

On-Life Communities of Practice: Between the Social and Epistemic Needs of Schools

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Abstract: This paper explores the need to redefine onlife communities of practice, capable of fostering relational and communicative networks among participants, promoting collaboration, negotiation, and the shared construction of knowledge. It aims to investigate how social neuroscience can provide a theoretical and interpretative framework for understanding and promoting professional teacher communities within online environments, characterized by the increasing integration of in-person and digital experiences. Drawing on motivational systems theory, the study examines the social and epistemic motivations that drive teachers and school administrators to collaborate, support each other, and share knowledge, also in line with Ministerial Decree No. 66/2023.

Keywords: On-life community of practice, Interpersonal motivational systems, Teacher professional learning and development

1. Introduction

Over the past decade, and particularly in the wake of the COVID-19 emergency, several regulatory measures have been introduced to strengthen digital education, providing significant funding for schools. Specifically, PNRR investments under Mission 4 – Education and Research have focused on three distinct areas for developing digital skills: training school staff for the digital transition, integrating curricula with courses dedicated to STEM, digital, and innovative skills, and transforming school environments through the School Plan 4.0, aimed at creating innovative learning spaces and laboratories for the digital professions of the future (Ministerial Decree no. 66/2023).

Among the eligible training activities under Line 1, whose primary purpose is to create an ecosystem of digital skills capable of supporting the digital transformation of schools and teaching processes, in line with the European DigCompEdu frameworks (Bocconi et al. 2018), a central role is given to Communities of Practice for Learning (MIM, 2023), understood as organizational and training devices oriented towards the sharing of digital content, strategies, methodologies and innovative practices, peer learning and connection with other schools for the exchange of best practices (Sicurello, 2024).

Although communities of practice are not a novelty in the panorama of continuing professional development (Lave and Wenger, 1991), they take on a renewed



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centrality in light of the innovations introduced by Ministerial Decree No. 66/2023, which promotes their development in a systematic and institutional way within schools for the first time.

Communities of practice are a theoretical construct originally developed by Lave and Wenger (1991) in the context of situated learning, according to which learning is a social process that takes shape through progressive participation in the practices of a community. Wenger (2007) subsequently expanded on this perspective by defining communities of practice as spaces in which individuals, sharing interests, problems, and professional repertoires, construct knowledge through interaction, negotiation of meanings, and participation in common practices. In the educational context, communities of practice represent not only training devices, but also relational infrastructures for scholastic innovation and the collective construction of professional skills (Cortigiani, 2010).

Recent studies highlight the role of communities of practice, including virtual or hybrid ones, in promoting collaborative professional learning processes based on peer exchange and the sharing of resources and teaching strategies (Ghamrawi, 2022; Grácio, Dorotea, & Rodrigues, 2024; Segev, Hason, & Hayak, 2026).

This perspective is particularly significant considering social neuroscience, which shows how cognitive, emotional and decision-making processes are closely connected to the relational dimension of human experience (Immordino-Yang, 2011). Social neuroscience shows, in fact, that the social dimension is not ancillary to learning, but rather constitutes a structural component: emotions, relationships, belonging, and peer exchange profoundly impact processes of attention, motivation, memory, and meaning-making (Immordino-Yang & Damasio, 2011).

Communities of practice, by enhancing peer exchange, sharing experiences, and collaborative work, therefore respond to the human need for connection and transform learning into a situated, participatory, and socially constructed process (Wenger, 2007).

Interpersonal neurobiology (Siegel, 2021) demonstrates how the "we" is part of the "I" and how the mind is an emergent process that originates from relational patterns. Indeed, without relationships with others, not only will full brain development be impossible, but a state of adequate psychophysical well-being will be impossible (as demonstrated by the effects of prolonged sensory and relational isolation on individual mental functioning).

As Cozzolino (2008) argues: "Humans act as neural circuits that we can use to help each other [...] they support us in procuring new ideas [...] they connect their brains with ours, the result is a vital integration. We can use our interpersonal resonance, our intuition, and our empathic abilities to help each other [...]. For human beings (and neurons), relationships are a natural habitat (p. 317)." Social neuroscience highlights interpersonal interaction as a foundational dimension of human life and encourages the development and use of communication tools that can more effectively connect the "I" with the "we."

In Cognitive Pragmatics, Bara (2005) considers communication a joint activity between actors who consciously and intentionally cooperate to jointly construct the meaning of their interaction, which includes both the specific content of the communication and the relationship within which the individual interactions occur. For communication to be effective, actors have to be able to construct an interaction that, in addition to intentionality (each participant has to have the intention to do so) and

awareness (it is not possible to engage in intentional communication without knowing it), is primarily based on sharing and cooperation. Compared to other species, humans require interaction systems that guarantee protective proximity in order to achieve full brain maturation; from an evolutionary perspective, language can be considered the ultimate expression of relational and communicative needs (Tommasello, 2009).

There is a growing need to redefine social learning environments capable of developing relational and communicative networks among participants, promoting the negotiation of solutions and the reworking of knowledge. These environments provide participants with a new dimension of self, fostering the emergence of collective identities. In the “sharing era” there is a need to develop online learning environments that can direct and balance the progressive development of individual and collective identity towards a socio-cognitive identity (Benigno & Chifari, 2007; Benigno & Chifari, 2015).

The idea for this paper arises from these reflections and aims to explore how social neuroscience can offer theoretical and interpretive support for understanding and promoting professional teaching communities in online environments, driven by the growing integration of in-person and digital experiences (Floridi, 2017).

2. Interpersonal motivational systems

There are biologically determined and evolutionarily selected tendencies that orient human beings toward specific directions of action. Lichtenberg defined these tendencies as *motivational systems*, referring to systems of goal-directed behavioral regulation (Gilbert, 1989; Lichtenberg, 1989). This concept was later further developed by Liotti (2005), who described motivational systems as “innate and universal dispositions, whose antecedents are already present in the animal species evolutionarily closest to *Homo sapiens*. These are tendencies, however powerful and often unavoidable, and not fixed and rigid action patterns” (Liotti, 2005, p. XX). Liotti therefore conceptualizes motivational systems as “propensities to act toward specific goals, selected by evolution” in order to support the survival of both the individual and the species).

Motivational systems emerge from the interaction between innate predispositions and learning processes. According to Liotti (2005), they can be organized into three hierarchically ordered levels, corresponding to different neural structures and degrees of plasticity. The first level is the most biologically constrained, whereas the third is the most open to cultural and environmental influence.

The first level is non-social and is associated with evolutionarily older neural structures. It regulates behaviors related to bodily survival and self-preservation, such as feeding, thermoregulation, sleep, and defensive reactions to threats, including fight-or-flight responses (MacLean, 1990). These systems are shared with less evolutionarily complex species, although they remain active in humans as well.

The second level is social and is primarily linked to the limbic system. It includes the interpersonal motivational systems (IMS) that regulate communication and interaction among members of a social group (Liotti, 2005). At this level, several major systems can be identified: *attachment*, activated in situations of fear, loneliness, pain, or need (Bowlby, 1969); *caregiving*, oriented toward responding to another’s need for protection or support (George & Solomon, 1999); *the agonistic system*, which regulates dominance and subordination dynamics within social hierarchies (Gilbert, 1989); *the*

sexual system, oriented toward pair bonding and reproduction; and the *cooperative peer system*, activated when individuals collaborate to achieve shared goals (Liotti, 2005).

Two additional systems derive from the cooperative peer system: social play and group affiliation, namely the innate tendency to belong to and participate in social groups (Liotti & Gilbert, 2011).

The third level is cultural and is associated with the neocortex. These are the most evolutionarily advanced motivational systems and appear to be uniquely human. This level includes intersubjectivity, namely the tendency to share subjective experience with others and the construction of systems of meaning (Bruner, 1990). Human beings are driven not only to survive and relate socially, but also to interpret experience, attribute meaning to events, and construct shared symbolic worlds. Meaning-making profoundly influences emotional regulation, identity construction, and interpersonal life. Equally fundamental is the need for sharing through language, narration, and cultural participation. In this perspective, the epistemic dimension enhances the cooperative system and supports the specifically human capacities for intersubjectivity, symbolic communication, and collective knowledge construction (Bruner, 1990; Tomasello, 2014).

3. School between social and epistemic reasons

Considering the theory of motivational systems, the social and epistemic motivations that drive individual teachers to interact, communicate, and share, and ultimately, to construct shared meanings, can easily be traced within the school context.

3.1 Social motivations

- Need for support in questioning and interpreting classroom events, and in sharing common intervention strategies not sporadically but continuously and timely (*IMS Attachment-Care*).

Teachers are experiencing increasing difficulty in addressing and managing critical events in their classrooms, expressing a sense of professional "risk" and loneliness in identifying intervention strategies. Teaching and learning are by their very nature fraught with unexpected events (expected events that don't happen; unexpected events that could have been foreseen; unthinkable events), and very often schools appear ill-equipped to manage such critical events collegially.

- Need for communication and reflection among teachers on disciplinary issue (*IMS – Cooperative*)

Typically, teachers carry out their teaching duties individually, apart from some limited *niches* of reflection and collaborative planning that emerge spontaneously from shared professional cultures and affinities. Consequently, the curriculum implemented within the school, beyond the formal unity declared in the Educational Offering Plan (Piano dell'Offerta Formativa - POF), often reflects the aggregation of individual teachers' curricula rather than a truly shared educational project.

- Need for sharing and interaction (*IMS – Cooperative*)

School buildings typically lack physical spaces specifically designed for teachers' cooperative work, since the so-called *teachers' lounge* is not conceived as a professional workspace, but rather as a transitional or resting area. Consequently, opportunities for informal exchange, collaborative reflection, and professional dialogue are also limited. Teachers often lack spaces for what Schön (1983) defined as *reflective conversation*, that

is, the possibility of making explicit the tacit dimensions of professional practice outside the formal agendas of institutional meetings and of learning reciprocally through shared reflection. The only opportunities for meeting and sharing are collegial body meetings, which have specific time limits. As a result, collaborative interaction frequently remains episodic, procedural, and insufficient to sustain authentic professional learning communities.

3.2 Epistemic motivations

- Need to reflect on courses of action and build a shared repertoire of languages and strategies (*IMS – Intersubjective*).

Teachers consider informal exchanges very useful, where knowledge and professional learning are spontaneously generated—when classroom events are recounted, opinions are exchanged, agreements are made, solutions to problems are explored, and strategies are outlined. However, they are also aware of the significant limitations of these informal exchanges, because the interactions are unstructured and unsystematic (only a few teachers participate) and because the exchanged-negotiated knowledge leaves no visible (written) trace that can be elaborated by others. Moreover, the knowledge produced through these dialogical processes frequently leaves no visible or documented trace that can be revisited, reflected upon, or further elaborated by the wider professional community. Consequently, valuable experiential knowledge risks remaining implicit, fragmented, and dispersed rather than becoming part of a shared professional repertoire (Wenger, 2007). From the perspective of the intersubjective motivational system, these practices respond to the specifically human need to share subjective experience, co-construct meaning, and develop common interpretative frameworks through language and interaction (Tomasello, 2009).

Spatial barriers (separated physical workspaces) and temporal barriers (asynchronous actions inside and outside the classroom) prevent teachers from coordinating interventions, collaboratively reflecting on courses of action, and co-constructing shared interpretations and meanings of events.

Teachers find it difficult to access information, communications, and the activities of colleagues and groups; the work of others remains virtually invisible and unavailable, hindering the coordination and integration of actions.

- Making professional knowledge distributed in schools visible and accessible (*SMI – Intersubjective*)

Tacit knowledge is a form of knowledge that people use in practice even without knowing it or codifying it. People know more than they can express. This means that a significant portion of knowledge remains in the hands of those who produce it, embedded in action and doing, and anchored to its original context, difficult to access except in small circles, and shareable through proximity.

4. The need for a professional online community

The social and epistemic motivations that guide the actions and behaviors of teachers and school administrators, along with the limitations highlighted in traditional organizational models, seem to point to communities of practice as a privileged form of collaboration and professional development within and between schools, also in line with the provisions of Ministerial Decree no. 66/2023.

From an epistemic perspective, communities of practice can support the enhancement of schools' cognitive and social capital. Today's complexity forces the school system to reorient itself toward the valorization of contexts and the acquisition of widespread capacities for collaborative reflection on situated actions (or practices). Communities of practice are tools for knowledge production that are open (because the outcomes of cognitive processes are not predeterminable), democratic (because knowledge is formed in chains that do not depend on a single decision-maker but on the equal interaction of many), and inexpensive (because they can develop without major investments and structures) (Cortigiani, 2010).

Regarding interpersonal and social motivations, communities of practice support interpersonal relationships (Siegel, 2021), mutual trust (Porges, 2022), and cooperation (Liotti, 2005). Communities of practice enable the exploration and management of complexity and enable endogenous, evolutionary, and connective learning, which leverages the distributed intelligence of schools (Cortigiani, 2010).

This perspective takes on even greater relevance today in light of the contemporary situation described by Floridi (2007), in which constant internet (online) connection, even in life, redefines the boundary between analog reality and the digital reality mediated by technology. Indeed, everyday experience unfolds in a hybrid space, in which the physical and digital dimensions are integrated and mutually influenced. From this perspective, the boundary between real presence and technological mediation becomes increasingly blurred, as even digital interactions take on a truly experiential, relational, and social value.

In this scenario, network technologies are not merely communication tools, but relational and cognitive environments capable of broadening participation and intensifying the verbal and reflective interactions that characterize teaching, supported by social and epistemic motivations. Precisely this continuous integration between the physical and digital dimensions fosters the emergence of *onlife communities of practice*, in which teachers share experiences, build common knowledge, and develop collaborative professional learning processes.

On-life communities of practice, overcoming space-time barriers, enable the creation of environments that support:

- *participation*, considered as an element in building an organized collective structure, in which each person relies on the actions of others to act;
- *access to information and activities*, so that each teacher is permanently connected to their work groups for the most diverse needs and can access, both reading and writing, documents (explicit and codified knowledge).
- *mutual visibility of their own and others' work* and better management of attention to the diverse and innumerable courses of action in the context;
- *coordination of actions between individuals*, between individuals and groups, and between groups, to integrate the many and diverse activities, to coordinate teaching activities in the classroom, to arrange in-person meetings, to prepare documentation, for organized educational events such as guided tours, external workshops, exhibitions, and performances;
- *the construction and negotiation of meaning*, as the deferred and written nature of online communication offers a tremendous opportunity to pause and discuss with colleagues and collectively develop a sense of purpose for one's work;
- *proximal learning*, as they enhance peer learning opportunities.

Finally, an on-life community of practice, capable of documenting professional experiences and reflectively questioning educational practices, facilitates the process of peripheral participation of newly hired or assigned teachers within the school community. Drawing on the concept of *legitimate peripheral participation* developed by Lave and Wenger (1991), new community members initially enter through gradual forms of involvement, based on observation, mentoring, and participation in shared practices recognized as significant by the community itself.

From this perspective, onlife environments expand the possibilities of accessing the school's professional heritage, as they allow for the visibility, documentation, and preservation of practices, routines, materials, reflections, and teaching strategies that constitute the community's collective knowledge.

5. Towards the Future

The paper adopts a theoretical approach grounded in social neuroscience to interpret teachers' needs and actions within the school community.

Considering the reflections that emerged, on-life communities of practice take on significant added value because they foster the construction of relational systems capable of fostering mutual support, distributed participation, and shared reflection on professional practices, responding to the motivational and social needs that guide teachers' actions.

An on-life community of practice expands the internal educational potential of schools. A work context, in fact, does not automatically constitute a learning environment, but becomes one through intentional and systematic action aimed at enhancing and making accessible the educational resources present and distributed within it. Indeed, participation and mutual commitment can emerge spontaneously, but generally need to be nurtured through intentional organizational strategies and awareness-raising processes that foster authentic and ongoing collaboration. From this perspective, it becomes necessary to rethink the organizational structures of educational institutions, in line with the provisions of Ministerial Decree no. 66/2023, which recognizes schools as communities of practice oriented towards continuous personal and professional development (Fig. 1).



Building on the conceptual framework proposed in this paper, an emerging perspective concerns the potential contribution of Artificial Intelligence to the further evolution of on-life communities of practice. Although the potential of AI for supporting teacher professional learning is increasingly acknowledged, empirical research on AI-mediated communities of practice remains limited (Medina Vargas et al., 2025), suggesting that this is still an emerging field of investigation.

AI could contribute to collecting, organizing, and synthesizing materials, discussions, and professional experiences, transforming tacit and fragmented knowledge into a shared community memory that is searchable, accessible, and continuously enriched. Conversational assistants, intelligent repositories, automatic summaries, and recommendation systems may facilitate the retrieval of practices, support newly appointed teachers, and foster the circulation of expertise across school.

The evolution of communities of practice may move from knowledge construction through participation, to knowledge sharing across on-life environments, and ultimately towards Artificial Intelligence supports the continuous regeneration of the community's shared professional knowledge.

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