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Research and Practices

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Quality of Education and Inclusion Processes: Technologies, Methods, and Policies from an International Perspective

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Sommario

Saggi e ricerche

Gender equity policies and practices: The experience of eight organizations in northeastern Italy

Marica Liotino[*], Monica Fedeli[^]

Abstract
This study examines gender equity and diversity management practices within organizations in the province of Vicenza, addressing a critical gap in Italian DM research, which remains underdeveloped and predominantly focused on gender. Drawing on social constructionism, critical feminism, and Mintzberg's organizational typologies, the research investigates how local cultures, structural configurations, and power dynamics shape the implementation of gender equity initiatives. Using a qualitative case study approach, the study analyzes semi-structured interviews with leaders and HR personnel across eight organizations, complemented by narrative inquiry and qualitative content analysis. Findings reveal a persistent disconnect between formal commitments to equity and the lived realities of organizational processes. Meritocratic discourse often masks entrenched inequality regimes, including gender pay gaps, vertical segregation, limited paternal leave uptake, and welfare policies that reinforce traditional caregiving roles. The study underscores the need for intersectional auditing, redistributive care policies, and participatory narrative practices to foster transformative, context-sensitive gender equity strategies.
Keywords: Organizational policies, Organizational practices, Gender equity, Diversity management, Case study.

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Introduction

Diversity Management (DM) has emerged as an increasingly important area of research within organizational studies, particularly considering global shifts toward more inclusive workplaces (Olsen and Martins, 2012). Despite this relevance, much of the academic focus remains concentrated in the United States, limiting comparative and contextual perspectives (Jonsen et al., 2011). DM broadly refers to human resource strategies that address the complexities arising from workplace heterogeneity – spanning dimensions such as gender, ethnicity, age, and ability (Ferrara, 2019). The aim is to cultivate inclusive environments where individual differences are not only respected but leveraged for improved organizational outcomes (Buemi et al., 2015; Ravazzani et al., 2021).

In Italy, DM research remains underdeveloped, and its practical implementation in organizations lags behind many European counterparts (Colella & Di Lorenzo, 2023). When adopted, DM initiatives tend to focus predominantly on gender, particularly women's workforce participation. The Italian approach to DM often reflects a tension between external compliance and internal voluntarism, driven more by reputational concerns and legal obligations than by genuine commitment to inclusion (Ravazzani, 2016). Measures such as flexible work arrangements and parental leave are generally considered core components of DM (Santoni & Crespi, 2022), yet their adoption has not fully addressed persistent gender disparities in the workplace.

Despite advances such as the gender quota law (Law 120/2011) and the Gender Equality Certification (Laws 162/2021 and 234/2021), gender-based discrimination and structural inequality persist across Italian organizations (Cavalieri & De Giorgi, 2025).

The most recent evidence underscores the magnitude of these challenges: women in Italy – despite being more educated than men (ISTAT & CNEL, 2025) – continue to experience significantly lower employment rates compared to the European average, with the female employment rate standing at 52.5% as of Q4 2024, compared to 76.0% for men, representing a gender gap of approximately 19.5 percentage points that is nearly double the EU average (ISTAT, 2025; Paggetti, 2025). Beyond employment access, women face disproportionately higher levels of involuntary part-time work, with 49.2% of employed women working part-time compared to only 27.3% of men, and persistent underrepresentation in leadership and executive positions, where women comprise only 18% of executive-level managers (Paggetti, 2025). This employment disadvantage is further exacerbated by caregiving responsibilities: women remain disproportionately burdened with unpaid domestic work and face a significant “child penalty” whereby the employment rate of mothers in

couples (aged 25-64) is 57.2%, almost 30 percentage points lower than that of fathers in couples (86.3%) (ISTAT & CNEL, 2025). After maternity leave, 16% of women exit the workforce compared to only 2.8% of men, a disparity that reflects the gendered division of labor and family responsibilities (Paggetti, 2025).

These national trends underline the importance of considering local and organizational contexts when assessing DM strategies (Jonsen et al., 2011; Poggio et al., 2010). The province of Vicenza presents a compelling case study due to its significant economic vitality and notable industrial diversity, characterized by a predominant small and medium-sized enterprise (SME) structure with well-established industrial districts spanning jewelry, textiles, tanning, ceramics, furniture, electronics, and marble extraction (Camera di Commercio Vicenza, 2024). Research into diversity management practices in Veneto reveals that 70% of analyzed companies do not employ gender-neutral recruitment procedures, with 80% similarly lacking gender-neutral performance evaluation processes, suggesting substantial resistance to formalized diversity management approaches, particularly in the metalworking sector (Riva & Benfatto, 2024). Additionally, 61% of companies do not offer support services for parenthood, and 80% report not conducting any specific training on gender, diversity, and inclusion issues, indicating that diversity management awareness remains primarily theoretical rather than operationalized (Riva & Benfatto, 2024).

This research aims to provide a context-specific analysis of DM practices in Vicenza, contributing to a deeper understanding of how local organizational cultures, leadership, and structural factors influence the implementation and success of gender equity initiatives. By focusing on localized dynamics, this study seeks to fill a critical gap in the literature and promote more effective, tailored approaches to diversity and inclusion within Italian organizations.

Theoretical Background

This research is grounded in the theoretical lenses of social constructionism and critical feminism, which together provide a multidimensional framework for understanding gender equity and diversity management in organizational contexts. Constructionism, rooted in constructivist theory, holds that reality is not objective but socially constructed and contextually situated. Spector and Kitsuse (2017) argue that social problems do not exist independently of interpretation; rather, they emerge through the discursive practices and interactions of social actors. A central element of this approach is “claims-making,” the process through which certain phenomena are defined and

presented as societal issues requiring attention. As Miller and Holstein (1989) explain, this perspective investigates how moral and reformist discourse contributes to the reshaping of institutional contexts and power structures.

Aligned with this, Papert's (1980; 1986) work on constructivist learning contributes an educational dimension to constructionism, emphasizing the role of active, experiential, and culturally resonant learning. He posits that knowledge is most effectively constructed when it engages with prior experience, personal meaning, and social relevance. This recursive process of learning, further developed by Harel and Papert (1991), privileges agency, interpretation, and contextual problem-solving over rote instruction. Within this framework, learning becomes a co-constructed, adaptive, and empowering process. The public, too, plays an active role in the construction of social meaning; as Nichols (2003) contends, audiences are co-producers of social discourse, shaping and negotiating meaning in everyday interactions.

This research extends these principles to the narratives of women in the Vicenza area, using them as vehicles for understanding organizational inequalities and responses to gender diversity. The integration of critical feminist theory enhances this constructionist approach by explicitly interrogating the gendered power dynamics embedded within organizations. Critical feminism, as articulated by Bierema (2017), critiques the patriarchal foundations of organizational development and the structural biases that limit women's career advancement. Rather than focusing on individualistic fixes – such as increasing women's self-confidence – critical feminism urges structural reform and consciousness-raising to dismantle systemic inequality (Bierema et al., 2022).

Core to this approach is the concept of privilege and power, which critical feminism aims to expose and challenge. It promotes a vision of social transformation through collective action, solidarity, and intersectional analysis (hooks, 1984; Crenshaw, 1989; Collins, 2008). It stresses the importance of addressing overlapping dimensions of identity – such as gender, race, class, and sexuality – that shape women's experiences in the workplace. Feminist theorists including Butler (1990), Mohanty (1984), and Davis (1981) call for greater inclusion and representation within feminist movements themselves, warning against replicating exclusionary structures. Through this lens, organizations are sites of both domination and potential resistance, where agency and critical reflection can lead to structural change (Ahmed, 2017; Crenshaw, 1991; hooks, 2000).

Complementing these theoretical foundations, Mintzberg's (1981) organizational typologies offer insight into how organizational form influences decision-making, communication flow, and the allocation of authority. Mintzberg identifies five key organizational configurations: the simple

structure, machine bureaucracy, professional bureaucracy, divisionalized form, and adhocracy. For instance, smaller organizations (simple structures) may be more flexible and responsive to change but lack the formalized policies seen in larger bureaucracies. Conversely, professional bureaucracies – such as educational institutions – might possess established diversity policies but be slow to implement change due to entrenched norms. Adhocracies, characterized by innovation and decentralization, may offer the greatest potential for transformative gender policies, as they encourage experimentation and participatory practices.

By integrating Mintzberg's structural insights with the critical feminist and constructionist lenses, this study acknowledges that gender equity initiatives are not only shaped by cultural narratives and power dynamics but are also conditioned by the organizational architecture itself. Understanding these multiple, intersecting dimensions is essential to developing context-sensitive strategies for advancing gender equity in Italian organizations.

Methodology

This research adopts a case study methodology, which allows for an in-depth examination of bounded systems within specific spatial, temporal, and contextual dimensions (Yin, 2018). The study focuses on identifying organizational models, policies, and practices aimed at promoting gender equality within a range of businesses located in the Vicenza region. These include manufacturing and service companies, small and medium-sized enterprises (SMEs), and tertiary-sector cooperative enterprises.

The methodological approach is grounded in narrative inquiry, a qualitative research method that seeks to explore human experiences through the analysis of personal narratives (Chase, 2018). This method is particularly suitable for understanding the lived experiences of individuals within organizations by collecting and interpreting stories, interviews, field notes, and other narrative forms (Clandinin & Connelly, 2004). According to Chase (2005), narrative inquiry helps to interpret actions and events through the lens of individual storytelling. Moreover, it can serve both professional development and social change objectives (Goodson & Gill, 2011; Wells, 2011), especially by foregrounding marginalized narratives and examining how institutional structures shape and regulate these narratives (Andrews et al., 2013).

The research is guided by two primary questions:

- What is the perceived level of organizational equity in processes and relationships among employees of manufacturing, service, commercial, tourism, tertiary, cooperative, and artisan firms in Vicenza?

- What policies, models, and organizational practices are employed by these companies to promote gender equity?

Semi-structured interviews (Trinchero, 2002) were conducted with HR managers, directors, and organizational leaders to identify gender equity policies, models, and practices. Out of 20 companies initially contacted with the support of the lead project organization, only eight agreed to participate. The sampling strategy, though based on convenience, reflects the broader composition of the Vicenza business landscape, where commerce and tourism lead (28.5%), followed by artisanal and transport (24.7%), business services (17.5%), industry (13.7%), agriculture (8.6%), and other sectors (7%) (Camera di Commercio Vicenza, 2024). The following table (Table 1) adds details of the organizations involved and the profiles interviewed.

Table 1- Sector, business focus and participants involved per organization

Organization	**Sector**	**Business Focus**	**Participants (gender)**
Arcoprofil Srl	Manufacturing	Metalworking products	HR Manager (f)
ARES LINE SPA	Manufacturing	Seating design and production	Product and System Certification Manager(f)
IPAB Centro Servizi Sociali Villa Serena	Tertiary/Services	Residential services for elderly	Psychologist (f), Executive Secretary (f), Socio-health Area Manager (f)
DENTAL ART SPA	Manufacturing	Dental and household supplies	HR-Manager (f), CEO (m)
Baxi	Manufacturing	Heating and air conditioning systems	HR Business Partner Manager (f)
Enersys	Services/Manufacturing	Electronic products	HR Business Partner (f)
Taka Srl	Manufacturing	Industrial adhesives and chemicals	Legal HR Compliance Manager (f)
Kolver Srl	Manufacturing	Electric screwdrivers	Commercial/ Administrative Employee (f)

Interviews explored organizational features -including model (Mintzberg, 1981), climate (Murayama, & Elliot, 2012), and power decentralization (Filippi et al., 2023)- and diversity management position, made up of organizational

openness to change, symptoms of diversity-related problems, diffusion of inclusive language (Di Fabio, 2016; Harris et al., 2007), feminization rate, gender wage differential, gender segregation index (Poggio et al., 2010). Policies and practices to foster gender equality were scrutinized as well: policies and processes of the organization (Gay, 2013; Poggio et al.,2010), corporate welfare processes (Razetti, & Santoni, 2019; Income Tax Consolidation Act) and employment welfare processes (Razetti, & Santoni, 2019; Law 81/2017; Consolidated Maternity/Paternity Act).

Additionally, a validated employee survey was proposed, exploring areas such as motivation, job satisfaction, empowerment, burnout, work-life fit, gender roles, inclusive language, and perceived power decentralization.

Participants were also invited to digital storytelling workshops (Simsek, 2012) to reflect gender dynamics within their organizations. These workshops aimed to both document and inspire the continuation of effective gender equity practices. Finally, qualitative content analysis was conducted using Atlas.ti 23. The coding structure was determined by creating analysis categories based on existing literature and specific research questions (Schreier, 2013). These categories were divided into main categories and subcategories that mirrored the thematic areas of the interviews presented above. After trial coding, categories with discrepancies or overlaps were reviewed and adjusted to improve the coding structure. New categories were implemented to accommodate unexpected and emerging information.

Findings and Discussion

The empirical evidence provided insights into both the advancements made toward inclusivity and the enduring challenges obstructing full gender equity in these diverse organizational contexts.

Across sectors, most respondents reported a general perception of fairness and inclusivity in daily professional interactions and organizational culture. In many cases, recruitment and career progression were guided by meritocratic principles that formally eschewed gender, age, and ethnic considerations, prioritizing individual competencies and objective performance indicators. This meritocratic discourse, while appearing equitable, often functioned as a rhetorical device that masked underlying inequalities, consistent with Acker's (2006) concept of "inequality regimes" – organizational processes that perpetuate inequality while ostensibly operating under neutral frameworks. As we move from smaller to larger companies, we transition from simple structures to models with professional bureaucracy or divisional structures. Several organizations, particularly in the cooperative and social enterprise sector,

championed participatory governance models. These institutions favored horizontal communication and inclusive decision-making, which were viewed by the interviewees as enhancing workplace cohesion, creativity, and employee well-being.

Nonetheless, deeper analysis revealed that such surface-level inclusivity was insufficient to dismantle long-standing gender hierarchies. A recurrent theme in the data was the pervasive underrepresentation of women in leadership roles, even in organizations with a predominantly female workforce, as proved by Silvia

> In a company where 92% of the workforce is female, the board of directors is made up of five members, four of whom are male, including the chairman. The vice-chair is the only woman on the board. [..] There is a very strong male presence in top positions, and I feel very angry because there is still a difference in mentality when it comes to assigning top positions to women. And a significant difference in salary historically.

Even at companies where women make up less than half of the total workforce and are usually hired as office workers, there are no female managers and only one or none on the board of directors (Elena, Ketty and Francesca). Connell and Messerschmidt (2005) highlights the persistence of "hegemonic masculinity" within institutional cultures, which continues to valorize male leadership even in contexts that appear demographically skewed in favor of women.

Another critical finding was the existence of a gender pay gap, particularly in senior and executive roles. Despite frequent declarations of parity in pay structures, a closer examination of salary data revealed that women in equivalent roles frequently earned less than their male colleagues. According to Silvia, gender discrimination also occurs in terms of pay because part of executives' salaries is decided by the board of directors. This was particularly pronounced in hierarchical organizations, where informal negotiation mechanisms and discretionary bonuses often favored men. This mirrors broader international findings (OECD, 2021), which show that gender pay disparities remain endemic, especially in top positions, due to opaque evaluation criteria and gendered assumptions about leadership and value.

Furthermore, many organizations lacked a robust analytical framework for assessing internal gender equity. Only a minority conducted gender-based audits or disaggregated their data by gender, contractual type, or hierarchical level. The absence of systematic diagnostics has rendered gender inequalities largely invisible within strategic planning processes. This approach often stemmed from a belief that, in the absence of overt conflict or complaints, no corrective action was necessary – a dynamic aligning with the idea of

"inequality denial" and narrative silencing (Mumby, 1998). In this context, Acker's (2006) theory of inequality regimes is particularly salient, as it suggests that unchallenged routines and cultural narratives are instrumental in reproducing gender hierarchies.

In the few companies that shared this data, the gender pay gap, or the average difference between the hourly wages earned by men and women expressed as a percentage, is -24% for women and +11.5% for men in Marta's company, -34% for women and -22% for female workers in Ketty's company. In addition, in Mariangela's company, almost half of the women are employed part-time. These findings are consistent with the overall national trend. Narrative inquiry further revealed how gender dynamics were discursively constructed within organizational settings. Interviews showed that the man interviewed recounted his career paths as logical and linear, reinforcing dominant "heroic" leadership narratives, whereas women tended to describe their advancement as circumstantial or due to "luck" (Gherardi and Poggio, 2007; Poggio, 2018). This divergence in career storytelling contributes to the reproduction of what Riessman (2008) refers to as "discursive hegemony," where dominant narratives normalize male authority and marginalize alternative trajectories. Such narrative asymmetries underscore how organizational storytelling is both a product and producer of structural inequalities.

Structural factors also played a pivotal role in shaping the lived experiences of equity. While cooperative and smaller firms often adopted flat governance models that promoted participation and inclusive communication, these structures did not necessarily challenge deeper gender norms. For instance, caregiving responsibilities remained overwhelmingly feminized, with welfare policies typically designed to reduce women's working hours or workloads to accommodate domestic obligations.

> Upon returning from maternity leave, some colleagues were granted part-time work for a period. One of them had twins. Until the children turned three, she only worked in the mornings (Francesca).
> Some time ago, we implemented a six-hour shift for the production department, ending at 2 p.m. This line was made up entirely of women, who were able to leave at 2 p.m. and take care of their families in the afternoon (Chiara).

Although well-intentioned, these policies reinforced traditional gender roles and failed to address the root cause of imbalance – namely, the unequal distribution of care labor (Lewis and Humbert, 2010).

The low uptake of paternity leaves further reinforced this pattern, as men were less likely to engage in caregiving, leaving women to shoulder a disproportionate burden.

Following reports of incidents of gender-based verbal harassment, most of the organizations report having implemented training and informational campaigns aimed at promoting the use of inclusive language.

Some organizations, particularly in the social enterprise and public sectors, introduced innovative welfare collaborations aimed at supporting female employees. Examples included the provision of free menstrual products and discounted care technologies like Seremy, as well as well-being initiatives focused on emotional health, financial education, and caregiving support. These measures, while responsive to women's needs, often remained ad hoc and lacked integration into broader equity strategies (ILO, 2022). More formalized practices, such as objective-based performance evaluations, were also noted for their potential to mitigate subjective bias. However, these were rarely accompanied by gender-sensitive performance metrics.

Programs designed to support women's participation in male-dominated sectors were also present, particularly those aimed at promoting access to STEM careers and supporting requalification pathways for women re-entering the workforce. While these initiatives were viewed positively, they risked reinforcing a deficit model of gender equity – that is, framing the problem as women's lack of skills rather than addressing systemic barriers. Ahmed (2017) warns against such "diversity alibis," where organizations showcase targeted interventions without transforming underlying power structures. Similarly, Crenshaw (1989) highlights the importance of intersectional analysis in recognizing how such initiatives may fail to serve the most marginalized subgroups, such as women of color or those on precarious contracts.

The UNI/PdR 125:2022 Gender Equality Certification was another focal point. Although it offered a standardized framework for evaluating and promoting gender equity, its uptake remained limited. The disjunction between procedural compliance and cultural transformation was evident here. Damaschin (2023) emphasizes that organizational change cannot be reduced to checklist approaches; rather, it requires deep engagement with normative frameworks and relational dynamics.

From a theoretical perspective, these findings support the application of social constructionist and feminist organizational theories. The performative nature of equity – how organizations present themselves as equitable without substantively addressing inequalities – mirrors Butler's (1990) concept of gender performativity. Moreover, Gergen's (2015) theory of social constructionism suggests that equity is not a fixed state but an ongoing negotiation of meaning through interaction. As such, seemingly neutral practices, such as performance evaluations or hiring processes, may in fact reproduce dominant gender norms through embedded assumptions and micro-interactions (Garfinkel, 1967).

To transform these dynamics, a multidimensional strategy is required. First, implementing intersectional auditing protocols is essential. Disaggregated data collection and participatory analysis – wherein employees contribute to identifying and interpreting equity metrics – can make hidden disparities visible (Poggio, 2018; Acker, 2006). Second, care-related welfare policies must move from an accommodation model to one of redistribution. For instance, peer-to-peer care networks, cross-sector childcare cooperatives, and flexible, outcome-based work arrangements could help dismantle the gendered division of labor (Esin & Squire, 2020; ILO, 2022). Finally, narrative interventions, such as facilitated "story circles" and equity workshops, could foster critical reflection on dominant narratives and cultivate alternative discourses that validate diverse professional journeys (Bamberg, 2012; Gherardi & Poggio, 2007).

Conclusions, Limitations and Future Directions

This study has revealed that while organizations in Vicenza are increasingly engaging with the principles of gender equity and diversity management, a significant gap persists between formal intentions and tangible, systemic transformation. The data suggest that larger companies, such as Enersys, Baxi, and Taka, have made progress through structured policies, including flexible work arrangements, mentoring programs, and leadership development for women. These findings align with existing literature that supports the positive effects of such initiatives on female representation and organizational innovation (Romano & Petruccioli, 2020; Vieira, 2022). Conversely, small and medium-sized enterprises often exhibit less structured approaches, relying heavily on informal workplace culture rather than on institutionalized diversity strategies, consistent with observations that SMEs frequently lack the resources to implement effective equity policies (Greco, 2023; Galdiero et al., 2024).

However, the journey toward organizational equity is challenged by several structural and cultural obstacles. Notably, persistent gender pay gaps and vertical and horizontal segregation limit women's access to leadership and reinforce traditional gender roles, particularly regarding caregiving responsibilities. Even where flexible arrangements exist, such as part-time work or tailored shifts, these are still disproportionately framed around women's caregiving roles. In contrast, men's uptake of parental leave remains minimal, underlining a gendered division of labor that diversity management alone cannot fully rectify. These findings suggest that procedural neutrality is insufficient; what is needed is a cultural reconfiguration that challenges the entrenched norms about gender and work.

Despite some promising developments, particularly in larger enterprises, the research identified critical challenges and limitations that impact both the implementation of gender equity practices and the capacity of academic inquiry to fully assess them. A central methodological limitation was the forced abandonment of the originally planned survey due to the concurrent deployment of multiple surveys within the same regional project framework. Overlapping research initiatives in some companies may have caused survey fatigue or diminished the perceived relevance of this study.

Another significant challenge lays in the engagement of local organizations. Despite numerous email follow-ups and outreach through collaborative networks, participation remained limited. Organizations were often hesitant to share sensitive internal information, particularly related to organizational charts and diversity metrics such as age, ethnicity, and gender. Moreover, companies showed minimal interest in disseminating employee surveys or participating in digital storytelling workshops. None of the organizations agreed to take part in the DSWs, which curtailed the study's ability to gather firsthand, participatory narratives from employees. This lack of engagement restricted the analysis to management perspectives – primarily those of HR personnel, CEOs, and department heads – thereby omitting crucial voices from other organizational levels. This limitation suggests broader cultural resistance to transparency and inclusive practices. The reluctance to embrace participatory methodologies like DSWs may be attributed to organizational inertia, lack of awareness, or time constraints. However, it also reflects a possible underestimation of the value that employee narratives can add to equity-oriented change processes.

The findings also point toward several future directions for research. One important avenue is the need to investigate more deeply the differentiated impacts of diversity management practices across organizational sizes and sectors. For example, while large companies may adopt formalized diversity tools, such as the UNI/PdR 125:2022 gender equality certification, questions remain about the actual efficacy and long-term sustainability of such certifications in reshaping workplace culture. Research could explore whether these certifications lead to lasting improvements in gender equity, particularly in terms of career progression, pay parity, and employee retention (Hunegnaw Kebede, 2017; AGN, 2024).

Moreover, future studies should delve into the specific barriers that hinder the adoption of diversity and inclusion policies in SMEs. These might include financial constraints, limited managerial expertise, or a narrow understanding of diversity beyond gender. Gaining insight into these barriers would enable researchers and policymakers to design tailored support mechanisms that address the unique contexts of SMEs, thereby fostering more inclusive organizational ecosystems.

Another promising direction is the longitudinal analysis of how diversity management strategies evolve and impact organizational dynamics over time. While this study provides a snapshot, a longitudinal approach would offer a richer understanding of the cultural shifts, resistances, and breakthroughs that characterize organizational change. This would be particularly relevant in evaluating the effectiveness of mentoring programs, flexible work policies, and inclusive leadership training initiatives.

Finally, the study underscores the need for multi-perspective, participatory research methodologies that include employee voices at all levels. Future research should aim to create safe, engaging, and low-barrier spaces for workers to share their lived experiences, potentially through anonymized interviews, participatory workshops, or creative methods like storytelling. These narratives can provide critical insights into the subtle dynamics of inclusion and exclusion that are often invisible in top-down assessments.

In conclusion, while progress is evident in certain segments of Vicenza's organizational landscape, particularly among larger firms, meaningful gender equity remains a distant goal. Structural challenges, limited data access, and organizational resistance to participatory practices all constrain the depth and scope of both change and research. Yet, these challenges also illuminate future pathways – toward more inclusive methodologies, stronger institutional accountability, and a broader cultural transformation that reimagines how gender, work, and equity are understood and enacted.

References

Acker, J. (2006). Inequality Regimes: Gender, Class, and Race in Organizations. *Gender & Society*, *20*(4): 441-464.

AGN (2024, July 26). Balancing Gender Diversity - Diversity and Inclusion Strategy. AGN International. https://agn.org/insight/balancing-gender-diversity-a-key-aspect-of-a-firms-diversity-and-inclusion-strategy/.

Ahmed, S. (2017). *Living a Feminist Life*. Duke University Press.

Andrews, M., Squire, C. & Tamboukou, M. (Eds) (2013). *Doing Narrative Research,* 2nd ed., Sage.

Bamberg, M. (2012). Narrative Analysis. In: H. Cooper (Ed.). *APA Handbook of Research Methods in Psychology* (3 Volumes). Washington DC: APA Press. Doi: 10.1037/13620-006.

Bierema, L.L., Sim, E., He, W., & Cox, A.B. (2022). Double jeopardy: the paradox and promise of coaching women leaders from a critical feminist perspective. *Gender in Management: An International Journal*. Doi: 10.1108/gm-07-2022-0239.

Bierema, L.L. (2017). No woman left behind: critical leadership development to build gender consciousness and transform organizations. In: Madsen, S.R. (Ed.). *Handbook of Research on Gender and Leadership.* Edward Elgar (pp. 145-162).

Buemi, M., Guazzo, G., Conte, M. (2015). *Il Diversity Management per una crescita inclusiva: strategie e strumenti*. FrancoAngeli.

Butler, J. (1990). *Gender trouble: feminism and the subversion of identity*. Routledge.

Camera Di Commercio Vicenza (2024). *Conoscere Vicenza 2023: guida statistica della provincia di Vicenza*. https://www.vi.camcom.it/it/servizi/studi-statistica-e-ricerca-economica/conoscere-vicenza.html.

Cavalieri, A., & De Giorgi, E. (2025). Women's substantive representation under the Meloni government: Insights from a new dataset on parliamentary attention in Italy. *Parliamentary Affairs*, *78*(3): 123-145. Doi: 10.1080/13608746.2025.2518083.

Chase, S.E. (2018). Narrative Inquiry: towards theoretical and Methodological maturity. In: Lincoln, Y. S., & N. K., Denzin. *The Sage handbook of qualitative research* (5. edition). Sage.

Chase, S. E. (2005). Narrative Inquiry: Multiple Lenses, Approaches, Voices. In: N. K., Denzin & Y. S., Lincoln (Eds.). *The Sage handbook of qualitative research* (3rd ed., pp. 651-679). Sage Publications Ltd.

Clandinin, D.J. & Connelly, F.M. (2004). *Narrative Inquiry: Experience and Story in Qualitative Research.* Jossey-Bass.

Colella, F., & Di Lorenzo, S. (2023). Diversità, inclusione e innovazione sociale nei sistemi organizzativi complessi: Una riflessione critica sulla Gender Diversity intersezionale in Italia. *Mondi Migranti*, *2*: 21-37. Doi: 10.3280/MM2023-002002.

Collins, P. H. (2008). *Black Feminist Thought: Knowledge, Consciousness, and the Politics of Empowerment*. Routledge.

Connell, R. W., & Messerschmidt, J. W. (2005). Hegemonic Masculinity: Rethinking the Concept: Rethinking the Concept. *Gender & Society*, *19*(6): 829-859. Doi: 10.1177/0891243205278639.

Crenshaw, K. (1989). Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics. *University of Chicago Legal Forum*, (1): 139-167. https://scholarship.law.columbia.edu/faculty_scholarship/3007.

Crenshaw, K. (1991). Mapping the Margins: Intersectionality, Identity Politics, and Violence Against Women of Color. *Stanford Law Review*, 43(6): 1241-1299. Doi: 10.2307/1229039.

Damaschin, A. (2023). Social Construction of Organization. A New model in Organizational Development. *Postmodern Openings, 14*(2): 39-55. Doi: 10.18662/po/14.2/607.

Davis, A. Y. (1981). *Women, race, & class*. Vintage Books.

Di Fabio, A. (2016). *Diversity Management Questionnaire*: Primo contributo alla versione italiana [Diversity Management Questionnaire: First contribution to the Italian version]. *Counseling: Giornale Italiano di Ricerca e Applicazioni, 9*(2): 1-5.

Esin, C. & Squire, C. (2020). Narrative Relations and Associations: Catherine Kohler Riessman's Research Dialogism. *Narrative Works, 10*, 107-116. Doi: 10.7202/1076922ar.

Ferrara, M. D. (2019). Lavoro femminile e diversity management tra mediazione sindacale e nuove opportunità del lavoro agile. In: Consigliera regionale di parità (Eds). *Il Lavoro Femminile in Friuli Venezia Giulia. Rapporto 2019*, 103-128.

Filippi, S., Peters, K., & Suitner, C. (2024). Power to the people: A social identity perspective on organizational decentralization and employee well-being. *Journal of Community & Applied Social Psychology*, 34(1), e2725. Doi: 10.1002/casp.2725.

Galdiero, C., Maltempo, C., Marrapodi, R., & Martinez, M. (2024). Gender Diversity: An Opportunity for Socially Inclusive Human Resource Management Policies for Organizational Sustainability. *Social Sciences, 13*(3), 173. Doi: 10.3390/socsci13030173.

Garfinkel, H. (1967). *Studies in Ethnomethodology*. Polity Pr.

Gay, V., Santacreu-Vasut, E., Shoham, A. (2013). *The Grammatical Origins of Gender Roles.* Berkeley Economic History Laboratory. hal-04046900.

Gergen, K. J. (2015). *An invitation to social construction* (3rd ed.). Sage Publications Ltd. Doi: 10.4135/9781473921276.

Gherardi, S. & Poggio, B. (2007). *Gendertelling in Organizations: Narratives from male-dominated environments*. Liber AB.

Goodson, I. F., & Gill, S. R. (2011). The Narrative Turn in Social Research. *Counterpoints, 386:* 17-33. http://www.jstor.org/stable/42981362.

Greco, M. (2023, 23 Ottobre). *Diversity management: cos'è e come introdurlo nella PA.* FPA. https://www.forumpa.it/riforma-pa/diversity-management-cose-e-come-introdurlo-nella-pa/.

Harel, I., & Papert, S. (eds) (1991). *Constructionism*. Ablex.

Harris, C., Rousseau, G. G., & Venter, D. L. J. (2007). Employee perceptions of diversity management at a tertiary institution. *South African Journal of Economic and Management Sciences*, *10*(1): 51-71. Doi: 10.4102/sajems.v10i1.536.

hooks, B. (1984). *Feminist Theory: From Margin to Center.* South End Press.

hooks, B. (2000). *Feminism is for Everybody: Passionate Politics*. South End Press.

Hunegnaw Kebede, G. (2017). Gender diversity in management positions and organizational performance: A review of literature. *Management Studies and Economic Systems, 3*(4): 245-252.

ILO (2022). *Care at Work: Investing in Care Leave and Services for a More Gender Equal World of Work*. Geneva: International Labour Organization.

ISTAT & CNEL (2025). *Il lavoro delle donne tra ostacoli e opportunità*. https://www.istat.it/wp-content/uploads/2025/03/istat-cnel.pdf.

ISTAT (2025). *Labour market – Q4 2024*. https://www.istat.it/wp-content/uploads/2025/03/EN_labour_market_Q4_2024.pdf.

Jonsen, K., Maznevski, M. L., & Schneider, S. C. (2011). Special Review Article: Diversity and its not so diverse literature: An international perspective. *International Journal of Cross Cultural Management, 11*(1): 35-62. Doi: 10.1177/1470595811398798.

Lewis, S., & Humbert, A. L. (2010). Discourse or Reality: "Work-Life Balance" Flexibility and Gendered Organisations. *Equality, Diversity and Inclusion, 29*: 239-254. Doi: 10.1108/02610151011028840.

Miller, G., & Holstein, J. (1989), On the sociology of social problems. In Miller, G. e Holstein, J. (Eds), *Perspectives on Social Problems*, JAI Press, 1-16.
Mintzberg, H. (1981). Organization design: fashion or fit?. *Harvard Business Review*. https://hbr.org/1981/01/organization-design-fashion-or-fit.
Mohanty, C. (1988). Under Western Eyes: Feminist Scholarship and Colonial Discourses. *Feminist Review*, *30*(1): 61-88. Doi: 10.1057/fr.1988.42.
Murayama, K., & Elliot, A. J. (2012). The competition-performance relation: A meta-analytic review and test of the opposing processes model of competition and performance. *Psychological Bulletin, 138*(6), 1035-1070. Doi: 10.1037/a0028324.
Nichols, L. T. (2003). Voices of social problems: A dialogical constructionist model. In *Studies in Symbolic Interaction*. Emerald Group Publishing Limited (93-123). Doi: 10.1016/S0163-2396(2003)26.
OECD (2021). *Gender Wage Gap (Indicator).* [online] Available at: https://data.oecd.org/earnwage/gender-wage-gap.htm.
Olsen, J.E. and Martins, L.L. (2012). Understanding organizational diversity management programs: a theoretical framework and directions for future research. *Journal of Organizational Behavior, 33*(8): 1168-1187. Doi: 10.1002/job.1792.
Paggetti, E. (2025). Behind the numbers: The hidden inequalities of women's work in Italy. *Donne Quaderni*, 4(1): 45-67.
Papert, S. (1980). *Mindstorms: Children, Computers, and Powerful Ideas*. Basic Books. Trad. It. *Mindstorms. Bambini computer e creatività*. Emme, 1984.
Papert, S. (1986). *Constructionism: A new opportunity for elementary science education*. NSF Grant Application
Poggio, B. (2018). Deconstructing and challenging gender orders in organizations through narratives. In: L.A.E., Booysen, R., Bendl, & J. K., Pringle. *Handbook of Research Methods in Diversity Management, Equality and Inclusion at Work*, 430-449. Doi: 10.4337/9781783476084.00029.
Poggio, B., Murgia, A., & De Bon, M. (2010). *Interventi organizzativi e politiche di genere*. Carocci.
Ravazzani, S. (2016). Understanding approaches to managing diversity in the workplace: An empirical investigation in Italy. *Equality, Diversity and Inclusion, 35*(2): 154-168. Doi: 10.1108/EDI-08-2014-0062.
Ravazzani, S., Mazzei, A., Fisichella, C., & Butera, A. (2021). Diversity and inclusion management: an analysis of practice developments in Italy. *Sinergie Italian Journal of Management, 39*(3): 213-229. Doi: 10.7433/s116.2021.11.
Razetti, F., Santoni, V. (2019). Il mercato del welfare aziendale: l'intermediazione e il ruolo dei provider. In: Maino, F., Ferrera, M. (a cura di). *Nuove Alleanze per un welfare che cambia. Quarto Rapporto sul secondo welfare in Italia 2019* (pp. 119-152). Giappichelli.
Riessman, C.K. (2008). *Narrative Methods for the Human Sciences*. Sage.
Riva, C., & Benfatto, V. (2024). *Il diversity management in Veneto: La ricerca Unipd-Fòrema* [*Diversity management in Veneto: The University of Padova-Fòrema research*]. University of Padova, Department of Philosophy, Sociology, Pedagogy and Applied Psychology.

Romano, A., & Petruccioli, R. (2020). Gender diversity management, culture inclusive e sfide dell'attualità. Una review sistematica della letteratura. *Education Sciences & Society - Open Access, 11*(1). Doi: 10.3280/ess1-2020oa9477.

Santoni, C., & Crespi, I. (2022). Conciliazione famiglia e lavoro tra smart-working e diversity management. Una riflessione su pratiche e nuove semantiche. *Autonomie locali e servizi sociali, 1*: 45-66. Doi: 10.1447/104028.

Schreier, M. (2013). Qualitative Content Analysis. In: U. Flick, *The SAGE Handbook of Qualitative Data Analysis* (pp. 170-183). SAGE Publications Limited.

Simsek, B. (2012). Enhancing Women's Participation in Turkey through Digital Storytelling. *Culture Science, 5*(2): 28-44. Doi: 10.5334/csci.45.

Spector, M., & Kitsuse, J. I. (2017). *Constructing social problems*. Routledge.

Trinchero, R. (2002). *Manuale di ricerca educativa*. FrancoAngeli.

Vieira, L. (2022). Increasing gender diversity in organisations: What works?. *Journal of Applied Leadership and Management, 10*: 41-59.

Wells, K. (2011). *Narrative inquiry. Pocket Guides to Social Work Research Methods*. Oxford University Press.

Yin, R. K. (2018). *Case study research and applications: Design and methods*. (6th ed.). Sage publications.

Leveraging Learning Analytics in Formative Assessment: Insights from a Scoping Review of Blended Learning Courses in Higher Education

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Abstract
In recent years, the expansion of advanced digital technologies in the learning field has caused a deep change in educational platforms and revolutionized the tools and systems that support online learning. Within this context, the rapid development of Learning Analytics (LA) in blended and online higher education has transformed assessment practices, enabling personalized feedback and more targeted instructional strategies. This scoping review investigates how LA is integrated into formative assessment practices within blended learning courses in higher education. By analysing 13 selected studies, the review identifies the main techniques, purposes, and roles attributed to LA, such as student profiling, predictive modeling, teacher support, and feedback automation. The restricted number of papers examined could limit the broader applicability of the conclusions. However, findings highlight how LA is increasingly employed to support formative assessment in blended higher education, with methods such as process mining, predictive modeling, and visualization enabling more precise monitoring of student learning and the provision of timely, personalized feedback. Yet, the pedagogical challenge lies in ensuring that these tools are not reduced to mere instruments of control, but are instead leveraged to foster engagement, support teachers' decision-making, and promote more inclusive and meaningful learning experiences.
Keywords: Learning Analytics, Formative Assessment, Scoping Review, Blended Learning, Higher Education.

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1. Introduction

In recent years, digital technologies have become increasingly pervasive in higher education (HE), reshaping not only the tools available for instruction but also the modalities through which learning is organized and delivered. One of the most prominent developments in this context is the growing adoption of blended learning - a pedagogical model that combines face-to-face instruction with online components. Blended learning has proven particularly well-suited to the demands and flexibility of university education, offering opportunities for personalized learning pathways and asynchronous engagement (Hughes, 2025). However, while teaching practices have progressively evolved to incorporate digital infrastructures, assessment practices in these innovative contexts remain underdeveloped and often disconnected from the technological affordances of modern learning environments.

This gap became especially evident during and after the COVID-19 pandemic, a period which saw the rapid proliferation of online assessment systems – most notably, remote proctoring tools designed to monitor academic integrity. Yet, such systems primarily function as surveillance mechanisms, aimed at preventing misconduct rather than supporting meaningful learning processes with negative consequences on students' engagement (Marano et al., 2024). They offer limited potential for formative assessment – that is, assessment conceived as an integral part of teaching and learning, aimed at guiding students' development and promoting reflection, self-regulation, and improvement.

In response to these challenges, the Italian PRIN project, *Active Online Assessment in Higher Education* (2023-25), set out to investigate how digital technologies might enhance assessment in online and blended HE settings. Within this context, the current study focuses on the field of Learning Analytics (LA), an emergent and promising area that leverages educational data to better understand and support learning (Romero & Ventura, 2020). Despite its potential, the application of LA to formative assessment in university-level blended learning contexts remains relatively unexplored.

This study seeks to address this gap by examining how LA can be used to support and enrich formative assessment practices in HE, particularly within blended learning contexts. It investigates the ways in which LA tools and methodologies can transform assessment from a static, summative process into a dynamic, ongoing dialogue between students and educators - one that fosters deeper engagement, timely feedback, and continuous improvement. Specifically, the study aims to identify the key techniques employed in current research and practice, their intended pedagogical purposes, and the extent to which they contribute to reshaping assessment practices. In doing so, it explores how LA can help create more responsive learning environments that adapt to students' needs in real time and more data-informed educational models that empower instructors to make better decisions.

2. Background

Over the past few years, the expansion of advanced digital technologies in the learning field has caused a deep change in educational platforms and revolutionized the tools and systems that support online learning. High-tech developments in Learning Management Systems (LMS) have significantly boosted interactions between teachers and students, as well as among students themselves. Furthermore, they have supported and driven the creation of automated strategies for data collection, enabling more effective monitoring of learners' progress and comprehension levels. Since this paper explores the relationship between LA and formative assessment within blended learning environments, it is relevant to examine how these concepts naturally complement each other. By understanding how LA can support formative assessment, educators can better personalize their teaching approaches, ultimately creating more meaningful and effective learning experiences for students in HE.

A most cited definition of Siemens and Gašević (2012, p. 1) describes LA as "the measurement, collection, analysis, and reporting of data about learners, learning environments, and contexts to understand and optimize learning and their environments". Its primary objective consists in fostering student learning and providing new spaces to investigate educational environments. Both researchers and practitioners can utilize LMS dashboards and other external tools to extract, visualize, and analyse data, not only to monitor student progress, but also to enhance teaching practices and foster professional development (Ranieri & Gabbi, 2021; Gabbi, 2023). This information enables them to craft targeted interventions and develop personalized learning experiences for students (Bulut et al., 2023). Most LA techniques – such as visualization, classification, clustering, and association analysis – have already been effectively implemented within the educational field (Romero & Ventura, 2020). A disconnect remains

between the analytical outputs generated by data-processing algorithms and their effective interpretation to positively impact students' learning experiences. As highlighted by Wise (2014), greater attention should be given to the process of translating data into meaningful enhancements within learning environments. Multimodal solutions that integrate text and images can further increase the support provided to educators given their ability to identify complex, evolving learning behaviors and to offer meaningful "insights about learners' cognitive, metacognitive and emotional states" (Yan et al., 2024, p. 1903).

Empirical studies suggest that LA-based feedback can enhance students' perception of feedback and support improvements in their academic performance, particularly through scalable, data-driven approaches (Pardo et al., 2019). Moreover, Guzmán-Valenzuela et al. (2021) refer to the image of a virtuous and iterative cycle wherein learners generate data in the LMS platform based on their interactions with the online applications, as well as their engagement with the provided resources and assessments. This data is then used to inform and modify teachers' instructional practices, which, in turn, influence and modify students' behaviors and cognitive patterns, creating a continuous feedback loop. Regarding potential concerns arising from extensive use of LA, the authors cited above highlight some controversial aspects, such as the reduced autonomy of teachers and students, while the control mainly remains in the hands of central organizations, keen to prioritize grades and statistics over students' interest, motivation, and learning satisfaction. A second aspect to consider calls into question the Rosenthal effect: since LA aims to identify at-risk students, it may unintentionally contribute to labeling them and reinforcing teacher bias, potentially leading to lowered expectations for vulnerable or disadvantaged learners. In addition, the methods by which LA collects, analyses, and interprets data should be examined, as they may lead to misinterpretation and, in terms of privacy, could potentially restrict user freedom and raise concerns about data collection, storage, and usage.

These reflections underscore the necessity for careful consideration of both pedagogical and ethical dimensions when integrating LA and assessment into educational contexts. When such considerations are carefully balanced with practical application, this approach can significantly enhance the quality of blended and online university courses, making education more inclusive, equitable, and continuously responsive to students' evolving needs. It is largely acknowledged that LA offers substantial advantages for both students and teachers, contributing to provide personalized feedback and targeted support, with improved outcomes for everyone involved.

LA has therefore emerged as a promising educational approach designed to understand and optimize learning outcomes, effectively supporting formative assessment practices, enhancing student engagement, and fostering improved

academic achievement. In the practice of formative assessment, consequently, digital learning environments combined with Automatic Assessment Systems play a strategic significance, as Barana et al. (2019) highlight. These authors emphasize several key functions through which a digital learning environment can effectively assist educational activities. Such functions play a crucial role in: supporting students and teachers in designing and creating tools and operational strategies; providing and personalizing these resources to the intended users; gathering both quantitative and qualitative data on student interactions, like material usage, participation in activities, and performance metrics; analysing the data generated by students during training sessions; delivering individual feedback to students based on their performance; and offering comprehensive data analyses to both teachers and students to inform future learning and instructional strategies.

In Yan's (et al., 2021) systematic review, 52 studies were analysed, revealing the key factors that shape how teachers perceive and implement formative assessment. The findings suggest that teachers' decisions and practices are influenced by personal aspects, such as their attitude toward assessment and prior training, as well as contextual elements, including the level of support within their institution and the overall school environment. In this context, LA can complement and enhance formative assessment by providing data-driven insights that guide instructional decisions in terms of didactic and pedagogical choices. It can also support student learning, by offering feedback that is both timely and tailored to their individual needs, while also giving teachers insights and opportunities for appropriate intervention. Assessment and LA can have beneficial interactions in both directions. For instance, if predictive modeling indicates that students who struggle with a particular section of the course are at high risk of failing later on, instructors can step in sooner with tailored tutorials, extra resources, or peer mentoring to help them get back on track. To increase its validity and reliability, LA can make use of assessment-related tools, hypotheses, and techniques. At the same time, the discipline of evaluation may also benefit from the insight provided by LA. In assessment research, LA may also be employed to test open-ended theories and examine existing testing methods (Gašević, Greiff, & Shaffer, 2022).

The use of analytical tools enables teachers to provide LA based personalized feedback, particularly helpful in large student cohorts. By leveraging extensive data previously collected on student behavior, educators can generate timely and tailored feedback messages that respond to individual learning needs (Pardo, Jovanovic, Dawson, Gašević, & Mirriahi, 2019). Personalized feedback based on LA is an outstanding demonstration of how cutting-edge technology may enhance educators' skills. In situations where providing tailored feedback to students would typically be difficult, such as in large classes with hundreds or thousands of attendees, technology can facilitate the delivery of personalized

feedback. The teacher creates feedback templates, or "IF-THIS-THEN-THAT" scripts, instead of writing traditional feedback messages to each student. Automated messages would in this scenario follow multiple and differentiated responses, based on the student's outcomes. The system then uses information about the students and their learning processes to transform the templates into individualized feedback (Merikko, Saqr, & Ihantola, 2022).

As this article examines university courses implementing blended learning, a brief definition is provided to frame the theoretical discussion and clarify the term's usage. Blended learning, increasingly adopted in HE for its flexibility and inclusivity, supports formative assessment by allowing students to engage with content at their own pace and follow personalized learning paths (Hughes, 2025). While the concept has evolved to include diverse pedagogical models and digital tools, this study adopts Graham's (2006) definition: the integration of traditional face-to-face and distributed learning systems. This understanding informs the analysis within the LA framework.

3. Method

This study investigates the application of LA in conjunction with formative assessment tools to support student learning through continuous feedback and adaptive instructional strategies. The focus is on HE blended learning environments, where digital technologies facilitate the collection and analysis of learning data. This research is a component of a broader state-of-the-art review that aimed to determine the variety of tools and approaches used worldwide to support ongoing evaluation, feedback, and learners' active participation in blended learning contexts.

Few systematic reviews and critical syntheses have investigated the relationship between LA, assessment, and dashboard use in HE (Banihashem et al., 2022; Guzmán-Valenzuela et al., 2021; Matcha et al., 2019; Zhang et al., 2023). The use of LA for feedback support extends beyond simply making feedback more manageable for educators who are often overwhelmed; it also enables more diversified and tailored feedback, assisting learners in acquiring and developing effective learning strategies and skills (Banihashem et al., 2022). Moreover, the literature review by Zhang et al. (2023), encompassing school education and lifelong learning, shows that LA in formative assessment enhances digital learning by delivering timely and actionable feedback to both students and instructors. The study reviewed identify various purposes of LA in formative assessment, such as generating feedback for students, offering feedback for instructors, creating learner profiles, facilitating peer assessment, monitoring student performance, identifying learning strategies, and providing

automatic instant corrections. However, persistent challenges concern the translation of theoretical constructs into measurable learning variables (Guzmán-Valenzuela et al., 2021) and the limited grounding of LA dashboards in self-regulated learning theory, which constrains their potential to support metacognition and inform effective learning strategies (Matcha et al., 2019).

While existing reviews have highlighted the potential of learning analytics (LA) to enhance feedback practices, their specific operationalization within formative assessment processes in blended university contexts remains insufficiently explored. To address this gap, this study examines the presence and role of LA in formative assessment strategies within blended learning settings. Specifically, the study aims at answering two research questions: 1) Which techniques are employed, and for what purposes, in the application of LA within university blended learning courses that incorporate formative assessment strategies? 2) What roles could LA play in the formative assessment process within HE blended learning contexts?

This study adopts a scoping review approach, aiming to provide a preliminary overview of the scope and nature of existing literature on a given topic (Paré, Trudel, Jaana, & Kitsiou, 2015). These reviews are mostly conducted to assess the breadth, range, and focus of research activities, and to determine the feasibility of a full systematic review, or else to identify gaps in the existing body of knowledge (Cooper, Hedges, & Valentine, 2019). The literature review was undertaken through the following process (Moher et al., 2015): defining the research problem and questions, searching for relevant literature, reviewing and evaluating the search results, analysing, coding, and synthesizing the findings, and finally, reporting the review.

The paper collection process aimed to identify relevant studies by integrating multiple approaches for literature analysis to combine the advantages and capabilities of artificial intelligence with research methods. This included the use of generative artificial intelligence technologies - such as Scopus AI, an innovative add-on to the Scopus database, and Elicit, a research assistant AI tool – alongside conventional methods, such as string searches in the Scopus database. This approach aligns with recent scholarly discussions on integrating AI into research practices (Gatrell, Muzio, Post, & Wickert, 2024). The integration of Scopus AI and Elicit into the literature review process enhances discovery by uncovering relevant works beyond disciplinary or terminological boundaries, revealing emerging trends through visual mappings, and reducing the effort needed to process large datasets, yet it remains difficult to reproduce and subject to constant evolution in its algorithms and data sources. The AI-based search was conducted to expand the scope of inquiry by formulating two initial questions: one focused on toolkits for formative assessment in blended learning environments and the other on frameworks and guidelines for formative

assessment and evaluation in HE blended learning. Researchers then selected specific in-depth questions generated by the system for further exploration. Additionally, a targeted search was performed on Scopus using the following search string: "blended AND learning AND formative AND assessment."

The inclusion criteria comprised studies that investigated HE settings, published within the last decade (2014-2024) and written in English. Specifically, studies were selected based on the following parameters: i) *Publication type*: Peer-reviewed articles and conference papers, both empirical and conceptual; ii) *Educational context*: Higher education institutions; and iii) *Intervention*: LA applied in blended learning courses that incorporate formative assessment strategies. Studies were excluded if they focused solely on fully online or fully in-person learning, addressed summative assessment or general evaluation, or were conducted in primary and secondary education, vocational training, lifelong learning, or informal learning contexts.

To fully address the study objectives, a data extraction tool was developed to collect a variety of data to analyse the studies. Firstly, the basic study features were coded to accurately describe the selected searches. Subsequently, to answer RQ1 and RQ2, during the analysis phase, each paper was inductively or deductively coded according to three key dimensions (Table 1).

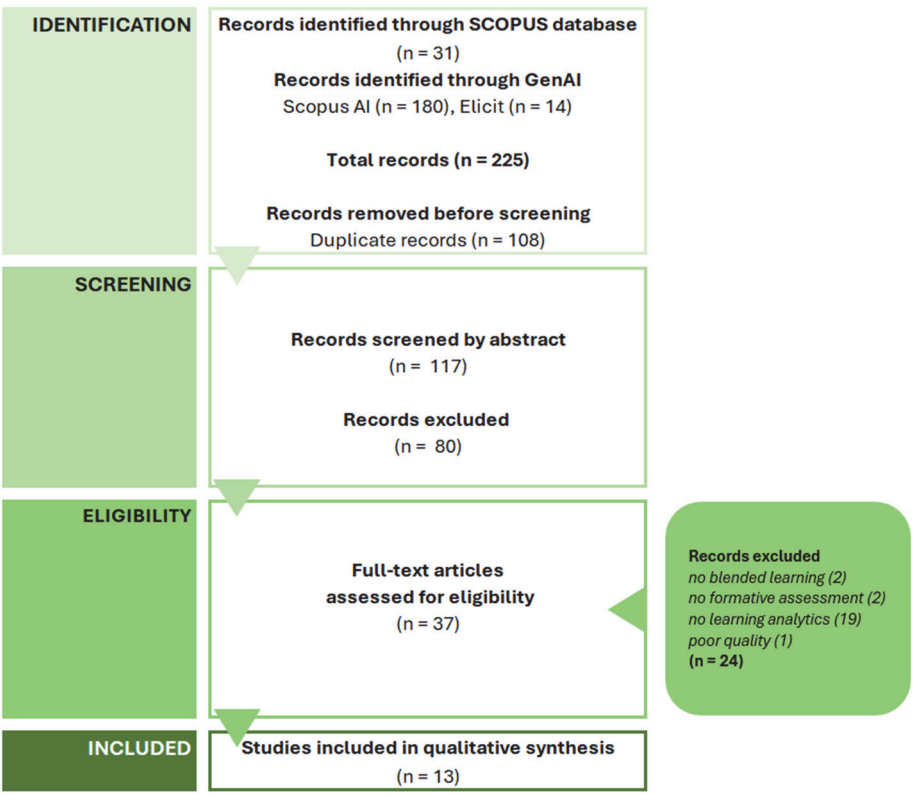
Table 1 - Coding categories

Dimension	**Categories**
LA techniques (Romero & Ventura, 2020	Cluster analysis Process mining Machine learning and data-based systems Multimodal LA Regression analysis Visual LA
Purposes of LA application	Profiling and predictive modeling of students Teacher assistance for assessment Monitoring student activities Data visualization Automation of feedback Adaptation and personalization
LA's function in relation to formative assessment	Collecting evidence on formative assessment Enriching the formative assessment process Designing data-based tools for formative assessment

The entire screening and analysis process was carried out in parallel by three researchers, following a pilot phase during which the collaborative extraction and coding table was tested and aligned through the joint analysis of three articles.

This initial calibration ensured consistency in the application of the coding criteria throughout the review. The data, structured within a data extraction tool, were independently coded and cross-checked by multiple researchers. Any discrepancies in interpretation were subsequently discussed and resolved through consensus to ensure methodological rigor. An aggregative synthesis approach (Sandelowski & Barroso, 2003) was employed to present the results extracted through the coding process, categorized by type of findings.

Figure 1 - Flowchart of the study selection process using GenAI tools and database searches



As illustrated in Figure 1, the search conducted on the previously mentioned criteria produced a total of $N = 225$ records. Duplicate records ($N = 108$) were first removed to eliminate overlaps across different search tools. Articles that did not align with the study's focus were then excluded based on predefined criteria. This screening process refined the literature corpus, ensuring that only the most relevant and significant studies were retained for the final analysis ($N = 13$). The next section outlines the characteristics of the selected studies and

provides a summary of the literature review findings in relation to the research questions.

4. Results

4.1 Background information on the included publications

The selected studies, listed in the Appendix, argued about the use of LA in HE settings, examining its different applications for improving learning environments in the realm of formative evaluation and blended learning. As seen in Table 2, the analysis of the scholarly contributions demonstrates a relatively uniform distribution of research output over a decade, with a slight concentration in 2017, 2019, and 2020. Notably, no publications were recorded in 2016, while in the most recent years, the research output appears to have stabilized without significant variation.

Table 2 - Overview of the Studies Included

Authors	**Year**	**Geographical area**	**Research area of the studies**	**Document type**	**Type of study/ methodology**
Biswas & Bhattacharya	2024	Asia	Computer Science and Engineering	Journal	Empirical
Borter	2023	n.a.	Psychology	Journal	Empirical
Clutterbuck & Lewis	2019	Australia	Business and Informatics	Journal	Empirical
Comerford, Mannis, DeAngelis, Kougioumtzoglou & Beer	2018	n.a.	Engineering	Journal	Conceptual
Koh, Tee, Suresh & Caleon	2020	n.a.	n.a.	Conference paper	Empirical

Kohnke, Foung & Chen	2022	Asia	English for Academic Purposes	Journal	Empirical
Morais Marenzi & Kantz	2015	Europe	Medical	Conference paper	Empirical
Nguyen	2017b	n.a.	n.a.	Journal	Empirical
Pardo, Jovanovic, Dawson, Gašević & Mirriahi	2017	Oceania	Computer engineering	Journal	Empirical
Paredes & Hsiao	2021	n.a.	Computer Science	Journal	Empirical
Tempelaar, Rienties & Giesbers	2014	Europe	Mathematics and statistics	Conference paper	Empirical
Titov, Kurilov, Titova & Brikoshin	2019	Russia	n.a.	Journal	Empirical and conceptual
Xiaogun & Yiwei	2020	Asia	Engineering	Conference paper	Empirical

A geographic analysis of the included studies reveals that 3 research papers investigated LA in blended learning environments within Asian universities, and an additional one in Russia. Two studies were conducted in European institutions. However, five studies did not specify their geographical scope or university affiliations, limiting the possibility of a comprehensive data retrieval.

Regarding the disciplinary focus, most of the selected studies (5) investigated LA in university departments of Computer Engineering, Computer Science, and Engineering. An additional one focuses on Business and Informatics. However, three out of the thirteen studies failed to provide specific details about their disciplinary scope, thereby hindering a comprehensive comparison across all studies. In terms of publication type, the majority of the selected papers (9) were published in journals, while the remaining 4 appeared in conference proceedings, suggesting a preference for journal-based dissemination of research findings in this domain. From a methodological perspective, a quantitative approach was the most commonly employed (7

cases), followed by three studies adopting a mixed-methods approach, while the remaining contributions were qualitative, including theoretical proposals and applied concept analyses.

42 Techniques, purposes and functions of Learning Analytics in university blended learning courses with formative assessment

LA aims to improve the educational process by systematically measuring learning-related data and providing informative feedback to students and teachers to support the regulation of learning. In the selection process, thirteen papers mention the use of LA in HE contexts, exploring various applications of this technology to enhance the educational experience in the field of formative assessment and blended learning contexts. To analyse the presence of LA in formative assessment, the studies were classified based on the specific techniques employed (Romero & Ventura, 2020). This categorization highlights the different analytical approaches used to collect, process and interpret student data (Table 3).

Table 3 - Categories of Learning Analytics techniques used

LA techniques	Definition	References (*N* = 13)
Cluster analysis	Grouping students or learning materials based on patterns of learning and interaction.	Borter, 2023
Process mining	Analysing student behavior through digital traces, including sequences of course participation, grades, and timestamps.	Clutterbuck & Lewis, 2019; Pardo et al., 2017; Titov et al., 2019; Xiaogun & Yiwei, 2020
Machine learning and data-based systems	Identifying hidden insights in data using models that autonomously adapt to new information.	Biswas & Bhattacharya, 2024; Comerford et al., 2018
Multimodal LA	Connecting the physical and the digital learning spaces during practice-based learning activities.	Paredes & Hsiao, 2021
Regression analysis	Predicting student performance and detecting behavioral patterns.	Kohnke et al., 2022; Nguyen, 2017; Tempelaar et al., 2014
Visual LA	Utilizing computational tools and interactive visualization techniques to analyse and interpret educational phenomena.	Koh et al., 2020; Morais et al., 2015

Among the techniques identified, process mining is the most frequently used, appearing in four of the thirteen studies. It enables researchers to analyse student behavior through digital footprints, revealing learning sequences,

assessment patterns, and engagement over time. Regression analysis, used in three studies, helps predict student performance and detect behavioral trends, supporting data-driven decisions. Visual LA also appear in two studies, employing computational and interactive visual tools to interpret complex learning data more effectively. Other techniques, such as cluster analysis, machine learning, and multimodal LA, are each mentioned in only one study.

Besides the technical features, the 13 studies examine different goals of LA's use, including profiling and predictive modeling of students, teacher assistance for assessment, visualization of assessments for students, detection of student engagement and automation of feedback, as seen in Table 4.

Table 4 - Categories of Learning Analytics application purposes

LA purposes	Definition	References (*N* = 13)
Profiling and predictive modeling of students	Analysis of learner data to identify profiles and predict academic performance or risk.	Biswas & Bhattacharya, 2024; Borter, 2023 Kohnke et al., 2022; Nguyen, 2017; Tempelaar et al., 2014
Teacher assistance for assessment	Support for instructors in evaluating student work and decision-making through data-driven insights	Clutterbuck & Lewis, 2019; Paredes & Hsiao, 2021
Monitoring student activities	Tracking learners' engagement, participation, and behaviors within digital learning environments.	Titov et al., 2019; Xiaogun & Yiwei, 2020
Data visualization	Representation of learning data through visual formats and dashboards to enhance interpretation and pedagogical decisions.	Koh et al., 2020; Morais et al., 2015
Automation of feedback	Generation of timely, data-based feedback for students without direct human intervention.	Pardo et al., 2017
Adaptation and personalization	Dynamic adjustment of learning pathways, content, or feedback to meet individual learner needs.	Comerford et al., 2018

Five articles focus on the use of LA for profiling and predictive modeling of students. Biswas and Bhattacharya (2024) present an "intelligent real-time feedback" system that uses a machine learning–based prediction and classification model to support in-class teaching. The system generates automated feedback by classifying student performance during lessons. Teachers appreciated the reduced burden of real-time feedback, while students responded positively to its effectiveness and usability. Another study applies cluster analysis to identify meaningful self-regulated learning behaviors

(Borter, 2023). The results shows that the benefit of additional formative assessments depended on students' time investment: high-effort students (with above-average time and additional engagement) improved significantly, while low-effort and efficient clusters showed no measurable gains. Notably, engaging with assessments prompted a shift in learning behavior, increasing the proportion of students in the efficient cluster, which correlated with higher academic performance. Moreover, Kohnke et al. (2022) use LA to explore how student engagement with formative assessments predicts performance in English for Academic Purposes courses. Students invested considerable effort in multimodal tasks and strived to perform well, demonstrating the formative potential of these assessment formats. The fourth paper analyzes how different types of interactivity affect learning outcomes using regression models (Nguyen, 2017). Results show that student–student interaction has the strongest predictive value, followed by student – teacher and student – content interaction, indicating the importance of peer engagement in blended learning. Finally, Tempelaar et al. (2014) investigate predictive modeling using three data sources: LMS tracking data, students' learning dispositions, and results from computer-assisted formative assessments. Their longitudinal study reveals that formative assessment outcomes are the most powerful predictors of academic performance and early risk detection, while LMS data alone have limited predictive value.

Regarding teacher assistance in assessment, two key studies stand out. Clutterbuck and Lewis (2019) present a logging worksheet – described as a "formative assessment artifact" – that grants instructors immediate access to students' problem-solving processes. This tool enables rapid evaluation of the logic applied, supporting timely and high-quality feedback, including insights into response times. Similarly, Paredes and Hsiao (2021) describe the development of WebPGA, a web-based application that digitizes, grades, and distributes paper-based assessments in blended programming courses. The system integrates multimodal LA from physical and digital environments and provides students with dashboards detailing results, grading, and feedback. Findings show that students, particularly high-performing and improving ones, engaged actively in reviewing their assessments, especially when guided. They were also able to identify misconceptions in their work.

In relation to activity monitoring, Titov et al. (2019) propose a model that uses computer-aided techniques in blended learning to measure students' actual study time. Similarly, Xiaogun and Yiwei (2020) analyse learning processes through project and online discussion data, streamlining evaluation. Their findings reveal a strong correlation between online participation, peer evaluation, and final grades, showing that students who are more active in discussions tend to achieve better academic results.

Another purpose for which LA has been applied is the implementation of visualization systems for the assessment. One article focuses on a visual analytics approach based on self and peer ratings of a domain-general, four-dimensional teamwork competency measure (Koh et al., 2020). A digital formative assessment approach was designed for blended learning environments, focusing on visual analytics, awareness, reflection, and goal-setting. To evaluate its effectiveness, a quasi-experimental study with an embedded mixed-methods design was conducted. The results indicate that the applied design principles played a key role in enhancing students' learning and self-reflection on their teamwork competencies. The other paper illustrates a formative assessment strategy based on visualization techniques designed to support teachers' awareness and reflection in university learning contexts that integrate technology-enhanced learning activities into the curriculum (Morais et al., 2015). The authors build on the LearnWeb Design Framework to design and implement a Formative Assessment extension that supports the monitoring of the learning process to increase awareness and support reflection in a specific learning scenario.

Two additional studies from the literature review examine the application of LA in university settings, specifically focusing on personalized feedback and adaptive systems. Pardo et al. (2017) explore how analytics can address the challenge of delivering personalized feedback at scale. Their algorithm generates tailored comments for each student and activity, which are compiled into a single feedback message delivered via a virtual environment or email. Results indicate a positive correlation between these messages and both student satisfaction with feedback and academic performance. Finally, Comerford et al. (2018) present an adaptive system that tracks student progress and delivers personalized feedback, directing learners toward simpler or more advanced versions of the same content. Based on two case studies in engineering education, the study shows that embedding formative assessment within interactive applications – replacing traditional video lectures – enhances the integration of assessment into students' self-directed learning in flipped classrooms.

To answer the second research question on how LA contributes to formative assessment processes, the studies were analysed based on an additional inductive coding theme. Table 5 shows the three key roles of LA in formative assessment emerged from the classification of the articles: (1) collecting evidence to support formative assessment, (2) enhancing the formative assessment process, and (3) designing data-based tools specifically for formative assessment.

Table 5 - Roles of LA in the formative assessment process

LA function	Definition	References (*N* = 13)
Collecting evidence on formative assessment	Gathering data on student learning to provide concrete information that informs ongoing assessment and guides instructional decisions.	Borter, 2023; Kohnke et al., 2022; Nguyen, 2017; Tempelaar et al., 2014; Xiaogun & Yiwei, 2020
Enriching the formative assessment process	Using LA to improve the effectiveness of formative assessment by making student progress visible, supporting reflection, and facilitating feedback.	Clutterbuck & Lewis, 2019; Paredes & Hsiao, 2021; Titov et al., 2019
Designing data-based tools for formative assessment	Creating technological tools that leverage LA to deliver personalized feedback, adapt instruction, and actively support the formative assessment cycle.	Biswas & Bhattacharya, 2024; Comerford et al., 2018; Koh et al., 2020; Morais et al., 2015; Pardo et al., 2017

The first category, LA for assessing the impact of the chosen formative assessment method, involves systematically collecting and analysing evidence of students' learning processes. This approach enables data-driven insights to evaluate the effectiveness of assessment strategies and optimize instructional practices. The predominant focus across the five studies is on academic performance, with some exploring its relationship with self-regulated learning (Borter, 2023) and interaction (Nguyen, 2017).

LA for supporting formative assessment entails the analysis of student data to identify learning patterns and extract meaningful insights from the feedback process. In the three studies, educators utilized automated tools that facilitated and enhanced the assessment process. LA tools in this context are used to make the learning process visible while students practice autonomously (i.e., making available the attempts made by the students, in Clutterbuck & Lewis, 2019), boost students' ability to review their work to support blended-instruction classes and allow teachers to interpret the time spent on the platform, providing deeper insights into learners' engagement and progress.

The third category includes five studies that design formative assessment tools incorporating LA techniques. In these cases, the prototypes provide feedback to students or facilitate the adaptation of instruction. Examples include a machine-led real-time feedback system released through an app that uses students' academic performance prediction models and real-time engagement statistics (Biswas & Bhattacharya, 2024), an adaptive system that steers students towards different presentations of the same source material in a

flipped classroom setting (Comerford et al., 2018) and visual analytics tool for self-reflection about teamwork competency (Koh et al., 2020).

In conclusion, the three perspectives on the role of LA for formative assessment reveal distinct yet complementary approaches to enhancing the learning process. While the first focuses on evaluating assessment methods with data-driven insights, the second emphasizes enhancing the feedback process by adding relevant elements for teachers and the third explores the development of tools that directly interact with the learning journey and adapt to students' needs. Together, these perspectives demonstrate the diverse ways in which LA can be employed to improve formative assessment practices and contribute to the overall goal of improving academic performance and supporting student development but with a different degree of involvement of automated tools within the teaching practice.

5. Discussion

The selected studies illustrate the potential of LA to transform various facets of HE, from improving assessment practices to fostering deeper student engagement, particularly in technology enhanced contexts. Concerning the specific LA techniques employed, the varied application of the tools illustrates the diverse ways in which LA can be used to enhance formative assessment, with process mining, regression analysis, and visual LA standing out as particularly influential methodologies. The process mining widespread use in the selected studies suggests an emphasis on understanding the progression of learning activities and identifying potential areas for intervention. The results are consistent with Banihashem et al. (2022), highlighting the predominant use of data mining techniques for providing feedback in formative assessment contexts.

Moreover, the data on the application of LA for formative assessment and blended learning in university contexts reveals a clear focus on profiling and predictive modeling, with five papers dedicated to this purpose. This indicates a relevant interest in understanding and forecasting student behavior and performance. Teacher assistance for assessment is represented in a small number of studies, with two papers noting the potential of tools to support educators in evaluating and providing feedback. Visualization techniques and monitoring student activities are similarly limited, appearing in two papers each, suggesting initial attention to visualizing data and tracking student engagement rather than widespread application. As stated by Stanja et al. (2023), in the specific context of STEM education, visual dashboards can offer summarized representations of student data to assist teachers in selecting

effective interventions, even though reference to learning theories remains essential for effective practices (Matcha et al., 2019). Additionally, automation of feedback and adaptive systems are less frequently explored, with only one paper each, suggesting potential areas for further development.

Finally, the function of LA tools varies in their application for the formative assessment. In some cases, they primarily serve a monitoring role, tracking student learning processes without direct intervention. In other instances, they are integrated into teachers' formative assessment practices, supporting decision-making by providing data-driven insights while still allowing educators to interpret and act upon the results. Additionally, certain tools operate autonomously, offering adaptive solutions to support learning in blended educational contexts. A significant development in this direction would involve using data extracted from online formative assessments as a foundation for building predictive LA models (Bulut et al., 2023).

The limited number of studies indicates that, while initial efforts have demonstrated potential benefits for student learning and faculty support, there is a clear need for further investigation. Longitudinal research is crucial to understand the sustained effects of LA interventions on learning outcomes over time, while cross-disciplinary comparisons could reveal how context-specific factors influence both implementation and efficacy. Moreover, the diversity of approaches and tools discussed highlights the potential impact of LA to enhance both teaching and learning outcomes. On one hand, it is possible to observe the support provided to teachers and students by automated systems, even in real-time. On the other hand, LA allows for a deeper understanding of the effects of assessment tools and the design of educational activities.

Automated systems embedded within LA frameworks provide some advantages by delivering immediate, real-time support to both educators and students (Merikko et al., 2022; Pardo et al., 2019). For instance, real-time feedback mechanisms enable instructors to offer prompt, tailored responses, thereby enhancing comprehension and addressing issues swiftly. While LA can facilitate feedback delivery, making it more detailed and personalized - particularly for large classes - it also enables the provision of a broader variety of feedback with distinct purposes, leading to positive outcomes (Banihashem et al., 2022). Such systems also streamline the management of substantial volumes of student data, allowing for ongoing monitoring of academic progress and engagement levels, focusing on the actual relevant data (Guzmán-Valenzuela et al., 2021). This capability can support educators in adapting their teaching strategies dynamically and providing timely assistance, while explicit attention to ethical implications is essential to ensure that technological innovation aligns with pedagogical and social values (Wise, 2014).

In addition to immediate support, LA serves as a methodological tool for gaining a deeper understanding of the impact of formative assessment tools and instructional design on learning outcomes. By analysing data from diverse sources, such as student performance metrics and digital traces, educators can evaluate the efficacy of various assessment methods and instructional approaches. This analytical process facilitates the refinement of educational activities, ensuring alignment with learning objectives and student needs. In conclusion, LA could contribute to evidence-based enhancements in educational design, thereby augmenting the quality and effectiveness of teaching experiences and instructional design (Gašević et al., 2022).

These findings underscore a persistent tension in the use of formative assessment in blended learning, despite its widespread adoption in HE (Hughes, 2025). While automated systems are often used for control rather than engagement (Marano et al., 2024), this review highlights emerging practices that better align with the pedagogical potential of technology, calling for a more intentional and formative use of digital tools to support feedback, participation, and personalization.

This study contributes to understanding how LA intersects with formative assessment in blended learning contexts; however, certain limitations should be acknowledged. The first limitation of this study is that it did not specifically search for LA using targeted keywords and search questions, but rather represents a further exploration of a broader investigation on formative assessment in blended learning courses. Moreover, the number of papers analysed was limited, which may affect the generalizability of the findings. Additionally, an important consideration is that the innovative AI-supported approach used for the literature search influenced the selection process, meaning it cannot be regarded as entirely systematic. Furthermore, the unavailability of certain papers at the time of retrieval may have led to the omission of critical empirical evidence relevant to this review.

6. Conclusion

The current study offers a synthesis of how LA are currently utilized to support formative assessment practices within blended learning within HE. The findings suggest that LA holds promising potential to enhance instructional practices by making student learning processes more visible, measurable, and adaptable. However, the evidence remains limited and emergent, reflecting a small and selective body of literature. While LA can provide nuanced insights into student engagement with course content, learning activities, and assessments, the studies reviewed are often context-specific, short-term, and

lack generalizability. Similarly, the mapping of techniques such as process mining, predictive modeling, and visual analytics illustrates current capabilities but cannot yet support broad conclusions about their effectiveness across diverse HE contexts. Furthermore, the diverse purposes these techniques serve - from monitoring student engagement to automating formative feedback - highlight the strategic value of LA in enhancing both the immediacy and the pedagogical relevance of feedback processes. This can be particularly critical in complex, large-scale, and digitally mediated learning environments, where traditional forms of assessment and feedback often prove insufficient. In HE contexts, where assessment sometimes relies on control-oriented solutions such as online proctoring systems which mainly aim to safeguard academic integrity but contribute little to pedagogy, LA tools shows potential to bridge instructional intentions and learner experiences. However, evidence of its effectiveness remains limited. Unlike proctoring tools, which emphasize surveillance, LA can theoretically support more responsive and personalized formative feedback by offering insights into student behavior, engagement, and progress, yet current applications are mostly small-scale, context-specific, and insufficiently evaluated to confirm broader pedagogical impact.

From a HE perspective, the implications of this study are twofold. First, it signals the need for institutions to integrate formative assessment frameworks more deliberately into the pedagogical and instructional design of blended learning courses, thereby moving beyond the predominant reliance on summative evaluations that often offer limited, retrospective insights. Embedding formative assessment as a core component of course design can foster a more continuous and process-oriented view of learning, where feedback is not merely evaluative but serves as a formative driver for student improvement and self-regulation. Second, it illustrates how LA can serve as a catalyst for pedagogical innovation, enabling educators to personalize instruction, identify at-risk students at earlier stages, and dynamically adapt learning pathways based on real-time evidence of student progress and engagement. In this role, LA application can evaluate the effectiveness of ongoing assessment practices and improve their efficiency, although their adoption remains limited. These capabilities are especially relevant in university settings where student cohorts are large, heterogeneous, and increasingly diverse in terms of background, learning styles, and academic preparedness.

Furthermore, blended learning environments present unique opportunities for the effective implementation of LA. The hybrid structure - combining face-to-face and digital components - not only facilitates the continuous collection of rich interaction data but also offers flexible touchpoints for integrating adaptive feedback and self-regulated learning strategies (Hughes, 2025). LA

thus becomes instrumental in closing the feedback loop, fostering a more dialogic and learner-centered approach to assessment (Guzmán-Valenzuela et al., 2021).

However, the study also points to critical areas for further development. Greater attention must be paid to building the assessment literacy of faculty, ensuring that educators are equipped to interpret and act upon analytics outputs in pedagogically sound ways. Additionally, ethical concerns around data privacy, algorithmic bias, and student autonomy must be addressed to foster responsible and transparent use of LA tools.

In conclusion, this research highlights the emerging potential of LA to support formative assessment in HE blended learning courses, suggesting that they could contribute to more responsive and evidence-informed teaching practices. However, current evidence remains limited, and further research is needed to better understand how these tools can be effectively integrated and to assess their impact on learning outcomes in diverse university contexts in the pursuit of high-quality, student-centered learning in the digital age.

References

Banihashem, S. K., Noroozi, O., Van Ginkel, S., Macfadyen, L. P., & Biemans, H. J. (2022). A systematic review of the role of learning analytics in enhancing feedback practices in higher education. *Educational Research Review*, *37*, 100489.

Barana, A., Conte, A., Fissore, C., Marchisio, M., & Rabellino, S. (2019). Learning Analytics to improve Formative Assessment strategies. *Journal of e-Learning and Knowledge Society*, *15*(3): 75-88.

Bulut, O., Gorgun, G., Yildirim-Erbasli, S.N., Wongvorachan, T., Daniels, L.M., Gao, Y., Lai, K.W., & Shin, J. (2023). Standing on the shoulders of giants: Online formative assessments as the foundation for predictive learning analytics models. *British Journal of Educational Technology*, *54*(1): 19-39.

Cooper, H., Hedges, L. V., & Valentine, J. C. (Eds.). (2019). *The Handbook of Research Synthesis and Meta-Analysis* (3rd edition). New York, NY: Russell Sage Foundation.

Gabbi, E. (2023). About or with teachers? A systematic review of learning analytics interventions to support teacher professional development. *QWERTY*, *18*: 88-109.

Gašević, D., Greiff, S., & Shaffer, D. W. (2022). Towards strengthening links between learning analytics and assessment: Challenges and potentials of a promising new bond. *Computers in Human Behavior, 134*, 107304.

Gatrell, C., Muzio, D., Post, C., & Wickert, C. (2024). Here, there and everywhere: On the responsible use of artificial intelligence (AI) in management research and the peer-review process. *Journal of Management Studies*, *61*(3): 739-751.

Graham, C. R. (2006). Blended learning systems: Definition, current trends, and future directions. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning: Global perspectives, local designs* (pp. 3-21). Hoboken, NJ: Pfeiffer Publishing.

Guzmán-Valenzuela, C., Gómez-González, C., Rojas-Murphy Tagle, A., & Lorca-Vyhmeister, A. (2021). Learning analytics in higher education: a preponderance of analytics but very little learning?. *International journal of educational technology in higher education*, *18*: 1-19.

Hughes, N. (2025). *Blended learning solutions in higher education: History, theory and practice*. New York, NY: Routledge.

Marano, E., Newton, P. M., Birch, Z., Croombs, M., Gilbert, C., & Draper, M. J. (2024). What is the student experience of remote proctoring? A pragmatic scoping review. *Higher Education Quarterly 78*(3): 1031-1047.

Matcha, W., Uzir, N. A. A., Gašević, D., & Pardo, A. (2019). A systematic review of empirical studies on learning analytics dashboards: A self-regulated learning perspective. *IEEE transactions on learning technologies*, *13*(2): 226-245.

Merikko, J., Ng, K., Saqr, M., & Ihantola, P. (2022). To opt in or to opt out? Predicting student preference for learning analytics-based formative feedback. *Ieee Access*, *10*: 99195-99204.

Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., ... & Prisma-P Group. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic reviews*, *4*(1): 1-10.

Pardo, A., Jovanovic, J., Dawson, S., Gašević, D., & Mirriahi, N. (2019). Using learning analytics to scale the provision of personalised feedback. *British journal of educational technology*, *50*(1): 128-138.

Paré, G., Trudel, M. C., Jaana, M., & Kitsiou, S. (2015). Synthesizing information systems knowledge: A typology of literature reviews. *Information & management*, *52*(2): 183-199.

Ranieri, M., & Gabbi, E. (2021). Esplorare le comunità professionali online attraverso i Learning Analytics per la formazione degli insegnanti. In: *eTwinning e formazione degli insegnanti* (pp. 161-173). Roma: Carocci.

Romero, C., & Ventura, S. (2020). Educational data mining and learning analytics: An updated survey. *Wiley interdisciplinary reviews: Data mining and knowledge discovery*, *10*(3), e1355.

Sandelowski, M., & Barroso, J. (2003). Classifying the findings in qualitative studies. *Qualitative health research, 13*(7): 905-923.

Sareen, S., & Mandal, S. (2024). Challenges of blended learning in higher education across global north south: A systematic and integrative literature review. *Social Sciences & Humanities Open, 10*, 101011.

Siemens, G., & Gašević, D. (2012). Special issue on learning and knowledge analytics. *Educational Technology & Society*, 15(3): 1-163.

Stanja, J., Gritz, W., Krugel, J., Hoppe, A., & Dannemann, S. (2023). Formative assessment strategies for students' conceptions – The potential of learning analytics. *British Journal of Educational Technology*, *54*(1), 58-75.

Wise A. F. (2014, March). Designing pedagogical interventions to support student use of learning analytics. In *Proceedings of the fourth international conference on*

learning analytics and knowledge LAK '14, March 24 - 28 2014 (pp. 203-211). New York, NY: ACM.
Yan, L., Echeverria, V., Jin, Y., Fernandez-Nieto, G., Zhao, L., Li, X., ... & Martinez-Maldonado, R. (2024). Evidence-based multimodal learning analytics for feedback and reflection in collaborative learning. *British Journal of Educational Technology*, *55*(5): 1900-1925.
Yan, Z., Li, Z., Panadero, E., Yang, M., Yang, L., & Lao, H. (2021). A systematic review on factors influencing teachers' intentions and implementations regarding formative assessment. *Assessment in Education: Principles, Policy & Practice, 28*(3): 228-260.
Zhang, K., Yılmaz, R., Ustun, A. B., & Yılmaz, F. G. K. (2023). Learning analytics in formative assessment: A systematic literature review. *Journal of Measurement and Evaluation in Education and Psychology*, *14*(Özel Sayı): 359-381.

APPENDIX

Articles included in the study

1. Biswas, U., & Bhattacharya, S. (2024). ML-based intelligent real-time feedback system for blended classroom. *Education and Information Technologies*, *29*(4): 3923-3951.
2. Borter, N. (2023). Differential Effects of Additional Formative Assessments on Student Learning Behaviors and Outcomes. *Studia paedagogica*, *28*(3): 9-38.
3. Clutterbuck, P., & Lewis, D. (2019). Personalized Blended Learning via New Media and Formative Assessment. *International Journal of Learning*, *5*(1): 12-18.
4. Comerford, L., Mannis, A., DeAngelis, M., Kougioumtzoglou, I. A., & Beer, M. (2018). Utilising database-driven interactive software to enhance independent home-study in a flipped classroom setting: going beyond visualising engineering concepts to ensuring formative assessment. *European Journal of Engineering Education*, *43*(4): 522-537.
5. Koh, E., Tee, Y. H., Suresh, D., & Caleon, I. (2020). A digital formative assessment intervention for cultivating teamwork skills. In *ICLS 2020 Proceedings* (pp. 1597-1600). ISLS.
6. Kohnke, L., Foung, D., & Chen, J. (2022). Using learner analytics to explore the potential contribution of multimodal formative assessment to academic success in higher education. *Sage Open*, *12*(2), 21582440221089957.
7. Morais, A. M., Marenzi, I., & Kantz, D. (2015). The LearnWeb formative assessment extension: Supporting awareness and reflection in blended courses. In *ARTEL@ EC-TEL* (pp. 97-103). EC-TEL.
8. Nguyen, V. A. (2017). The impact of online learning activities on student learning outcome in blended learning course. *Journal of Information & Knowledge Management, 16*(04), 1750040.
9. Pardo, A., Jovanovic, J., Dawson, S., Gašević, D., & Mirriahi, N. (2019). Using learning analytics to scale the provision of personalised feedback. *British Journal of Educational Technology, 50*(1), 128-138.

10. Paredes, Y. V., & Hsiao, I. H. (2021). WebPGA: An educational technology that supports learning by reviewing paper-based programming assessments. *Information, 12*(11), 450.
11. Tempelaar, D. T., Rienties, B., & Giesbers, B. (2014, June). Computer assisted, formative assessment and dispositional learning analytics in learning mathematics and statistics. In: *International computer assisted assessment conference* (pp. 67-78). Cham: Springer International Publishing.
12. Titov, S., Kurilov, A., Titova, N., & Brikoshina, I. (2019). Integrative assessment framework in blended learning. *Technology, Education, Management, Informatics Journal, 8*(3): 768-774.
13. Xiaochun, G., & Yiwei, W. (2020, May). Experiments on Blended Learning and its Formative Assessment for Engineering Majors in Universities. In: *Proceedings of the 5th International Conference on Distance Education and Learning* (pp. 16-20). New York, NY: ACM.

The Challenge of OER in the Era of AI: A Transnational Intervention

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Abstract
The adoption of Open Educational Resources (OER) represents a turning point in democratizing access to knowledge and promoting innovative educational practices. The ENCORE project aims to integrate the use of OER with digital, green and entrepreneurial (DGE) skills through a system based on advanced artificial intelligence technologies. This study analyzes results of a transnational intervention aimed at assessing ENCORE's impact on increasing OER-related knowledge (OER Knowledge) and explores outcome variability across learner profiles and intervention types. The data collected shows a significant increase in participants' ability to identify, use and integrate OER in their educational settings, as well as an improvement in their understanding of open licenses and open educational practices. These findings highlight ENCORE's potential as a tool to facilitate access to OER, emphasizing the importance of course design in shaping learning outcomes and educational practices. ENCORE proves to be a valuable tool for enhancing professional development and promoting innovation. The article reflects implications for instructional design and the adoption of open AI-supported education.
Keywords: open educational resources, technology acceptance, AI-driven tools, open science, educational practices, DGE skills

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Introduction

The digital age is transforming the way education and society evolve and progress. Today, with an increasing abundance of resources, significant changes in educational strategies are occurring, and as a result of the sprint given by the COVID-19 pandemic and an era seemingly governed by smart technologies, educational systems need answers (García-Peñalvo et al., 2021). More recently, generative artificial intelligence (GenAI) has dramatically expanded the range of possibilities, increasingly "at the fingertips" of students and educators. This continuous change has intensified the need for adaptive and anticipatory approaches, including the integration of AI-driven tools such as ChatGPT (Tlili et al., 2023). While GenAI technologies offer new opportunities, they also require critical reflection on their human and educational impact. It is undoubtedly important to develop educational interventions and policies in step with the times. However, the urgency of having "a bigger picture" of technological change, through a more personal and critical reevaluation of central methods and issues, has remained equally firm.

There have also been numerous initiatives aimed at providing the tools and context necessary to understand and experience the effects of digital transformation on the workplace, education, and daily life. For example, the Digital Education Action Plan (2021-2027) was formulated to realign education and training to post-pandemic educational needs (European Commission, 2023). The Digital Competence Framework has been updated (Vuorikari et al., 2022), designed not only to explain how to access information today but also to become aware of the impact these resources can have on personal and professional lives. Above all, this concept is connected to the idea that every institution dedicated to lifelong learning must find the "right way" to implement openness, linking it to its own culture of learning and, in particular, to the concept of thoughtful professional development (Raffaghelli, 2014a).

These contemporary educational challenges require educators to reconsider their methods and pedagogical approaches, to shape interventions that effectively integrate technological advancement, environmental sustainability, and social resilience (Sancho-Gil et al., 2020; Selwyn, 2023; Parry & Metzger, 2023). The information landscape is thus undergoing a significant transformation, meeting the spread of the Open Education concept and the growth of Open Educational Resources (OER), which aim to "remove barriers and make learning accessible, abundant and customizable for all" (Inamorato dos Santos et al., 2016). As a key to quality education (Agenda 2030), Open Education emphasizes removing barriers, leveraging digital technologies, and connecting formal and informal learning to promote personalized, lifelong educational pathways (Inamorato dos Santos et al., 2016). This paradigm

promotes a culture of shared knowledge, enabling educators and students to adapt materials to specific contexts and create relevant and engaging learning experiences.

This vast repository of shared and reusable knowledge opens up numerous possibilities while introducing new challenges that must be addressed in the 21st century.

In this context, the ENCORE (Enhancing Competences to Open Up Education) Project (Ref. 101055893) is an innovative initiative that leverages advanced artificial intelligence technologies to promote the use of OER alongside the development of digital, green, and entrepreneurial (DGE) skills. By integrating these elements, ENCORE supports students, prospective educators, teachers, and trainers in designing learning pathways that respond to pressing global challenges such as digitalization, climate change, and post-pandemic economic recovery.

This study is the first of two complementary investigations into the outcomes of ENCORE-based interventions. Here, the focus is on the impact of Crash and Intensive Courses on participants' knowledge, awareness, and use of OER, intending to investigate the central hypothesis that ENCORE can be effectively embedded into institutional practices to promote OER through the lens of DGE skills. The second, complementary study explores participants' perceptions of the ENCORE system itself, examining acceptance, usability, and perceived usefulness. Taken together, these two investigations provide a comprehensive understanding of both the educational impact of ENCORE interventions and the factors influencing the adoption and practical integration of the platform in teaching practices.

2. Background

2.1 OERs

Central to the concept of open education is the OER, or Open Educational Resources. OERs are educational materials made freely available online under Creative Commons (CC) licenses, enabling users to retain, reuse, revise, remix, and redistribute these resources (Wiley & Hilton, 2018). This concept, established during UNESCO's 2002 Forum on Open Courseware, aims to democratize access to knowledge and empower learners globally. OERs encompass a wide range of materials, including textbooks, lesson plans, instructional videos, and even entire courses, promoting equitable access to quality education (UNESCO, 2002, 2011; Inamorato dos Santos et al., 2016). In recent years, their dizzying rise in teaching object repositories has offered

teachers a vast wealth of information and the ability to personalize interactions with students, without losing sight of the demands of an ever-changing technological landscape.

Initially seen as tools for broader accessibility, OERs have evolved to embody the philosophy of Open Education, which extends beyond the simple instrumental application of the resources themselves, connecting to the idea of institutional and individual collaboration and fostering an open and democratic community of practice. This philosophy positions OERs as a cornerstone for transforming educational practices, shifting from resource sharing to the integration of Open Educational Practices (OEP) that modernize and democratize learning environments (Ossiannilsson et al., 2020). Nonetheless, this transition remains a multifaceted process that requires careful consideration and reflection (Ossiannilsson et al., 2020).

The Joint Research Centre (JRC) introduced a comprehensive framework to promote the adoption of OER, defining Open Education as encompassing diverse applications, including OER, MOOCs, and open access (Innamorato dos Santos et al., 2016). This framework encompasses 10 dimensions of open education, promoting a holistic and transparent approach to practice. It encouraged educators to move beyond the mere creation and use of resources, fostering an approach that embraces openness in teaching and learning. From 2013 to 2018, the European Commission supported this vision through the Open Education Europa (OEE) platform, which disseminated research, including eLearning Papers, to advance the concept of Open Education. The conversation gradually shifted towards leveraging OER to support broader learning contexts, emphasizing learning as a dynamic and open process (Camilleri et al., 2012).

Further developments focused on implementing Open Education frameworks to aid educational design and teaching practices with OER (Elias et al., 2020; Padilla-Zea et al., 2022). Innovations such as micro-credentials and open digital badges also emerged, offering new ways to recognize and certify skills through portable digital evidence (Camilleri et al., 2012). Despite a decade of progress, the impact of OERs on student learning remains a key concern, with ongoing debates over their effectiveness (Wiley & Hilton, 2018; Kılıçkaya & Kic-Drgas, 2021).

Political support for Open Education continues to grow, driven by longstanding debates on its transformative potential to align education with the needs of the knowledge society (Innamorato, 2016; Stracke et al., 2020).

However, a more radical critique examines the very conceptual basis of open education, also exploring the digital architectures that support it (Villar-Onrubia & Marin, 2022). It still raises concerns, particularly after pandemics, about what extent open education is a driver of equity and social justice and

thus achieves the goals of globally available, accessible, and inclusive quality education (Veletsianos, 2020). Openness is not only about using open resources but also about engaging in a reflective pedagogical practice that transforms teaching and learning. It involves a sequence of individual decisions and an ongoing process of negotiation (Cronin, 2017). There is currently an attempt to understand what openness means beyond the performative idea of something readily available in a repository and what this implies for the professionalism and skills of educators.

2.2 ENCORE Approach

Despite these challenges, teachers play a vital role in ensuring the quality of education and student learning (Darling-Hammond et al., 2005, 2017). Improving teacher training, both initial and in-service, is widely recognized as a priority in international educational policies (OECD, 2005, 2019) and European strategies (European Commission, 2007; European Council, 2009, 2014, 2017, 2020).

In this context, teachers' Continuous Professional Development (CPD), also known as in-service professional training, is acknowledged as a key factor in enhancing the quality of education and learning (Caena, 2014; Darling-Hammond, 2005, 2017). Regularly updating teachers' skills is critical, especially in rapidly evolving contexts, where selecting and adopting high-quality resources for active teaching methodologies is key. Investing in innovative and effective CPD is therefore a strategic priority (United Nations, 2015).

For educational institutions, particularly universities, and organizations involved in adult education and open digital learning, professional development must go beyond traditional training courses. It requires providing educators with practical cases and resources to explore, experiment with, and reflect upon, fostering new approaches to tackle complex problems (Raffaghelli, 2014a, 2014b; Vladimirschi, 2018; Kuhn & Raffaghelli, 2023).

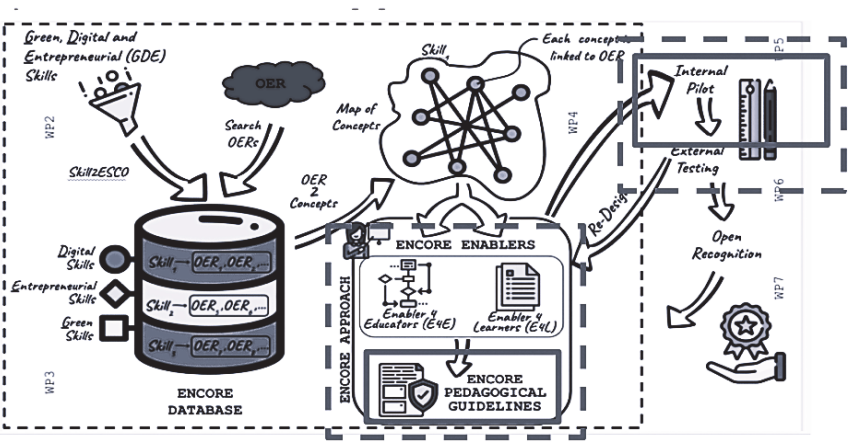
From this perspective, embracing the development of ecosystems for Open Education (OE) within the EU, the ENCORE Project emerges (https://project-encore.eu/). Among the various general objectives of the Erasmus+ program it seeks to pursue, the urgency to promote innovative and multidisciplinary approaches to teaching and learning stands out, as well as supporting and fostering innovation in the design and delivery of education and teaching methods.

ENCORE was conceived as an innovative system designed to enhance teaching and support the development of skills most influenced by emerging global trends. The platform leverages the knowledge embedded in Open

Educational Resources (OER), using artificial intelligence (AI) and natural language processing (NLP) techniques to identify, organize, and classify high-quality OER according to the relevant competencies of the ESCO framework (European Skills, Competences, Qualifications, and Occupations). A distinctive feature of ENCORE is its AI-powered interface, which integrates API-driven support based on large language models (LLMs) and generative AI (GenAI) to assist users in the design of learning scenarios. This intelligent support system enables educators to connect OER with specific competence areas, promoting deeper reflection on how education can address global challenges such as the digital transition, climate change, and post-pandemic economic recovery (Bucchiarone et al., 2023; Bucchiarone et al., 2024).

The ENCORE approach incorporates three key competence frameworks identified by EU policymaking as essential for lifelong learning and societal progress: Digital, Green, and Entrepreneurial (DGE). Through this integrated approach, the ENCORE project seeks to support students, future educators, teachers, and trainers in designing courses and learning pathways that connect educational objectives with the competences required to tackle global challenges such as digitalization, climate change, and post-pandemic economic recovery (Raffaghelli et al., 2023). Within this model, ENCORE promotes the use of OER in a collaborative human-machine environment (Figure 1).

Figure 1. ENCORE Approach



To make the most effective use of OER and enhance teaching, training, and learning, ENCORE enriches its holistic approach by selecting OERs starting from one's own educational or instructional design and by adopting a *design for objectives* model. In this perspective, content, resources, activities, and methods are deemed valid insofar as they align with the learning objectives. To support this objective-based design, various taxonomic classifications exist,

each characterized by different levels of complexity and articulation. The most widely used is Bloom's Taxonomy (Bloom, 1956). For the ENCORE project, Revised Bloom's Taxonomy (Anderson et al., 2001) was adopted to plan appropriate learning objectives. In brief, it distinguishes six main categories of objectives: remembering, understanding, applying, analyzing, evaluating, and creating. Each of these six levels involves different "cognitive processes" hierarchically organized to reflect increasing complexity and abstraction as one move from lower to higher levels. This taxonomy provides educators with a structured framework to design, deliver, and assess instruction, ensuring alignment with desired learning outcomes.

By embedding Bloom's taxonomy within the ENCORE platform, users are guided in designing clear, measurable objectives and in developing personalized learning scenarios tailored to their educational contexts. The taxonomy thus acts as a bridge between the definition of learning goals and the design of meaningful learning activities supported by OER.

Through this combination, the ENCORE project aims to guide students, prospective educators, teachers, and trainers in designing courses and pathways that connect learning objectives with the skills needed to address global challenges such as digitalization, climate change, and post-pandemic economic recovery.

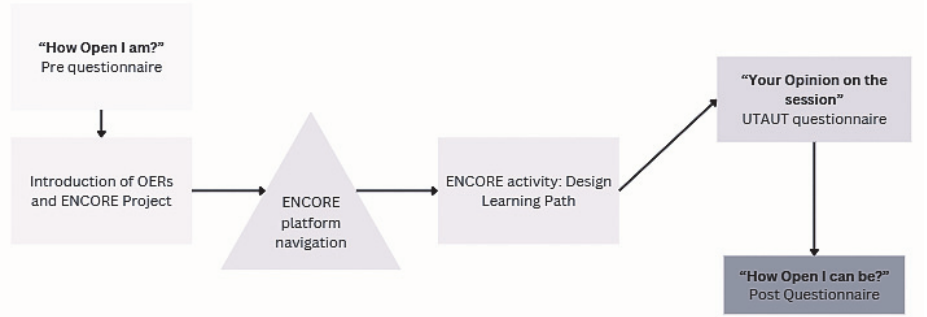
3. Methods

3.1 Context of Intervention

The study was characterized by a Design-Based Research (DBR) approach, which emphasizes iterative testing and refinement in real-world contexts. Within the ENCORE project, testing phases were organized to collect feedback and progressively improve the approach (Wang & Hannafin, 2005). This paper reports on the data collection from the transnational intervention carried out in two rounds, aimed at testing the ENCORE platform and refining its overall approach. About 7 preliminary sessions that we called "crash courses" and 8 additional sessions that we called "intensive courses" were delivered, in terms of participatory workshops and webinars co-designed with ENCORE project partners.

Through these initiatives, the ENCORE platform was tested in authentic educational settings to assess its usefulness in supporting innovative and collaborative learning practices. Following the two different cycles, the ENCORE approach was progressively applied, tested, and consolidated, as depicted below in Figure 2.

Figure 2 - Crash and Intensive Courses Approach



The first testing phase ("crash course") was an introductory and exploratory path aimed at familiarizing participants with OERs and the ENCORE platform and testing its potential to support the construction of a learning scenario. During this stage, participants used a scenario-design template to define learning objectives – drawing on verbs from the Revised Bloom's Taxonomy – describe their educational context, identify target learners and activities, and plan how to integrate DGE competences and OER found on the ENCORE platform. The feedback collected at this stage informed several improvements in usability and key features, especially regarding scenario design. Building on these results, the second phase tested the updated version in more authentic and collaborative educational settings. Here, with the taxonomy already integrated into the ENCORE platform, participants engaged in hands-on activities with OERs – designing, creating, and sharing their own materials – following a more practical path to reflect on openness and actively contribute to open knowledge.

Each workshop combined a theoretical introduction to Open Education, OER, and related policy frameworks with hands-on activities. After an overview of the ENCORE project and the role of DGE competences in learning design, participants selected one of three competence areas, explored relevant OERs on the platform, and used the platform's scenario-design tool to develop their own learning activities.

The study examines 15 interventions conducted among the project partners to collect responses on the effectiveness of ENCORE in promoting innovative teaching practices and supporting the integration of OER into educational practices. The findings will offer insights into how innovative platforms like ENCORE can enhance teaching and learning in the broader framework of Open Education and in response to global challenges.

3.2 Participants

This contribution focuses on the 15 interventions carried out between June

and December 2024, involving a total of 340 participants from Italian, Greek, and Spanish institutions in both higher education and vocational education and training (VET). A detailed breakdown of the anonymized sample is provided below.

3.3 Objective and Research Questions

While a related study from the ENCORE project (in press) focused on the acceptance, usability, and perceived usefulness of the platform among educators and students, the present study takes a complementary approach by examining the role of ENCORE in supporting the integration of OER into educational practices.

Building on the main working hypothesis that ENCORE can be effectively incorporated into educators' professional practice and institutional life as a tool to facilitate OER adoption, this contribution specifically aims to explore how the use of the ENCORE system affects educators' and trainers' engagement with OER, within the broader context of DGE competences. From this main working hypothesis, the contribution pursues the following two research questions (RQs):

- RQ1: How does participation in ENCORE-based courses affect educators' and trainers' knowledge, awareness, and use of OER in their teaching practices?
- RQ2: Are there observable differences in the effectiveness of ENCORE interventions depending on the participants' target group, level of prior exposure, or type of intervention implemented?

Focusing on ENCORE's practical role in supporting the integration of Open Educational Resources (OER), this study complements other project contributions on user perceptions and platform acceptance, offering a more complete view of the platform's educational value.

3.4 Research Design

The workshops themselves were structured with a theoretical and more practical part. To understand the impact of exposure to the ENCORE Approach on professional learning and identity related to knowledge and use of OERs, a self-test - named "How Open I Am" (ex-ante) and "How Open Can I Be" (ex-post) - was developed and administered at the beginning and end of the internal Crash and Intensive Courses. For transparency and clarity, the full version of the tool is presented in Annex 1.

The questionnaire was based on the self-reflection statements from DigCompEdu (Redecker & Punie, 2017; Council of the European Union, 2018)

and expanded through the Open Digital Framework (Inamorato D.S. et al., 2016). It focused on knowledge and use of OERs, licensing practices, implementation of Open Educational Practices, and understanding and contribution to Open Science. Separate versions were developed for educators and students, adapting the language accordingly.

Between these questionnaires, a theoretical session was held on OE and OERs, including the relevance of OE and DGE for educational design and activities. Subsequently, participants navigated the ENCORE platform, focusing first on the collection and creation of OER collections and then on learning path design.

The focus of this paper will be on the OERs questionnaires to detect increases in knowledge and perceived relevance of the Open project and culture to educational and professional practice.

The data collected from the questionnaires were analyzed at two different times to answer the two research questions, respectively. To answer RQ1, as will be seen below, a preliminary analysis of the sample distribution was conducted, including variables such as institution, location, intervention type, and target audience. Then, to assess changes in the distribution of scores, descriptive analyses were conducted between pre- and post-test results. To test the significance of these differences in distribution and determine whether or not the intervention had a significant impact on participants, the Wilcoxon test was used.

In response to RQ2, however, data was prepared and collected on other variables analyzed in the workshops:

- The type of target, based on the distinction between students, i.e., those who use the tool for study purposes; prospective educators, i.e., those preparing to enter the teaching profession, using the tool for initial training or skill development; and VET trainers, who use the tool for learning design or training;
- The level of exposure to the ENCORE system based on the different activities conducted, in terms of High (more than one session), Medium (120-180 minute session), and Low (60-90 minute session);
- and the type of intervention to which the data refer, in terms of “Crash course”, i.e., shorter sessions aimed at producing learning scenarios using the ENCORE system, and “Intensive course”, i.e., short, medium, or long approach to students' use of ENCORE, with no final production required.

From here, a multiple linear regression was conducted to estimate the relationship between two or more independent variables and a dependent variable. The regression model was constructed with the different predictors mentioned above and the final performance (post-test) as the response variable.

For transparency, the codebook with the relevant variables, adopted procedures, tools, and datasets is available in the Open Data repository (Raffaghelli et al., 2024).

4. Results

4.1 OER Knowledge

Concerning the first research question, before reporting the data analysis outcomes, an overview of the sample distribution analyzed will be provided (Table 1). A total of 340 responses were collected.

Table 1 - Distribution of the OERs test sample

Variables	Indicators	Freq	%
Institution	HIGHER-ED1	276	81,2%
	HIGHER-ED3	15	4,4%
	VET1	45	13,2%
	VET2	4	1,2%
Localisation	Italy	280	82,40%
	Greece	45	13,20%
	Spain	15	4,40%
Type of Intervention	Crash Course	183	53,80%
	Intensive Course	157	46,20%
Target	Prospective Educators	43	12,60%
	Students	293	86,20%
	VET Trainers	4	1,20%

Regarding OER Knowledge, a comparison of pre- and post-test data shows an increase in the average score from the initial phase (pre_OER: M = 2.846; post_OER: M = 3.463). The central tendency of the distribution also shifted upward (O1. Me = 3.00; O2. Me = 4.00), accompanied by reduced dispersion and greater consistency across most values.

Table 2 - Descriptive Analysis of OER Knowledge Pre- (left) and Post-test (right)

Question	Mean	Std.Dev	Question	Mean	Std.Dev
OER Knowledge Pre-test			OER Knowledge Post-test		
Q.1.1	2.97	1.10	Q.2.1	3.73	0.84
Q.1.2	2.73	1.01	Q.2.2	3.58	0.93
Q.1.3	2.88	1.15	Q.2.3	4.07	1.05
Q.1.4	2.23	1.06	Q.2.4	2.92	1.09
Q.1.5	2.68	1.10	Q.2.5	3.58	0.97
Q.1.6	3.05	1.07	Q.2.6	3.66	0.93
Q.1.7	2.18	1.07	Q.2.7	2.89	1.11
Q.1.8	2.88	1.08	Q.2.8	3.23	1.03
Q.1.9	3.30	1.07	Q.2.9	3.68	0.96
Q.1.10	3.10	1.02	Q.2.10	3.49	0.89
Q.1.11	2.75	1.02	Q.2.11	3.41	0.94
Q.1.12	3.02	1.02	Q.2.12	3.41	0.84
Q.1.13	2.32	1.00	Q.2.13	2.83	1.16
Q.1.14	2.77	1.25	Q.2.14	3.69	0.97
Q.1.15	2.49	1.08	Q.2.15	3.51	0.98
Q.1.16	3.42	0.98	Q.2.16	3.80	0.87
Q.1.17	1.98	0.99	Q.2.17	2.77	1.02
Q.1.18	2.88	1.13	Q.2.18	3.42	0.94
Q.1.19	4.45	0.70	Q.2.19	4.12	1.17

Specifically, in the pre-test (Table 2 - left side), the lowest values were recorded for creating and sharing OER (Q.1.4: M = 2.23, Me = 2.00), licensing practices for produced OER (Q.1.7: M = 2.18, Me = 3.00), familiarity with Open Science concepts (Q1.13: M = 2.32, Me = 2.00), and active contribution to Open Science (Q1.17: M = 1.98, Me = 2.00). Higher scores were associated

with recognizing open formats for faculty, researchers, and students (Q1.16: M = 3.42, Me = 4.00) and perceived relevance of open research and collaboration (Q.1.19: M = 4.45, Me = 5.00, std = 0.70).

Post-intervention (Table 2 - right side), all scores were generally higher with reduced data dispersion. The intervention appears to have had a positive impact on participants' perceptions and knowledge, as shown by improved responses to previously problematic questions. Notable improvements were observed in license identification (Q.2.1: M = 3.73, Me = 4.00), understanding OER terminology (Q.2.3: M = 4.07, Me = 4.00), proper referencing of OER (Q.2.5: M = 3.58, Me = 4.00), and recognizing Open Education principles in practice (Q.2.9: M = 3.68, Me = 4.00). However, familiarity with Open Science concepts (Q2.13: M = 2.83, Me = 3.00) and active contribution to Open Science (Q2.17: M = 2.77, Me = 3.00) remained relatively low.

The Wilcoxon signed-rank test was used to assess differences between pre- and post-OER groups, suitable for non-normally distributed data.

The test returned an extremely low p-value ($p < 2.2e-16$), indicating statistically significant differences. Despite this, the effect size was very small ($r = -0.012$), suggesting that the magnitude of the practical effect appears minimal, with a limited impact on the overall responses. Additionally, eta squared ($\eta^2 = 0.0382$) indicates that only ~3.8% of the total variability in scores is attributable to the difference between pre- and post-tests, implying that other factors may also influence participants' responses. While this value is significant, it suggests that the variability in the data is not primarily due to the difference between the groups but may also be influenced by other variables not considered in the analysis.

Analysis of the individual dimensions of the questionnaire – Know, Using, Adoption, OpenScience, Support, and Contribution – confirmed significant improvements across all areas, with p-values < 0.05.

4.2 Level of Impact

Regarding the second research question, in the preparatory phase, an attempt was made to test whether there were significant differences between two or more groups on a continuous variable. The Kruskal-Wallis's test was applied to explore differences in post-test scores (*post_total*) across three categorical variables:

1. Target (the recipients of the intervention: "Prospective educators", "Students" and "VET").
2. Level_Exposure (the level of exposure: "high", "medium", and "low").
3. Type_intervention (the type of intervention: "Crash course" and "Intensive course").

For Target, no statistically significant differences were observed in post-test results ($p = 0.3763$). From here, calculating the medians for groups to try to frame a summary indication of the distribution of groups concerning the continuous variable, prospective educators (Me = 3.82) performed slightly better than students (Me = 3.47), possibly reflecting the course focus and relevance to ENCORE skills. No data was available for VETs.

Regarding "Level_Exposure," data for the "Low" group were incomplete. Between "Medium" and "High" exposure, a significant difference emerged ($p = 4.225e\text{-}10$), with medium exposure participants scoring higher (Me = 3.76) than high exposure participants (Me = 3.24). This may reflect that longer or more intensive exposure encourages deeper engagement but also introduces greater complexity and caution in responses.

Finally, for "type_intervention", significant differences were observed ($p = 4.225e\text{-}10$). Participants in the "Crash course" group (Me = 3.76) generally scored higher than those in the "Intensive course" group (Me = 3.24), potentially due to the greater caution and criticality given by a longer time of activity and interaction.

At this point, a regression model was constructed including Type_intervention, Target, and Level_Exposure as independent variables (predictors) and post-test scores as the response variable.

The model showed no problems in fitting the data and was overall significantly useful in predicting post-test scores ($p < .001$). It then confirmed that intervention type significantly affected outcomes with the "Intensive" group scoring lower than the "Crash course" group (-0.515, $p < .001$). Differences by Target were not statistically significant, with Students scoring slightly lower than Prospective educators (-0.086, $p = 0.086$). The medium exposure level was excluded due to singularity (probably because the "medium" level of Level_Exposure was perfectly collinear with another variable in the model).

The model, however, explained only 23% of the variability in post-test scores, suggesting that there may be other variables not included in the model that explain a significant portion of the variability in scores.

An additional regression model including interactions between Type_intervention × Level_Exposure and Level_Exposure × Target confirmed that intervention type remained the only variable with a significant impact on post-test scores.

5. Discussion and Conclusion

The results will follow the two proposed research questions. Regarding RQ1

– *How does participation in ENCORE-based courses affect educators' and trainers' knowledge, awareness, and use of OER in their teaching practices*? – the findings indicate a significant improvement in OER knowledge between the pre- and post-test. The increase in the mean score (from M = 2.846 to M = 3.463) and the shift in the median towards higher values (from Me = 3.00 to Me = 4.00) suggest that the intervention had a positive impact on participants' perceptions and knowledge. Additionally, the reduction in data dispersion indicates greater consistency in responses after the intervention.

A more detailed analysis of individual pre-test questions immediately revealed critical areas, particularly concerning OER creation and sharing, knowledge of licenses, familiarity with Open Science, and active contribution to it. After the intervention, scores for all questions increased, with particularly notable improvements in the ability to identify licenses (M = 3.73, Me = 4.00), understanding OER terminology (M = 4.07, Me = 4.00), and correctly citing used OERs (M = 3.58, Me = 4.00). This demonstrates an increase in participants' awareness and knowledge following their engagement with ENCORE.

However, despite the overall improvement, familiarity with Open Science (M = 2.83, Me = 3.00) and active contribution (M = 2.77, Me = 3.00) remained among the least developed areas, suggesting the need for further targeted interventions to enhance these complex competencies. The initial positive results nonetheless indicate potential for further improvement through additional investigations. Inferential tests also revealed a significant difference between pre-and post-test groups ($p < 2.2e\text{-}16$). However, effect size analysis showed that, despite statistical significance, the magnitude of the difference was relatively small, suggesting the possible influence of other factors.

In this regard, an attempt was made to answer RQ2 – *Are there observable differences in the effectiveness of ENCORE interventions depending on the participants' target group, level of prior exposure, or type of intervention implemented?* – by exploring whether categorical variables such as participant target group, exposure level, and type of intervention influenced post-test scores. While no significant differences emerged across target groups, prospective educators scored slightly higher than students, likely reflecting prior familiarity with the relevant content, and given the specificity of some university courses considered. Medium-exposure participants (120-180 minute sessions) achieved higher post-test scores than high-exposure participants, potentially reflecting the balance between sufficient engagement and cognitive overload in longer interventions. Although greater exposure offered more time and opportunities for in-depth exploration of the concepts and the platform, it may have also prompted a more cautious and tentative approach, highlighting the need for further consolidation of the acquired knowledge. Similarly,

participants in Crash Courses scored higher than those in Intensive Courses, suggesting that concentrated, collaborative interventions may foster more immediate learning gains. Regression models confirmed the significance of intervention type, whereas target group and exposure level had limited predictive power.

The findings of this study underscore the potential of ENCORE-based interventions to enhance participants' knowledge and awareness of Open Educational Resources, aligning with broader trends in Open Education and digital transformation. The significant improvement in OER-related knowledge, particularly in areas such as license identification, terminology understanding, and correct citation practices, reflects the effectiveness of the ENCORE approach in fostering critical competencies for the digital age. These results resonate with the goals outlined in initiatives like the Digital Education Action Plan (2021-2027) and the updated Digital Competence Framework (Vuorikari et al., 2022), which emphasize the importance of equipping learners and educators with the skills needed to navigate and contribute to an open, collaborative, and technologically advanced educational landscape.

Critically comparing these findings with recent OER literature reveals both convergence and divergence. Consistent with prior studies (Inamorato dos Santos et al., 2016; Wiley & Hilton, 2018; Vuorikari et al., 2022), our results support the idea that structured, contextualized interventions can improve educators' knowledge and awareness of OER. However, in contrast to the idea emphasizing the benefits of sustained engagement over time, our findings suggest that shorter and more intensive interventions can yield immediate knowledge gains that are comparable to, or even exceed, those achieved through more extended learning schedules. This aligns with evidence indicating that learning outcomes depend more on the activation of key self-regulatory processes during instruction than on the mere duration of engagement (Sitzmann & Ely, 2011). Moreover, studies on learning design show that massed learning often yields higher initial performance than distributed approaches (Greving & Richter, 2021), although it may not support long-term retention or conceptual transfer to the same degree (McDaniel et al., 2013). Taken together, these results underscore the critical role of instructional design and learner engagement in shaping short-term outcomes, highlighting that the effectiveness of educational interventions may rely more on intensity and quality of engagement than on the overall length of participation.

However, the persistent gaps in familiarity with Open Science and active contribution highlight the complexity of these competencies and the need for targeted, ongoing interventions to address them. This aligns with the broader literature on Open Education, which stresses the importance of not only

providing access to resources but also fostering a culture of engagement and collaboration (Inamorato dos Santos et al., 2016; Wiley & Hilton, 2018).

A future study will focus specifically on this aspect of Open Science, investigating how participants' perceptions and engagement with Open Science evolve after a session more concentrated on OER and the ENCORE system, thereby closing the loop on the findings presented here.

From a pedagogical perspective, these findings suggest several practical implications. Educators and trainers designing OER-focused programs should carefully balance intensity and duration, align content with participants' prior knowledge, and include targeted modules to support complex competencies such as Open Science engagement. Attention to instructional strategies – such as collaborative activities, practical applications, and scaffolding of higher-order skills – can enhance the effectiveness of OER interventions and promote broader adoption within institutional practices.

Some limitations should be noted. Sample sizes were relatively small for certain groups (e.g., VET participants), and data for some exposure levels were incomplete. The modest effect sizes suggest that additional factors – such as prior experience with digital tools, institutional support, or participants' intrinsic motivation – may also have influenced outcomes. Future research could address these aspects by exploring longitudinal effects, evaluating the impact of specific pedagogical strategies, and examining OER adoption across diverse educational contexts, in order to better understand the processes underlying knowledge acquisition, engagement, and the integration of open practices.

In conclusion, this study shows that ENCORE-based interventions can effectively enhance participants' OER knowledge, especially when they are well-structured, focused, and aligned with learners' needs. While some competencies, such as engagement with Open Science, still require further development, the findings highlight the value of adaptive, evidence-informed approaches in fostering digital and open education skills. Overall, this research contributes to a deeper understanding of how targeted OER interventions can support educators and trainers in navigating the evolving landscape of open, collaborative, and digitally enriched education, offering practical insights for implementation and guiding directions for future inquiries.

Interventions that ensure relevance and meaningfulness in addressing the challenges and opportunities of the 21st century.

References

Anderson, L. W., Krathwohl, D. R., Airasian, P. W., Cruikshank, K. A., Mayer, R. E.,

Pintrich, P. R., et al. (2001). *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives.* Longman.

Bloom, B. S. (1956). *Taxonomy of educational objectives: The classification of educational goals, 1-2.* Longmans, Green & Co.

Bucchiarone, A., Vázquez-Ingelmo, A., Schiavo, G., Barandoni, S., García-Holgado, A., García-Peñalvo, F.J., Mosser, S., Pierantonio, A., Zschaler, S., & Barnett, W. (2023). Towards Personalized Learning Paths to Empower Competence Development in Model Driven Engineering Through the ENCORE Platform. *IEEEXplore*. Doi: 10.1109/MODELS-C59198.2023.00036.

Bucchiarone, A., Cicchetti, A., Vázquez-Ingelmo, A., Adami, F., Schiavo, G., García-Holgado, A., & García-Peñalvo, F.J. (2024). Designing and Generating Lesson Plans combining Open Educational Content and Generative AI. In *MODELS Companion '24: ACM/IEEE 27th International Conference on Model Driven Engineering Languages and Systems* (pp. 78-86). Doi: 10.1145/3652620.3687773.

Caena, F. (2014). Teacher Competence Frameworks in Europe: Policy-as-discourse and policy-aspractice. *European Journal of Education*, 49(3): 311-331. https://www.jstor.org/stable/26609223.

Camilleri, A., Ferrari, L., Haywood, J., Maina, M.F., Pérez-Mateo, M., Montes, R., Sangrà, A., & Tannhäuser, A.C. (2012). Open Learning Recognition: Taking Open Educational Resources a Step Further. *EFQUEL – European Foundation for Quality in e-Learning*. http://hdl.handle.net/10609/21341.

Council of the European Union (2018). *Council recommendation of 22 May 2018 on key competences for lifelong learning*. Official Journal of the European Union, C189, 1-13. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H0604(01).

Cronin, C. (2017). Openness and Praxis: Exploring the Use of Open Educational Practices in Higher Education. *The International Review of Research in Open and Distributed Learning*, 18(5). Doi: 10.19173/irrodl.v18i5.3096.

Darling-Hammond, L., Holtzman, D. J., Gatlin, S. J., & Heilig, J. V. (2005). Does Teacher Preparation Matter? Evidence about Teacher Certification, Teach for America, and Teacher Effectiveness. *Education Policy Analysis Archives*, *13*(42): 1-51. Doi. 10.14507/epaa.v13n42.2005.

Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). Effective Teacher Professional Development. *Learning Policy Institute*, 1-76. https://learningpolicyinstitute.org/sites/default/files/productfiles/Effective_Teacher_Professional_Development_REPORT.pdf.

Elias, M., Oelen, A., Tavakoli, M., Kismihok, G., & Auer, S. (2020). Quality Evaluation of Open Educational Resources. In: C. Alario-Hoyos, M. J. Rodríguez-Triana, M. Scheffel, I. Arnedillo-Sánchez, & S. M. Dennerlein (Eds.). *Addressing global challenges and quality education: 15th European Conference on Technology Enhanced Learning, EC-TEL 2020, Heidelberg, Germany, September 14-18.* Proceedings (pp. 410-415). Springer. Doi: 10.1007/978-3-030-57717-9_36.

European Commission (2007). *Improving the Quality of Teacher Education.* [Report] https://eurlex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52007DC0392.

European Commission (2025, January 9). *L'UE e le Nazioni Unite: obiettivi comuni per un futuro sostenibile [The EU and the United Nations: common goals for a sustainable future]*. Sustainable Development Goals. European Repository. https://commission.europa.eu/strategy-and-policy/sustainable-development-goals/eu-and-united-nations-common-goals-sustainable-future_it

European Council (2014). *Council conclusions of 20 May 2014 on effective teacher education.* Retrieved from https://eur-lex.europa.eu/legalcontent/EN/TXT/PDF/?uri=CELEX:52014XG0614(05)&from=EN.

European Council (2017). *Council Conclusions on school development and excellent teaching.* Official Journal of the European Union. https://eur-lex.europa.eu/legalcontent/EN/TXT/PDF/?uri=CELEX%3A52017XG1208%2801%29&from=EN.

European Council (2020). *Council conclusions on "European teachers and trainers for the future".* Official Journal of the European Union. https://eur-lex.europa.eu/legalcontent/EN/TXT/HTML/?uri=CELEX:52020XG0609(02)&rid=5.

García-Peñalvo, F. J., Corell, A., Rivero-Ortega, R., Rodríguez-Conde, M. J., & Rodríguez-García, N. (2021). Impact of the COVID-19 on Higher Education: An Experience-Based Approach. In: F. J. García-Peñalvo (Ed.), *Information Technology Trends for a Global and Interdisciplinary Research Community* (pp. 1-18). IGI Global. Doi: 10.4018/978-1-7998-4156-2.ch001.

Greving, C. E., & Richter, T. (2021). Beyond the Distributed Practice Effect: Is Distributed Learning also Effective for Learning with Non-repeated Text Materials?. *Frontiers in Psychology, 12*. Doi: 10.3389/fpsyg.2021.685245.

Inamorato, D. S. A., Punie, Y., & Castaño, M. J. (2016). *Opening up Education: A Support Framework for Higher Education Institutions.* JRC Publications Repository. Doi: 10.2791/293408.

Kılıçkaya, F., & Kic-Drgas, J. (2021). Issues of context and design in OER (open educational resources). *Education Tech Research Dev*, 69: 401-405. Doi: 10.1007/s11423-020-09852-8.

Kuhn, C., & Raffaghelli, J. E. (2023). 'Something Important is Going on With Data': Educators' Search for Political Agency to Act as Professionals in Complex Datafied Contexts. In: *Human Data Interaction, Disadvantage and Skills in the Community: Enabling Cross-Sector Environments for Postdigital Inclusion* (pp. 53-77). Springer International Publishing.

McDaniel, M. A., Fadler, C. L., & Pashler, H. (2013). Effects of Spaced Versus Massed Training in Function Learning. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 39*(5): 1417-1432. Doi: 10.1037/a0032184.

OECD (2005). *Teachers Matter: Attracting, Developing and Retaining Effective Teachers.* OECD Publishing. Doi: 10.1787/9789264018044-en.

OECD (2019). *TALIS 2018 Results (Vol. 1): Teachers and School Leaders as Lifelong Learners.* OECD Publishing. Doi: 10.1787/1d0bc92a-en.

Ossiannilsson, E., Zhang, X., Wetzler, J., Gusmão, C., Aydin, C. H., Jhangiani, R., Glapa-Grossklag, J., Makoe, M., Harichandan, D. (2020). From Open Educational Resources to Open Educational Practices. *Distances et médiations des savoirs,* 31. Doi: 10.4000/dms.5393.

Padilla-Zea, N., Burgos, D., García-Holgado, A., García-Peñalvo, F. J., Harquevaux, M. P., de-la-Higuera, C., Brunton, J., & Tlili, A. (2022). Catch the Open! A gamified interactive immersion into Open Educational Practices for Higher Education Educators. *Frontiers in Psychology*, 13. Doi: 10.3389/fpsyg.2022.812091.

Parry, S. & Metzger, E. (2023). Barriers to learning for sustainability: a teacher perspective. *Sustainable Earth Reviews*, *6*(2). Doi: 10.1186/s42055-022-00050-3.

Raffaghelli, J. E. (2014a). A Scholarship of Open Teaching and Learning: New basis for quality in higher education. *Formazione&Insegnamento, European Journal of Research on Education and Teaching, 12*(1): 211-244. http://ojs.pensamultimedia.it/index.php/siref/article/view/380.

Raffaghelli, J. E. (2014b). Learning Design as the base for adult educators' professionalism in the field of intergenerational learning. Progettazione formativa come base per la professionalità dei formatori degli adulti nell'ambito dell'apprendimento intergenerazionale. *Formazione & Insegnamento, XII*(2): 275-309. https://ojs.pensamultimedia.it/index.php/siref/article/view/878.

Raffaghelli, J. E., Foschi, L. C., Crudele, F., Doria, B., Grion, V., & Cecchinato, G. (2023). *The ENCORE Approach. Pedagogy of an AI-driven system to integrate OER in Higher Education & VET* (DLV 5.1; ENCORE Project Report Series, pp. 1-94). University of Padova; Padova Research Archives. https://www.research.unipd.it/handle/11577/3502320.

Raffaghelli, J. E., Foschi, L. C., Crudele, F., Doria, B., Cechinato, G., & Grion, V. (2024). Codebook - Educathons & Internal Piloting - ENCORE APPROACH [Data set]. Zenodo. Doi: 10.5281/zenodo.11431597.

Redecker, C., & Punie, Y. (2017, 28 November). *European framework for the digital competence of educators: DigCompEdu. Publications Office of the European Union.* https://publications.jrc.ec.europa.eu/repository/handle/JRC107466.

Sancho-Gil, J. M., Rivera-Vargas, P., & Miño-Puigcercós, R. (2020). Moving beyond the predictable failure of Ed-Tech initiatives. *Learning, Media and Technology, 45*(1): 61-75. Doi: 10.1080/17439884.2019.1666873.

Selwyn, N. (2023). Lessons to Be Learnt? Education, Techno-solutionism, and Sustainable Development. In: H.S. Sætra (Ed.), *Technology and Sustainable Development* (pp. 71-83). Routledge. Doi: 10.1201/9781003325086

Sirzmann, T., & Ely, K. (2011). A Meta-Analysis of Self-Regulated Learning in Work-Related Training andEducational Attainment: What We Know and Where We Need to Go. *Psychological Bulletin, 137*(3): 421-442. Doi: 10.1037/a0022777.

Stracke, C. M., Bozkurt, A., Conole, G., Nascimbeni, F., Ossiannilsson, E., Sharma, R. C., Burgos, D., Cangialosi, K., Fox, G., Mason, J., Nerantzi, C., Obiageli Agbu, J. F., Ramírez Montoya, M. S., Santos-Hermosa, G., Sgouropoulou, C., & Shon, J. G. (2020). Open education and open science for our global society during and after the COVID-19 outbreak. In: *Proceedings of the Open Education Global Conference 2020* (pp. 1-4). Doi: 10.5281/zenodo.4274890.

Tlili, A., Shehata, B., Adarkwah, M.A., Bozkurt, A., Hickey, D.T., Huang, R., & Agyemang, B. (2023). What if the devil is my guardian angel: ChatGPT as a case

study of using chatbots in education. *Smart Learning Environments, 10*(15), Doi: 10.1186/s40561-023-00237-x.
Veletsianos, G. (2020). Open educational resources: expanding equity or reflecting and furthering inequities? *Educational Technology Research and Development.* 69(1): 407-410. Doi: 10.1007/s11423-020-09840-y.
Villar-Onrubia, D., Morini, L., Marín, V.I., & Nascimbeni, F. (2022). Critical digital literacy as a key for (post)digital citizenship: an international review of teacher competence frameworks. *Journal of e-Learning and Knowledge Society, 18*(3), 128-139. Doi: 10.20368/1971-8829/1135697.
Vladimirschi, V. (2018). *Professional Development Guidelines for OER: A case study of Brazilian fundamental education public school teachers*. DTheses. Faculty of Graduate Studies Dissertations and Theses. https://dt.athabascau.ca/jspui/handle/10791/266.
Vuorikari, R., Kluzer, S., & Punie, Y. (2022). *DigComp 2.2: The Digital Competence Framework for Citizens - With new examples of knowledge, skills and attitudes.* JRC Publications Repository. Doi: 10.2760/1153768.
UNESCO (2002). *Forum on the Impact of Open Courseware for Higher Education in Developing Countries: Final Report.* UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000128515.
United Nations (2015). *Transforming our World: The 2030 Agenda for Sustainable Development.* United Nations. https://sdgs.un.org/2030agenda.
Wang, F., & Hannafin, M.J. (2005). Design-based research and technology-enhanced learning environments. *Educational Technology Research and Development*, *53*(4): 5-23. Doi: 10.1007/BF02504682.
Wiley, D., & Hilton, J. (2018). Defining OER-Enabled Pedagogy. *The International Review of Research in Open and Distributed Learning, 19*(4). Doi: 10.19173/irrodl.v19i4.3601.

Annex

Annex 1 - How Open I am? Full Questionnaire
Initial version of the Questionnaire: Juliana E. Raffaghelli
(upon the OpenEdu Survey for Self-Assessment https://joint-research-centre.ec.europa.eu/what-open-education/openedu-framework-and-guidelines_en;
https://publications.jrc.ec.europa.eu/repository/handle/JRC115663)

KNOWLEDGE OF OER
1. I can identify the license of an educational resource.
2. I can tag OER properly to increase the possibilities of others to reuse/find them.
3. I know what an Open Educational Resource (OER) is.

USING OER
4. I have shared and created OERs adapted from others.
5. I appropriately reference the OER I use (whether I adapt the resource or not).
6. I support my institution in the implementation of OER as an open education practice.
7. I openly license the OERs I produced.
11. I use OER to study through a personalised approach to the learning process.

OER TEACHERS' ADOPTION
8. I do not know whether my teachers have used Open Educational Resources for my learning.
9. I have seen the principles of open education in practice by teachers, e.g. using and sharing OER, using MOOCs and free and open online courses as support material or reference.
10. Besides applying the principles of OER in their teaching, I have seen my teachers take into account the access and accessibility of the teaching materials that I produce, in order to cater to those learners with special needs.
12. Generally, in my experience, the teachers adopt different OER in my teaching and support the institution to be more open to the learners.

ENGAGEMENT WITH OPEN KNOWLEDGE
13. I am not familiar with the concept of Open Science.
14. I understand basic concepts of open science and have consulted research shared openly.
16. I have seen open data and I can explain what it is.

UNIVERSITY SUPPORT TO OPEN KNOWLEDGE

15. The university where I study supports the teachers/researchers to publish openly, so we (students) can have access to the materials.

CONTRIBUTION TO OPEN KNOWLEDGE

17. I am an active contributor to open research projects and I am involved in communities that contribute to citizen science.
18. I support my institution in its effort to promote open research by engaging in my teachers' research projects or through the association of my thesis/project work with research activity.
19. I believe open research and collaboration are extremely relevant, whenever appropriate and feasible.

Data availability statement

The document and data used in this paper are publicly available in the following open data:
Raffaghelli, J. E., Foschi, L. C., Crudele, F., Doria, B., Cechinato, G., & Grion, V. (2024). Codebook - Educathons & Internal Piloting - ENCORE APPROACH [Data set]. Zenodo. https://doi.org/10.5281/zenodo.11431597.

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Conflict of interest

The authors declare no conflict of interest.

Ethics statement

The research was approved by the ENCORE partners. The data was anonymized, with pseudo-anonymization or complete anonymization of the identities of participants and institutions.

Innovating Residency Orientation Training. A Multi-Modal, Gamified Approach to Clinical Onboarding at Fondazione Policlinico Universitario Campus Bio-Medico

Claudio Pensieri[*], Sabrina Saccoccia[^], Rosanna Alloni[°]

Abstract
This study assesses the effectiveness of "Resident Day," a multi-modal orientation program at Fondazione Policlinico Universitario Campus Bio-Medico for newly enrolled medical residents. The program combines traditional lectures, experiential simulations, and gamified activities, including a hospital-based treasure hunt designed to bridge theoretical knowledge and practical clinical readiness. A comparative analysis of pre- and post-training surveys from the 2022 (n. 146 respondents) and 2024 (n. 135 respondents) cohorts revealed statistically significant improvements in technical competencies, spatial orientation, and familiarity with clinical workflows. Notably, the gamification element, particularly the "Treasure Hunt," significantly enhanced spatial orientation and clinical area familiarity, with 2024 participants showing greater improvement compared to 2022. While practical sessions received strong evaluations, the team-building activity ("Airplane Challenge") scored lower than in previous years, suggesting areas for refinement. Overall, the Resident Day initiative demonstrates that innovative, engaging onboarding strategies can effectively enhance early clinical integration, technical skills, and resident confidence. Experiential

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learning and gamification emerged as particularly impactful, underlining the value of active, hands-on methodologies in bridging the gap between academic training and real-world medical practice. These findings may inform broader reforms in medical education and orientation programs internationally.
Key Words: Resident Orientation, Medical Education, Gamification, Clinical Training, Experiential Learning

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Introduction

Each November, a new cohort of medical residents begins training across Italy's teaching hospitals. For many, this transition marks the shift from theoretical knowledge to applied clinical practice – an emotionally and cognitively intense phase that shapes professional identity and competence. While orientation is a well-established practice in North American and other systems (McGrath, 2017), structured onboarding in the Italian context has been less systematically described.

This can be summarized as follows:

- High turnover from outside institutions.
- Unfamiliarity with hospital systems and culture.
- Need for cross-training across disciplines.

For some residency programs, this new beginning includes the annual tradition of orientation (Lappen, 2014), a week full of hours of information on what it means to be a resident. For most physicians, the transition from medical school to residency program is a pivotal moment in their careers, a time when the theoretical knowledge learned through countless hours of study starts to collide with the practicalities of patient care.

The transition period is one of intense growth and self-discovery as they develop the professional identity, clinical competence, and ethical principles of future physicians while they learn how to fill the electronic medical records, order entry, teamwork, policies and procedures, etc.

The hurdles for new medical residents range from adapting to the frenetic tempo of clinical practice to facing off against complicated patients for the first time, under the stress of time, can be overwhelming, and at times demoralizing.

Without appropriate direction and support, this transition may lead to disorientation, low self-esteem, and increase in burnout. All of these are not positive outcomes and supporting patients as well as the resident will be affected. That is why there is no need for desires, such programs are crucial to properly guide and orient them and medical residents no longer consider

structured orientation programs an extravagance. They act as a bedrock, allowing trainees to gain the requisite skills as well as the right attitude and knowhow to perform their new roles.

A thoughtfully prepared orientation program cultivates learning, adaptability, resilience and teamwork as well as puts into practice the institutional policies and clinical workflows. At the same time, it incorporates communication, ethics, and work-life balance which are essential to long-term success in the medical profession.

If we consider the US Emergency medicine (EM) residency training, the first formal orientation program for incoming EM residents was started in 1976. One attempt to describe the nature of orientation programs was by Brillman (1995). Now almost all residencies offer orientation to incoming residents, but little is known about the curricular content or structure of these programs.

McGrath (2017) found that more programs (99%) offer formal orientation and allocating more time to them. Lectures remain the most common educational activity. They found increases in the use of skills labs and specialty certifications. But they also observed increases in time dedicated to clinical work during orientation. Only a few programs reported engaging in baseline or milestone assessments, an activity that could offer significant benefits to the residency program (McGrath, 2017).

In this article, we investigate the unique attributes and benefits of an orientation program for Italian residents undergoing specialty training.

Medical institutions can enhance the orientation experience for their residents and concurrently increase the skill set, confidence, and compassion within the healthcare workforce by applying comprehensive and evidence-based orientation initiatives.

As the population grows older, the demand for multidisciplinary teams to manage complex care has undoubtedly increased. As these teams become more integrated, the knowledge, skills, and attitudes of resident physicians to practice safe and effective care evolve (Mank, 2022).

Fondazione Policlinico Universitario Campus Bio-Medico (PUCBM) is a teaching hospital having about 374 beds and roughly 37 medical/surgical departments, which includes an emergency unit and a Hospice.

From 2017, the PUCBM has this orientation course for new residents.

In 2024, 25 Residency program (22 medical and 3 non-medical: Clinical Pathology and Clinical Biochemistry; Microbiology and Virology; Clinical Pharmacology and Toxicology) featuring roughly 135 new medical residents and 10 non-medical residents started in the Fondazione Policlinico Universitario Campus Bio-Medico, only 15% of them had their medical education in our university.

In Italy, postgraduate medical training consists of 4 or 5 years of residency (depending on the specialty) after a national examination. Admission to the residency program is based on examination results and overall score, and there is an annual limit to the number of residency positions. During training, residents work in academic hospitals, gain clinical experience in their chosen specialty, and rotate between major subspecialties.

They also follow an educational program based primarily on lectures (i.e., teaching activities in front of the class) and may be involved in research projects.

The level of autonomy with which residents can perform duties is regulated by law and depends on the year of residency (Abati, 2022).

This means also that new first-year residents (85% of them went from other University):

1. Don't know the layout of the hospital where they'll work (where to find departments clinical services like endoscopy, radiology, etc.).
2. Don't understand the hospital's current "policies and procedures" (guidelines, procedures, operating instructions, policies, etc.) (Pensieri, 2021).
3. Can't find some key services in the hospital (hospital management, admissions office, pharmacy administrative offices) and important people (heads of operating units, nursing coordinators, who manages beds or other resources, etc.).
4. They are not familiar with the hospital's clinical records system (information technology).
5. They are not aware of the institution's rules (dress code, ethics code, nursing organization, etc.).

The mission of the Campus Bio-Medico University of Rome is that "students, including residents, should reach high-level professional and scientific understanding and competence along with high moral sense" (UCBM Aims Charter, 2020).

In a context that technical preparation and learning have a substantive impact on the required skills, clinical practice has undergone a deep transformation (Guaglianone, 2007). In recent years, many Italian medical students have expressed a desire for university professors to improve their teaching skills and adopt more engaging methods. This trend has been highlighted in studies and projects such as the COLT Project (Jacobs, 2012; Ramboldi 2021), which analysed student perceptions of teaching in Italian medical schools.

In undergraduate medical and health faculties, lectures are a notable but not exclusive part of the forms of learning (Pensieri, 2019).

"The role of teachers is rightly believed to be universally crucial to the quality of education. Teachers, in addition to decisively affecting the educational outcomes of students, activate and support the improvement processes of the institutions they work in" (Tammaro, 2017).

Teaching at the university level requires skills that include (in addition to knowledge of the discipline) mastery of teaching strategies (Biasutti, 2017).

In addition, the use of effective teaching methodologies, capable of getting each student to acquire knowledge and skills more quickly, consistent with the identified objectives, effectively saves time-work time that can be invested in other areas of greater interest to the student (Binetti, 2000).

The Fondazione Policlinico Universitario Campus Bio-Medico nursing care, unlike in many Italian hospitals, is organized according to the model for small teams and by complexity of care, a model integrated with the criterion of bed distribution by "intensity of care". This means that patients are grouped by type of care required and not by operative unit (Pensieri, 2022).

So, we can have a urology patient near an orthopaedic one, every Department can also have patients hospitalized in different Hospital's floors.

It is therefore a very flexible organization that has abandoned the traditional departmental structure to maximize efficiency with maximum support.

Since 2014, the Fondazione Policlinico Universitario Campus Bio-Medico has been a Joint Commission International (JCI) accredited hospital (as an "Academic Medical Center" a hospital where teaching and clinical research activities take place in addition to clinical activities).

Joint Commission International accreditation means that the entire hospital (from governance to staff) is focused on quality and safety of care.

It is obvious that in this context the entry into clinical practice of a group of residents is crucial.

We started our Resident's pedagogical project with "practical action", of "discovery" and "learning in the field" through:

- Active learning design.
- Immersive clinical simulation.
- Gamification in professional education.

The Fondazione Policlinico Universitario Campus Bio-Medico has greatly backed the application of practice and synergetic learning because it assists to know how to "fully learn new skills and knowledge" (Haynes, 2007).

In fact, we experienced at the same time the teach/educate/train (Cambi, 2000) described as the "restless trinomial".

Numerous components contribute to a resident's good training. Training needs direction to follow and tools where to direct themselves, techniques to navigate, values that know how to inflate the sails and drive towards existential design goals (Iori, 2018).

This, therefore, cannot rest on a single aspect of being, a single moment in life, or on just one dimension. For us it is no longer sufficient to construct the resident's boat, we want to provide him or her with all the features that will allow for safe navigation through the stormy sea, starting from the very first orientation.

Methods

Two anonymous quantitative evaluation questionnaires were used to evaluate the impact of the Resident Day orientation program to first-year residents at Fondazione Policlinico Universitario Campus Bio-Medico (PUCBM). We administered in November 2024:

1. An entry questionnaire to assess previous training and knowledge (134 questionnaires out of 140 Residents enrolled). In the same survey we collected data to assess possible future training needs, in three areas: technical skills, quality and safety procedures, and working environment knowledge.
2. A questionnaire at the end of the training to assess the change in this knowledge and to assess the perceived quality of the training.

The **pre-training questionnaire** (38 items) captured:

- Demographic data (5 items).
- Prior training (e.g., BLSD, radiation protection) (5 items).
- Awareness of hospital layout and services (1 item).
- Interest in further training and extracurricular activities (2 items).
- Familiarity with institutional quality, safety procedures, and IT systems (25 items).

The **post-training questionnaire** (33 items) assessed:

- Demographic data (2 items).
- Expectations and reflections on training (1 item).
- Change in spatial familiarity with the hospital (1 item).
- Perceived understanding of institutional protocols and systems (6 items).
- Perceived value of individual sessions (23 items), rated on a five-point Likert scale (1 = Not at all useful, 5 = Very useful).

The Resident's Day orientation program

We conducted the training on the first useful day after the start of the contract, on 4, 5 and 6 November 2024, we scheduled 19 hours of training (+16 of Safety at work) as follows:

1) In-person lectures: 12 hours.
2) Practical activities 7 hours: role-play and innovative teaching activities (treasure hunter, simulated liver biopsy, paper airplanes, bioethics' clinical cases, etc.).
3) 9 online courses:
   a. N. 4 Mandatory for everyone (BLSD, International Patient Safety Goals JCI (IPSG), Management of Clinical Alarms, Advance treatment directives).
   b. N. 5 different for every residency program: drug preparation, Management of patients under mild and moderate sedation, Management of blood gas analysis; Management of ROTEM (viscoelastometry), Management of glucometers.
4) Moreover, our residents must do the 16 hours training about "safety at work".

Even the choice of "places" where training must take place was not random but determined by teaching requirements.

We used the university's Great Hall, a lawn in front of the university, normal teaching rooms and our Simulation Center, to engage audiences and inject a bit of fun into mundane activities as well as to generate motivational and cognitive benefits.

In terms of the development of more engaging learning environments for students, Ulmanen (2014) suggests that more attention should be paid to create positive opportunities to participate, in terms of both academic activities and peer interaction.

Starting from this suggestion we thought to "balance" frontal lessons and practical activities.

Resident Day's Program:

DAY 1

- Breakfast, registration and delivery of the "Welcome KIT".
- Institutional greetings (Resident representative, Director of Residents programs, University CEO and Dean).
- Campus Bio-Medico University of Rome: "Values and code of ethics".
- The resident's employment contract (legal information).
- Presentation of the Hospital (CEO-General-Director).
- Information on mandatory courses.
- Resident program service.
- Spiritual care of patients; chaplaincy and other religious ministers.

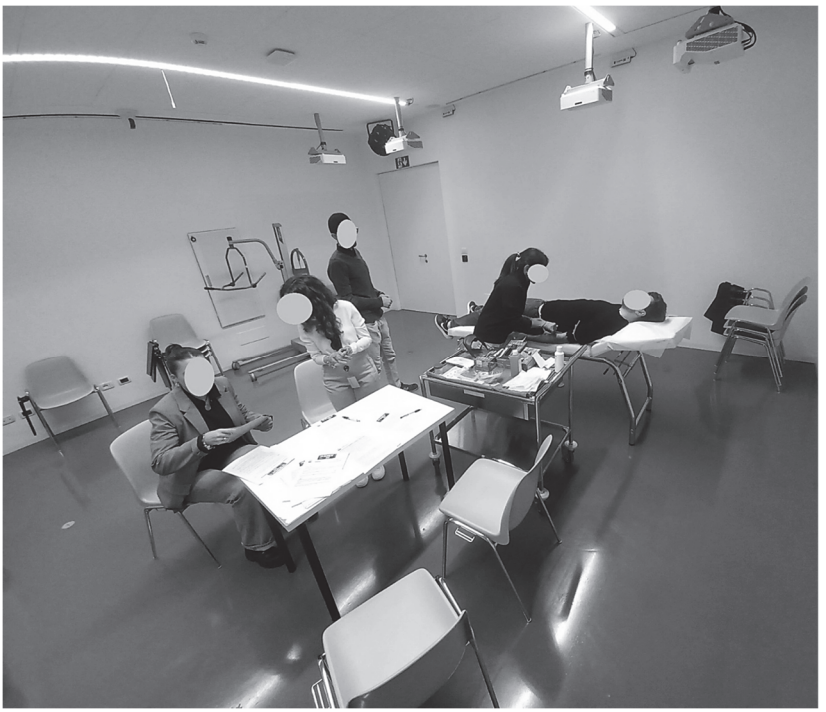
- International Cooperation and Volunteering service.

DAY 2
- Clinical risk management (an history case about a chemotherapeutic drug administration).
- Quality and safety and introduction to Joint Commission International standards.
- Patient flow: from admission to discharge.
- Dress code in the hospital (management of gowns, non-use of nail polish, wrist watches, bracelets, etc.).
- Personal protective equipment (PPE).
- The Hospital Information System (SHI): computerized medical records, inpatient, outpatient, operating log, Prescription and Medication Administration Record (PMAR).
- Nursing care organization in hospital wards (according to the model by small teams and by complexity of care).
- Hygiene and hospital infections.
- "Campus Sharing" (student association for recreational activities).
- "Campus Life": recreational and educational activities.
- "ASD Campus": sport activities.
- Non-compliance in the transfusion.

DAY 3 - Interactive Activities
- Small group discussion session of a clinical bioethics case (reconstructive surgery following neoplastic disease).
- A role-play on a liver biopsy procedure inside the Simulation Center with the aim of introducing doctors to quality and safety procedures (patient identification, hand hygiene, patient education: information notes and collection of informed consent, etc.). This activity was played in our simulation center, with hospital beds, paper/informatics documentation, with all necessary instruments: from sterile gloves to clinical instrumentation. The residents who participated to this session had to study a script and impersonate 2 structured physicians. Two students at the Theatre School of our University were trained to play the role of a patient and his wife (with the mandate to be a "communicatively demanding" wife). One of our registered nurses had to make "pre-determined" mistakes such as incorrect patient identification (anytime information about a patient is recorded or accessed – from sign-in sheets to online scheduling systems to electronic health records. Because this process is universal, it is fraught with risk for wrong-patient errors), incorrect transport of biological specimens

etc. Other students had the task of recording the errors they noticed during this session on a special observation sheet and then we made a single plenary session to debrief all together (Fig. 1).

Fig. 1 – Liver Biopsy role play



- Treasure Hunts: the various groups competed inside the hospital (Fig. 2) following and collecting the clues scattered in the various clinical areas of the hospital (blood collection center, morgue, transfusion center, diagnostic imaging area, etc.).
- Final team building activity: the "Paper Airplane challenge": interdisciplinary teams had 3 days to accomplish this mission: "*Your group has started an Airline company. You have to give a NAME to your company and think of a Flag/Standard that represents ALL the members of your Team. You have to draw your FLAG freehand or with graphics programs or online software. On the last day, you will have to explain to your colleagues the "why" of the name and flag you have chosen (60 seconds per team). During the last day there will be the aviation competition. A representative of each group will launch a paper plane (that you will make*

at home and that will have your flag and the name of the company on it). The group that launches the plane the furthest will win" (Fig. 3).

Fig. 2 – Treasure Hunt

Fig. 3 – Paper Airplane Challenge

Results

In Table 1 we report the data collected from the assessment questionnaire administered to the students BEFORE each Resident Day.

Since we only have two years (2022 and 2024) and a single percentage for each year, the appropriate test for each row is a Chi-Square test for two proportions (equivalent to the z^2 test).

Tab. 1 - Assessment Questionnarie 2022 vs 2024

TECHNICAL SKILLS 2022 vs 2024					
Question	**Answers**	**2022 Total**	**2024 Total**	**2022 vs 2024**	**Chi-Square**
Have you ever preformed an Arterial blood gases (ABG)? *(more than an answer possible)*	I had a detailed instruction on how to perform ABG	41 (28%)	35 (26%)	- 2%	$\chi^2 = 0.16$ $p = 0.69$
	I only performed the arterial sampling	30 (21%)	40 (30%)	+ 9%	**$\chi^2 = 3.27$ $p = 0.071$**
	I have never had a lesson on how to perform arterial sampling	32 (22%)	25 (19%)	- 3%	$\chi^2 = 0.43$ $p = 0.51$
	I have never developed an ABG by inserting the syringe into the device	21 (14%)	19 (14%)	=	$\chi^2 = 0.0$ $p = 1$
	I never performed an arterial sampling	70 (48%)	58 (44%)	- 4%	$\chi^2 = 0.57$ $p = 0.45$
The only response showing a significant change (although not significant at $p < 0.05$) is "*I only performed arterial sampling*," which increases from 21% to 30% ($p \approx 0.07$). This is an increasing trend, but it does not reach statistical significance. All other percentage differences are small and statistically insignificant.					
Have you ever taken a blood sample from a patient?	< 5 on patients.	52 (36%)	40 (31%)	- 5%	$\chi^2 = 0.58$ $p = 0.45$
	> 10 on patients	35 (24%)	26 (18%)	- 6%	$\chi^2 = 1.54$ $p = 0.21$
	Only on a simulator	11 (8%)	9 (7%)	- 1%	$\chi^2 = 0.09$ $p = 0.77$
	Never performed	47 (32%)	58 (44%)	+ 8%	**$\chi^2 = 3.35$ $p = 0.067$**
The only line showing a significant trend ($p \approx 0.07$) is "Never performed," which increases from 32% (2022) to 44% (2024). This indicates a possible growth in the number of students who have never had a blood sample drawn. All other differences (≤ 5-6 percentage points) are small and not statistically significant.					

Have you ever taken a patient's pulse and blood pressure?	YES	142 (98%)	130 (98%)	=	$\chi^2 = 0.0$ $p = 1$
	NO	3 (2%)	3 (2%)	=	$\chi^2 = 0.0$ $p = 1$
No percentage differences					
Medical History of the patient	I do not remember having lectured on the subject or ever having done so	4 (3%)	5 (4%)	+ 1%	$\chi^2 = 0.18$ $p = 0.67$
	I have never personally collected and written a medical history, but I know how to do it	11 (8%)	21 (16%)	+ 8%	**$\chi^2 = 3.13$ $p = 0.077$**
	I have collected and written less than 5 medical histories in my training course	18 (12%)	24 (18%)	+ 6%	$\chi^2 = 0.96$ $p = 0.33$
	I have collected and written more than 5 medical histories in my training	112 (77%)	83 (62%)	- 15%	**$\chi^2 = 7.15$ $p = 0.0075$**
The percentage of students who wrote more than five medical histories decreased from 77% (2022) to 62% (2024), a statistically significant difference ($p \approx 0.0075$). The item "I have never personally collected..." showed an increase from 8% to 16%, with a $p \approx 0.08$, thus a trend that is not yet significant.					

As for haemogasanalysis (ABG), we note the fact that there has been greater practical training.

“Only arterial sampling” has increased by 9% (compared to 2022) while the students who had not received any training on ABG have gone from 22% to 19% (-3%), suggesting better initial university training.

The students who had “Never performed an arterial sampling” have gone from 48% to 44% (-4%), it means that more students have acquired experience during their previous training.

About the ability to perform blood sampling, we recorded a general decrease in practical experience on patients, with a significant increase in those who had never performed a blood sampling (+8%). This could mean that fewer practical opportunities for students during their previous university career, considering that simulator practice also decreased by 1%.

Finally, regarding the collection of the “Patient’s Medical History” we recorded a significant decrease in those who collected more than 5 clinical histories (-15%), which suggests a reduction in practical experience in this area, with more students who stop at theoretical rather than practical knowledge.

The following data (Table 2) compares the level of perceived familiarity with the PUCMB environments during the Resident Day of 2022 (RD22), in which the

"Treasure Hunt" (TH) **was not used**, and the Resident Day of 2024 (RD24), when the gamification activity "Treasure Hunt" was introduced.

Tab. 2 - Fair scores familiarity with environments

	Δ Pre-Post 2022	Δ Pre-Post 2024
1 = no knowledge of the environments	- 19%	- 27%
2	- 18%	- 12%
3	=	- 16%
4	+ 10%	- 1%
5	+ 6%	+ 4%
6	+ 13%	- 2%
7	+ 9%	**+ 12%**
8	- 2%	**+ 11%**
9	+ 2%	**+ 9%**
10 = maximum knowledge of the environments	- 1%	**+ 12%**

Next graphs (Fig. 4 & 5) show the comparison between the "pre" and "post" training situation in the two years (2022 and 2024) about perceived level of familiarity with the Hospital areas.

Fig. 4 – Training without Treasure Hunt

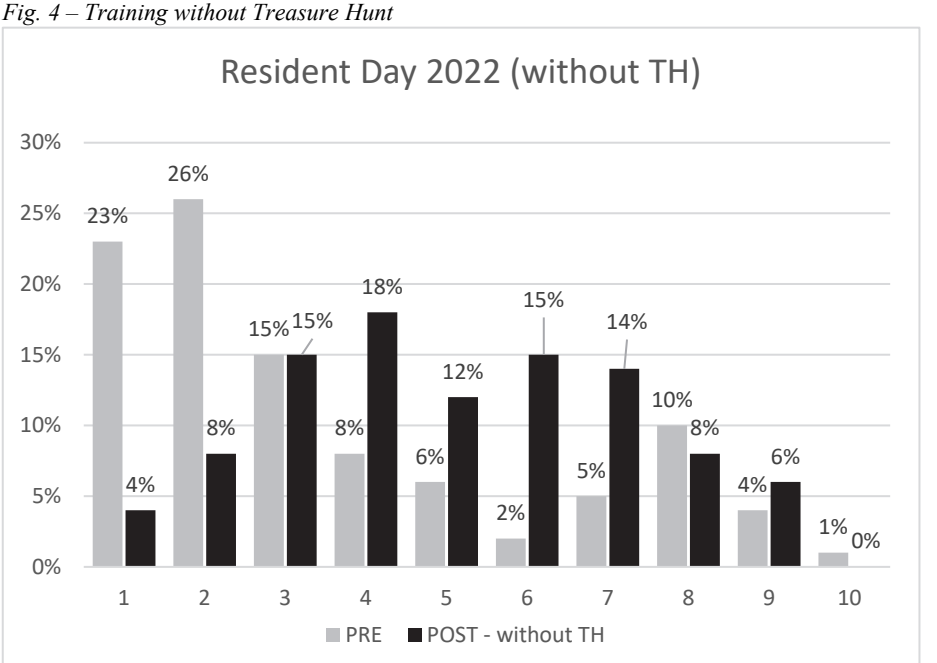
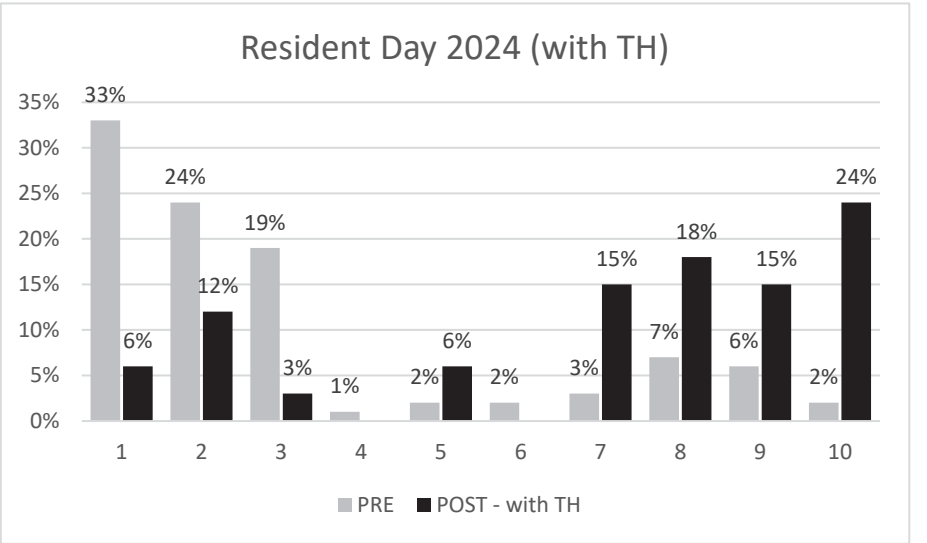


Fig. 5 – Training with Treasure Hunt



We applied the Mann–Whitney U test (a nonparametric statistical test used to compare two independent groups). If $p < 0.05$, the distributions of the two groups are significantly different:

- $U \approx 2500$
- $p < 0.001$ (highly significant)

The distribution of post-training scores is significantly different between RD2022 and RD2024.

RD2024 has a greater concentration of high scores (8-10), while RD2022 is more centered on average scores (4-7).

This indicates that the introduction of the Treasure Hunt resulted in a significant improvement in familiarity with the environments.

Resident Day 2022

Pre-RD2022 (light gray): Most people report a very low level of familiarity (scores 1-3), with a gradual decline as scores increase.

Post-RD2022 (black): There is a shift toward the middle range (scores 4-7) and a reduction in the lowest scores, indicating an overall improvement in familiarity.

Resident Day 2024

Pre-RD2024 (light grey): There is a higher spike in score 1 (over 30%), it means that, before training, many more people had almost zero knowledge of hospital environments than in 2022.

Post-RD2024 (black): The improvement is more marked than in 2022. Low levels (1-3) decrease dramatically, while high scores (8-10) increase significantly, with level 10 exceeding 20%.

Thus, the data shows that, in 2024, training with Treasure Hunt's interactive learning was more effective in moving people from the lowest levels of knowledge (1-3) to the highest levels (8-10).

In fact, the level of "unfamiliarity" (score 1) decreased by 27% in 2024, compared to a 19% decrease in 2022.

Meanwhile, the shift to higher scores (8-10) is much more consistent in 2024, with increases of 11%, 9% and 12% for levels 8, 9 and 10 respectively, while in 2022 the increases were much more limited (or even negative).

So, in 2024, more people started from a very low level of knowledge than in 2022, but after training the improvement was more marked. The data suggests that the introduction of the "Treasure Hunt" gamification contributed to a more marked increase in high scores, while at the same time reducing the share of those who maintained very low levels of familiarity.

Analysis of practical activities

Even though all practical activities obtained high scores (at least 3.4 - 4.3 out on a range scale 1-5), (which indicates a positive appreciation by the participants), some of them turned out to be less "understood" by the participants.

In particular (Table 3) the most marked difference was found in the Teamworking Challenge session: the session was perceived as less useful in the RD24 (having however recorded an excellent score of 3.8 out of 5.0), which could however indicate problems related to the way it was carried out, the perceived relevance or other variables related to the training experience.

In fact, this means that the "Egg Challenge" was more appreciated and more perceived as "useful" than the "Paper airplane challenge".

Tab. 3 Perceived usefulness

Practical sessions 5-point Likert scale 1 (Not at all useful) to 5 (Very useful)	**Average Post RD22**	**Average Post RD24**
Covid dressing and undressing	4,2	n.a.
Role play on liver biopsy	4,2	4,0
Problem solving	4,1	n.a
Clinical bioethics case	4,2	4,3
Teambuilding's challenge	4,1	3,4
Treasure Hunt	n.a.	3,8

Similar ratings in common sessions show some consistency in training quality. However, the decrease in teambuilding scores in RD24 may indicate the need to review the format or approach used to engage participants.

Discussion

This study highlights the efficacy of a structured, multi-modal orientation program in enhancing early clinical competence and hospital integration among newly enrolled residents.

Comparative analysis between the 2022 and 2024 cohorts revealed notable shifts in self-reported technical skill acquisition and institutional familiarity - particularly in procedures such as arterial blood gas sampling and clinical history taking.

For **Arterial blood gas sampling (ABG),** there is an improvement in hands-on training, with a 9% increase in students who performed arterial sampling only.

Additionally, the number of students who had never received a class on ABG decreased by 3%, suggesting an improvement in basic university teaching.

The number of students who had never performed arterial sampling also decreased by 4%, indicating increased hands-on exposure.

In contrast, for blood sampling, there was an overall decline in hands-on experience, with an 8% increase in students who had never drawn a blood sample. This may reflect a reduction in hands-on learning opportunities in the curriculum. Furthermore, 1% decrease in simulator practice suggests that this reduction was not offset by an increase in simulated activities.

About the **clinical history taking**, there is a 15% decrease in students who collected more than five clinical histories during university training. At the same time, there is an 8% increase in students who declare to have only theoretical knowledge on the subject. These data suggest a change in the training approach, with a possible reduction of direct practical experience in favor of a greater emphasis on theory.

These results suggest incremental improvements in pre-residency training, but also emphasize the continuing need for robust, hands-on onboarding frameworks.

A key innovation in the 2024 program was the integration of **gamification –** specifically the "Treasure Hunt" – which significantly improved spatial orientation within clinical environments. This supports the broader literature on experiential and game-based learning, which posits that **active engagement with physical space** accelerates cognitive mapping, retention, and motivation

(Ulmanen et al., 2014). The increased transition from low (1-3) to high familiarity scores (8-10) in 2024 – despite a lower baseline – underscores the pedagogical value of immersive learning design.

While in 2022 students were more evenly distributed between the medium and high levels, in 2024 many reached the maximum levels (10) resulting in more students reaching the maximum levels of familiarity with hospital environments, despite a lower starting point, a sign of a more effective acquisition of familiarity

The practical sessions highlight that, although the perception of the usefulness of the training activities remained generally high, some sessions underwent variations in the level of appreciation.

In particular, the teambuilding Airplane challenge obtained a lower score in 2024 compared to the Egg-challenge of the 2022, suggesting the need for a possible review of the format or the approach adopted.

The mixed outcomes in the perceived usefulness of practical activities, particularly the decline in appreciation for the Paper Airplane teambuilding challenge, point to the importance of aligning learning objectives with perceived clinical relevance. While creativity and collaboration are important, simulations that closely mimic medical contexts (e.g., the liver biopsy role-play) yielded higher engagement and learning transfer. This finding echoes cross-disciplinary insights from medical simulation, behavioral psychology, and instructional design - where **authenticity and scenario fidelity** are known to enhance performance and satisfaction.

However, the consistency in the scores of the other activities confirms the overall training quality of the program. The small improvements (such as in the bioethics clinical case) are encouraging and indicate that any changes made to the RD24 course had positive effects in some areas.

These data underline how practical experience is a key element in medical training and suggest the need to further strengthen active learning opportunities to improve students' technical skills.

Overall, the Resident Day program exemplifies a shift in orientation practices from passive information delivery to active, participatory learning. It contributes to a growing body of evidence that underscores the role of **experiential learning**, **interdisciplinary collaboration**, and **gamified design** in preparing residents not only for procedural competence, but also for systems navigation, communication, and resilience.

These insights are transferable to global residency settings facing similar onboarding challenges. Future research might explore longitudinal outcomes (e.g., error reduction, burnout, clinical efficacy), multi-site replication, and cross-cultural adaptation of this orientation model.

Conclusions

The overall analysis highlights how a structured and innovative orientation program can significantly improve the preparation of new residents, promoting not only the acquisition of technical skills, but also a rapid familiarization with the hospital environment.

While orientation programs are common in North America and Northern Europe (Brillman, 1995; McGrath, 2017), the PUCBM experience demonstrates a structured, culturally grounded, and scalable approach relevant across health systems facing similar onboarding challenges.

The integration of active teaching methodologies – such as role-play, Treasure Hunt and other practical activities – allowed us to bridge, in a short time, the gap between theory and practice, highlighting a positive impact on the levels of knowledge and security perceived by participants. This study suggests gamified exploration enhances spatial memory and orientation, supporting the use of play-based design in complex learning environments.

However, some training moments, such as the teambuilding Airplane challenge in RD24, showed room for improvement, suggesting the need to refine the format to optimize involvement and effectiveness.

These results underline the importance of investing in evidence-based orientation programs that support the critical transition from academic training to clinical practice, reducing the risk of disorientation and burnout and promoting the development of competent and resilient professionalism in an increasingly complex healthcare context.

Practice Points

1. **Adopt multi-modal onboarding:** Combine lectures, simulations, and gamified activities to bridge theoretical knowledge and clinical practice for new residents.
2. **Use gamification to boost hospital orientation:** Interactive games like treasure hunts can significantly improve spatial awareness and familiarity with hospital workflows.
3. **Prioritize experiential learning:** Role-playing and simulations of clinical procedures enhance early technical skill development and understanding of safety protocols.
4. **Align team-building activities with non-clinical relevance:** Design activities that foster collaboration and engagement across different residency backgrounds, not only clinical specialties.

5. **Continuously evaluate and refine orientation programs:** Regular assessment of participant feedback and outcomes ensures ongoing improvements in training quality and resident satisfaction.

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References

Abati, E., Nelva Stellio, L., Manini, A., Moroni, F., Azzalini, L., & Vilca, L.M. (2022). A cross-sectional survey study of the impact of COVID-19 pandemic on the training and quality of life of Italian medical residents in the Lombardy region. *Annals of Medicine*, 54(1): 2325-2338. Doi: 10.1080/07853890.2022.2105392.

Biasutti, M., Makrakis, V., Concina, E., Frate S. (2017). Sviluppo professionale dei docenti universitari: un'esperienza in un progetto internazionale, *Italian Journal of Educational Research*, 18: 67-82

Binetti, P. (2000) *Diventare medici in Europa*. Roma: Società Editrice Universo, 133.

Brillman, J.C., Sklar, D.P., Viccellio, P. (1995). Characteristics of emergency medicine resident orientation programs. *Acad Emerg Med.*, 2(1): 25-31. Doi: 10.1111/j.1553-2712.1995.tb03075.x.

Cambi, F., (2000). *Manuale di filosofia dell'educazione*. Roma-Bari: Laterza.

Guaglianone, L., Malzani, F. (2007). *Come cambia l'ambiente di lavoro: Regole, rischi, tecnologie*. Milano: Giuffré editore.

Haynes, J.D., Sakai, K., Rees, G., Gilbert, S., Frith, C., Passingham, R.E. (2007). Reading hidden intensions in the human brain. *Curr Biol.,* 17(4): 323-8 Doi: 10.1016/j.cub.2006.11.072.

Iori, V. (2018). *Educatori e Pedagogisti.* Trento: . Edizioni centro studi Erickson.

Jacobs, J.C.G., Van Luijk, S. J., Van Berkel, H., Van der Vleuten, C. P. M., Croiset, G., & Scheele, F. (2012). Development of an instrument (the COLT) to measure conceptions on learning and teaching of teachers, in student-centred medical education. *Medical Teacher*, 34(7): E483-E491. Doi: 10.3109/0142159X.2012 .668630

Lappen, J.R., Talati, A., Wieczorek, M., Cossler, N. (2014). Resident Orientation: A Time to Foster Cultural Competency. *Obstetrics & Gynecology* 123(3): 653-655, March. Doi: 10.1097/AOG.0000000000000135.

Mank, V.M.F., Wiggins, A., Lowe, D., Breighner, C. (2022). Evaluation of an Education-based Training Orientation for Resident Physicians in an Intensive Care Unit in Hawai'i. *Hawaii J Health Soc Welf*. Aug; 81(8): 223-227.

McGrath, J., Barrie, M., Way, D.P. (2017). Emergency Medicine Resident Orientation: How Training Programs Get Their Residents Started. *West J Emerg Med.* Jan; 18(1): 97-104. Doi: 10.5811/westjem.2016.10.31275. Epub 2016 Nov 15.

Pensieri, C., Alloni, R. (2019). Educazione e simulazione nelle Facoltà universitarie. Una review. *Ricerche di pedagogia e didattica*, 14: 121-142. Doi: 10.6092/issn.1970-2221/9167.

Pensieri, C., De Benedictis, A., Iori, T., Nobile, L., Alloni, R. (2021). L'orientamento iniziale dello specializzando. *Nuova Secondaria*, 5, gennaio, XXXVIII: 43-57.

Pensieri, C., Saccoccia, S., De Benedictis, A., Alloni, R. (2022). Il Resident-Day 2019: l'esperienza del Policlinico Universitario Campus Bio-Medico per l'orientamento dei nuovi medici specializzandi. *Nuova Secondaria Ricerca*, 7: 34-53.

Ramboldi, G. (2021). *Didattica innovativa e percezione dei docenti: il Colt Project nelle scuole di medicina*. Università degli Studi di Milano-Bicocca, Tesi di Dottorato, Accessed on: 24 oct 2025, available here: https://boa.unimib.it/retrieve /e39773b7-a898-35a3-e053-3a05fe0aac26/phd_unimib_750018.pdf.

Tammaro, R., Petolicchio, A., D'Alessio, A. (2017). Formazione dei docenti e sistemi di reclutamento: un leitmotiv. *Italian Journal of Educational Research*, (19): 53-67. Doi: 10.32043/gsd.v9i1.1328

UCBM (Università Campus Bio-Medico di Roma), Aims Charter, ed. 2020, accessed on 04.08.2023, p. 1. Accessible on: https://www.unicampus.it/storage/45f932be/ UCBM_Carta_finalita_2020.pdf

Ulmanen, S., Soini, T., Pyhältö, K., Pietarinen, J. (2014). Strategies for academic engagement perceived by Finnish sixth and eighth graders. *Cambridge Journal of Education,* 44(3): 425-443. Doi: 10.1080/0305764X.2014.921281.

Developing Pragmatic Comprehension of Indirect Speech Acts through Explicit Instruction: Evidence from Algerian EFL University Students

Salma Aleb[*], Leila Loucif[^], Zohra Labed[°]

Abstract
This quasi-experimental study investigates the effectiveness of explicit pragmatic instruction on Algerian EFL university students' comprehension of indirect speech acts. Sixty-four second-year English majors from an Algerian university participated in an eight-week intervention. The experimental group (n = 32) received explicit instruction targeting requests, refusals, and suggestions, while the control group (n = 32) followed conventional communicative language teaching methods. Data collection involved discourse completion tasks and metapragmatic assessments administered pre- and post-intervention. Analysis of covariance revealed statistically significant differences favoring the experimental group, $F(1, 61) = 47.83$, $p < .001$, $\eta^2p = .32$, with large effect sizes for request comprehension (Cohen's $d = 1.28$) and refusal recognition (Cohen's $d = 1.18$). Qualitative analysis of learner reflections indicated enhanced metalinguistic awareness and contextual sensitivity. Findings provide novel evidence supporting the integration of explicit pragmatic instruction within Algerian EFL curricula, addressing persistent gaps between linguistic competence and pragmatic performance. This study offers one of the first empirical investigations of pragmatic comprehension development in the Algerian EFL context, extending current interlanguage pragmatics research. Pedagogical implications emphasize structured awareness-raising activities, authentic materials incorporation, and teacher professional development in pragmatic pedagogy.
Keywords*:* Explicit Instruction; Pragmatic Comprehension; Indirect Speech Acts; Algerian EFL Learners; Interlanguage Pragmatics

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1. Introduction

The globalization of English as a lingua franca has intensified the need for communicative competence extending beyond grammatical accuracy to encompass pragmatic appropriateness (Bardovi-Harlig, 2020; Taguchi & Roever, 2017). Pragmatic competence – the ability to produce and comprehend language in contextually appropriate ways – remains a critical yet underdeveloped dimension of foreign language proficiency, particularly where learners have limited exposure to authentic target language use (Alcón-Soler & Martínez-Flor, 2022). In Algeria, where English functions as a foreign language learned primarily through formal instruction, university students frequently demonstrate grammatical proficiency while struggling with pragmatic comprehension, especially regarding indirect speech acts requiring inferential reasoning and cultural knowledge (Al-Issa, 2003; Taguchi & Roever, 2017).

Indirect speech acts – utterances whose intended meaning differs from literal interpretation – pose significant challenges for EFL learners who must navigate linguistic form, contextual cues, and sociocultural norms simultaneously (Searle, 1975; Thomas, 1983). Algerian EFL learners, immersed in an educational system emphasizing grammatical structures and vocabulary acquisition, often lack systematic exposure to pragmatic features, resulting in miscommunication when engaging with proficient English speakers.

The Algerian higher education context presents unique characteristics influencing English pedagogy. Following implementation of the Licence-Master-Doctorat (LMD) system in 2004, universities adopted communicative approaches emphasizing interaction and authentic language use. However, instructional practices frequently prioritize linguistic forms over pragmatic functions, with curricula offering insufficient attention to speech act realization patterns, politeness strategies, and contextual variation. Furthermore, large class sizes, limited resources, and teacher unfamiliarity with pragmatic instruction methodologies constrain implementation of pragmatically focused activities (Bardovi-Harlig, 2020).

Research within instructed second language acquisition has increasingly demonstrated that pragmatic competence benefits from explicit, focused instruction rather than incidental acquisition alone (Jeon & Kaya, 2006; Taguchi, 2015). Explicit instruction – involving metalinguistic explanations, consciousness-raising activities, and structured practice – enables learners to develop awareness of form-function-context mappings essential for pragmatic comprehension (Schmidt, 1993). While studies in diverse EFL contexts have documented explicit pragmatic instruction effectiveness for production abilities, fewer investigations have examined its impact specifically on comprehension, particularly within North African educational settings.

This study addresses three critical gaps. First, despite growing interest in pragmatic instruction research, limited empirical evidence exists regarding Algerian EFL learners' pragmatic comprehension development. Second, while production-oriented studies dominate interlanguage pragmatics research, comprehension – which precedes and informs production – requires independent investigation (Roever, 2012). Third, most pragmatic instruction studies have focused on Asian or European contexts, necessitating context-specific research considering the sociocultural and pedagogical realities of Algerian higher education.

The present investigation employs a quasi-experimental design examining whether explicit pragmatic instruction enhances Algerian EFL university students' comprehension of indirect speech acts, specifically requests, refusals, and suggestions. These speech acts were selected because they occur frequently in academic contexts, exhibit substantial cross-cultural variation, and pose documented challenges for Arabic-speaking EFL learners (Al-Issa, 2003; Bella, 2021). Three research questions guide the study:

1. Does explicit pragmatic instruction significantly improve Algerian EFL learners' comprehension of indirect requests compared to conventional instruction?
2. To what extent does explicit instruction enhance learners' ability to recognize and interpret indirect refusals and suggestions?
3. How do learners perceive the role of explicit pragmatic instruction in developing their metapragmatic awareness?

2. Literature Review and Theoretical Framework

2.1 Pragmatic Competence and Instructed Development

Pragmatic competence constitutes a fundamental component of communicative competence, encompassing both pragmalinguistics – the linguistic resources available for conveying communicative acts – and sociopragmatics – the social perceptions underlying language use in context (Leech, 1983; Thomas, 1983). Interlanguage pragmatics research has documented systematic patterns in learners' pragmatic development, revealing that pragmatic competence develops gradually, influenced by proficiency level, exposure length, individual differences, and instructional interventions (Taguchi & Roever, 2017). Crucially, studies demonstrate that pragmatic competence does not develop naturally through general language instruction alone; rather, it requires focused attention and explicit pedagogical support (Jeon & Kaya, 2006; Takimoto, 2020).

Comprehension of indirect speech acts represents a particularly complex dimension of pragmatic competence. Unlike direct speech acts, where illocutionary force matches linguistic form, indirect speech acts require listeners to infer intended meanings through contextual integration and pragmatic reasoning (Searle, 1975). Research on pragmatic comprehension has identified several cognitive processes involved in interpreting indirect speech acts. Bouton (1994) found that understanding implicatures posed significant challenges for ESL learners, with certain types proving particularly difficult. Subsequent studies confirmed that comprehension difficulties persist even among advanced learners, suggesting that explicit instruction targeting inferential reasoning may be necessary (Roever, 2012; Taguchi et al., 2021).

2.2 Explicit Instruction Effectiveness

Jeon and Kaya's (2006) seminal meta-analysis of 49 studies demonstrated that explicit instruction yielded significantly larger effect sizes than implicit instruction across various pragmatic features. These findings have been corroborated by subsequent research examining diverse speech acts, proficiency levels, and instructional contexts (Li, 2021; Nguyen et al., 2021; Takimoto, 2020). Explicit instruction has proven particularly effective for developing pragmatic comprehension, as metalinguistic explanations facilitate the cognitive processing required for mapping forms to functions and contexts (Bardovi-Harlig et al., 2023).

Recent investigations have explored optimal approaches to explicit pragmatic instruction. Taguchi et al. (2021) demonstrated that combining explicit instruction with meaningful communicative practice enhanced both comprehension and production abilities. Similarly, Alcón-Soler and Martínez-Flor (2022) found that structured input activities directing learners' attention to form-meaning connections proved particularly effective for pragmatic comprehension development.

2.3 The Algerian EFL Context

Research on pragmatic competence within Arab EFL contexts has revealed systematic patterns of pragmatic transfer, cultural variation in politeness norms, and persistent gaps between linguistic proficiency and pragmatic appropriateness (Al-Qahtani, 2022). Within the Algerian context specifically, research has primarily focused on pragmatic production, revealing difficulties with speech act realization, politeness strategies, and register variation (Al-Issa, 2003; Bella, 2021). However, substantial gaps remain regarding pragmatic comprehension within Algerian EFL education. Limited research has

systematically examined the effectiveness of explicit instruction for developing comprehension abilities, nor have investigations explored pedagogical interventions specifically designed for the Algerian university context.

2.4 The Algerian EFL Curriculum Context

English occupies the status of foreign language in Algerian education, introduced at the middle school level (approximately age 11) and continuing through secondary and tertiary education. At the university level, English department students typically receive 20-25 contact hours per week across various skill areas. The curriculum structure under the LMD system emphasizes four primary domains: written expression, oral expression, linguistics, and literature/civilization studies, with additional courses in grammar, phonetics, and research methodology.

Within this framework, oral expression courses – where the present intervention was implemented – typically allocate 3 hours weekly across two 90-minute sessions. The official curriculum guidelines emphasize communicative competence development through interactive activities, role-plays, presentations, and discussions. However, pragmatic competence receives minimal explicit attention within these guidelines. Standard departmental syllabi for second-year students address general communicative functions such as describing, narrating, expressing opinions, and making presentations, but rarely include systematic treatment of speech act realization, politeness strategies, or cross-cultural pragmatic variation.

This curricular gap becomes particularly significant given that Algerian EFL learners have limited exposure to authentic English interaction outside the classroom. Unlike ESL contexts where learners encounter English in daily communication, Algerian students primarily experience English through textbooks, classroom discourse, and occasional media consumption. Consequently, opportunities for noticing pragmatic patterns, observing contextual variation, and developing intuitions about appropriate language use remain severely constrained. The absence of explicit pragmatic instruction within the existing curriculum thus represents a critical pedagogical limitation that the present study seeks to address.

2.5 Integrated Theoretical Framework

This study draws upon three complementary theoretical perspectives: Sociocultural Theory (SCT), Skill Acquisition Theory (SAT), and Usage-Based Theory (UBT). From an SCT perspective (Vygotsky, 1978; Lantolf & Thorne, 2006), explicit instruction serves as a mediational tool facilitating

learners' transition from other-regulated to self-regulated pragmatic performance. The Zone of Proximal Development suggests that explicit instruction provides scaffolding enabling learners to accomplish pragmatic comprehension tasks beyond their independent capabilities.

SAT (DeKeyser, 2007, 2015) proposes that complex skills develop through progression from declarative knowledge (knowing what) through procedural knowledge (knowing how) to automatized performance. Applied to pragmatic comprehension, learners initially require explicit declarative knowledge about speech act conventions, indirectness strategies, and contextual factors. Through repeated comprehension activities involving diverse contexts, this knowledge becomes proceduralized, enabling faster and more efficient processing.

UBT (Tomasello, 2003; Ellis, 2019) conceptualizes language acquisition as an emergent process wherein linguistic knowledge derives from exposure to and processing of language in use. Explicit instruction, from a usage-based perspective, enhances pragmatic comprehension by increasing the salience of pragmatic features within input and directing learners' attention to relevant patterns.

These three perspectives converge in explaining how explicit pragmatic instruction facilitates comprehension development. Explicit instruction initiates development through multiple pathways: providing mediation and scaffolding (SCT), establishing declarative knowledge foundations (SAT), and heightening attention to pragmatic patterns (UBT). Through structured practice involving diverse contexts, knowledge becomes consolidated, associations strengthen, and comprehension becomes more efficient.

3. Methodology

3.1 Research Design and Participants

This study employed a quasi-experimental pretest-posttest control group design. The independent variable was instructional condition (explicit pragmatic instruction vs. conventional communicative teaching), and dependent variables included pragmatic comprehension scores assessing recognition and interpretation of indirect requests, refusals, and suggestions.

Participants were 64 second-year English majors (41 female, 23 male; ages 19-22, M = 20.3, SD = 0.8) enrolled at an Algerian university during the 2023-2024 academic year. All were native Arabic speakers (Algerian dialectal Arabic and/or Tamazight) who had studied English for approximately seven to eight years. Participants were enrolled in two intact classes of 32 students each, with one class assigned to the experimental condition and the other serving as

control. Both instructors were experienced faculty members with similar educational backgrounds and teaching experience.

3.2 Materials and Instruments

The primary assessment instrument was a Pragmatic Comprehension Test (PCT) incorporating Discourse Completion Recognition Tasks (DCRTs) and Metapragmatic Assessment Questionnaires (MAQs). The DCRT component consisted of 30 scenarios depicting authentic university-related situations, with questions targeting: (a) recognition of illocutionary force, (b) interpretation of implicit meaning, and (c) evaluation of contextual appropriateness. The MAQ component included 15 scenarios requiring participants to identify pragmatic features, explain speaker intentions, and demonstrate metapragmatic awareness.

The PCT underwent pilot testing with 20 students from a comparable department, yielding acceptable internal consistency (Cronbach's $\alpha = .79$). Two experienced applied linguistics researchers reviewed the instrument for content validity.

For the experimental group, instructional materials included: (1) explicit instruction modules targeting indirect requests, refusals, suggestions, and integrated pragmatic competence; (2) authentic materials including video clips, audio recordings, and email transcripts; (3) consciousness-raising activities; and (4) structured practice tasks. Control group materials consisted of standard departmental textbook units focusing on general communicative functions without systematic attention to pragmatic features.

3.3 Ethical Considerations

The study received ethical approval at the departmental level. All participants provided written informed consent after receiving detailed information about the study's purposes, procedures, and their right to withdraw without penalty. Participation was voluntary and did not affect students' course grades. Data were anonymized and stored securely.

3.4 Procedures

During the first week (February 2024), both groups completed the PCT under standardized conditions. The eight-week intervention (mid-February through mid-April 2024) occurred during regularly scheduled 90-minute oral expression classes meeting twice weekly, totaling 16 sessions.

Experimental Group: Explicit pragmatic instruction followed a structured

sequence within each module. For example, the indirect requests module (Weeks 1-2) included metalinguistic presentations explaining direct versus indirect requests, conventional indirectness patterns, and factors influencing directness choices; consciousness-raising activities comparing request realizations across contexts; and structured practice progressing from recognition to interpretation to production tasks. Similar sequences addressed indirect refusals (Weeks 3-4), suggestions (Weeks 5-6), and integrated application (Weeks 7-8). Throughout the intervention, the instructor provided explicit feedback and encouraged metapragmatic reflection.

Control Group: Conventional communicative instruction followed the departmental syllabus, addressing topics including describing processes, expressing opinions, and delivering presentations. Activities emphasized fluency development, vocabulary expansion, and pronunciation accuracy without systematic attention to pragmatic features.

Several practical challenges were encountered during implementation. Student attendance averaged 89% across sessions, with occasional absences due to illness or scheduling conflicts. One session in Week 5 was postponed due to facility unavailability. Despite efforts to standardize instruction, minor differences in teaching style between the two instructors may have influenced outcomes.

Immediately following the intervention (final week of April 2024), both groups completed the PCT under identical conditions. Experimental group participants also completed reflection questionnaires, and four volunteers participated in 30-minute semi-structured interviews exploring their experiences with explicit instruction.

3.5 Data Analysis

DCRT responses were scored dichotomously (correct/incorrect), yielding scores from 0 to 30. MAQ responses were scored using a rubric assigning 0-2 points per item (0-30 total), with two raters achieving inter-rater reliability of $\kappa = .87$.

Preliminary analyses examined data distributions, outliers, and assumption violations. Independent samples t-tests compared pretest scores between groups to verify initial equivalence. The primary analysis employed Analysis of Covariance (ANCOVA) with posttest scores as the dependent variable, instructional condition as the independent variable, and pretest scores as the covariate. Separate ANCOVAs examined effects on overall comprehension, DCRT subscales, and MAQ performance. Effect sizes were calculated using partial eta squared (η^2p) and Cohen's d.

Reflection questionnaires and interview transcripts underwent thematic analysis following Braun and Clarke's (2006) six-phase approach, focusing on patterns in learners' perceptions regarding explicit instruction's benefits, challenges experienced, and developing metapragmatic awareness.

4. Results and Discussion

4.1 Preliminary Analyses and Overall Comprehension

Preliminary examination revealed no missing values, with score distributions approximating normality for both groups at both time points. At pretest, independent samples t-tests revealed no significant differences between experimental and control groups on overall comprehension, $t(62) = 0.47$, $p = .64$, confirming initial equivalence. Both groups demonstrated moderate pretest performance (approximately 50-52% accuracy), indicating substantial room for improvement.

Table 1 presents descriptive statistics for pretest and posttest scores. Visual inspection reveals substantial improvements in the experimental group across all measures, with posttest means increasing by approximately 13-14 points for overall comprehension. In contrast, the control group demonstrated modest gains of 5-6 points.

Figure 1 illustrates the pretest-posttest comparison between groups. Visual inspection reveals that while both groups demonstrated improvement, the experimental group's gain (13.39 points) substantially exceeded the control group's gain (5.94 points), representing a difference of 7.45 points in improvement magnitude.

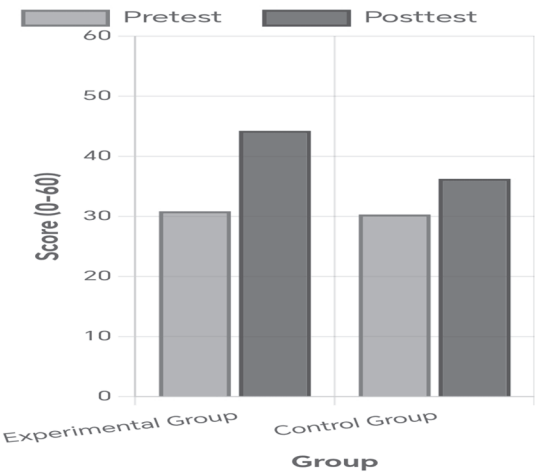
ANCOVA with posttest overall comprehension as the dependent variable yielded statistically significant results, $F(1, 61) = 47.83$, $p<.001$, $\eta^2p = .32$. The large effect size indicates that instructional condition accounted for 32% of variance in posttest scores after controlling for pretest performance. Adjusted posttest means revealed that the experimental group ($M = 44.21$, $SE = 0.89$) significantly outperformed the control group ($M = 36.27$, $SE = 0.89$), with a mean difference of 7.94 points (95% CI [5.82, 10.06]). Cohen's $d = 1.24$ represents a large effect, indicating the average experimental group participant scored more than one standard deviation above the control group mean.

Table 1 - Descriptive Statistics for Pragmatic Comprehension Assessment by Group and Time

Measure	ExperimentalGroup (n=32) M (SD)	ControlGroup (n=32) M (SD)
OverallComprehension (0-60)		
Pretest	30.84 (5.23)	30.31 (5.67)
Posttest	44.23 (5.12)	36.25 (6.12)
DCRT Total (0-30)		
Pretest	15.72 (2.81)	15.34 (3.04)
Posttest	22.45 (2.68)	18.19 (3.18)
DCRT:Illocutionary Force (0-10)		
Pretest	5.78 (1.26)	5.53 (1.38)
Posttest	7.89 (1.12)	6.41 (1.45)
DCRT:Implicit Meaning (0-10)		
Pretest	5.06 (1.32)	4.97 (1.41)
Posttest	7.54 (1.24)	5.84 (1.52)
DCRT: Appropriateness (0-10)		
Pretest	4.88 (1.15)	4.84 (1.29)
Posttest	7.28 (1.18)	5.94 (1.41)
MAQ Total (0-30)		
Pretest	15.12 (3.18)	14.97 (3.26)
Posttest	21.87 (3.08)	18.06 (3.45)

Note. DCRT = Discourse Completion Recognition Task; MAQ Metapragmatic Assessment Questionnaire.

Figure 1- Comparison of Overall Pragmatic Comprehension Scores: Pretest and Posttest by Group



Note. Error bars represent standard deviations. Maximum possible score = 60. Experimental group: Pretest M = 30.84 (SD = 5.23), Posttest M = 44.23 (SD = 5.12). Control group: Pretest M = 30.31 (SD = 5.67), Posttest M = 36.25 (SD = 6.12).

4.2 Speech Act Specific Analyses

Separate ANCOVAs examined intervention effects on specific comprehension dimensions. For illocutionary force recognition, ANCOVA revealed significant group differences, $F(1, 61) = 58.24$, $p < .001$, $\eta^2p = .49$. Experimental group participants ($M = 7.88$, $SE = 0.24$) demonstrated substantially higher recognition accuracy than control participants ($M = 6.42$, $SE = 0.24$), $d = 1.15$. Analysis by speech act type revealed that improvements were most pronounced for requests ($Mexp = 8.35$, $Mctrl = 6.81$, $d = 1.28$) and refusals ($Mexp = 7.89$, $Mctrl = 6.22$, $d = 1.18$), with somewhat smaller but still substantial effects for suggestions ($Mexp = 7.52$, $Mctrl = 6.25$, $d = 1.08$).

For implicit meaning interpretation, ANCOVA yielded significant results, $F(1, 61) = 52.36$, $p < .001$, $\eta^2p = .46$. Experimental participants ($M = 7.53$, $SE = 0.23$) outperformed control participants ($M = 5.85$, $SE = 0.23$), $d = 1.12$. Error pattern examination revealed that control group participants frequently selected literal interpretations over intended pragmatic meanings, particularly for indirect refusals. For example, when interpreting "That sounds interesting, but I'm completely overwhelmed this week," 67% of control participants at posttest selected "The speaker is interested in the proposal" rather than recognizing the

refusal function. In contrast, 91% of experimental participants correctly identified the refusal.

For appropriateness evaluation, ANCOVA showed significant group differences, $F(1, 61) = 34.19$, $p < .001$, $\eta^2p = .36$. Experimental participants ($M = 7.27$, $SE = 0.22$) demonstrated superior appropriateness judgments compared to control participants ($M = 5.95$, $SE = 0.22$), $d = 1.02$. Experimental participants demonstrated particular sensitivity to power dynamics and social distance factors, with appropriateness ratings aligning closely with native speaker norms (correlation $r = .84$) compared to control group ratings ($r = .58$).

For metapragmatic knowledge, ANCOVA revealed highly significant effects, $F(1, 61) = 43.67$, $p < .001$, $\eta^2p = .42$. Experimental participants ($M = 21.84$, $SE = 0.58$) substantially outperformed control participants ($M = 18.09$, $SE = 0.58$), $d = 1.09$. Qualitative analysis of MAQ responses revealed that experimental participants provided sophisticated explanations referencing politeness strategies, face-saving motivations, and contextual factors, while control group responses were typically brief and focused on surface features.

Table 2 summarizes ANCOVA results across all dependent measures, demonstrating consistent and substantial intervention effects

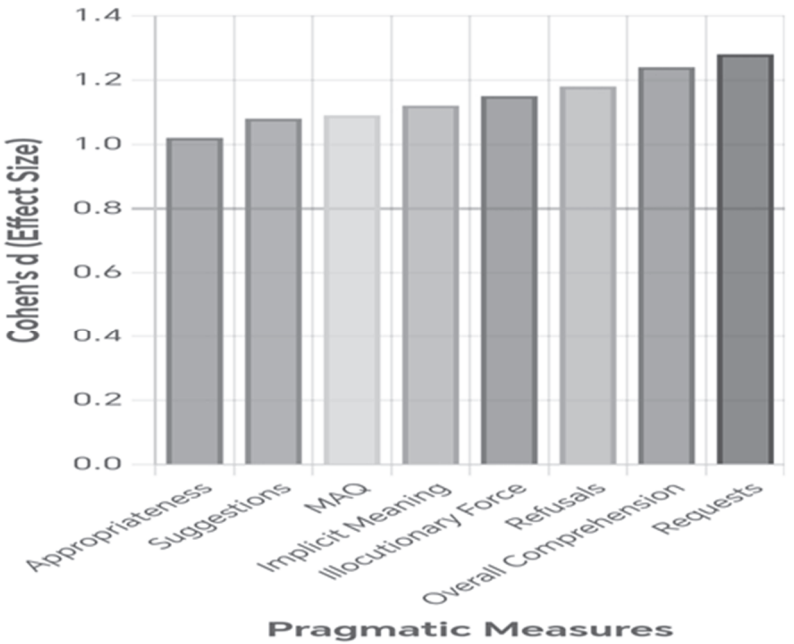
Table2 - Summary of ANCOVA Results for Pragmatic Comprehension Measures

Measure	F	df	p	η^2p	Cohen's d
Overall Comprehension	47.83	1, 61	<.001	32	1.24
DCRT Total	55.41	1, 61	<.001	48	1.18
Illocutionary Force	58.24	1, 61	<.001	49	1.15
Implicit Meaning	52.36	1, 61	<.001	46	1.12
Appropriateness	34.19	1, 61	<.001	36	1.02
MAQ Total	43.67	1, 61	<.001	42	1.09

Note. All effects remained significant after Bonferroni correction ($\alpha = .008$).

Figure 2 displays effect sizes across all pragmatic measures. All Cohen's d values exceeded 1.0, indicating large practical significance. Effect sizes were largest for requests ($d = 1.28$) and overall comprehension ($d = 1.24$), with somewhat smaller but still substantial effects for appropriateness evaluation ($d = 1.02$). These consistently large effects across multiple measures demonstrate the intervention's robust impact on pragmatic comprehension.

Figure 2 - Effect Sizes (Cohen's d) for Pragmatic Comprehension Measures



Note. Cohen's d values: small effect = 0.2, medium effect = 0.5, large effect ≥ 0.8.
All effects exceeded the large effect threshold. Dashed line indicates d = 0.8 threshold.

4.3 Qualitative Findings: Learner Perceptions

Analysis of reflection questionnaires and interview transcripts yielded four primary themes: (a) enhanced awareness of implicit meanings, (b) development of analytical strategies, (c) increased confidence in interpretation, and (d) challenges with complexity and transfer.

[Note: The quotation has been edited for clarity while preserving the participant's intended meaning]

4.3.1 Enhanced Awareness of Implicit Meanings

Participants consistently reported that explicit instruction heightened their awareness of indirect communication strategies previously unnoticed. One participant (EP12) reflected:

"Before this course, I think understanding English is just know the words and grammar. Now I know there is hidden meaning everywhere. When someone say 'I will think about it', maybe they mean 'no'."

This heightened awareness extended beyond classroom contexts, with several participants reporting noticing indirect speech acts in English-language films and social media.

4.3.2 Development of Analytical Strategies

Participants described developing systematic strategies for interpreting indirect speech acts. EP08 articulated:

"The teacher teach us to ask questions like: What is the situation? What is relationship between speakers? What does the person really want? Now I use this questions automatically when I am confused about someone meaning."

The structured practice activities were frequently cited as beneficial for consolidating analytical approaches.

4.3.3 Increased Confidence in Interpretation

Participants reported enhanced confidence comprehending English communication in academic contexts. EP23 described:

"Before, I was always not sure about what professors or classmates really mean, especially in emails. Now I feel more confidence to interpret their messages. I can tell when professor is making suggestion or giving order."

4.3.4 Challenges with Complexity and Transfer

Despite overall positive perceptions, participants acknowledged challenges applying pragmatic knowledge to complex, authentic situations. EP16 articulated:

"In class, the examples was clear and we have time to think. But in real conversations, everything happen fast and there might be many speech acts mixed together."

Transfer beyond practiced contexts also presented challenges, with participants uncertain whether learned strategies applied to non-academic contexts.

4.4 Interpretation and Implications

The substantial improvements demonstrated by experimental group participants align with and extend previous research documenting explicit

instruction benefits for pragmatic development (Jeon & Kaya, 2006; Taguchi, 2015). The overall effect size (η^2p = .32) falls within the range typically reported in pragmatic instruction research, suggesting the theoretically grounded, multi-componential intervention design proved effective.

However, the intervention was not uniformly effective for all participants. Approximately 12-15% of experimental group students demonstrated minimal improvement, suggesting that individual differences in learning style, motivation, or prior knowledge may moderate instructional effectiveness. Additionally, three students in the experimental group reported finding the metalinguistic explanations initially confusing, indicating that explicit instruction may require scaffolding for some learners.

Several factors account for the positive effects observed. First, the integration of metalinguistic explanations, consciousness-raising activities, structured practice, and metapragmatic reflection created complementary learning opportunities addressing multiple dimensions of pragmatic competence. Metalinguistic presentations established foundational declarative knowledge, as predicted by Skill Acquisition Theory (DeKeyser, 2015). Consciousness-raising activities facilitated noticing processes essential for acquisition (Schmidt, 1993), supporting Usage-Based Theory contentions regarding attention allocation's influence on acquisition (Ellis, 2019). Structured practice involving diverse contexts promoted robust construction formation while facilitating generalization, resonating with usage-based accounts emphasizing that abstraction emerges from exposure to varied instances (Goldberg, 2006). Metapragmatic reflection activities served as mediational tools facilitating internalization of pragmatic knowledge (Swain, 2006), consistent with Sociocultural Theory.

The particularly large effects for illocutionary force recognition (d = 1.15) and implicit meaning interpretation (d = 1.12) indicate that explicit instruction effectively targeted the inferential reasoning and contextual integration processes central to comprehension. These findings extend Taguchi's (2007, 2011) work documenting that pragmatic comprehension speed and accuracy improve with instruction, demonstrating that focused pedagogical intervention can substantially accelerate comprehension development within a relatively brief timeframe.

An important contribution involves the focus specifically on comprehension rather than production. The substantial gains in metapragmatic knowledge (η^2p = .42) support theoretical claims that metapragmatic awareness facilitates pragmatic development by supporting comprehension monitoring, strategic processing, and transfer (Roever, 2012; Schmidt, 1993). Experimental group participants demonstrated sophisticated metapragmatic understanding, with

this explicit knowledge appearing to support comprehension by enabling systematic analysis when confronted with ambiguous situations.

These findings hold particular significance for the Algerian EFL context. The study demonstrates that explicit pragmatic instruction can effectively address challenges despite resource constraints and pedagogical challenges characterizing North African higher education settings. The modest pretest performance (approximately 50% accuracy) indicates that current instructional approaches inadequately address pragmatic competence, despite students' relatively advanced grammatical proficiency. The substantial improvements following focused instruction suggest that systematic pragmatic focus could meaningfully enhance communicative competence outcomes.

4.5 Pedagogical Implications

The findings yield concrete implications for integrating pragmatic instruction within Algerian and similar EFL contexts:

1. Systematic Pragmatic Focus: Rather than assuming pragmatic competence develops incidentally, curricula should incorporate systematic, focused instruction on pragmatic features across proficiency levels. Even relatively brief interventions can substantially enhance comprehension.
2. Metalinguistic Explanations: Providing explicit explanations of form-function-context relationships, politeness strategies, and cultural norms enables learners to develop conscious understandings supporting comprehension and self-regulation. Explanations should address not only what patterns occur but why they occur.
3. Consciousness-Raising Activities: Activities directing attention to pragmatic features within authentic materials facilitate noticing and pattern extraction. Comparison tasks highlighting variation across contexts, analysis activities requiring identification of speech act strategies, and metapragmatic discussions prove particularly valuable.
4. Authentic Materials Integration: Despite limited naturalistic exposure, learners benefit from encountering pragmatic features within authentic discourse. Video clips, audio recordings, and written texts representing diverse contexts provide input for pattern extraction and comprehension practice.
5. Structured Practice Progression: Practice activities should progress from controlled (recognizing speech acts in isolated contexts) to communicative (interpreting speech acts within extended discourse). Contextual diversity promotes generalization and flexible application.
6. Teacher Professional Development: Effective implementation requires teacher preparation addressing content knowledge (pragmatic concepts,

cross-cultural variation), pedagogical techniques (designing consciousness-raising activities, facilitating metapragmatic discussions), and ongoing support through communities of practice and resource access.

7. Addressing Contextual Challenges: For large classes, use pair and small group activities maximizing participation. When resources are limited, download and curate free authentic materials for offline use, create transcripts enabling multiple uses, and leverage learner resources. When time is constrained, integrate pragmatic focus within existing activities and implement a spiral approach with brief, recurring focus.

5. Conclusions

This quasi-experimental study provides robust empirical evidence that focused, theoretically grounded explicit instruction substantially enhances Algerian EFL university students' pragmatic comprehension abilities. Experimental group participants demonstrated large gains in recognizing illocutionary force, interpreting implicit meanings, evaluating contextual appropriateness, and articulating metapragmatic knowledge following an eight-week intervention. These results address critical gaps by examining pragmatic comprehension specifically within the underexplored Algerian EFL context, demonstrating that explicit instruction proves effective despite resource constraints characterizing North African higher education settings.

The findings extend theoretical understanding of how pragmatic competence develops in instructed settings, supporting predictions from Sociocultural Theory regarding mediation's facilitative role, Skill Acquisition Theory regarding declarative knowledge establishment and proceduralization, and Usage-Based Theory regarding attention direction and pattern extraction from input. The integration of quantitative and qualitative data enabled both measurement of learning outcomes and exploration of mechanisms underlying comprehension development from learners' perspectives.

Several contributions distinguish this research. First, the focus specifically on comprehension addresses a gap in interlanguage pragmatics research, which has predominantly examined production abilities. Comprehension merits independent investigation because it involves distinct cognitive processes and remains essential for successful communication even when production abilities are limited. Second, the study provides empirical evidence within a previously underexplored context, contributing to global understanding of pragmatic development across diverse educational settings. Third, the substantial effect sizes ($\eta^2p = .32$ overall; d ranging from 1.02 to 1.28) demonstrate meaningful, practical significance beyond statistical significance.

Limitations acknowledge several constraints that should inform interpretation of findings. The quasi-experimental design, while appropriate for the intact classroom context, limits causal inference possibilities compared to randomized controlled trials. The eight-week intervention duration, while producing measurable gains, prevents conclusions about long-term retention or delayed effects; longitudinal follow-up assessment would strengthen understanding of pragmatic knowledge durability.

The relatively modest sample size (n = 64) and limited number of assessment items, while sufficient for detecting large effects, constrain generalizability and may not capture the full range of pragmatic comprehension abilities. Future research should employ larger, more diverse samples across multiple institutions and proficiency levels, along with expanded test batteries containing more items per speech act category to enhance reliability and enable more fine-grained analysis of comprehension patterns.

Assessment relied primarily on recognition tasks in controlled conditions, which may not fully represent comprehension in spontaneous communication where processing time is limited and multiple pragmatic demands compete for attention. Practical challenges including student absences (89% average attendance), one postponed session, and potential instructor effects despite standardization attempts may have influenced outcomes. The homogeneous sample (second-year English majors at one Algerian university) limits generalizability to other proficiency levels, educational contexts, or Arabic-speaking populations. Finally, the study examined comprehension without directly assessing production transfer or application in authentic communication contexts, leaving questions about whether enhanced comprehension translates to improved pragmatic performance in real interactions.

Future research should address these limitations through randomized controlled trials, longitudinal designs tracking development over extended periods, incorporation of real-time processing measures, examination of production transfer, and replication across diverse populations. Additionally, research should investigate technology-mediated approaches, teacher professional development models, and factors facilitating transfer and generalization across contexts.

Despite limitations, this study makes meaningful contributions to interlanguage pragmatics research, second language pedagogy, and Algerian English language education. The findings demonstrate that pragmatic comprehension benefits substantially from focused, explicit instruction. For Algerian EFL learners facing documented challenges with pragmatic appropriateness despite advanced grammatical proficiency, systematic

pragmatic instruction represents a pedagogical priority that can meaningfully enhance communicative competence.

As globalization intensifies English's role as an international lingua franca, pragmatically competent speakers who can navigate cross-cultural communication successfully become increasingly critical. Algerian university students, preparing for careers requiring English-medium communication, need not only linguistic accuracy but also pragmatic awareness enabling them to interpret intentions, recognize indirectness, evaluate appropriateness, and avoid miscommunication. This study suggests that explicit pragmatic instruction can equip learners with these essential capabilities, contributing to their academic success and professional readiness.

Moving forward, the challenge involves translating research findings into widespread pedagogical practice through curriculum reform incorporating pragmatic objectives, professional development preparing teachers effectively, materials development providing accessible resources, and institutional support recognizing pragmatic competence as a legitimate educational goal. This study represents one contribution to the growing body of research supporting pragmatic instruction's central role in foreign language education, ultimately serving language learners worldwide by equipping them with pragmatic awareness essential for meaningful participation in our increasingly interconnected global community.

References

Al-Issa, A. (2003). Sociocultural transfer in L2 speech behaviors: Evidence and motivating factors. *International Journal of Intercultural Relations*, 27(5): 581-601.

Alcón-Soler, E., & Martínez-Flor, A. (2022). Pragmatics in instructed language learning. In: C. A. Chapelle (Ed.). *The concise encyclopedia of applied linguistics* (pp. 932-940). Wiley Blackwell.

Al-Qahtani, H. A. (2022). Pragmatic competence of Saudi EFL learners: A focus on speech acts. *Arab World English Journal*, 13(1): 89-106.

Bardovi-Harlig, K. (2020). Pedagogical pragmatics. In: M. Lamb, K. Csizér, A. Henry, & S. Ryan (Eds.). *The Palgrave handbook of motivation for language learning* (pp. 569-589). Palgrave Macmillan.

Bardovi-Harlig, K., Mossman, S., & Vellenga, H. E. (2023). The effect of instruction on pragmatic routines. *Language Teaching Research*, 27(1): 5-32.

Bella, S. (2021). Pragmatic development during study abroad: The case of requests and apologies. *Study Abroad Research in Second Language Acquisition and International Education*, 6(1): 147-176.

Bouton, L. F. (1994). Conversational implicature in the second language: Learned slowly when not deliberately taught. *Journal of Pragmatics*, 22(2): 157-167.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2): 77-101.
DeKeyser, R. M. (2007). Introduction: Situating the concept of practice. In: R. M. DeKeyser (Ed.). *Practice in a second language: Perspectives from applied linguistics and cognitive psychology* (pp. 1-18). Cambridge University Press.
DeKeyser, R. M. (2015). Skill acquisition theory. In: B. VanPatten & J. Williams (Eds.). *Theories in second language acquisition: An introduction* (2nd ed., pp. 94-112). Routledge.
Ellis, N. C. (2019). Essentials of a theory of language cognition. *The Modern Language Journal*, 103(Supplement): 39-60.
Goldberg, A. E. (2006). *Constructions at work: The nature of generalization in language*. Oxford University Press.
Jeon, E. H., & Kaya, T. (2006). Effects of L2 instruction on interlanguage pragmatic development: A meta-analysis. In: J. M. Norris & L. Ortega (Eds.). *Synthesizing research on language learning and teaching* (pp. 165-211). John Benjamins.
Lantolf, J. P., & Thorne, S. L. (2006). *Sociocultural theory and the genesis of second language development*. Oxford University Press.
Leech, G. N. (1983). *Principles of pragmatics*. Longman.
Li, S. (2021). The interface of prosody and pragmatics: Investigating metapragmatic awareness of English intonation by Chinese EFL learners. *Applied Linguistics*, 42(4): 691-717.
Nguyen, T. T. M., Pham, T. H., & Pham, M. T. (2021). The impact of explicit instruction on VietnameseEFL learners' pragmatic competence. *Journal of Asia TEFL*, 18(1): 110-130.
Roever, C. (2012). What learners get for free: Learning of routine formulae in ESL and EFL environments. *ELT Journal*, 66(1): 10-21.
Schmidt, R. (1993). Consciousness, learning and interlanguage pragmatics. In: G. Kasper & S. Blum-Kulka (Eds.). *Interlanguage pragmatics* (pp. 21-42). Oxford University Press.
Searle, J. R. (1975). Indirect speech acts. In: P. Cole & J. L. Morgan (Eds.). *Syntax and semantics 3: Speech acts* (pp. 59-82). Academic Press.
Swain, M. (2006). Languaging, agency and collaboration in advanced second language proficiency. In: H. Byrnes (Ed.). *Advanced language learning: The contribution of Halliday and Vygotsky* (pp. 95-108). Continuum.
Taguchi, N. (2007). Task difficulty in oral speech act production. *Applied Linguistics*, 28(1): 113-135.
Taguchi, N. (2011). Rater variation in the assessment of speech acts. *Pragmatics*, 21(3): 453-471.
Taguchi, N. (2015). Instructed pragmatics at a glance: Where instructional studies were, are, and should be going. *Language Teaching*, 48(1): 1-50.
Taguchi, N., Li, S., & Liu, Y. (2021). Comprehension of conversational implicature: Taguchi revisited with advanced-level Chinese learners of English. *Pragmatics*, 31(1): 101-127.
Taguchi, N., & Roever, C. (2017). *Second language pragmatics*. Oxford University Press.

Takimoto, M. (2020). Effects of metapragmatic discussion and metalinguistic information on L2 pragmatic development. *Language Teaching Research*, 24(3): 383-405.
Thomas, J. (1983). Cross-cultural pragmatic failure. *Applied Linguistics*, 4(2): 91-112.
Tomasello, M. (2003). *Constructing a language: A usage-based theory of language acquisition*. Harvard University Press.
Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Appendix: Sample Assessment Items

1. Discourse Completion Recognition Task (DCRT) Sample

Item 1: Indirect Request

Scenario: Student A is working on a group presentation with her classmate Student B. She needs to access a research article that Student B downloaded yesterday.

Dialogue:

Student A: “How did your research go yesterday?”
Student B: “Really well! I found some great articles about sociolinguistics.”
Student A: “That sounds helpful. I haven't been able to access the university database from home.”
Student B: “Oh, that’s frustrating.”

Questions:

1. What is Student A’s primary communicative goal?

a) To complain about the database.
b) To request access to Student B’s articles.
c) To discuss her research progress.
d) To express sympathy for Student B’s situation.

2. How would you interpret Student A’s statement “I haven’t been able to access the university database from home2?

a) She is explaining why she’s behind schedule.
b) She wants technical support.
c) She is indirectly asking Student B to share resources.
d) She is criticizing the university’s system.

3. Is Student A’s indirect approach appropriate for this situation?

a) Yes, very appropriate.
b) Appropriate.
c) Somewhat inappropriate.
d) Very inappropriate.

Item 2: Indirect Refusal

Scenario: Professor X receives an email from a student inviting him to attend the English Club's poetry reading event next Friday evening.

Email Response:

“Dear Student,

Thank you so much for thinking of me and for the invitation. The poetry reading sounds like a wonderful event, and I really appreciate the effort you and the club members have put into organizing it. Unfortunately, Friday evenings are typically when I catch up on grading and prepare for the following week’s lectures. I hope the event goes very well, and perhaps you could share some photos or recordings afterward.

Best wishes,

Professor X”

Questions:

1. What speech act is Professor X performing?

a) Accepting the invitation enthusiastically.
b) Requesting more information about the event.
c) Declining the invitation.
d) Postponing his decision.

2. Which linguistic features indicate Professor X’s actual intention?

a) “Thank you so much”.
b) “Unfortunately”.
c) “sounds like a wonderful event”.
d) “Friday evenings are typically when I catch up on grading”.

3. Why might Professor X choose this indirect style rather than simply writing “I cannot attend”?

a) He is uncertain about his schedule.
b) To maintain a positive relationship and soften the refusal.

c) He wants the student to invite him again.
d) To confuse the student.

Item 3: Indirect Suggestion

Scenario: Two students are discussing their group project strategy. One student notices that the other's proposed approach might be too complicated given their time constraints.

Dialogue:

Student A: "So you're thinking we should analyze all five novels for the comparison?"

Student B: "Yes, I think it would make our project really comprehensive."

Student A: "That's an ambitious plan. I'm just thinking about the deadline – we have only three weeks left. What if we focused on three novels and went deeper with the analysis? That might let us really develop our arguments."

Student B: "Hmm, that could work actually."

Questions:

1. What is Student A's primary communicative intention?

a) To criticize Student B's idea.
b) To suggest a more manageable alternative.
c) To complain about the deadline.
d) To take control of the project.

2. Which strategy does Student A use to soften her suggestion?

a) Acknowledging the positive aspect first ("ambitious plan").
b) Using a question form ("What if we focused...").
c) Providing a rationale (deadline constraint).
d) Being direct and assertive.

3. How appropriate is Student A's indirect approach in this peer-to-peer context?

a) Very appropriate.
b) Appropriate.
c) Somewhat inappropriate.
d) Very inappropriate.

Item 4: Indirect Acceptance/Agreement

Scenario: A department coordinator is responding to a colleague's proposal to reschedule their committee meeting.

Email:

"Dear Colleague,

Thank you for your email regarding the committee meeting. I can see the conflict with the conference you mentioned, and it sounds like an important event for your research area. The proposed alternative time on Wednesday afternoon works well with my schedule. I'll send a revised meeting notice to the other committee members.

Best regards,

Department Coordinator"

Questions:

1. What speech act is the coordinator performing?

a) Refusing the request.
b) Accepting the proposal.
c) Requesting more information.
d) Making a counter-suggestion.

2. How does the coordinator's response style differ from simply writing "Yes, Wednesday works"?

a) He acknowledges the reason for the request.
b) He validates the colleague's needs.
c) He demonstrates consideration of the broader context.
d) He avoids clear commitment.

3. Why might the coordinator choose this elaborated acceptance style?.

a) To maintain collegial relationships and show respect.
b) To make his message longer.
c) To avoid giving a clear answer.
d) To demonstrate superior knowledge.

Item 5: Indirect Request (Formal Register)

Scenario: A graduate student is emailing the university librarian about accessing restricted archive materials for her thesis research.

Email:

"Dear Librarian,

I hope this message finds you well. I am a second-year MA student in the English Department, currently working on my thesis examining colonial-era education documents. During my preliminary research, I discovered that the university archives contain several relevant collections from the 1920s-1940s period. I noticed that these materials are classified as restricted access. I was wondering whether there might be a possibility to consult these documents for my research purposes. I would be happy to complete any necessary forms or meet with you to discuss the appropriate procedures.

Thank you for your time and assistance.

Sincerely,

Graduate Student"

Questions:

1. What is the primary speech act in this email?

a) Requesting information.
b) Requesting permission/access.
c) Complaining about restrictions.
d) Making a suggestion.

2. Which politeness strategies does the student employ?

a) Providing justification for the request.
b) Using tentative language ("wondering whether," "might be a possibility").
c) Offering to comply with procedures.
d) Using imperative forms.

3. Is the level of indirectness appropriate for this context?
a) Yes, very appropriate for a formal student-librarian request.
b) Appropriate.
c) Too indirect.
d) Not indirect enough.

Item 6: Indirect Suggestion (Peer Context)

Scenario: Two classmates are reviewing each other's essay drafts. One student notices that the other's introduction is unclear.

Dialogue:

Student A: "I really like your thesis statement about social media's impact. The examples you chose are interesting too."

Student B: "Thanks! I wasn't sure if they were strong enough."

Student A: "They're definitely relevant. I'm just finding the introduction a bit hard to follow on first reading. Maybe it could benefit from a clearer roadmap of where the essay is going? Like, what if you outlined the three main points right after the thesis?"

Student B: "Oh, good point. Let me try that."

Questions:

1. What communicative function does Student A's feedback serve?
a) Criticizing the essay harshly.
b) Making a suggestion for improvement.
c) Requesting clarification.
d) Accepting the draft as-is.

2. How does Student A mitigate the potentially face-threatening act of criticism?

a) Beginning with positive feedback.
b) Using personal framing ("I'm finding...") rather than absolute statements.
c) Presenting the suggestion as a question.
d) Avoiding any mention of problems.
3. In peer feedback contexts, why might indirect suggestions be preferred?
a) To maintain positive relationships.
b) To avoid responsibility.
c) To confuse the peer.
d) To sound more academic.

2. Metapragmatic Assessment Questionnaire (MAQ) Samples

Item 1: Request Analysis

Scenario: A student sends an email to her professor:

"Dear Professor,

I hope this email finds you well. I am writing regarding the research paper assignment. I've been working on my topic selection and have narrowed it down to two possibilities, but I'm having difficulty deciding which would be more appropriate for the course objectives. I was wondering if you might possibly have some time available this week to discuss these options briefly, either during your office hours or at another time convenient for you. I understand you have a very busy schedule, so if this week doesn't work, I'm happy to wait until next week.

Thank you very much for your time and consideration.

Best regards,

Student"

Questions:

1. Identify the main speech act the student is performing in this email.
2. The student uses several politeness strategies in her request. List at least three specific linguistic features or strategies she employs to maintain politeness, and explain why each is appropriate for student-professor communication.

3. How does the student's request differ from a more direct version such as “I need to meet with you this week to discuss my paper topic”? Discuss the pragmatic effects of her chosen approach.

Item 2: Refusal Analysis

Scenario: A colleague responds to an invitation to collaborate on a research project:

“Dear Colleague,

Thank you so much for thinking of me for this exciting project on language policy. The research questions you’ve outlined are fascinating, and I can see this developing into significant work. I’m genuinely honored that you considered me as a potential collaborator.

I must confess, however, that I’m currently overcommitted with my existing projects. I have two article deadlines in the next three months, plus thesis supervision responsibilities that are requiring more time than anticipated. Taking on additional commitments at this point wouldn't allow me to contribute at the level this project deserves.

I hope you’ll keep me in mind for future collaborations when my schedule is less demanding. Perhaps we could still meet for coffee to discuss your ideas – I’d love to hear more about your approach, even if I can't formally join the project team.

Warm regards,

Faculty Member”

Questions:

1. What is the primary speech act in this response?
2. Identify and explain at least four strategies the writer uses to soften the refusal. Why are these strategies particularly important in professional academic contexts?
3. How does the indirect refusal approach differ from a direct “No, I cannot participate” response? Discuss the relationship maintenance functions of the chosen style.

Item 3: Suggestion Evaluation

Scenario: During a department meeting, a senior professor addresses a junior colleague's proposal:

"I think your idea about restructuring the literature course sequence has real merit. The chronological approach you're suggesting could definitely help students see the historical connections more clearly. One consideration that might be worth thinking about is how this would interact with the current linguistics courses. Since students take Introduction to Linguistics concurrently with 19th Century Literature in the current system, there might be some benefits to maintaining that parallel. Have you had a chance to look at how the revised sequence would align with the linguistics track? It might be worth consulting with the linguistics coordinator about the potential overlaps."

Questions:

1. Is the senior professor accepting, rejecting, or modifying the proposal? Explain your interpretation.
2. Identify the linguistic strategies used to express reservation or suggest modification without direct criticism. Why might these strategies be important in a professional meeting context?
3. How does power dynamics (senior to junior colleague) influence the pragmatic choices made in this interaction? Would a peer-to-peer suggestion likely be phrased differently?

3. Notes on Assessment Design

The complete Pragmatic Comprehension Test (PCT) contains:
- 30 DCRT items covering requests (n = 10), refusals (n = 10), and suggestions (n = 10);
- 15 MAQ items requiring extended metapragmatic analysis;
- items represent diverse contexts: student-professor, peer-peer, professional colleagues;
- scenarios include both positive (acceptance, agreement) and negative (refusal, disagreement) politeness contexts;
- register variation ranges from informal peer interaction to formal institutional communication.

Body Percussion and Educational Processes: Embodied Perspectives and Teaching Applications with ADHD Students

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Abstract
The research investigates the effectiveness of Body Percussion as a motor-musical practice in education, with particular attention to pupils with ADHD**,** within the paradigm of Embodied Cognition, which emphasizes the role of the body in cognitive, emotional and relational processes. The sample involved 106 primary and secondary school students: 75 included in the experimental group, subjected to weekly two-hour workshops for four months, and 31 in the control group, engaged in motor activities without musical components. The integrated analysis, based on quantitative and qualitative data (ANOVA with repeated measures, pre/post t-tests and systematic observations), showed significant improvements in the experimental group in almost all the macro-areas analysed, in particular motor-musical technique, involvement, inclusion and group cohesion (Cohen's d = 0.65-1.39), while the control group showed no relevant changes. The subgroup with ADHD also benefited above all in social cohesion and active participation. The results confirm Body Percussion as an inclusive methodology that promotes cognitive development, social-emotional skills and psychophysical well-being.

Keywords*:* Body Percussion; ADHD; Embodied Cognition; experimental research; inclusive educational methodology

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1.Introduction

Contemporary society is going through a double transformation: on the one hand, the increase in social inequalities; on the other, the rapid and pervasive spread of digitization, both elements that profoundly influence the education of the new generations and our daily lives, increasingly marked by a constant acceleration.

This condition, as Rosa observes, leads to a new type of alienation compared to the past: no longer imposed from the outside, but self-induced, the result of our progressive inner detachment (Rosa, 2015; Rivoltella, 2023). Faced with these dynamics, there is a need to rethink educational models, identifying approaches capable of addressing these challenges and promoting a more interconnected and inclusive society; it is essential to rethink movement education as a form of reconnection with the bodily self and the surrounding environment.

In the educational field, the body has always been at the center of numerous reflections and experimental studies until the recent birth of a new paradigm, Embodied Cognition, which has shown and emphasized the close relationship between movement, learning enhancement and cognitive functions. Studies such as those of Barsalou (2008) and Wilson (2002) show that learning is most effective when it involves the body, because physical actions help build mental meanings. Neuroscientific theories also emphasize the importance of situated and embodied learning (Barsalou, 2008; Diamond, 2013) and aligns with what is highlighted by the theory of Embodied Cognition which sees the body as an integral part of mental processes (Wilson, 2002; Varela et al.,1991). As is well known, in fact, human development is the result of the interactions between body, movement and environment (Damiani et al., 2015), where the subject and one's own learning process are placed at the center (Dewey, 1968), in terms of self-knowledge as well as knowledge of the other. According to Granja de Souza Campos (2006, pp. 54-55), the body plays a fundamental role in the personal, emotional and relational integration of the individual. Actively including it in learning paths means rethinking educational methods, adopting an approach in which perception and sensory experience take on central importance. This point of view opens new possibilities for educators, also in the context of artistic and recreational practices recently experimented in Latin America. In addition, the use of the body associated with percussive rhythm and music amplifies the multisensory itineraries attributed to it. The Body Percussion method revolves around three pillars: music, movement and language. “Musical and motor play” and “didactics of conduct” (Delalande, 1993) encouraged in the laboratories transform the learning context by creating a "zone of proximal development" (Vygotskij, 1993) in which students can

reach the maximum degree of development of their potential. Rhythm and music are phenomena shared by all human beings, regardless of nationality, gender or age. They create inclusive spaces, capable of uniting people beyond individual differences and their background.

For Dalcroze, the use of rhythmic body movement represents an effective means of promoting the development of musical sensitivity, improving motor coordination, stimulating concentration and increasing awareness of one's own body (Jaques-Dalcroze, 1921). His pedagogy, based on *rhythm,* laid the foundations for approaches such as Body Percussion, where rhythm is experienced in the body even before it is thought or played. Also, for Carl Orff (1978), the body is one of the first musical instruments available to the child. In his method, called *Orff-Schulwerk*, the use of body rhythm is central to developing musical skills through play, improvisation and movement. Body Percussion is fully part of this educational line, where the musical experience is born from doing, from the body in action; in Body Percussion, in fact, the rhythm is not only listened to or repeated, but acted, lived and internalized through movement. In addition to the bodily and cognitive aspect, Body Percussion has a strong relational value. When practiced in a group, it requires listening, synchronization, and cooperation. It is necessary to agree with others, to respect common time, to recognize one's own space and that of others. This type of activity strengthens not only prosocial skills, but also empathy and a sense of belonging. In this sense, rhythm is transformed into a shared language, non-verbal but deeply communicative. It is a way to "talk to the body", to express emotions, moods, ideas, even without words.

The pedagogy of Loris Malaguzzi, founder of the Reggio Emilia approach, moves precisely in this direction. For him, children learn through a hundred languages, among which the body and rhythm are fundamental tools. The time of learning, according to Malaguzzi, is not linear or standardized, but follows the internal rhythm of the child, which must be listened to and valued (Edwards et al., 1998).

Body Percussion, with its flexibility and inclusive nature, fits perfectly with this idea of education. From an educational point of view, Body Percussion: develops awareness of the body in space and time; stimulates motor coordination and concentration; strengthens motor memory and sense of sequence; enhances creative expression and self-confidence; it promotes socialization, through cooperative and synchronized group activities, creating well-being in the classroom.

Furthermore, it is a democratic and accessible practice, which does not require expensive tools or special technical skills: anyone, with their own body, can participate. Rhythm, in Body Percussion, is much more than a regular succession of sounds. It is a living, embodied and relational experience. It is a

way to learn with the whole body, to communicate, to get in tune with others. It is a bridge between pedagogy, neuroscience and art. The research described below aimed to investigate how much musical-motor activity such as Body Percussion considered in its various aspects, can positively influence the performance of pupils on their cognitive development, on training and as an agent of change to determine in themselves psychophysical well-being and overcoming barriers determined by stress, anxiety, fears and isolation with a view to inclusion (ref.). Above all, we wanted to evaluate the benefits on pupils with ADHD. The main symptoms of ADHD, such as poor attention, hyperactivity, and impulsivity, tend to appear early, typically in preschool or early school, and in some cases even earlier (Barkley, 2006). This disorder can impair the child's daily life, hindering learning, social relationships and adaptation to routines, with negative consequences on academic performance and interactions with peers (DuPaul & Stoner, 2014). Children with ADHD often experience difficulties in social relationships due to impulsivity, inattention, and hyperactivity, which can lead them to rash behavior and difficulty respecting the rules of games, resulting in rejection or marginalization by peers (Hoza, 2007). This social exclusion can impair self-esteem and foster feelings of loneliness, increasing the risk of developing depression and anxiety disorders (Mikami, 2010; Schatz et al., 2001). In this perspective Body Percussion is placed, an embodied activity that can improve executive functions and emotional regulation by developing in these students a strong sense of group cohesion thanks to the involvement of this game, which is not only musical motor, but also therapeutic for these students.

2. Experimental research

The present experimental research is therefore aimed to evaluate the effectiveness of Body Percussion as a motor-musical practice capable of promoting harmonious psychophysical development, school inclusion and cognitive enhancement in primary and secondary school pupils with a focus on pupils with ADHD. The intervention is based on the embodied approach that recognizes the body as a mediating device of knowledge (Carlomagno et al., 2014), enhancing learning through doing and bodily experience. In this context, the body has been conceived as a musical instrument, capable of activating cognitive, emotional, relational and sensory processes, also in relation to artistic expressiveness and psycho-emotional well-being.

The intervention was divided into several levels:

- Teacher training through dedicated meetings and support materials for active and inclusive teaching.

- Activation of interdisciplinary laboratories, designed to actively involve students in bodily-musical activities.
- Curricular integration of the proposed activities, with attention to pupils with disabilities, especially with ADHD or special educational needs.
- Use of digital tools (videos) to support the use and replicability of activities.
- Involvement of families through information meetings and collection of informed consent in compliance with the legislation on the protection of minors.

The intervention took place over a period of four months, with a weekly frequency of two hours per class. The sample included pupils aged between 9 and 12 years, with an average age of about 10.5 years, from classes IV and V of primary school and I and II of lower secondary school with the presence of 8 pupils with ADHD. The principal investigator, authorized by the school director, conducted systematic observations before and after the intervention, to assess changes in terms of psychophysical well-being, relational dynamics and involvement. Although the number of the two groups was not perfectly balanced (experimental group: n = 75; control group: n = 31), a preliminary analysis was conducted to verify their initial homogeneity.

Table 1 - Comparison between experimental and control groups

Variable	Experimental (M ± SD)	Control (M ± DS)	Statistical test	P (value)
Average age (years)	10,4 ± 1.1	10,5 ± 1.0	t(104) = -0.41	0.683
Distribution by gender (% female)	52%	55%	$\chi^2(1, n=106) = 0.09$	0.763
Average pre-test score (macro-area index)	3.12 ± 0.46	3.09 ± 0.43	t(104) = 0.32	0.749

The analyses did not show statistically significant differences ($p > 0.05$) between the two groups, neither in terms of age nor compared to the initial scores.

3. Methods

The analysis focused on eight macro-areas considered relevant to measure the effectiveness of the intervention: emotional, involvement, cohesion, liking,

breathing, technique, inclusion and technology. A mixed methodology was adopted, combining qualitative and quantitative analysis.

Qualitative analysis

During the activities, structured observations were conducted, aimed at detecting behaviors, interactions and learning dynamics; direct observations in class on the eight macro-areas implemented by the researcher and administration of self-report questionnaires to students and teachers, administered anonymously before and after the intervention.

Since no standardized tools were available in the literature, we proceeded to construct original questionnaires, based on a thematic analysis of the collected open-ended responses, according to the model proposed by Braun and Clarke (2006).

The analysis systematically followed the six phases identified by the authors:

1. Familiarization with data, through thorough and repeated reading of responses.
2. Initial coding, identifying keywords, recurrences, and relevant meanings.
3. Searching for themes, grouping codes into coherent sense nuclei.
4. Review of themes, checking internal consistency and mutual distinction between emerging categories.
5. Theme definition and naming, developing descriptive and interpretative labels.
6. Construction of the overall thematic framework, from which the eight interpretative macro-areas were derived.

These macro-areas were organized as second-level analytical categories, capable of synthesizing emerging themes and providing a systematic reading of the educational implications of the intervention.

Each macro area was defined based on frequency of themes in the data, conceptual relevance to the objectives of the intervention, and descriptive richness of the answers that supported it. The eight macro-areas thus obtained, (Emotional, Cohesion, Satisfaction, Technique, Inclusion, Involvement, Breathing, Technology) constituted the theoretical reference structure for the construction of the questionnaires, allowing qualitative evidence to be transformed into observable and measurable dimensions through coherent items and indicators.

Quantitative analysis

Numerical data were processed with SPSS (IBM SPSS Statistics) by means of descriptive (mean, standard deviation, minimum and maximum values) and inferential analyses.

The total sample consisted of 106 pupils, divided into:

- Experimental group: 75 students undergoing Body Percussion intervention;
- Control group: 31 students who did not undergo the intervention.

Within the sample, 8 children diagnosed with ADHD were identified (5 in the experimental group, 3 in the control group). A pre-post analysis was also carried out for these subjects on all the macro-areas considered, using the t-test for paired samples. The data were included in the overall dataset and subsequently observed as a subgroup for descriptive analysis and differential trends.

Assessments were performed in the first or second week of the start and end of the work.

A total of 8 class curriculum teachers, 4 support teachers, 2 motor education teachers and 3 music education teachers were involved in the project, supported by the researcher in charge of the project. The teachers were previously trained with teaching materials and introductory meetings focused on the aims, structure and operating methods of the intervention.

The activity of both groups included an intervention divided into sessions within the regular school hours. Specifically, the students of the experimental group participated in Body Percussion workshops that included details shown in Table 2.

Table 2 - Detail of the activities of the experimental group, modalities and times

N.	Activity	What has been done specifically (Body Percussion)	Minutes
1	Motor and respiratory coordination activities	Body Percussion exercises integrated with the breath: clapping hands during inhalation, finger snaps on exhalation, (small movements coordinated with rhythm and diaphragmatic breathing).	5’
2	Individual and group exercises for rhythmic small cell reproduction	Individual Body Percussion patterns (hands, chest, thighs, feet) and their repetition in groups on imitation of the teacher;	10’
3	Body musical compositions	Creation of short original compositions with Body Percussion: combinations of beats, pops, strokes on the chest and thighs, organized in small creative sequences.	12’
4	Rhythmic sequences combined with music with time changes.	Reproduction of percussive rhythmic movements on music (use of videos on the Lim): clapping of hands and feet, snaps of fingers, strokes on the chest and legs following first slow and then faster tempos (use of the metronome).	10’

5	Guided use of silence, breathing, and musical pause	Mindfulness activities: rhythmic pauses inserted in Body Percussion sequences, listening to silence, breathing as an integral part of the performance.	8’
6	Integration with verbal and body language	Recitation of rhythmic words/phrases accompanied by Body Percussion: call-and-response games with voice and beats, integration of sound and body gesture.	10’

During all the sessions, the researcher, authorized by the School Director, was present, who carried out systematic pre- and post-intervention observations through a structured observation grid. The pupils of the control group followed, at the same time and with the same frequency, alternative motor activities, not musical, based on elements shown in Table 3.

Tab.3 - Detail of the activities of the control group, modalities and times

N.	Activity	What was done specifically (Control group)	Minutes
1	General motor coordination exercises	Warm-up, walking, stretching, balance exercises and coordinated arm and leg movements	5’
2	Eye-manual activities and throwing/catching games	Games with balls and light objects, throwing and catching in pairs or small groups, manual precision exercises and hand-eye coordination	12’
3	Group games with low cognitive and relational intensity	Simple motor games in groups (passing objects, small walking or slow running competitions), without music.	10’
4	Combined motor sequences in space	Paths of movement in space with walking, changes of direction and simple steps in time to recorded music.	10’
5	Guided use of silence and breathing	Controlled breathing exercises, relaxation breaks and concentration on breathing.	8’
6	Integration with language and movement	Combination of simple verbal commands with body movement (raising arms, bending, moving).	10’

These activities were chosen to control the effects of physical exercise alone, to isolate the specific effectiveness of the rhythmic-musical component of the experimental intervention. All pupils enrolled in the classes involved were included in the study, without restrictive criteria, in compliance with the principles of equity and school inclusion. The only exclusion criterion concerned students with an attendance of less than 75% of the scheduled

sessions. The data collected from these subjects were excluded from the final analysis, to ensure the reliability of the pre/post comparisons.

For each of the eight macro-areas, standardized survey tools adapted to the school context were used, consisting of:

1. Systematic observation sheets used by the researcher and the reference professors.
2. Self-report questionnaires structured with five-point Likert scales, completed by pupils and teachers.
3. Teacher evaluation grids for monitoring group dynamics, inclusion and perceived interest.

The worksheets and questionnaires were validated through a preliminary phase of readability and comprehension tests, conducted on a pilot group of students (n = 10), to ensure linguistic adequacy and consistency with the age of the participants. All data have been collected anonymously and aggregately, in compliance with current legislation on the protection of personal data (EU Regulation 2016/679 - GDPR). The analysis was conducted on pseudonymized data, stored in a protected digital format. The entire process of data collection, management and analysis was supervised by the researcher, with the support of two referent teachers (one of motor education and one of curricular), in charge of the operational monitoring of the activities.

4.Data analysis

Data processing was carried out using IBM SPSS Statistics, statistical power estimation was carried out with G*Power software.

Before proceeding with the inferential analysis, a verification of the assumptions of normality was carried out. The Shapiro-Wilk test indicated that most of the variables (pre and post scores in the eight macro-areas) had a distribution compatible with normality ($p > 0.05$), allowing the use of parametric tests.

An analysis of the a priori statistical power, conducted with G*Power 3.1, indicated that, with a sample size of 106 subjects, the 2x2 repeated measures design (pre/post × group) guaranteed a power ($1-\beta$) greater than 0.95 for a mean effect ($f = 0.25$, $\alpha = 0.05$), confirming the adequacy of the sample. In addition, before processing the main data, the internal reliability of the self-report questionnaires used for the survey of the eight macro-areas was verified. The Cronbach's alpha coefficient was calculated for each composite scale (consisting of several items), both in the pre- and post-intervention survey. The observed alpha values were satisfactory for all dimensions, with values ranging from 0.72 (Technology) to 0.89 (Involvement), confirming a good internal

consistency of the measurement instruments. In particular, the dimensions Motor-musical technique (α = 0.86), Inclusion (α = 0.84), and Group cohesion (α = 0.81) showed high reliability, indicating that the included items measured the theoretical reference constructs homogeneously. Therefore, derived scores can be considered reliable for later analysis.

The ANOVA with repeated measures showed significant interactions between Time × Group in multiple dimensions that we report: motor-musical technique: $F(1, 104) = 21.3$, $p < 0.001$, $\eta^2 = 0.17$; involvement: $F(1, 104) = 15.2$, $p < 0.001$, $\eta^2 = 0.13$; inclusion: $F(1, 104) = 18.6$, $p < 0.001$, η^2 0.15; Group cohesion: $F(1, 104) = 12.8$, $p = 0.001$, $\eta^2 = 0.11$.

All effect sizes reported as η^2 refer to partial eta squared (ηp^2), the standard effect size measure for repeated-measures ANOVA.

Table 4 - Anova test results

Macroarea	F(1, 104)	p-value	η² (partial)
Motor-musical technique	21.3	**< 0.001***	0.17
Involvement	15.2	**< 0.001***	0.13
Inclusion	18.6	**< 0.001***	0.15
Group cohesion	12.8	**0.001***	0.11
Liking	3.1	0.081	0.04
Breathing	2.4	0.123	0.03
Emotional	1.6	0.204	0.02

Note: Results from repeated-measures ANOVA (Time × Group interaction).
**p < 0.05. η² values refer to partial eta squared (ηp²).*

The first four dimensions (Motor-musical technique, Involvement, Inclusion, Cohesion) show significant and medium-high effects; therefore, the intervention had a concrete impact on these areas (table 5).

In the experimental group, paired sample t-tests showed significant improvements in all eight macro-areas, with Cohen's d values ranging from 0.65 (liking) to 1.39 (technique), indicating moderate to large effects. In the control group, pre-post changes were not significant ($p > 0.05$) except for small improvements in cohesion ($p = 0.09$, not significant). Comparison between groups on post scores (independent t-tests) showed significant differences in:

- Technique: $t(70.2) = 3.92$, $p < 0.001$, $d = 0.88$; Involvement: $t(73.4) = 3.51$, $p = 0.001$, $d = 0.74$;
- Inclusion: $t(66.9) = 4.07$, $p < 0.001$, $d = 0.89$ (table 6).

To investigate the relationships between the improvements obtained in the different dimensions observed, a Pearson correlation matrix was calculated on the gain scores (pre-post differences) of the pupils in the experimental group ($n = 75$). The results show positive correlations of moderate-high magnitude

between different macro-areas. In particular, the variable "Motor-musical technique" is strongly correlated with Involvement (r = 0.76), Inclusion (r = 0.66) and Breathing (r = 0.57). Group Cohesion is significantly correlated with Inclusion (r = 0.73) and Emotional (r = 0.49), Similarly, Satisfaction is strongly associated with Involvement (r = 0.82), The Technology dimension, on the contrary, shows weak negative correlations with all other macro-areas (r between –0.13 and –0.24).

Table 5 – Pre-post analysis results for each macro-area in both groups

Macroarea	**Experimental Group**		**Control Group**	
	Cohen's d	p-value (pre-post)	Cohen's d	p-value (pre-post)
technique	1.39	< 0.001	0.05	0.827
Involvement	0.74	< 0.001	0.06	0.772
Inclusion	0.89	< 0.001	0.08	0.649
Group cohesion	0.71	0.002	0.21	0.090
Liking	0.65	0.006	0.18	0.502
Breathing	0.68	0.005	0.17	0.553
Emotional	0.67	0.012	0.15	0.478
Technology	0.66	0.009	0.11	0.622

Table 6 - Comparison between groups on post scores (independent t-tests)

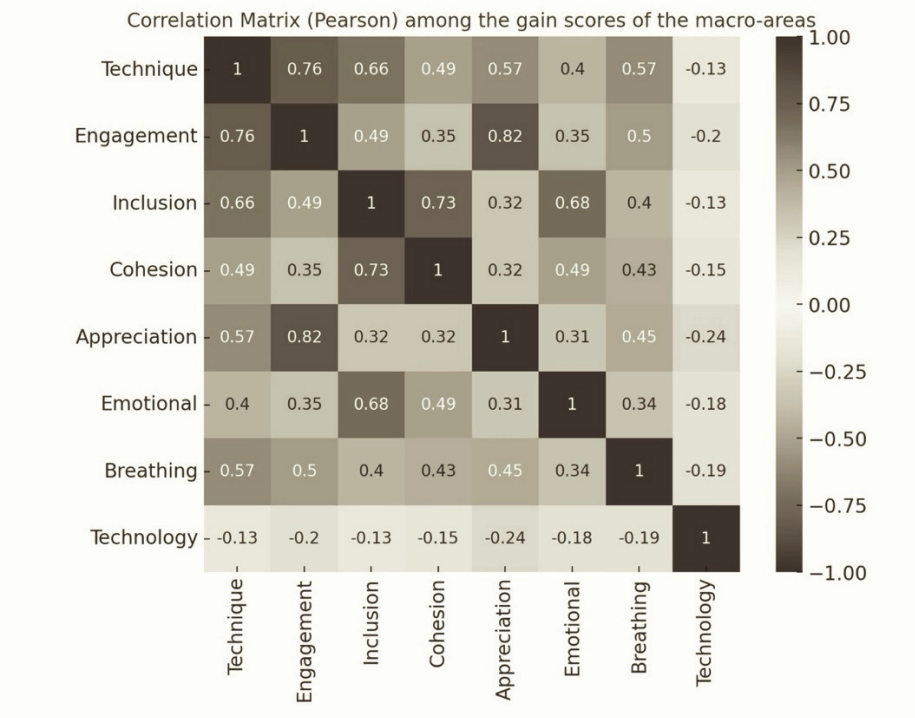
Macroarea	**t (df)**	**p-value**	**Cohen's d**
Musical technique	3.92 (70.2)	< 0.001	0.88
Involvement	3.51 (73.4)	0.001	0.74
Inclusion	4.07 (66.9)	< 0.001	0.89
Group cohesion	1.82 (72.8)	0.073	0.42
Liking	1.25 (75.1)	0.215	0.29
Breathing	1.04 (74.6)	0.301	0.25
Emotional	0.91 (76.0)	0.365	0.22
Technology	0.68 (73.9)	0.498	0.17

Table 7. Correlation matrix between macroarea gain scores (Experimental group)

	Tech	**Inv**	**Incl**	**Coh**	**Like**	**Emot**	**Breat**	**Techno**
Technique	1.00	0.76	0.66	0.49	0.57	0.40	0.57	–0.13
Involvement	0.76	1.00	0.49	0.35	0.82	0.35	0.50	–0.20
Inclusion	0.66	0.49	1.00	0.73	0.40	0.68	0.40	–0.13
Cohesion	0.49	0.35	0.73	1.00	0.32	0.49	0.43	–0.15
Liking	0.57	0.82	0.40	0.32	1.00	0.30	0.45	–0.24
Emotional	0.40	0.35	0.68	0.49	0.30	1.00	0.34	–0.18
Breathing	0.57	0.50	0.40	0.43	0.45	0.34	1.00	–0.19
Technology	0.13	0.20	0.13	0.15	0.24	0.18	0.19	1.00

Note: Correlations are considered statistically significant at $p < 0.05$.

Figure1 – Correlation matrix (Pearson) among the gain scores of the macro-areas



The central macro-areas (Technique, Involvement, Inclusion, Cohesion, Satisfaction, Emotional, Breathing) show moderate or strong positive correlations, suggesting that improvements in one tend to be associated with improvements in the others. Technology appears independent or even slightly negative compared to the other areas → indicates that the gain scores in Technology are not related to the other improvements. This type of matrix is useful for understanding which dimensions influence each other and for planning more targeted interventions.

4.1 Analysis of the subgroup of pupils with ADHD

An exploratory analysis was conducted on the subgroup of children diagnosed with ADHD (n = 8; 5 in the experimental group, 3 in the control group). The data show that all subjects reported improvements in pre/post scores, with a greater magnitude of variation in the experimental group. Social cohesion showed a statistically significant increase ($p < 0.05$), while inclusion showed a trend towards significance ($p = 0.056$). Given the limited number of participants in the ADHD subgroup (n = 8), the results should be considered

exploratory and not generalizable. These findings are indicative of possible trends that warrant further investigation into larger samples.

5. Discussion

The action research confirmed that the Body Percussion intervention brings significant benefits to the psychophysical development of the pupils, with documented improvements in behavioral, cognitive, emotional and socio-relational areas. The results obtained support on the effectiveness of Body Percussion as a tool for the enhancement of life competences in the school environment and as an inclusive and therapeutic tool for pupils with ADHD.

Inferential and descriptive analyses showed statistically significant improvements in the experimental group between pre- and post-scores in all eight macro-areas analyzed. In addition to the increase in averages, a reduction in the variability of post-intervention scores was also observed, suggesting greater homogeneity in the positive response of students to the intervention.

In the control group, on the other hand, the changes were negligible or not significant, except for a slight increase in cohesion, which was not statistically significant. Inclusion has remained stable, reinforcing the hypothesis that a structured approach such as the one proposed in the project is necessary to substantially affect this dimension.

Overall, the observed differences are supported by robust statistical analyses (ANOVA, t-tests and correlations) and confirm that Body Percussion can act positively on multiple levels of child development and especially for pupils with ADHD. All this is confirmed by the answers given by the pupils and teachers to the questionnaires formulated on the Likert scale, which have strengthened the research by confirming the validity of this musical motor game. In addition, further confirmations have been given by previous research (ref.) where Body Percussion emerges as a concrete educational response to the value of diversity and the cultivation of an ethics of reciprocity; in fact, promising results in the experimental group for some macro-areas analyzed such as: social cohesion (+43% $p \leq 00.5$), active involvement (+25% $p \leq 00.5$), stress management, emotional regulation (+43% $p \leq 00.5$) and inclusion (+25% $p \leq 00.5$) and again 39% of teachers noticed greater spontaneous collaboration between peers even for pupils from different backgrounds. In addition, some research (Gallese, 2007) has shown that learning occurs more quickly and effectively through the body and movement, as well as through experience and intentionality that guide the learning process itself. This also supports the idea that there is a motor area of the brain that is involved in the processes of comprehension and perception; in fact, to understand an observed action,

individuals activate the same sensory-motor connections that they use to perform and directly control their movements (Rizzolatti and Sinigaglia, 2006). It is therefore evident that learning has a motor basis and that comprehension is not limited only to the symbolic dimension. If applied to the pedagogical context, it can be argued that the bodily aspect cannot be excluded from educational and didactic processes, since the relationship with the other is always mediated by bodily action (Massa, 1983).

The results of the correlation analyses offer a deeper reading of the dynamics between the different dimensions involved in the intervention. The strong associations observed between Motor-Musical Technique and variables such as Engagement ($r = 0.76$), Inclusion ($r = 0.66$) and Breathing ($r = 0.57$) suggest that the improvement of technical-rhythmic skills is not isolated, but is accompanied by an increase in emotional activation, social integration and body awareness. These results confirm the pedagogical value of Body Percussion as a multidimensional practice, capable of simultaneously influencing cognitive, bodily and socio-relational aspects. In particular, the association between Engagement and Satisfaction ($r = 0.82$) reinforces the idea that motivation and perceived pleasure play a central role in students' participatory activation. This dynamic is consistent with the principle that perceived well-being and engagement promote more effective and lasting learning processes. The strong correlation between Inclusion and Group Cohesion ($r = 0.73$) also highlights the effect of the intervention on the relational dynamics of the class group, underlining how the sense of belonging can strengthen the inclusive climate and vice versa. Finally, the weak and systematic negative correlation of the Technology dimension with the other macro-areas (r between -0.13 and -0.24) is interesting, which could indicate a relative marginality of this variable in the context of the project. It is possible that, in an activity strongly centered on the body and direct interaction, the technological element has played an ancillary role, or even, in some cases, an element of distraction or interference with bodily and relational dynamics.

The results for the ADHD subgroup suggest that a structured motor-rhythmic intervention such as Body Percussion may be particularly effective in supporting social and relational self-regulation processes even in subjects with difficulties in attention and behavioral control. However, the limited number of subjects does not allow definitive generalizations; It is therefore recommended to investigate these findings with further studies on larger clinical samples.

In addition, it should be stressed that, although the results are statistically significant, their generalizability must be interpreted with caution. The specific characteristics of the intervention, its duration, structure, and school context, may limit the applicability of the findings to other student populations. Future

replications in diverse settings are recommended to confirm the broader validity of these results.

In the future, it would be appropriate to explore the role of individual moderating variables (age, gender, sociocultural background, different behavioral disorders) and to provide for longitudinal follow-up to assess the persistence of effects over time. These analyses would make it possible to optimize the intervention and better define its transformative potential within school contexts.

6. Conclusion

The analysis of the results indicates that Body Percussion generates positive effects not only on motor development, but also on an emotional level, with significant repercussions on the overall well-being of pupils, particularly those with ADHD. A crucial aspect concerns the cohesion and involvement that this practice fosters: these dimensions can encourage the development of prosocial attitudes, promoting the inclusion of all children. The construction of a cohesive group through shared action and rhythmic practice therefore seems to have a significant impact on inclusive processes. The study aimed to underline how Body Percussion, based on an educational approach that integrates play, rhythm and movement, is mainly configured as a stimulating and incisive methodology for pupils with ADHD. This practice, in addition to strengthening cognitive, motor and musical skills, is associated with benefits in terms of psychophysical well-being, thus representing a potential tool for educational and therapeutic intervention in school contexts, with effectiveness for students with ADHD and other special educational needs.

The available scientific evidence confirms the relevant role of physical activity as an educational and support tool for pupils with ADHD. Gaping and Etnier (2010) showed improvements in inhibition processes and executive functions, while Pontifex et al. (2013) documented significant increases in attention following aerobic exercise. These observations find further support in the analyses of Valentini and Canini (2020) and Ambrose (2021), who emphasized the benefits of motor activity on attentional control, reduction of hyperactivity and strengthening of higher cognitive skills. In this direction, the review by Valentini and Canini (2020) reiterated the value of physical activity as an educational resource even for children with ADHD who are not undergoing pharmacological treatments.

Within this framework, the role of particular interest is played by activities that integrate motor coordination and rhythmic dimension. The ability to synchronize movement to rhythm, both in simple and complex forms, is in fact

a determining factor in the development of executive functions and attentional regulation. In this sense, Verret et al. (2012) showed that structured activities, such as dance, promote motor control and concentration in children with ADHD.

Body Percussion is placed in this perspective as an educational and therapeutic practice of considerable potential: using the body as a rhythmic and sound instrument, it combines coordination, rhythm and sensorimotor involvement, promoting self-regulation, sustained attention and emotional well-being. Its integration into school contexts can therefore represent not only an innovative teaching methodology, but also an intervention with therapeutic value, capable of supporting the cognitive, emotional and relational processes of students with ADHD.

In fact, the data that emerged from the mixed analysis robustly confirms the initial hypothesis, highlighting how Body Percussion, understood as a structured motor-musical practice, produces significant and measurable effects on the motor, cognitive, socio-relational and emotional dimensions of students. In the Experimental Group, statistically significant increases were detected in all the macro-areas investigated, with relevance in coordination skills, group cohesion and inclusion, compared to the control group. The recreational-rhythmic approach, integrated into the school routine, is therefore configured as a highly effective pedagogical device, capable of combining psychomotor stimulation, the development of transversal skills and the promotion of an inclusive educational environment. This evidence supports the opportunity to systematically implement Body Percussion interventions in school contexts, both as a tool for enhancing skills and as a lever for the overall well-being of the student and for the improvement in emotional regulation, sustained attention and social participation, of students with ADHD, confirming the findings of international studies (Gapin & Etnier, 2010; Wassenaar et al., 2020; Diamond, 2013).

This study adopted a quasi-experimental design, which offers valuable insights into the educational impact of the intervention but also presents some methodological limitations. The absence of random assignment and the relatively small sample size constrain the internal validity of the findings and limit their external generalizability. Therefore, the results should be interpreted with caution and understood as context-specific rather than universally applicable. Despite this, the evidence collected offers relevant insights into the educational potential of the bodily and synchronic practices analysed that further studies would have to confirm in the future.

Ethics Committee and Conflicts of Interest

This study was conducted in full compliance with ethical standards, with a focus on research involving minors. The approval was granted by the IRB Ethics Committee of the bio-medical area of the Department of Human, Social and Health Sciences of the University of Cassino and Southern Lazio with prot. 8641 of 8/4/2024. Informed consent was obtained from all participants; for minors, consent has been provided by their parents or legal guardians. All procedures carried out in studies involving minor participants have been in accordance with the Institutional Research Committee's ethical standards and the 1964 Declaration of Helsinki and its subsequent amendments or comparable ethical standards.

References

Ambrose, H. (2021). Experiencing success: an occupational therapy partnership programme. Gymnastics for children with attention deficit hyperactivity disorder. *International Journal of Therapy and Rehabilitation*, *28*(10). Doi: 10.1108/ijot-03-2021-0005.

Barkley, R. A. (2006). *Attention-Deficit Hyperactivity Disorder: A Handbook for Diagnosis and Treatment.* New York: Guiford Publications.

Biederman, J., & Faraone, S. V. (2005). Attention-deficit hyperactivity disorder. *Lancet*, *366*: 237-248. Doi: 10.1016/S0140-6736(05)66915-2.

Barsalou, L. W**.** (2008). Grounded cognition*. Annual Review of Psychology*, *59*: 617-645

Brown, T. E. (2005). *Attention Deficit Disorder: The Unfocused Mind in Children and Adults.* Yale University Press. 5.

Braun, V., Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3(2)*: 77-101. Doi: 10.1191/1478088706qp063oa.

Carlomagno, N., Palumbo, C., & Sibilio, M. (2014). Traiettorie non lineari della ricerca didattica: Le potenzialità metaforiche ed inclusive delle corporeità didattiche. *Italian Journal of Special Education for Inclusion*, 2(1): 129-143. Doi: 10.7346/sipes-01-2014-42.

Damiani, G., Basso, D., Acampora, A., Bianchi, C.B., Silvestrini, G., Frisicale, E.M., Sassi, F., Ricciardi, W. (2015). The impact of level of education on adherence to breast and cervical cancer screening: Evidence from a systematic review and meta-analysis. *Prev Med*., *81*: 281-9. doi: 10.1016/j.ypmed.2015.09.011.

Delalande F. (1993). *Le condotte musicali. Comportamenti e motivazioni del fare e ascoltare musica,* a cura di Giovanna Guardabasso e Luca Marconi. Bologna: Clueb.

Dewey J. (1968). *Come pensiamo.* Firenze: La Nuova Italia.

Diamond, A. (2013). Executive functions. *Annual Review of Psychology, 64*: 135-168. Doi: 10.1146/annurev-psych-113011-143750.
DuPaul, G. J., & Stoner, G. (2014). *ADHD in the schools: Assessment and intervention strategies* (3rd ed.). New York, NY: Guilford Press.
Edwards, C., Gandini, L., & Forman, G. (1998). *The hundred languages of children: The Reggio Emilia approach to early childhood education*. Norwood, NJ: Ablex Publishing.
Gallese, V. (2007). Dai neuroni specchio alla consonanza intenzionale: Meccanismi neurofisiologici dell'intersoggettività. *Rivista di Psicoanalisi*, 53(1): 197-208.
Gapin, J., Etnier, J.L. (2010). The relationship between physical activity and executive function performance in children with attention-deficit hyperactivity disorder. *J. Sport Exerc. Psychol.*, *32*(6):753-63. doi: 10.1123/jsep.32.6.753.
Granja de Souza Campos, C. E. (2006). *Musicalizando a escola: Música, conhecimento e educação*. São Paulo, Brazil: Escrituras Editora.
Hoza, B. (2007). Peer functioning in children with ADHD. *Journal of Pediatric Psychology, 32*(6): 655-663. Doi: 10.1093/jpepsy/jsm024.
Jaques-Dalcroze, E. (2008). *Il ritmo, la musica e l'educazione* (A. Loiacono Husain, Trans.). Torino, Italy: EDT. (Original work published 1921).
Massa, R. (1983). *Le tecniche e i corpi verso una scienza dell'educazione*. Trezzano sul Naviglio: Unicopli.
Mikami, A. Y. (2010). The importance of friendship for youth with attention-deficit/hyperactivity disorder. *Clinical Child and Family Psychology Review, 13*(2): 181-198. Doi. 10.1007/s10567-010-0067-y.
Orff, C. (1978). *The Orff approach to music education*. New York, NY: Schott Music.
Pontifex, M.B., Saliba, B.J., Raine, L.B., Picchietti, D.L., Hillman, C.H. (2013). Exercise improves behavioral, neurocognitive, and scholastic performance in children with attention-deficit/hyperactivity disorder. *J Pediatr*., *162*(3):543-51. doi: 10.1016/j.jpeds.2012.08.036.
Rosa, H. (2015). *Accelerazione e alienazione: Per una teoria critica del tempo nella tarda modernità* (*Beschleunigung: Die Veränderung der Zeitstrukturen in der Moderne*). Einaudi.
Rivoltella, P. C. (2023). L'analisi pedagogica e i suoi oggetti al tempo dell'Intelligenza Artificiale. *Studi Sulla Formazione – Open Journal of Education, 26*(2): 63-67. Doi: 10.36253/ssf-14975.
Rizzolatti, G., Sinigaglia, C. (2006). *So quel che fai. Il cervello che agisce e i neuroni specchio.* Milano: Raffaello Cortina Editore.
Schatz, N. K., Weimer, M., & Lavergne, L. S. (2001). Attention-deficit/hyperactivity disorder with developmental coordination disorder. *Seminars in Pediatric Neurology, 8*(2): 131-140. Doi: 10.1053/spen.2001.24910.
Valentini M., Canini A. (2020). ADHD: Systematic review of the beneficial effects of motor activity. *European Journal of Educational and Teaching*, *18*(3): 162-179. Doi: 10.7346/-fei-XVIII-03-20_13.
Varela, F. J., Thompson, E., & Rosch, E. (1991). *The embodied mind: Cognitive science and human experience*. Cambridge: MA: MIT Press.

Verret, C., Guay, M. C., Berthiaume, C., Gardiner, P., & Béliveau, L. (2012). A physical activity program improves behavior and cognitive functions in children with ADHD: an exploratory study. *Journal of Attention Disorders, 16*(1): 71-80. Doi: 10.1177/1087054710379735.

Vygotskij, L. S. (1993). *Lo sviluppo psichico del bambino*. Milano, Italy: Editori Riuniti.

Wassenaar, T.M., Williamson, W., Johansen-Berg, H., Dawes, H., Roberts, N., Foster, C., Sexton, C.E. (2020). A critical evaluation of systematic reviews assessing the effect of chronic physical activity on academic achievement, cognition and the brain in children and adolescents: a systematic review. *Int J Behav Nutr Phys Act*., *17*(1): 79. Doi: 10.1186/s12966-020-00959-y.

Wilson, M. (2002). Six views of embodied cognition. *Psychonomic Bulletin & Review, 9*(4): 625-636. Doi. 10.3758/BF03196322

Zwaan, R. *A.* (1999). Embodied cognition, perceptual symbols, and situation models. *Discourse Processes*, *28*: 81-88.

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