, 2016).

The literature suggests that well-designed online tutoring not only compensates for learning difficulties but can also enhance both learning outcomes and student well-being by providing a stable, reassuring, and goal-oriented relational and organizational framework. However, to unlock this potential, it is essential that tutors are trained not only in the technical use of platforms, but also in inclusive pedagogies, the neuropsychological profiles of SLDs, and accessible communication strategies. A tutor who is unprepared or confined to a purely technical support role risks undermining the effectiveness of the support system.

Ultimately, the tutor in ODL represents a key pedagogical resource for building genuinely inclusive environments. Through continuous and personalized action, tutors help translate the principles of Universal Design for Learning (UDL) into practice, fostering education that is equitable, accessible, and transformative.

Higher education institutions are thus called upon to invest systematically in the training and professional development of tutors, recognizing them as digital inclusion professionals and crucial actors in the effort to combat dropout and academic failure.

5. Methods

Sixty-two undergraduate SLD students (40 women (65%), age $M = 23.5$ years, $SD = 3.9$, range = 19–40) were recruited from a large Italian online university that offers fully asynchronous courses supported by dedicated e-tutors. At the time of the survey 38.7 % were in their first year of study, 24.2 % in the second, 25.2 % in the third, and 11.3 % were in a supplementary year. Participation was voluntary and uncompensated. The study was approved by the departmental ethics committee and complied with the Declaration of Helsinki and the EU GDPR (Reg. 2016/679); electronic informed consent was obtained before the questionnaire began. Data were collected in April 2025 via a secure Google Form. The link was distributed through the university's learning-management system immediately after completion of a mandatory online course. After a brief introduction and consent screen, participants completed the demographic items followed by the

psychometric scales (presented in random order to minimise common-method bias). Median completion time was 14 min. Raw responses were exported to CSV, recoded to numeric values, keyed according to the original manuals, and checked for duplicates or multivariate outliers (none detected). The final analytic file contained 62 complete cases. Grounded in previous research on online learning, student engagement, and inclusive support, the following hypotheses were formulated to guide the analysis:

H1. Students' perceived quality of institutional inclusion services—measured via the Support-Service Quality for Disability scale (SQD-6)—is positively associated with their evaluation of the learning environment, as assessed by the Learning Experience Questionnaire (LEQ-12). This hypothesis reflects the expectation that accessible and responsive support services contribute to a more coherent and meaningful course experience.

H2. Institutional support (perceived quality of inclusion services, SQD) and interpersonal support (tutor interaction, STIS) are expected to enhance students' behavioural-emotional engagement (USEI), but the magnitude of these effects should vary as a function of students' online-learning self-efficacy (OLSES). Specifically, we predict that the positive relationship between each support source and engagement will be strongest for students who report lower self-efficacy, whereas the same support will yield diminishing returns as self-efficacy increases—consistent with the notion that external scaffolding compensates for weaker internal resources.

6. Measures

Unless otherwise noted, validated Italian versions were used; forward/back-translation with independent bilingual reviewers (Beaton et al., 2000) was applied where an Italian form was unavailable. Table 1 reports internal consistencies observed in the present sample.

- Online Learning Self-Efficacy Scale (OLSES; Zimmerman & Kulikowich, 2016). Twenty-two items (1 = *Not at all confident* to 6 = *Completely confident*) tap learning, time-management, and technology efficacy ($\alpha = .94$).
- Short Grit Scale (Grit-S; Duckworth & Quinn, 2009). Eight items (1 = *Not at all true* to 5 = *Very much true*) were scored on two facets: *Consistency of Interests* (items 1, 2, 3, 8 reversed; $\alpha = .74$) and *Perseverance of Effort* (items 4–7; $\alpha = .73$).

- Learning Experience Questionnaire—12-item version (LEQ-12; Åkerlind et al., 2014). Assesses meaningfulness, comprehensibility, and manageability of the course (1 = *Strongly disagree* to 5 = *Strongly agree*; $\alpha = .93$).
- University Student Engagement Inventory—9 items (USEI-9; Marôco et al., 2016). Provides a global engagement score across cognitive, behavioural, and emotional facets (1 = *Not at all true* to 5 = *Completely true*; $\alpha = .86$).
- Student-Tutor Interaction Scale (STIS-10; Wang & Liu, 2024). Ten items rate how often the e-tutor exhibits supportive behaviours (1 = *Never* to 5 = *Always*; $\alpha = .95$).
- Support-Service Quality for Disability Scale (SQD-6; developed for this study). Six items evaluate satisfaction with the university's inclusion service (1 = *Not at all satisfied* to 5 = *Completely satisfied*; $\alpha = .95$).
- Intention-to-Drop-out Scale—short form (IPV-DO-4; adapted from Rovai, 2003). Four items measure the frequency of withdrawal thoughts (1 = *Never* to 5 = *Always*; $\alpha = .87$).
- Utrecht Work Engagement Scale—Student, 9 items (UWES-S-9; Loscalzo & Giannini, 2019). Captures vigour, dedication, and absorption on a 7-point frequency scale from 0 = *Never* to 6 = *Always* ($\alpha = .94$); used for convergent-validity checks.

Overall, the scales employed demonstrated satisfactory to excellent internal consistency ($\alpha = .73$ –.95 as shown in Table 1), affirming their reliability and appropriateness for subsequent statistical analyses.

Scale	k	Cronbach α
OLSES	22	0.944
GRIT_CI	4	0.735
GRIT_PE	4	0.727
IPV_DO	4	0.871
LEQ	12	0.929
USEI	9	0.864
STIS	10	0.953
SQD	6	0.951
UWES	9	0.943

Table 1. Internal consistency (Cronbach's α) for study scales

7. Results

To test H1, a hierarchical multiple regression was conducted to determine whether perceived quality of inclusion services predicted students' learning experience after controlling for basic demographics (as shown in Table 2). In Step 1, gender (0 = male, 1 = female), age (in years), and year of study (first, second, third, supplementary) were entered as covariates; the model was not significant, $F(5, 56) = 1.52$, $p = .20$, accounting for 12 % of the variance in LEQ scores, $R^2 = .12$, 95 % CI [0, .28]. In Step 2, perceived Support-Service Quality (SQD) was added, yielding a significant improvement in model fit, $\Delta F(1, 55) = 47.90$, $p < .001$, with an additional 41 % of variance explained ($\Delta R^2 = .41$). The final model was significant, $F(6, 55) = 10.31$, $p < .001$, and explained 53 % of the variance, $R^2 = .53$ (adjusted $R^2 = .48$). Within this model, SQD emerged as a robust positive predictor, $b = 0.58$, $SE = 0.08$, 95 % CI [0.41, 0.76], $t(55) = 6.92$, $p < .001$. No demographic variable reached significance when SQD was included (all $|t| \leq 1.09$, $p \geq .28$). Multicollinearity diagnostics were satisfactory (all VIFs < 1.3), and inspection of residual plots revealed no serious departures from homoscedasticity or normality. Consistent with H1, students who reported higher-quality disability-support services also reported a substantially more positive learning experience, even after accounting for gender, age, and academic seniority.

Step	Predictor	B	SE	t	p
Step 1	Gender (Female)	0.22	0.22	0.99	0.325
	Age (years)	-0.01	0.03	-0.41	0.682
	Year of Study (Second)	-0.53	0.27	-1.96	0.055
	Year of Study (Third)	-0.05	0.26	-0.19	0.847
	Year of Study (Supplementary)	-0.48	0.36	-1.33	0.189
Step 2	Gender (Female)	0.13	0.16	0.82	0.416
	Age (years)	0.02	0.02	1.08	0.283
	Year of Study (Second)	-0.10	0.21	-0.50	0.619
	Year of Study (Third)	-0.04	0.19	-0.21	0.838
	Year of Study (Supplementary)	-0.20	0.27	-0.73	0.471
	Support Quality (SQD)	0.58	0.08	6.92	< .001

Table 2 Hierarchical regression predicting learning experience from support-service quality

We expected the positive association between tutor interaction (STIS) and student engagement (USEI) to be stronger for students with lower online-learning self-efficacy (OLSES). A centred multiple-regression model including the interaction term was tested:

$$\text{USEI} = \beta_0 + \beta_1(\text{STIS}) + \beta_2(\text{OLSES}) + \beta_3(\text{STIS} \times \text{OLSES}) + \varepsilon.$$

The overall model was significant, $F(3, 58) = 20.39$, $p < .001$, explaining 49 % of the variance in engagement (adjusted $R^2 = .49$). Main effects were positive: STIS, $\beta = .31$, $p = .065$ (marginal); OLSES, $\beta = .46$, $p = .005$. The interaction term was negative and nonsignificant, $\beta = -.11$, $p = .263$. A bias-corrected bootstrap (5,000 resamples) produced a 95 % CI for the interaction of $[-.283, .057]$, confirming the non-significance.

Simple-slopes analysis (Figure 1) revealed that STIS was a significant predictor of USEI at low OLSES (-1 SD), $\beta = .27$, $p = .004$, and at the mean OLSES, $\beta = .22$, $p = .010$, but not at high OLSES ($+1$ SD), $\beta = .16$, $p = .104$. A Johnson–Neyman probe indicated that the STIS slope was statistically significant when OLSES was ≤ 4.88 (approximately 90 % of the observed range).

Although the interaction did not reach conventional significance, the negative coefficient together with the simple-slope pattern supports the *compensatory scaffolding* hypothesis: tutor support is most beneficial for students who feel less efficacious in the online environment, whereas highly self-efficacious learners rely less on tutor interaction. Given the modest sample size ($N = 62$) and the wide bootstrap interval, these findings should be interpreted as preliminary and warrant replication with a larger cohort.

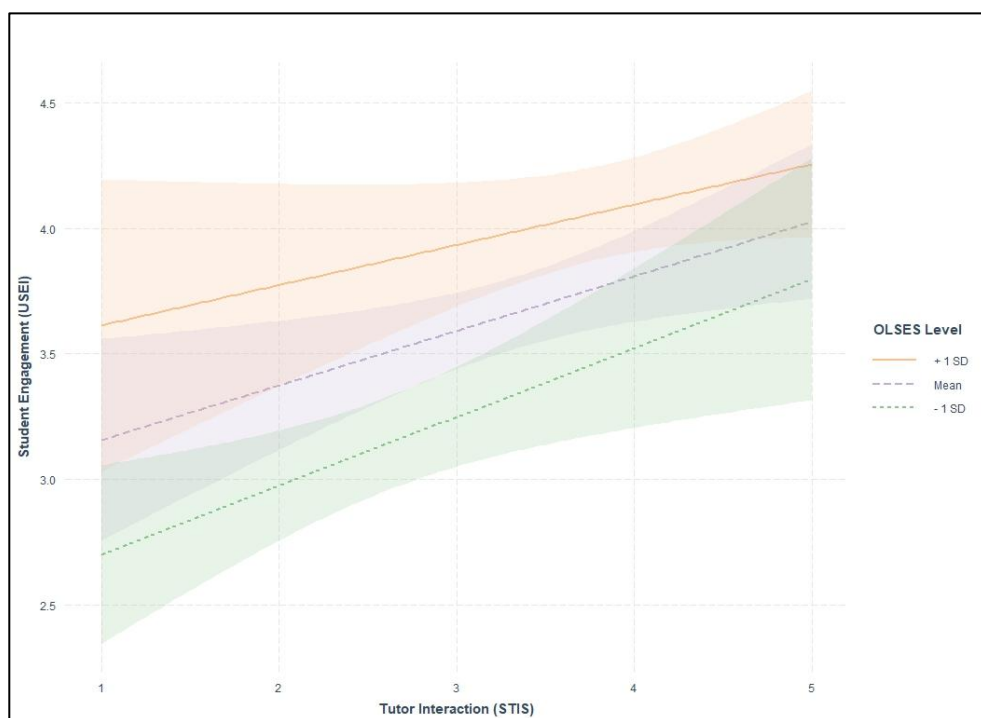


Figure 1 Simple-slopes plot

Conclusions

This study examined the role of institutional inclusion services and tutorial support in shaping university students' online learning experiences and their intentions to persist or withdraw, with particular attention to learners with Specific Learning Disorders (SLDs). The results highlight the necessity of considering both structural and relational dimensions of support when promoting inclusion in digital higher education environments.

Analyses revealed that students' perception of the quality of institutional support services was a significant predictor of how they evaluated the educational value of their online learning experience. Even after controlling for gender, age, and year of study, this variable explained over 40% of the variance in students' ratings of course quality. This finding aligns with international policy frameworks that advocate for a shift from mere access to active, meaningful participation in inclusive education (OECD, 2022a; UNESCO, 2020). In this context, system-level reliability—reflected in accessible digital infrastructure, transparent communication, and prompt provision of accommodations—emerges as a foundational condition for effective inclusion.

With regard to tutorial support, the study found that tutor interaction was positively associated with student engagement. Although the moderating role of online learning self-efficacy (OLSES) did not reach conventional levels of statistical significance, follow-up analyses using simple slopes and Johnson–Neyman procedures indicated that tutor interaction significantly predicted engagement among students with lower OLSES scores. This pattern supports a compensatory scaffolding perspective, whereby relational support provided by tutors becomes particularly salient for students who perceive themselves as less competent in navigating online learning environments (Richardson, 2016; Stampoltzis & Mroczko, 2023).

Contrary to initial hypotheses, the relationship between tutorial support and dropout intention was not mediated by engagement. Instead, a direct association was observed: students who perceived higher levels of tutor responsiveness and presence reported significantly lower intentions to withdraw. This direct effect suggests that tutor support may exert a protective influence against attrition that operates independently of engagement-related processes—a finding consistent with recent studies on asynchronous learning (Broadbent, 2020).

Collectively, these results suggest that promoting inclusion in online higher education requires more than compliance with accessibility mandates. A truly inclusive digital university must develop a dual infrastructure: first, institutional mechanisms that ensure reliable and equitable access to support services; second, pedagogical practices that are relationally responsive to students' self-perceptions of competence and autonomy. For students with SLDs, the intersection of these structural and interpersonal supports creates the conditions for equitable participation in higher education (Petretto, Masala, & Masala, 2021).

While limited by sample size ($N = 62$) and reliance on self-report measures, the study contributes valuable empirical insights for institutions aiming to reduce dropout rates and enhance student inclusion. Future research would benefit from longitudinal designs and the integration of behavioural metrics (e.g., digital engagement traces) to more precisely map the dynamics of support and persistence over time.

As emphasised by the OECD (2022b), digital inclusion in tertiary education demands sustained institutional investment not only in access, but in substantive engagement. When structural scaffolding and human support are aligned, students with diverse learning profiles—including those with neurodevelopmental differences—can fully participate and succeed in online academic settings.

Author contributions

Elisabetta Faraoni: Literature research, Writing – Review & Editing, Drafting of Introduction, Sections 2, 3, 4, and Conclusions.

Francesco Maria Melchiori: Conceptualization, Methodology, Supervision, Writing – Review & Editing, 5, 6, 7, Conclusions

Milena Pomponi: Writing – Review & Editing, Drafting of Introduction and Section 1.

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