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Mentoring and networking for innovation in the school ecosystem: from enabling conditions to *MentorQ* Self – Evaluation Tool

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Abstract

This study explores the potential of mentoring as a key lever for fostering innovation and systemic improvement in education, focusing on school-to-school mentoring models and the enabling factors that influence their sustainability and effectiveness. Using a mixed-methods approach combining exploratory and confirmatory research, the study identifies ten key enabling factors essential for the success of mentoring practices. These include shared objectives, the comparison of practices, access to resources, and the enhancement of professional skills among stakeholders. Special emphasis is placed on the "hub-and-spoke" model, which has demonstrated effectiveness in promoting collaboration and disseminating innovative practices while adapting to local contexts. Based on the findings, a self-assessment tool, MentorQ, has been developed to support schools in systematically evaluating their mentoring practices, identifying areas for improvement, and strengthening their processes. MentorQ will be piloted within INDIRE's innovation networks, such as *Avanguardie Educative* and *Piccole Scuole*, enabling the evaluation of its adaptability across both standardized and non-standardized educational environments. The results underscore the importance of investing in professional development, fostering a collaborative culture, and enhancing the capacity of schools to engage in effective mentoring practices. Future research will focus on validating MentorQ in diverse contexts and further developing a mentoring toolkit, including operational resources and case studies. This work contributes to building sustainable and inclusive mentoring networks, offering concrete tools and insights for driving continuous improvement and innovation in education.

KEYWORDS: Mentoring, Innovation, School-to-School Collaboration, Mentoring Enabling Factors, Self-Assessment Tool, Educational Improvement.

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1. Mentoring in the Context of School Ecosystem Innovation

In recent years, the concept of the school as an ecosystem has gained significant relevance in educational research, emphasizing the interdependence among actors, institutions, and contexts that contribute to learning and development (Bronfenbrenner, 1979; Fullan 2001; Mangione et al. 2024). Within this perspective, the school is no longer seen as an isolated entity but as an integral part of a broader system interconnected through networks of collaboration and continuous exchange. These school ecosystems are dynamic environments where the synergy among institutions, teachers, students, and local communities forms the foundation for addressing contemporary educational challenges, such as digital and pedagogical innovation (OECD, 2015, 2017).

The concept of the networked ecosystem, promoted by the OECD, further extends this vision by emphasizing a fluid connection among schools, universities, local authorities, and other educational organizations. Educational networks foster the sharing of resources, knowledge, and experiences, acting as catalysts for systemic change. Unlike traditional hierarchical models, educational networks promote greater autonomy and responsibility among their members, creating spaces for shared reflection and experimentation that transcend institutional and territorial boundaries (Hargreaves & Fullan, 2015; Nardi et al., 2024; Mangione et al., 2024).

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Additionally, these networks provide a platform for addressing common challenges, such as inclusion, diversification of pedagogical practices, and the transition to more integrated digital teaching (OECD, 2017).

Within this framework, *school mentoring*, particularly in networked settings, emerges as a crucial tool for facilitating innovation and continuous improvement (Chapman & Muijs, 2014; Muijs et al., 2010; Rossi et al., 2024; Mangione et al. 2024). Defined as a structured process of mutual support and learning, school mentoring involves institutions with advanced expertise in specific practices guiding other schools in adopting innovative strategies and overcoming organizational and pedagogical challenges (Hargreaves & O'Connor, 2018).

The mentoring approach can be particularly effective in fostering change at multiple levels of ecosystem (Ainscow et al., 2019; OECD, 2017).

Micro level: At the individual school level, mentoring provides direct support to teachers and school leaders, assisting them in implementing innovative practices. Recent studies highlight how inter school collaboration strengthens schools' adaptability to local and global challenges, fostering more personalized and inclusive learning. For instance, schools that have already integrated digital technologies can support others in adopting similar tools by sharing practical models and solutions to common obstacles.

Meso level: At the network or cluster level, mentoring facilitates the dissemination of knowledge and best practices, creating genuine professional learning communities. This approach helps to mitigate the isolation experienced by some schools, promoting the sharing of resources, experiences, and innovative strategies. School networks supported by mentoring processes have been identified as key drivers for developing collective capacities and distributing leadership. In transnational contexts, such networks have demonstrated their ability to enhance coherence and quality within educational systems by exchanging effective practices across diverse schools.

Macro level: At the systemic level, school mentoring contributes to building a systemic learning infrastructure, aligning educational policies, school practices, and local needs more effectively. This approach accelerates the adoption of large-scale reforms while maintaining attention to the specific contexts of individual schools. Moreover, mentoring acts as a bridge between central policy guidelines and the operational realities of schools, ensuring that reforms are implemented effectively and sustainably. International studies, such as those conducted by UNESCO (2021), highlight that well-structured mentoring programs can contribute to building more resilient, equitable, and inclusive educational systems.

Several school mentoring models have been developed to address the needs of different educational contexts and systems. These approaches reflect diverse strategies to promote resource sharing, collaborative learning, and continuous improvement. As example:

"RECIPROCAL EXCHANGE" MODEL. This model emphasizes equitable exchange between schools with similar contexts and characteristics. Each school acts as both mentor and mentee, fostering a collaborative dynamic based on mutual trust and shared objectives. It is particularly effective in enhancing teaching quality and adopting new technologies through direct comparison and the transfer of practical experiences (Johnson & Alamaa, 2012).

"HUB-AND-SPOKE" MODEL. In this approach, a central school (hub) serves as a guide for other schools (spokes), providing support through resources, training, and tools for adopting innovative practices. Successfully implemented in the Teaching School Hubs Programme in the United Kingdom (Roberts, 2023) and in the Mensi European Project (Rossi et al., 2024; Mangione, 2024) this model is particularly effective for disseminating large-scale strategies while requiring structured coordination and strong leadership.

"CASCADE" MODEL. The cascade model involves a school, after acquiring specific competencies through mentoring or training programs, transferring this knowledge to other schools within the network. Used in international initiatives (Turner et al., 2017), this model allows for a broader reach to more schools but requires rigorous monitoring to maintain the quality and consistency of the transmitted information.

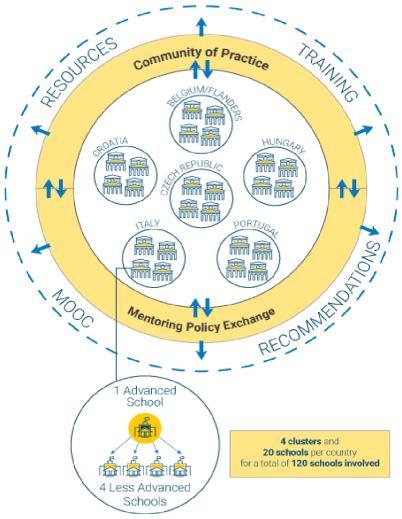

Figure 1 - Hub-and-Spoke Model implemented in the Mensi Project (Rossi et al., 2024; Mangione, 2024).

These models, despite their diversity, share the goal of promoting systemic improvement through the strengthening of educational networks. However, their effectiveness depends on specific enabling conditions, which vary according to the contexts and stakeholders involved.

2. The European experience and the Italian model

The MenSI (Mentoring for School Improvement) project, funded by the European Union's Horizon 2020 program, represents a comprehensive exploration of whole school mentoring models designed to foster innovation across European primary and secondary schools. This initiative, carried out between 2020 and 2023, sought to establish frameworks that enable the dissemination of effective teaching practices, support professional development, and create a sustainable foundation for educational progress. By engaging 24 Mentor schools and 96 Mentee schools in six European countries, the project highlighted both the potential and the challenges of implementing school-to-school mentoring models in diverse contexts (CUREE, 2005; Camberwell, 2016; Armstrong, Brown & Chapman, 2020).

Mentoring between schools is conceptualized as a collaborative process in which more experienced or resource-rich institutions support others in improving teaching methodologies and organizational practices. This structured relationship is built on mutual commitment and is facilitated through direct support, training, reciprocal observation, and feedback. The MenSI project identified three primary mentoring models (Panzavolta, Garner & Nencioni, 2022). The top-down model, often directed by central institutions such as ministries or national educational organizations, emphasizes a common scientific and technological framework while offering tools and strategies for both Mentors and Mentees. In contrast, the bottom-up model allows schools greater autonomy, with strategies derived from experiential knowledge rather than shared scientific validation. The mixed model, combining aspects of both approaches, seeks to balance the benefits of structured oversight with localized adaptability. One of the critical strengths of mentoring, as highlighted in the project, is its role in spreading innovative practices and solutions, enabling transformative professional development. It differs from networking, which fosters horizontal connections between institutions for shared learning and resource optimization. While networking emphasizes collaboration among peers or nodes, mentoring involves an asymmetrical relationship focused on specific developmental goals. This distinction is pivotal, especially when addressing significant transitions, such as integrating new teaching methodologies or managing institutional changes (Granovetter, 1998). The research underpinning MenSI employed a mixed-methods approach (Creswell, 2003), combining quantitative and qualitative analyses to evaluate the project's impact. Key tools included pre- and post-intervention surveys to measure digital maturity (e-maturity) - such as the SELFIE questionnaire (Kampylis, Punie & Devine, 2015; Costa, Castano-Munoz & Kampylis, 2021) - and interviews conducted in Mentor schools across participating countries. The findings confirmed the importance of robust leadership, clear role delineation, shared responsibility, and a supportive environment as foundational elements for successful mentoring. MenSI's findings resonate with broader discussions on educational innovation and its scalability. While micro-level innovations often proliferate within individual schools, scaling these practices to the meso (organizational) and macro (national) levels remains complex. The structured mentoring approach of MenSI provides a potential solution, enabling a gradual transition from mentoring to peer learning and, eventually, networking. This evolution fosters a culture of shared expertise, where Mentee schools can transition into mentoring roles, creating a sustainable, fractal-like structure for educational improvement. Therefore, the MenSI project highlights the transformative potential of school-to-school mentoring in promoting systemic change (Murray, Caulier-Grice & Mulgan, 2006). By bridging the gap between local adaptation and centralized oversight, it offers a model that balances flexibility with structure, enabling schools to address unique challenges while contributing to broader educational goals. However, its success depends on sustained investment in professional development, the cultivation of collaborative cultures, and ongoing research to refine and optimize mentoring methodologies and deal with national and local models that fit in the specific education system (Harris, 2008). Despite the logistical challenges posed by the COVID-19 pandemic, which necessitated a shift to online interactions, the project successfully demonstrated the adaptability of mentoring frameworks. The use of digital platforms for documentation and feedback, such as the "cluster diaries", proved instrumental in sustaining engagement and fostering professional growth among participants. However, the absence of in-person interactions during much of the project was perceived as a limitation, underscoring the importance of face-to-face exchanges in building trust and facilitating deeper collaboration.

The Italian school-to-school mentoring model, as piloted in the context of the MenSI project, is deeply rooted in Italy's longstanding tradition of networking and innovative practices, exemplified by national communities of innovative schools, such as Avanguardie Educative (Laici et al., 2015) and Piccole Scuole (Mangione & Cannella, 2018). It emphasizes the importance of structured, reciprocal relationships between schools to address challenges, share expertise, and implement effective strategies tailored to diverse educational contexts. In particular, Italy has experimented with forms of school mentoring inspired by the 'hub and spoke' model, where a central school (hub) acts as a guide and support for other schools (spokes), fostering the sharing of resources and innovative strategies. One of the key features of the Italian mentoring model is its reliance on a structured framework to guide the collaboration between Mentor and Mentee schools. The framework, inspired by the Deming Cycle (Plan-Do-Check-Act) of continuous

improvement (Deming, 1986), divides the academic year into distinct phases: planning, implementation, reflection, and adjustment. During the planning phase, schools worked together to identify shared goals and challenges, developing an action plan that reflects their unique needs and priorities. The implementation phase involves the enactment of these plans through classroom activities, workshops, and collaborative initiatives, all of which are supported by Mentor schools' expertise. Reflection and adjustment phases enable schools to analyze their progress, evaluate the effectiveness of their strategies, and refine their practices based on observed outcomes and feedback (Panzavolta & Cannella, 2024). The Italian model stands out for its focus on thematic clusters, which allow schools to concentrate their efforts on specific areas of innovation. These clusters are often aligned with national priorities in education, such as the integration of digital technologies, innovative methodologies - such as outdoor education (Giunti, Orlandini & Panzavolta, 2022) and the one based on Making Learning and Thinking Visible (MLTV) (Mughini & Panzavolta, 2020). For example, outdoor education initiatives encourage schools to engage students in learning experiences outside traditional classroom settings, fostering creativity, critical thinking, and environmental awareness. Similarly, digital content creation initiatives empower teachers and students to explore new tools and platforms for collaborative learning. These thematic focuses enable the mentoring process to remain both relevant and adaptable to the evolving needs of the Italian educational system. A defining aspect of the Italian mentoring approach is its emphasis on professional development. Mentor schools not only provide direct support to Mentee schools but also engage in their own continuous learning processes. This reciprocal relationship ensures that both Mentors and Mentees benefit from the collaboration. Training sessions, often facilitated by researchers, helped educators from both types of schools refine their practices and adapt innovative methodologies to their local contexts (Panzavolta & Cannella, 2024). For instance, professional development opportunities related to MLTV have proven particularly effective in promoting critical reflection and collaborative problem-solving among educators. The Italian model also highlights the role of leadership in successful mentoring. Effective leadership is essential for establishing clear goals, fostering a culture of collaboration, and ensuring accountability within the mentoring process. School leaders play a crucial role in facilitating communication between Mentor and Mentee schools, mobilizing resources, and creating an environment conducive to innovation. In the Italian context, school principals often act as catalysts for change, leveraging their strategic vision to drive the implementation of innovative practices and foster a shared sense of purpose among teachers and students. Despite its successes, the Italian school-to-school mentoring model faced challenges, particularly in terms of scalability and sustainability. The diversity of Italy's educational landscape, which includes schools from urban, rural, and remote areas, and a strong school autonomy legislation allowing the designing the educational offer necessitates highly tailored approaches that can address specific local needs. Additionally, resource constraints and regulatory barriers sometimes hinder the full realization of mentoring initiatives. For example, the COVID-19 pandemic posed significant obstacles to in-person collaboration, as in all the partners' countries, requiring schools to share their practices only in digital platforms. Other structural barriers were also in place, such as the absence of experience-based professional progression in the teachers' career, while in other EU countries this is foreseen (the senior teacher is a job position). The mentoring tools that were piloted in the Italian model proved to be very useful and very much appreciated (Panzavolta & Cannella, 2024). This is one of the reasons that pushed the Indire researchers to invest in a Mentoring Toolkit, including a Mentoring Self-evaluation system (called MentorQ) against which schools can measure their progress as for mentoring practices. The tool is presented in Paragraph 6. Ultimately, the Italian school-to-school mentoring model offers valuable insights into how structured collaboration can drive educational improvement. By leveraging the strengths of Mentor schools and fostering reciprocal relationships, this approach enables the dissemination of innovative practices and the development of professional communities. As the MenSI project illustrates, the success of this model depends on a combination of strategic planning, thematic focus, professional development, and strong leadership. These elements work together to create a dynamic framework that not only addresses immediate educational challenges but also lays the foundation for sustainable, system-wide improvement.

3. Research question and methodologies

3.1 The research question

The construction of the research question is a critical step in any empirical investigation, as it guides the entire study process and ensures methodological coherence.

In this case, the formulation of the question resulted from a systematic review of the literature that highlights the importance of certain "enabling factors" that contribute to the sustainability and effectiveness of these mentoring models. However, there is also a lack of empirical studies that systematically validate these factors and investigate their applicability in various contexts. The long-term sustainability of mentoring networks is another area where studies are limited. While many studies focus on the initial stages of building networks, few examine how these networks can be maintained over time and what mechanisms are necessary to ensure continuity in mentoring. Leithwood et al. (2020) note that many school networks disband once initial funding or support is exhausted, suggesting

that the lack of sustainability strategies represents a significant challenge for mentoring networking.

The hub-and-spoke model, observed in Mensi Project and in Italian school clusters, in which a hub school assumes a guiding role for a cluster of less advanced schools (spokes), was chosen as a reference framework to explore the conditions that ensure its sustainability. The definition of the research question followed two main directions. The first concerned the need to identify the structural, relational, and organizational factors that make school mentoring an effective and sustainable process. The second focused on exploring these factors within school clusters, contextualizing them within diverse and real educational systems.

This process led to the formulation of the study's central question: under what conditions is school mentoring sustainable, particularly within the hub-and-spoke model implemented by Italian schools?

This question reflects the intent to investigate not only the outcomes of mentoring practices but also the mechanisms and dynamics that enable their effective and replicable application in heterogeneous educational contexts.

3.2 Research Methodologies and Instruments

To address this question, an empirical methodological design was adopted, structured in two main phases: an exploratory study and a confirmatory study. This approach aligns with established principles of educational research, which emphasize the value of exploratory inquiries to generate preliminary knowledge on complex and understudied phenomena (Cresswell, 2007) and confirmatory studies to consolidate and generalize such knowledge on a larger scale (Cohen, Manion & Morrison, 2017).

3.2.1 Exploratory Research

The exploratory research phase was essential for gaining an initial understanding of the dynamics that characterize school mentoring. As highlighted by Stake (1995) and Ponce & Pagán-Maldonado (2015), this type of inquiry is particularly well-suited to capturing the complexity of educational phenomena in real-world contexts, providing an empirical basis for subsequent investigations.

In this study, the exploratory phase involved six schools, one from each country participating in the MenSI project. The selection of a small yet representative sample allowed for an exploration of diverse educational practices and the identification of common elements and specificities related to the hub-and-spoke model. The primary objective was to understand how relational and organizational dynamics contribute to the sustainability of mentoring.

A mixed-methods approach was employed to collect data, integrating both quantitative and qualitative tools. The initial questionnaire, consisting of 40 items, was administered to teachers and school leaders, exploring four main areas: whole-school experiences, teacher experiences, student experiences, and the role of tutoring. Additionally, semi-structured interviews were conducted with 63 participants (11 mentors and 52 mentees), providing detailed qualitative insights into perceptions and practices related to mentoring. Field observations, conducted both face-to-face and virtually, complemented the data collection, enabling direct analysis of interactions between mentors and mentees.

A significant contribution came from the Cluster Diaries, compiled by 19 advanced schools (mentors) and 82 less advanced schools (mentees). These narrative diaries documented challenges, reflections, and best practices, offering a rich perspective on the internal dynamics of the school clusters. The data collected were analyzed using thematic analysis, supported by the Nvivo software, which facilitated systematic coding and the identification of significant patterns.

Confirmatory Research

The confirmatory research represented the second phase of the methodological design, aimed at validating the results of the exploratory research within the Italian context (Jaeger & Halliday, 1998; Foster, 2024). Specifically, the questionnaire used in the confirmatory phase was developed based on the 10 enabling factors identified during the exploratory research. This approach ensured methodological consistency between the two phases and allowed for a deeper investigation into the validity and relevance of the identified factors across broader contexts.

This study, inspired by the descriptive and evaluative empirical model (Trinchero, 2002), sought to analyze the applicability and significance of the enabling factors in a larger and more specific sample. It focused on examining potential differences between mentor and mentee schools, across school levels, and among the various regional clusters.

The sample consisted of 18 schools, organized into four clusters, each led by a hub school. Data collection was conducted through a questionnaire, administered to 158 teachers and 18 school leaders, with 81 respondents (16 from mentor schools, and 65 from mentee schools). A questionnaire asked participants to rank the 10 enabling factors on a priority scale from 1 to 10. Additionally, participants could propose new factors or suggest modifications to the existing ones, enabling a critical and participatory analysis. The data collected were analyzed both quantitatively, to identify significant trends, and qualitatively, to deepen the understanding of the dynamics influencing the sustainability of mentoring. This approach validated the findings from the exploratory research, adapting them to the Italian context and providing practical insights for improving school mentoring networks.

In the following sections, the results of the two research phases and their discussions will be presented, with the

aim of supporting the development of a reflection tool for schools to evaluate their positioning concerning the identified enabling factors.

4. What the Exploratory Research Tell Us?

4.1 Context and Results

The identification of "enabling factors" for mentoring between school clusters was achieved through a comprehensive data analysis conducted across three levels of the educational ecosystem targeted by the intervention: the individual school level, the cluster level, and the national education system level. Emphasis was placed on gathering narrative evidence for this project, highlighting the articulated thoughts and reflections of participating school staff as a credible representation of the concept of "teachers talking to teachers". This approach underscores the essence of a collaborative, peer-focused professional learning community. To preserve the authenticity of the real-world impact of the project, we deliberately avoided representing these interactions in the form of metrics or quantifications, which might obscure the depth of the qualitative insights. Instead, Figure 2 provides an abbreviated summary of data derived from transcript analyses of narrative evidence collected from various sources. This summary underscores the relative priority assigned to each enabling factor across the school clusters involved in the project. Ten principal enabling factors were identified for each level of analysis. Below, we present the results obtained specifically at the cluster level. The analysis identified ten enabling factors that were crucial for the success of ICT mentoring within school clusters. Below, each factor is discussed in detail, with its significance contextualized through narrative evidence and frequency data.

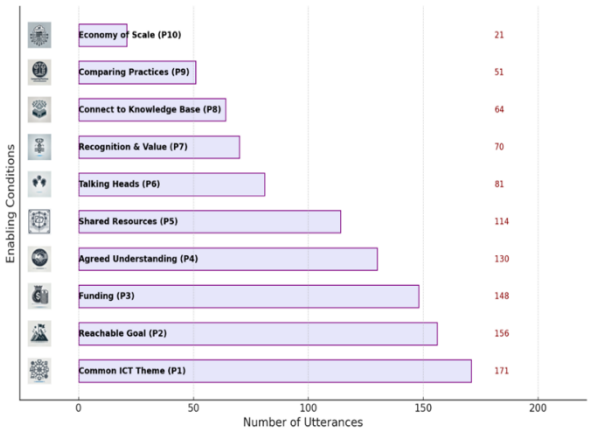

Figure 2 - Mentoring networking enabling conditions and priority.

Common ICT Theme. The most frequently cited enabling factor, with 171 utterances across the dataset, was the establishment of a common ICT theme. Teachers working collaboratively on a shared, well-defined issue reported a heightened sense of investment and purpose. This shared focus strengthened the critical mass of collaborative activities, transitioning from the mere exchange of practices to the co-development of innovative ICT solutions (Ravhuhali, Kutame & Mutshaeni, 2015). Mentor schools led the way by embedding ICT themes into their curricula and pedagogy, offering mentee schools clear models to emulate.

Reachable Goals. With 156 utterances highlighting its importance, the adoption of goal-oriented approaches was pivotal to the success of cluster activities. Goals were tailored to reflect the unique contexts and constraints of each school while considering individual teacher motivations. This alignment not only facilitated engagement but also fostered collaboration over competition. Teachers noted that clearly defined and achievable goals gave them confidence to experiment with ICT, creating a pathway for sustained progress (Zwart et al., 2008; Louws et al., 2017).

Funding. Funding emerged as a vital enabler, referenced in 148 utterances. Financial resources provided by mentor schools played a key role in supporting mentee schools, particularly in rural or economically disadvantaged areas. Teachers and leaders emphasized that access to updated ICT equipment and professional development opportunities, made possible through targeted funding, was instrumental in driving digital transformation within their schools.

Agreed Understanding. The importance of shared protocols and a clear understanding of collaboration principles was noted in 130 utterances. These protocols ensured consistency and equity within the clusters, creating a structured framework for mentoring. The "flip the system" approach (Evers & Kneybar, 2016) underpinned these efforts, allowing schools to address systemic inequalities and build sustainable collaboration models.

Shared Resources. Resource sharing was highlighted in 114 utterances as a core practice within the clusters. Mentor schools provided open access to ICT toolkits, materials, and solutions that mentee schools could adapt to their specific needs. Teachers noted that this approach was particularly impactful in overcoming resource limitations in remote and rural schools, fostering innovation through collective efforts (Kurelovic, 2016).

Talking Heads. Professional dialogue and mutual engagement were emphasized in 81 utterances as key components of successful mentoring. Mentor schools created environments that encouraged open communication, trust, and active participation from all stakeholders. This collaborative atmosphere fostered a sense of shared responsibility and empowerment, enabling teachers to learn from one another effectively (Bolam et al., 2005).

Recognition and Value. With 70 utterances reflecting its significance, recognition emerged as a motivating factor for teachers. Mentor schools introduced certificates of participation and completion to acknowledge

contributions, alongside informal recognition practices such as social events and feedback sessions. Teachers reported that these measures reinforced their commitment to cluster activities and strengthened their sense of belonging.

Connect to Knowledge Base. Clusters provided a critical mass of collective knowledge, referenced in 64 utterances, that helped teachers overcome barriers to professional growth, such as the Dunning-Kruger effect (Dunning, 2011). This shared knowledge base enabled teachers to reflect on their practices and access a wealth of expertise, fostering growth and innovation across the cluster.

Comparing Practices. The opportunity to compare teaching practices and curricula across diverse cultural and educational contexts was highlighted in 51 utterances. These comparisons enriched professional development by exposing teachers to new approaches and insights, often facilitated through EU-funded initiatives. Participants noted that this exchange of practices inspired them to adapt and refine their own teaching methods.

Economy of Scale. While referenced less frequently, with 21 utterances, the concept of economies of scale addressed the financial challenges faced by smaller schools. Clusters leveraged shared resources, such as equipment loans and collaborative training sessions, to optimize costs and ensure equitable access to ICT tools and strategies. Teachers in smaller schools noted that these practices enabled them to participate in digital initiatives that would otherwise have been out of reach.

4.2 Discussion and limits

The exploratory study provides valuable initial insights into the enabling factors for mentoring within school clusters, particularly in the context of the hub-and-spoke model implemented at international level. This phase was instrumental in identifying the elements that contribute to the sustainability of mentoring processes (Figure 3).

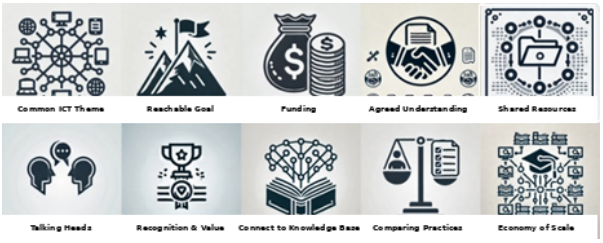

Figure 3 - Icons for mentoring enabling conditions.

However, it is essential to consider the methodological and contextual limitations of this initial exploration.

The exploratory study involved a small sample of six schools, one from each participating country, which, while diverse, is not sufficient to capture the full variability and nuances of educational systems. The contexts in which mentoring emerged as effective may have been shaped by several key factors, such as the characteristics of the national education systems, the schools' prior experience with networking and collaboration, their orientation toward innovation through networks, and the presence or absence of institutional support for such practices. These elements emphasize the need to interpret the findings as situated within specific environments rather than as universally applicable conclusions.

Moreover, the exploratory nature of the study prioritized hypothesis generation over hypothesis testing. While this approach effectively uncovered initial patterns and relationships, it does not provide the depth or breadth required for robust validation or generalization of the findings. The identified enabling factors, while promising, are intrinsically linked to the particular contexts and interactions observed during the study.

These limitations highlight the importance of conducting further confirmatory research to rigorously test and refine the identified factors in a variety of educational settings. This subsequent phase would enable a deeper understanding of how systemic, cultural, and organizational differences influence the effectiveness and sustainability of ICT mentoring practices. Only through such contextualized validation can the findings be adapted to inform broader and more robust applications in diverse educational systems.

5. Confirmatory research in the Italian context

5.1 Context and results

In particular, the study aims to answer three key questions:

1. Are some factors more important in the Italian context than in the international one?
2. Are there significant differences in the perception of "enablers" between different school levels or between schools with different roles, such as Mentor and Mentee schools?
3. Do the specificities of different school contexts influence the importance attributed to the different enabling factors?

The "Mentoring ICT Survey" questionnaire was developed to collect empirical data on the perceptions and experiences of schools participating in the project, with particular attention to the priority scale attributed to key factors for mentoring success. The instrument is divided into different sections, each of which contributes to a detailed and contextualized analysis.

1. *Basic information on participants and schools.* The first section of the questionnaire collects basic data on respondents (e.g. role, experience, position) and the schools they belong to. This information allows us to correlate participants' perceptions with specific institutional characteristics and to understand any differences between school roles,

such as managers, teachers or technical staff, as well as between types of schools.

2. *Adoption of the Deming cycle in schools.* A section of the questionnaire explores the application of the Deming cycle (Plan-Do-Check-Act) (Deming, 1986) in school processes. The cycle is analyzed as a potential tool for continuous improvement, with the aim of verifying its degree of adoption and the perception of effectiveness in Italian school contexts.
3. *Prioritization of mentoring enablers.* The central part of the questionnaire focuses on the analysis of mentoring enablers, at two levels: cluster and individual school. Participants are asked to rank ten key enablers using a priority scale from 1 (highest priority) to 10 (lowest priority). This section provides an overview of participants' perceptions of the elements deemed most crucial for mentoring success, both at network and institutional levels. Additionally, participants have the opportunity to propose an alternative enabler, evaluating its importance in relation to those already identified. They are also asked to indicate which enablers they would eliminate to make room for the new proposal, thus contributing to a process of reviewing and customizing the mentoring model.
4. *Willingness to participate in further research activities.* The last section of the questionnaire investigates the willingness of participants to continue their involvement in the project, through further research and in-depth study activities.

In this contribution, we specifically focus on the analysis of the results related to the enabling factors identified at the cluster level. Through the classification of priorities and the analysis of the perceptions emerged from the participants, the study aims to highlight the dynamics and specificities of online mentoring, while providing useful indications for the improvement and implementation of mentoring practices in different Italian school contexts.

The questionnaire was administered to a total sample of 176 participants, including 158 teachers and 18 school principals. Of the 81 actual respondents, 16 came from Mentor schools and 65 from Mentee schools. In terms of school level, 53.1% of respondents belonged to secondary schools, while 46.9% belonged to primary schools. In terms of geographical distribution, respondents were divided into the following regional clusters: Emilia-Romagna (13.6%), Sicily (33.3%), Campania (24.7%), and Puglia-Lazio-Sardinia (28.4%).

The collected data were analyzed through descriptive statistical techniques, with the aim of identifying the priorities perceived by the participants regarding the enabling factors for the success of school-to-school mentoring. The percentages reported represent the sum of the preferences attributed by the respondents as first, second and third choice for each enabling factor, thus providing a detailed overview of the perceptions that emerged. While the international survey highlighted how the most relevant factors for the success of mentoring are a common theme, achievable objectives and access to resources, in the Italian context school mentoring was configured around three main enabling factors (Figure 4):

1. comparison of practices (15.8%);
2. willingness to learn from others (15.4%);
3. active learning (12.9%).

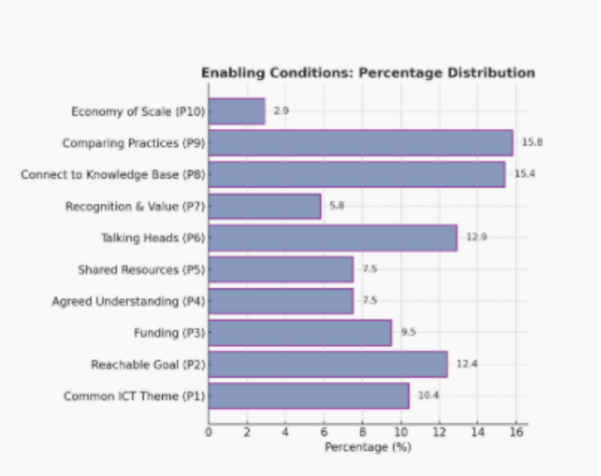

Figure 4 - Cluster level: Enabling Factors in the Italian Context.

These results reflect the cultural and pedagogical peculiarities of the Italian educational system. In Italy, the comparison of practices represents a key opportunity for schools to share experiences and teaching methodologies. By comparing with different contexts, schools can identify innovative solutions and adapt them to their specificities. The willingness to learn from others is a factor rooted in a collaborative culture. This factor enhances the contribution of each member of the school community, fostering mutual growth and greater cohesion among schools in the network. Finally, active learning, i.e. the direct participation of teachers in mentoring activities promotes an experiential approach, stimulating the adoption of innovative and interactive practices that can be integrated into everyday teaching. These enablers not only support the success of mentoring between schools but also contribute to creating a more equitable and flexible educational system, in which innovations can be shared and adapted to the needs of different school contexts.

The analysis of the data at the cluster level shows that, although there are some common enabling factors between the first and second cycles, such as comparison of practices and achievable goals, there are also significant differences. In the first cycle, in addition to comparison of practices (16.7%), there is a greater emphasis on active learning (15.8%) and willingness to learn from others (15.8%). In the second cycle, greater priority is given to access to the knowledge base (9.1%), sharing of resources (10.6%), and recognition and valorization of individual participants (8.3%).

The analysis of enabling factors for mentoring at cluster level reveals key differences between mentor and mentee schools. Both categories recognize the importance of comparing practices and the willingness to learn from others, but mentor schools place more emphasis on active learning (14.6%) and sharing resources (10.4%). Mentee schools, on the other hand, prioritize achievable goals (13.5%) and agreed protocols (8.3%). These differences highlight how mentoring is not a uniform process, but rather a path that needs to be adapted to the specificities of schools and their contexts. While Mentor schools tend to favor an approach based on active collaboration and the exchange of resources, Mentee schools need more guidance and support through clear goals and defined structures.

These findings offer valuable insights for designing more effective mentoring programs, capable of responding both to the specific needs of participating schools and to the challenges posed by the Italian educational context.

To better understand the enabling factors in mentoring networking between mentor and mentee schools, a qualitative analysis of the open-ended responses provided by the participants was conducted. The questions focused on the factors considered crucial at the cluster level (Q20). This type of analysis allowed us to go beyond numbers and percentages, offering a detailed look at the perceptions, experiences and motivations of the teachers involved. Through a thematic approach, the responses were read and coded, revealing recurring themes that reflect the key concepts shared by the participants. A central theme that emerged from the analysis concerns the sharing of resources and best practices. Many teachers highlighted how the comparison between mentor and mentee schools made learning more active and meaningful. This comparison allowed not only the experimentation of concrete teaching practices, but also continuous professional growth through mutual learning. A teacher from a mentor school described this experience in very positive terms, highlighting how the process facilitated the development and achievement of a common theme among the participating schools:

> *"The comparison of best practices between mentor and mentee schools was very productive and made learning active and meaningful. There was sharing between schools, and the common theme was developed and achieved by everyone".*

This type of collaboration helped create a real "community of practice", where knowledge is not only transferred, but shared and co-constructed. Another element considered crucial by the participants is the definition of a common theme and the pursuit of achievable objectives. Clarity in the definition of objectives was often cited as a factor that favored motivation and concreteness of learning. Some teachers highlighted that working on clear and shared objectives strengthened group dynamics, creating a sense of more effective collaboration among the schools involved. As a teacher from a mentor school observed:

> *"It is necessary to share a common theme and pursue an achievable objective to be concrete in learning".*

This aspect played a key role in ensuring that mentoring produced tangible results, going beyond the simple sharing of ideas. Willingness to learn from others was identified as a key prerequisite for successful mentoring in clusters. Several teachers highlighted how openness to discussion facilitated a real collaborative dialogue, essential to promote professional improvement. A teacher from a mentor school described this attitude in simple but incisive words:

> *"Availability and discussion with others were very important for the development of the common project".*

This openness not only allowed a fruitful exchange of ideas, but also fostered a climate of mutual trust, essential to establish authentic and meaningful mentoring relationships. Comparison of practices also played a key role in the process. Teachers highlighted how this comparison gave them the opportunity to reflect on their teaching methods and to introduce concrete changes in their daily practice. This reflective dimension was perceived as one of the main benefits of mentoring, capable of stimulating authentic learning aimed at continuous improvement. A particularly interesting aspect that emerged from the open-ended responses concerns the importance of emotional and relational collaboration. Many teachers noted how collaborative work within the clusters allowed them to grasp the emotional dynamics that characterize daily school life. This strengthened interpersonal relationships, creating a favorable environment for active learning and reflection on educational processes. A teacher from a mentor school highlighted this aspect by stating:

> *"Active learning was the priority factor in the cluster, as it was necessary to be open to learning and experimenting with the teaching practices proposed by the mentor school".*

Finally, several participants highlighted the importance of agreed protocols. These tools were described as essential to ensure a clear and defined structure for group work. The use of protocols allowed them to establish precise steps, phases and objectives, avoiding dispersion of energy and resources. As a teacher from a mentee school observed:

> *"The use of agreed protocols makes requests and objectives clear, avoiding dispersion on too many fronts".*

This structured approach allowed them to concentrate efforts on well-defined interventions, improving the

overall effectiveness of mentoring. In summary, the qualitative analysis of open-ended responses provided an in-depth picture of the enabling factors that contributed to the success of mentoring at cluster level. Resource sharing, clarity of objectives, openness to discussion, reflection on practices and the adoption of agreed protocols were identified as key elements to create a collaborative and productive environment. These findings offer important insights for the future design of mentoring paths, highlighting the need for an integrated approach that enhances both relational and organizational aspects.

5.2 Discussion of the Results and future prospects

The results of the national survey highlighted significant differences between the Italian and international contexts regarding the factors that facilitate school-to-school mentoring. In Italy, the enabling factors focus more on the comparison of practices, the willingness to learn from others and active learning. This dynamic reflects an educational tradition that privileges collaboration and sharing as the main levers for professional improvement and innovation. Previous studies, such as those by Stoll and Louis (2007), underline the importance of such approaches in promoting mutual interaction and active involvement in mentoring activities. On the contrary, the international context seems to be oriented towards more structural elements, such as the definition of clear and achievable objectives, access to specific resources and the construction of a well-defined common theme around which to develop mentoring activities. These differences highlight not only the cultural and educational peculiarities of each school system, but also the different needs that emerge depending on the local context. The discrepancies highlight the importance of adapting mentoring policies and educational strategies to the specific needs of the schools involved. In Italy, for example, the emphasis on comparing practices and active learning fits into a framework that strongly values sharing experiences as a tool for growth. This suggests that mentoring initiatives should be designed to strengthen and capitalize on these characteristics. For this to be possible, schools must be able to identify the mentoring strategies that best suit their needs, resources and objectives. As highlighted by Hargreaves (2021), there is no one-size-fits-all approach to educational success: each context requires customized and flexible solutions. The data collected offers valuable insights for designing more effective educational policies and mentoring practices. However, it is important to recognize some limitations of the study. Although representative, the sample of schools involved could be expanded to include a greater variety of contexts and situations. Furthermore, it would be useful to explore the long-term impact of school-to-school mentoring, analyzing how these practices influence the improvement of teaching methodologies and innovation. Future research should further explore these dynamics, ensuring that school-based mentoring can fully express its potential for transformation and growth. The qualitative responses collected offer an interesting perspective on the dynamics and effectiveness of mentoring networking. At cluster level, mentoring is particularly beneficial when it is implemented in an inter-institutional dimension. Sharing resources, collaborating between schools and comparing practices are key factors that contribute to creating a fertile environment for learning and innovation. Participants frequently highlighted how the existence of a common theme and shared objectives fosters dialogue and cohesion between different schools. Active learning and the willingness to experiment with new methodologies emerge as essential components of successful mentoring. This openness to change allows schools to break down institutional barriers and create opportunities for mutual exchange. However, inter-institutional relationships need to be carefully managed and agreed protocols adopted to ensure that the process maintains a clear and coherent direction. Mentoring at cluster level is particularly useful for strengthening links between schools and promoting a culture of shared innovation. However, the diversity of contexts and resources among participating institutions requires careful coordination. Although peer review and resource sharing are key elements, they risk remaining episodic or limited to specific projects, if not supported by a broader strategic vision. In this framework, INDIRE's research perspectives are articulated in two main directions. The first concerns the development and validation of a mentoring toolkit designed for innovation networks. This tool will aim to support the professional growth of school actors through the sharing of mentoring models, operational guidelines and training materials. It will also focus on self-reflection, helping schools and clusters to identify their strengths and areas for improvement. The second direction involves the international validation of mentoring enabling factors. This initiative will involve schools of the Mensi Community in different countries, with the aim of culturally adapting the identified factors and assessing their effectiveness through comparative studies and longitudinal evaluations. The process will be characterized by a collaborative approach and will focus on the long-term impact of mentoring practices in educational contexts. These actions are crucial steps to ensure the sustainability of innovation networks and promote continuous improvement of educational practices. Through specific tools and rigorous validation of enabling factors, it will be possible to offer schools increasingly effective resources to address innovation challenges and improve student outcomes.

6. The MentorQ self-evaluation tool

Toolkits are tools used across many fields, from education to medicine to corporate training. Their primary purpose is to enable the transfer of practical knowledge through a complex system of interactions

between researchers and knowledge users, within a dynamic and iterative process that includes the synthesis, dissemination, exchange, and ethically sound application of the knowledge produced (Yamada et al., 2015). This aims to improve existing practices provide more effective services and products, and strengthen the considered system (in this case, the educational one). One of the most comprehensive toolkits was developed by European Schoolnet, a European consortium of Ministries of Education and associated organizations, called the "Future Classroom Toolkit". This highly structured toolkit includes video testimonials, suggestions for digital tools to use, and practical guidelines. The toolkit supports an innovation approach that involves the entire school, fostering the creation of an ambitious yet realistically achievable educational vision, engaging all stakeholders, focusing on advanced pedagogical and change management practices, designing engaging learning activities through the use of digital technologies, and assessing the use of these learning activities. It is a toolkit that addresses the various dimensions of innovation in schools in a systemic way.

The idea stemming from the MenSI project is to support mentoring practices by providing a Mentoring Toolkit for the Italian innovative communities of Avanguardie Educative and Piccole Scuole, made up respectively of thousands of schools, in order to scaffold mentoring practices that Indire researchers could never be able to monitor, support and boost. Therefore, in this case, a mixed model mentoring would be as such: letting Mentor and Mentee schools proceed on their own yet providing them with a set of tools for checking the quality of the mentoring process, self-evaluating the state-of-the art of their implementations and acting in order to cover important dimensions that are scored as little developed. In order to do so, the Indire Toolkit for school-to-school mentoring will be composed of:

1. supporting documents on what school mentoring is and what are the challenges of it;
2. tools to implement school-to-school mentoring practices (such as instructional rounds, lesson studies and onsite observations);
3. case studies of mentoring practices, with videos and testimonials.
4. MentorQ, a tool of self-evaluation for schools to reflect on the maturity of their mentoring practices.

The latter tool is inspired by the SELFIE (Self-reflection on Effective Learning by Fostering the use of Innovative Educational Technologies), a tool developed by the European Commission (Costa, Castano-Munoz & Kampylis, 2021) to help schools assess how effectively they are integrating digital technologies into teaching, learning, and assessment. It gathers anonymous feedback from school leaders, teachers, and students through a series of tailored questions. The results provide a comprehensive snapshot of the school's current digital practices and areas for improvement, enabling schools to develop targeted strategies for enhancing their use of digital tools. The rationale behind it is that integrating technology effectively requires a clear understanding of current practices, strengths, and challenges. By fostering self-reflection among school leaders, teachers, and students, the tool encourages schools to align their digital strategies with their broader educational goals. As feedback, schools receive a detailed, customized report that provides a snapshot of their digital practices. The insights are both quantitative and qualitative, offering a clear picture of where the school stands in its digital journey. The feedback acts as a foundation for strategic planning, enabling schools to set achievable goals and monitor progress over time. It also provides schools with comparative insights, helping them understand their performance in a broader context, such as within their region or country. Additionally, the results guide schools in identifying areas where targeted professional development is needed, empowering educators and leaders to enhance their practices and support meaningful digital transformation. In essence, SELFIE equips schools with the tools to take a data-driven approach to innovation (Figure 5), fostering a culture of continuous improvement in the integration of technology.

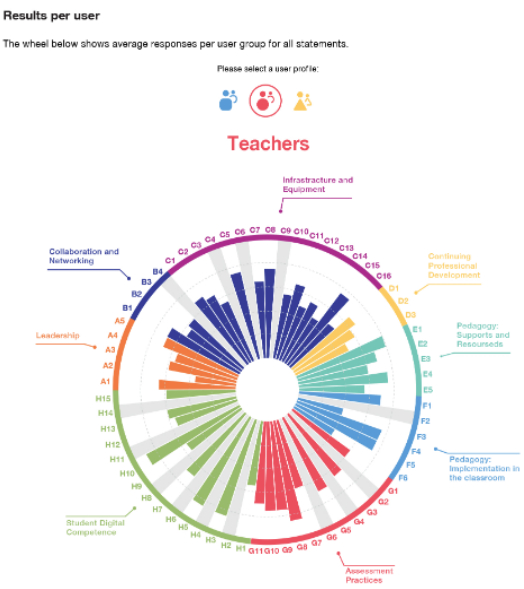

Figure 5 - One of the infographics provided by the SELFIE questionnaire concerning the perceptions of teachers.

The rationale of MentorQ is pretty similar. Its objective is to support school organizations to self-evaluate their mentoring process and practices and improve them according to the dimensions that have been validated, considering the most important enabling conditions that derive from evidence. Each condition will be scored by a number of teachers participating in the process, both from the Mentor and the Mentee schools. The means resulting from all the questionnaires will provide a Mentoring Index, and a detailed measure for each dimension so that weak dimensions can be visualized, addressed and improved. In order to validate the

MentorQ questionnaire, a factorial analysis is being employed (Schmitt, 2018). Factor analysis is a statistical method used to validate the items in a questionnaire by examining the underlying patterns in the data. It helps determine whether the items group together in ways that reflect specific latent variables, often referred to as "factor". These factors represent the conceptual dimensions that the questionnaire aims to measure. The primary purpose of factorial analysis is to ensure that the questionnaire is both valid and reliable. Validity means that the questionnaire accurately measures the intended constructs, while reliability ensures that the measurements are consistent across different contexts or populations. By identifying how items relate to each other and grouping them into factors, factorial analysis ensures that the questionnaire is well-structured and that the items collectively provide meaningful insights. To perform a factorial analysis on MentorQ, data has been first collected from a large enough sample to ensure robust results, as explained above. In this case all the Italian teachers participating in the MenSI project were asked to participate in the first phase of the analysis. This exploratory factor analysis confirmed the ten dimensions presented above (common theme; reachable goals; funding; agreed understanding; shared resources; talking heads; recognition & value; connect to knowledge practices; comparing practices; economy of scale). The factors are now being refined using rotational methods to simplify and clarify the relationships between items and factors.

At present, the process of factor analysis is in progress and statistical measures such as factor loadings, and goodness-of-fit indices will be considered to assess the strength and validity of the factor structure. Factor loadings, which indicate the correlation between each item and a factor, will be critical in deciding which items should be retained or revised. Items with weak or ambiguous associations may be removed to improve the overall structure of the questionnaire. The proportion of variance explained by each factor provides additional insights into the importance and relevance of each construct. For each factor, a total of 5 items will be tested against a 4-point Likert scale. A 4-point Likert scale was preferred to a 5-point Likert scale in order to oblige respondents to take a clearer position. The 5 items are slightly different and encompass nuances in the dimension, with different phrasing. Redundant or poorly performing items will be deleted, refining the constructs being measured, and improving clarity for respondents.

The methodological approach for validating the questionnaire involves several sequential steps. Firstly, the reliability of the questionnaire will be measured by using Cronbach's alpha. This statistical indicator is widely applied in psychometric tests to assess the reliability and reproducibility of results under consistent conditions over time. Secondly, correlations will be examined among items, both within individual scales and across the entire questionnaire. This analysis will help researchers to determine if a global score, calculated by summing all items, is justified and meaningful. Next, factorial analysis will be performed to explore the underlying structure of the questionnaire. A Confirmatory Factor Analysis (CFA) will be performed to test the pre-established structure based on theoretical foundations and existing literature, given that the 10 dimensions (factors) have been identified and confirmed within the Italian sample. This approach will evaluate whether the hypothesized 10-factor model fits the data adequately or whether item removal is necessary to maintain the integrity of the model. Additionally, standardization of scores may be considered, including the establishment of cutoff thresholds, provided the sample size is sufficiently large to support this analysis. Typically, a robust sample size is required for such standardization. Finally, supplementary analyses may be conducted to examine sociodemographic differences, such as gender, education level and school type. For this purpose, additional demographic questions could be included at the beginning of the MentorQ questionnaire Alpha-version.

In this way, the factorial analysis on MentorQ will ensure that the questionnaire is both focused and effective. The method also validates the ability of the questionnaire to perform consistently across different groups in different schools, regions and school level, making it a powerful tool for researchers and practitioners aiming to assess quality mentoring processes.

7. Conclusion

This study has explored the potential of mentoring as a lever for innovation and systemic improvement in school contexts, with particular attention to school-to-school mentoring models and the enabling factors that influence their sustainability and effectiveness. Through a combination of exploratory and confirmatory investigations, a clear vision has emerged of the necessary conditions for building solid and resilient mentoring networks capable of supporting the adoption of innovative practices and the continuous professionalization of teachers.

The results highlight ten key enabling factors that underpin the success of mentoring experiences, including the adoption of shared objectives, the comparison of practices, access to dedicated resources, and the enhancement of the professional skills of all involved stakeholders. In particular, the analysis conducted within the Italian context revealed that elements such as the comparison of practices, openness to learning from others, and active learning are fundamental pillars for the success of mentoring within school clusters.

An additional significant element is the role of the "hub-and-spoke" model, which has proven effective in organizing and disseminating innovative practices while ensuring the necessary flexibility to adapt to the specificities of local contexts. However, it has also

become clear that the sustainability of these networks largely depends on the existence of specific enabling conditions and on each school's ability to monitor and critically reflect on its own practices.

Based on these findings, a self-assessment tool for schools, called MentorQ, has been proposed. This tool will enable schools to systematically reflect on their mentoring experiences, assessing the maturity level of the practices adopted concerning the ten identified enabling factors.

MentorQ will not only provide a clear picture of the current state of mentoring practices but will also help schools identify areas for improvement and adopt targeted strategies to enhance their processes. The tool is designed to be flexible and adaptable, allowing schools to use it in different educational contexts and with customized approaches.

In particular, MentorQ is planned to be piloted within INDIRE's innovation networks, such as Avanguardie Educative and Piccole Scuole, which allow for observations in both standardized educational environments and non-standard scenarios characterized by high geographical, cultural, and infrastructural variability. This approach will offer a unique perspective on the adaptability and effectiveness of the tool across diverse school settings.

The evidence gathered thus far underscores the need for further investment in professional development, school support, and the creation of a collaborative culture that fosters mentoring and the sharing of best practices. Future research can focus on applying MentorQ in diverse contexts, exploring its effectiveness in promoting continuous and systemic improvement. Furthermore, it will be crucial to further develop the mentoring toolkit, including operational materials and case studies to support schools in their innovation journeys.

This research represents a significant step toward the construction of sustainable and inclusive mentoring networks, offering concrete tools and valuable insights for the continuous improvement of the educational system. It supports the transformation and guidance of schools toward their envisioned futures.

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