Mapping innovation in educational contexts: drivers and barriers

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Abstract

The present demand for school transformation considers innovation a tool that operates in a triangle of strengths: leadership, school cultures, and school accountability. Considering the growth and diversification of literature produced on this subject, we propose to discuss the factors that influence innovation. This article exposes a literature review focused on the systematization of factors that foster or inhibit innovation, presenting a qualitative classification sustained on two main criteria: organizational capital and professional capital. The built typology harmonizes criteria that concern functional, strategic, relational, behavioral, and environmental aspects of innovation and aims to fulfill an epistemic, phenomenological, and propositional purpose. The typology congregates a scheme of constructs, that in an integrative way, systematize and organize 102 factors, described in the literature, that influence the school's organization.

Keywords: Innovation, typology, transformational capital, organizational capital, professional capital

Introduction

In half a century of studying innovation as an educational phenomenon, significant knowledge was generated that allowed it to be understood as multidimensional and polysemic (Lambriex-Schmitz et al., 2020; Sloka, 2020). The literature on educational innovation allows us to understand it as a cultural, economic, political, and socially determined process (Arar et al., 2019) as well as a tool for school transformation, translated into improving the quality of the learning and teaching processes (Cuenca et al., 2006; Serdyukov, 2017).

In the educational field, innovation can involve changes at various levels, including the organizational, cultural, digital, curricular, and pedagogical (Alves & Cabral, 2019; Blömeke et al., 2021; Figueiredo, 2020; Pathak & Mishra, 2019; Sotiriou et al., 2016; Wisetsat & Nuangchalerm, 2019; Woolner et al., 2018). The change lies in the educational institutions, in each school, being an interdependence of the school cultures and of the innovative processes that are generated and spread (Alves, 2021; Amorim et al., 2019; Córdoba-Pachón et al., 2021; Hall & Rowland, 2016; Mogren et al., 2019; Navarro-Corona, 2016; Song & Choi, 2017). In biological systems, evolutionary changes are driven by genetic variations that are generated by mutations and the forces of natural selection indexed to the environment. Similarly, at schools, innovation corresponds to a mutational force that wants to change the DNA of the school itself. In education, natural selection corresponds to internal and external forces, respectively, the cultures established in schools and the societal forces of change. In nature most mutations are deleterious and end up being eliminated, others are silent producing no effects and only an insignificant percentage are successful. This is mirrored in schools where most changes have been also nothing more than attempts. Therefore, the resilience of natural systems has parallelism in schools. Resilience in educational systems is widely documented and recognized as resistance to systemic change (Bocconi et al., 2013; Cuenca et al., 2006; Eyal, 2009; Fullan, 2007; Hargreaves, 2012; Nóvoa, 2019). Educational resistance is decoded into conservatism and extreme resilience (Eyal, 2009), as well as a lack of sustainability of change (Arar et al., 2019; Córdoba-Pachón et al., 2021; Fullan, 2007; Hargreaves & Shirley, 2009; Lambriex-Schmitz et al., 2020). Hence, it is crucial not only to understand the transformational qualities of schools but also to identify factors that promote innovation and the ones that hinder innovation to better support change-oriented organizations. This article discusses a taxonomy for defining factors influencing innovation in the educational field. Considering that principles that underlie classification schemes improve the potential to leverage from prior research (Lambert, 2016), we propose a criterial classification system that provides further understanding of the innovative phenomena. We intend to systematize and synthesize the forces that prefigure

promoters in the innovative process, as well as the ones assumed as opposing forces to school transformation.

Methodology

"Classification is a necessary step for understanding a research area" (Lambert, 2015, p. 50), to classify complex objects into a smaller number of categories using taxonomies, categorization schemes, or typologies (Ahlquist & Breunig, 2012). "A typology is a hierarchical system of categories used to organize objects according to their similarities and dissimilarities" (Fonseca, 2013, p. 2). Therefore, we propose a taxonomy for systematizing and synthesizing factors that influence innovation in educational systems according to literature, including empirical studies. In this study, we follow a six-step methodology design proposed by Lambert (2015). The first step states the objective of classification, which is to systematize factors promoting and factors holding back innovation in complex institutions, namely, schools. The second step consists of defining the function and characteristics of the classification, assuming the feature of a typology. A typology is a qualitative classification that considers categories (types) conceptually derived, being reasoned by deduction. In the third step, considering the classification philosophy, we follow mainly an essentialism viewpoint to define the criteria to form categories, which are conceptually derived, and to identify objects that fit the categories. The fourth step consists in identifying the classification principles that flow from the theoretical basis, which is a model conceived for studying innovation in educational systems and that highlights the main criteria for clustering (fig. 1): leadership capital interrelated with structural capital and incorporated into a broader construct, which is organizational capital; school knowledge related to school assessment, which leads to school's decisional capital; and teachers' professional cultures, arise from social capital and human individual capital. Cluster membership is only meaningful as an explanatory construct when we have pre-existing empirical evidence of clustering the relevant variables (Ahlquist & Breunig, 2012). So, this classification has an additional purpose, which is to identify variables (factors) that

may be allocated to each field of the theoretical model for studying innovation in schools. The fifth and sixth steps consist, respectively, in choosing a procedure to establish categories through observation (a procedure to discover variables) and deciding the rules to operationalize the procedure. To accomplish that, we followed the method adopted by Tyunnikov (2017) which consists in:

- Identification and ontologization of the rationale for classification sustained in literature. Hence, employing databases SCOPUS and WOS it was identified and selected relevant literature using the combination of terms: [innovation, school change], [innovation, leadership], [innovative behavior, school cultures], and [teacher's innovative behavior; leadership]. The documents gathered included also seminal authors as well as secondary bibliographic resources arising from the revised articles. Of 138 documents considered due to the relevance of the title, keywords, and abstracts, were selected 77 after integral text reading. Therefore, the analysis included 33 articles exposing empirical studies, 3 literature reviews, and 37 texts including books, articles on theoretical essays, and reports.
- Definition of selection criteria and establishing a framework for classification criteria (Table 1).
- Clustering factors that promote or hinder innovation in schools.

Figure 1. *Model for studying innovation*

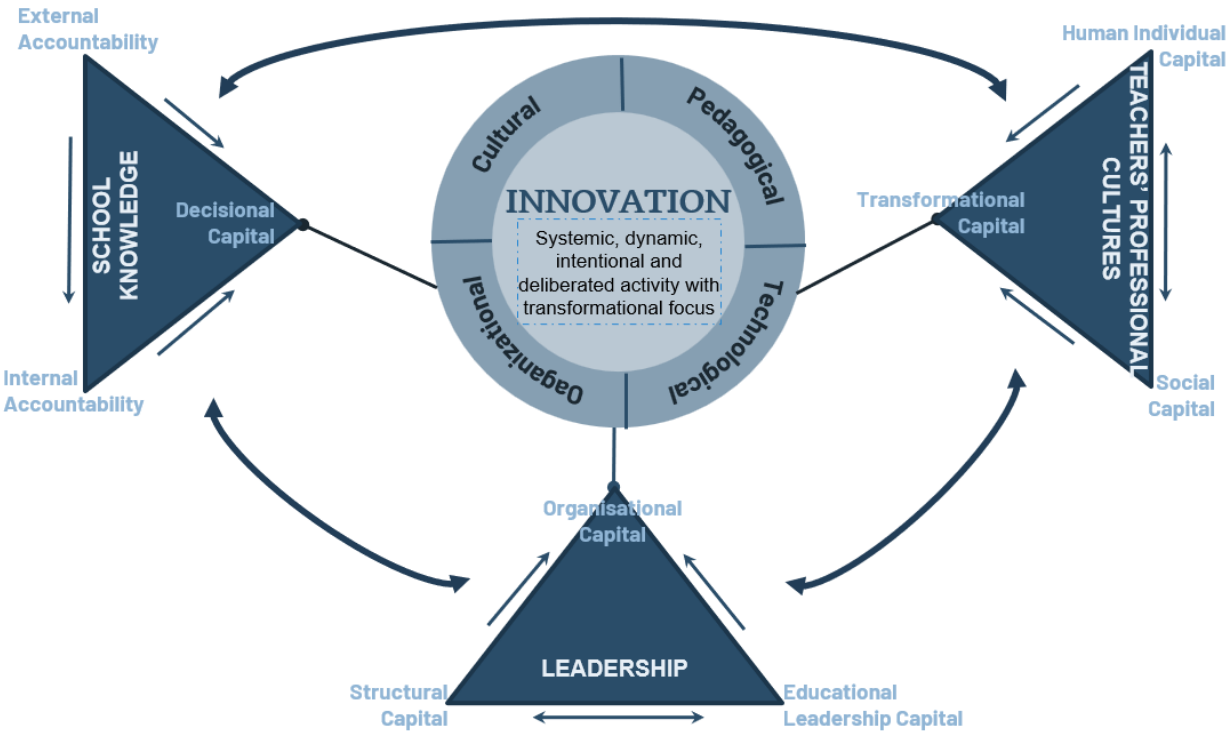


Table 1. *Categories defined for building the classification*

Structural domains		Dimensions	Categories
Transformational capital A systemic, sustainable, and driven-mission process that happens in schools, leading to its transformation. It is how professional capital and organizational capital is used to transform teaching and learning.	**1. *Organizational capital*** A purview of leadership to devise new forms of organizational capital to produce high-leverage strategies of teaching and learning, enabling its transformation; it is considered as leadership for capacity building for transformation.[1]	**1.1. *Educational leadership capital*** Social and symbolic capital for educational leadership used to articulate a clear mission or vision for the school.[2]	Leadership style, Leader behavior, Cognitive support
		1.2. *Structural capital* Internal processes and information that belongs to the organization.[3]	Focus, Strategy, Supervision focus
	2. *Professional capital* Professional capital is a function of the interactive, multiplicative combination of the three kinds of capital: decisional, social, and individual.[4]	**2.1. *Decisional capital*** The wisdom and expertise to make sound judgments about learners cultivated over many years.[4]	Vision and focus, Procedural principles, Meaningfulness, Responsiveness
		2.2. *Social capital* Teachers and other professionals of a school, working together in a collaborative culture that allows them to learn from each other.[4]	Professional practices, Climate for transformation

	2.3. ***Individual human capital*** Personal attributes - knowledge, experience, and skills - of teachers that can improve the teaching-learning process.[4]	Individual behavior, Innovative behavior, Individual morale, Working posture

Note: [1](Dimmock, 2011; Yakavets et al., 2017)**;** [2](Bartee, 2007); [3](Sujudi et al., 2020); [4](Hargreaves & Fullan, 2012)

Critical analysis of literature and synthesis

Innovation for School transformation

Education is in a transitional stage, in a process of reconstruction and reset of its identity as a response to challenges imposed by globalization. In this context, innovation emerges as a key element for school transformation, given that it is recognized that in schools cultures of non-innovation, professional isolation prevail and innovations have been assuming an episodic and fleeting character, receiving little support from leaders and colleagues (Hargreaves & Shirley, 2009). Alves and Cabral (2019) mention that discontinuity, individualism, and voluntarism shape the logic of educational actions in schools, which are mega bureaucratic systems. Therefore, the educational change translated as the ability to spread pedagogical and educational advances (Fullan, 2007) is related to innovation, a necessary and positive instrument of change (Serdyukov, 2017).

Considering that school systems are refractors of the global forces of change, the main work is to understand the process of social refraction (Goodson, 2014) and to find a balance between internal issues, external relations, and individual determinants of change (Goodson, 2001). Because innovations adopted have been superficial and have had almost no impact on teaching practices (Pacheco, 2019), the transformation of schools will have to consist, not of top-bottom policies, but in changing the school cultures (Fullan, 2007), transforming school grammar (Alves & Cabral, 2019, 2021; Cabral & Alves, 2016; Fullan, 2020; Machado, 2018), taking into consideration and transforming the personal beliefs and missions of teachers (Goodson, 2014),

using the professional capital of schools under the concept "use the group to change the group" (Fullan et al., 2015, p.6), transforming leaderships considering their influence on the school's organizational climate, teachers learning and in empowering innovative behavior (Pan & Chen, 2021; Sattayaraksa & Boon-Itt, 2012; Shirley et al., 2020; Tayag & Ayuyao, 2020; Vermeulen et al., 2020). The resignification of the role of teachers and other educational actors is necessary (Goodson, 2014) because at the heart of school transformation settles personal and professional involvement aspects as well as cultural, organizational, and pedagogical features.

Promoters and hindrance factors in educational innovation

The school transformation is ecological, which means that innovation in the classroom is supported by systemic changes and becomes imperative in a future-oriented education (Straub & Vilsmaier, 2020). At the organizational level, innovations are an interdependence between leaders, self-knowledge generated in school, and school cultures themselves. So, it is important to identify the factors extrinsic to the school that can promote or hinder innovation, as well as the intrinsic factors of educational institutions, plus the individual factors allocated to each element of the educational community that influences it. This logic of analysis stems from internal and external issues and from personal perspectives indexed to the agents of change that need to be addressed so that the problem of sustainability and generalization is attempted.

Teachers and professional cultures

Teachers are key elements to change and scaffold students to meet the goals of education and are also requirements for the preparation of 21st-century citizens (Wisetsat & Nuangchalerm, 2019). Considering the importance that the transformation of school has been assuming, boosting innovation and creativity in education requires the existence of a supportive environment that profiles organizational change, fosters responsibility, and impulses teachers to work collaboratively and autonomously towards organizational success (Pathak & Mishra, 2019). An environment of

trust and teachers' identification with the school mission strengthens the sense of belonging and innovative behavior of the teacher. On the other hand, teachers who work in closed environments feel restrictions and demotivation which produce an inability to lead to organizational improvements (Pathak & Mishra, 2019). Hargreaves (2010) points out that teachers focus on the daily challenges and immediate and concrete rewards of their work, exhibiting a professional attitude marked by 'presentism' (focused on the short-term), 'conservatism' (concentrate on small-scale changes rather than global school changes), and 'individualism'. The prevailing professional culture drifts between isolation and superficial collaboration and between balkanization and forced collegiality (Alves & Cabral, 2019; Fullan, 2007; Messina, 2001). In response to this *modus operandi* that marks the profession, it is required a transformational grammar that alters the organizational structures and scaffold agency in teachers (Alves & Cabral, 2021). The emergence of this new school grammar is indexed to innovation which is dependent on moderating forces that include professional autonomy and enhances a more autonomous, collaborative, interactive, deliberative, committed, and responsible professional teaching practice (Alves & Cabral, 2021). Additionally, empirical studies have identified statistically significant effects between innovation, perception of professional self-efficacy, and motivation for teaching (Cao et al., 2020; Serdyukov, 2017). According to Roness (2011), motivation has an intrinsic dimension, reporting satisfaction with teaching experiences, and an extrinsic dimension, due to wage benefits and other rewards. The same author appends an altruistic dimension that stems from the teacher's perception of teaching as a social good and his hope to play a role in the development of students.

Perception of self-efficacy represents one of the most important factors that contribute to innovative behavior, being even a measure of potential to express innovative behavior and being associated with other factors that enforce it, like positive self-assessment, favorable self-concept, flexibility, and sharing skills (Blömeke et al., 2021; Cerna, 2014; Gao et al., 2021; Wisetsat & Nuangchalerm, 2019). For Nemeržitski et al. (2013) greater involvement and participation of teachers in professional development and decision-making generates more favorable and

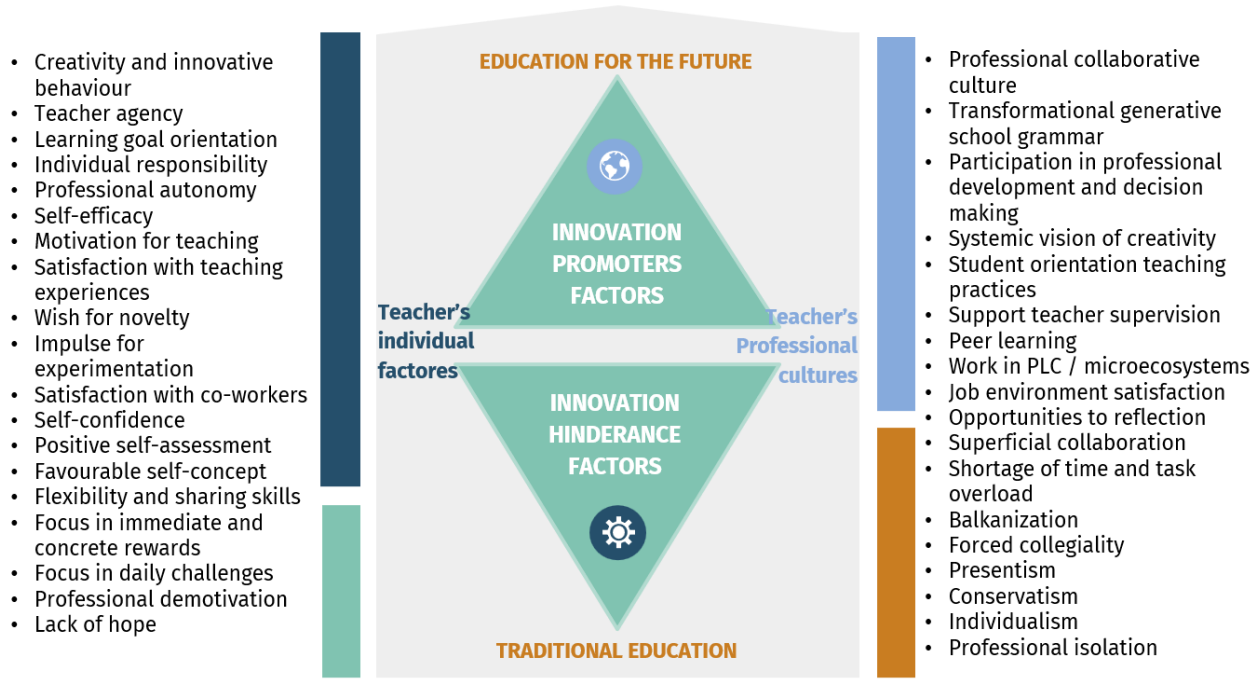
supportive environments for creativity and innovative behavior. Systemic visions of creativity result from understanding it not as an individual property, but as something that gradually emerges from the connections and interactions between creators and other elements of the community, involving ideas, thoughts, and experiences (Córdoba-Pachón et al., 2021; Cuenca et al., 2006; Tyunnikov, 2017). Shortage of time, task overload, lack of autonomy, lack of opportunities for reflection, non-believing and lack of hope, scarce communication systems for supporting teachers' work, and lack of opportunities for face-to-face interactions impede innovation in schools (Fullan, 2007; Hargreaves & Shirley, 2009; Lee et al., 2020; Messina, 2001; Song & Choi, 2017).

Teachers' innovative behavior is a key factor in the process of transformation of teaching practices and is defined by Nemeržitski et al. (2013) as teachers' ability to provide students with new, unfamiliar models and tools for classroom activities, thus, fostering students' creativity and produce new original outcomes for the learning process. Those authors define two composite factors to evaluate innovative behavior: first, professional self-development in interaction with cognitive and motivational factors, including management of teachers' own learning, wish for novelty, and impulse for experimentation; second, innovation skills and self-efficacy interrelated with the use of innovative and students' creativity supporting teaching practices, as well as the use of student-oriented teaching practices. Innovative behavior is also fostered by peers' and leaders' recognition, as the lack of it can negatively impact the willingness to adhere to innovative practices (Cao et al., 2020). The risk of falling into conflict with co-workers and reduced satisfaction with co-worker relations are factors that obstruct innovative change (Janssen, 2003). Innovative behavior is influenced by employee characteristics (e.g. mood, self-confidence, wide interest, learning goal orientation, reflection, and openness to new experiences), job features (e.g. job complexity, job demands, and supportive supervision), and, especially, by team characteristics (Runhaar et al., 2016). Innovative behavior is also determined by low or high job involvement attitude due to self-concept or sense of identity (Janssen, 2003).

Collaborative cultures are strongly associated with school success and potential peer learning, providing support and encouragement to teachers to overcome the difficulties of change (Hargreaves & Shirley, 2009), including the ones due to acquired routines through experience and daily practice (Cuenca et al., 2006). Professional collaboration between teachers in planning and realization of the teaching-learning process as well as cooperation at the organizational level, especially, participation in decision-making, favor innovation (Nemeržitski et al., 2013). On the other hand, innovations are not favored by the high levels of discretion that characterize educational actors (Cuenca et al., 2006). Social innovations provide new forms of collaboration between people in co-working spaces (Domanski et al., 2020) that function as micro-ecosystems of innovation or professional learning communities (PLC). Teachers in a strong PLC believed that their colleagues tend to be open to innovation, to be respectful towards one another, and provide ample support and good advice for their instructional activities; still, schools with weak teacher communities tend to be conservative toward change, and their teachers are markedly individualistic and have low expectations regarding student learning (Song & Choi, 2017). Innovative school environments are associated with more frequent teacher collaboration and exchange and higher job satisfaction among teachers (Blömeke et al., 2021).

Innovativeness appears as a multifaceted and very complex construct that is a balance between individual aspects and climate and cultural characteristics of schools, to which are added the influence of leadership (fig. 2).

Figure 2 *Synopses of forces for innovation centered on teachers*



Leadership, organizational culture, and educational responsibility

Innovation is understood as a central factor for society, enabling improvements in education and, subsequently, promoting transformational social change (Córdoba-Pachón et al., 2021; Domanski et al., 2020; Howaldt et al., 2016). However, even in organic organizations designed to facilitate innovativeness, new ideas for changing structure, culture, or strategy may challenge the consensually agreed paradigms, raising resistance to change and disagreement (Janssen, 2003) which justifies the discussion about factors related to leadership. For principals and head departments or middle leaderships, it is important to understand the psychological main characteristics of schools' community which are, according to Wolf (2008): how community members interpret an institution's culture; the level of discord within that culture; how innovations are received; reasons provided for change and how those changes are facilitated; the status of communications between central and peripheral parts of the culture; and ideas about the past, present, and future changes throughout the culture.

School leaders need to articulate the innovation's alignment with the school's broader goals (Tan & Hung, 2020). Leadership for innovation demands special attention with ongoing

community learning, receptiveness to novelty, flexibility, and continuous adaptation. So, it is important to use "a specific construct of school leaders' learning support, rather than a generic construct of leadership support, to understand how learning-supportive school leaders may affect teachers' professional learning and work effectiveness" (Lee, Nie & Bai, 2020, p. 2). The leader's support is fulfilled in four main domains:

- Providing infrastructure and resources: supplying space and structured time, allocating budgets for professional collaboration and knowledge sharing within and outside the school (Lee et al., 2020; Song & Choi, 2017); yielding technology to support teachers' work, the pedagogical process, routines and school structures (Mogren et al., 2019); reducing bureaucratic charge in teacher's work (Fullan, 2007); providing ICT supporting innovative pedagogies considered first-order barriers and purely operational obstacles (Serdyukov, 2017); managing the renovation of the schools' grammar meant as regular structures and rules that organize the work of instruction (Tyack & Tobin, 1994) by allowing a generative transformational grammar (Alves & Cabral, 2021).
- Providing professional development: fostering professional learning communities and micro-ecosystems for innovation which are new forms of collaboration between people in co-working spaces (Domanski et al., 2020; Shirley et al., 2020); boost formal ongoing relevant formation opportunities and satisfy cognitive needs (Lee et al., 2020) that assure teacher learning support (Song & Choi, 2017); encouraging pedagogical diversity through multidisciplinary or interdisciplinary teams (Shirley et al., 2020; Straub & Vilsmaier, 2020); act intentionally on innovation's second-order barriers, which are applicational and pedagogical (Serdyukov, 2017); encourages uplifting cultural attitudes toward pedagogy (Serdyukov, 2017); fight actively against teacher insolation practices, balkanization and artificial collegiality (Amorim et al., 2019; Hargreaves & Fullan, 2012).
- Providing knowledge of school: giving access to relevant data about school and regular information about school assessment, as well as improving reflection on it and stimulating

sustained participation in decision making (Nemeržitski et al., 2013); providing data about monitoring actions of pedagogical, collective, and structured ongoing experiences; supporting professional knowledge creation for action following bottom-up logics (Mogren et al., 2019); to privilege internal accountability for knowledge which means to adopt responsible accountability (Fullan et al., 2015; Serdyukov, 2017).

- Providing psychological robustness among teachers: satisfy cognitive needs, including autonomy (Lee et al., 2020); harvest engagement (Shirley et al., 2020); inspire an inclusive vision (Hargreaves & Shirley, 2009) and a common purpose to increase cognitive alignment among the innovation ecosystem members (Gomes et al., 2021); foster tolerance, flexibility, openness and diversity (Nemeržitski et al., 2013); care for job satisfaction among teachers (Blömeke et al., 2021).

Schools adopt innovations according to their needs and contexts (Tan & Hung, 2020), and subsequently, is crucial to embrace a culture of internal and systemic assessment. “Policymakers will need to make a major shift from superficial structural solutions to investing in leveraging internal accountability and building the professional capital of all teachers and leaders throughout the system” (Fullan et al., 2015, p. 14-15). This is also true for leaders once it allows them to better consider the needs and design interventions to act in each context and, according to Tan and Hung (2020), to transcend the binary between adaptation and fidelity to allow adoption and diffusion of innovation. Deep professional knowledge and collaboration act as an indispensable platform for, “not just overseeing the present”, but essentially “to be accountable for the future” (Fullan et al., 2015, p. 14). Leaders must recognize school transformation as a collective phenomenon that yields on professional capital, a construct that considers three elements: professional autonomy; social capital reporting teachers learn from each other; and decisional capital considering developing judgment and expertise over time (Fullan et al., 2015; Hargreaves & Fullan, 2012). Leadership practiced through professional capital allows leaders and teachers to get a deep understanding of the teaching profession and pedagogical practices, as well as scaffolding a school culture sustained

in reflection and criticism. Leaders must be ecological due to schools' growth, acting as community builders, encouraging a sense of growing together (Tan & Hung, 2020), and administrating school improvement, namely, to collectively enhance students' possibilities for learning (Mogren et al., 2019). It requires proactive, transformational, and empowering leadership that, according to Shirley et al. (2020), includes: first, set performance objectives that will close the growth gap innovation assuring a means to an end, which is to improve long-run and top-line learning growth; second, surface the current innovation narrative and develop the desired narrative; third, pull the organizational levers to change the work environment and foster those narratives that characterize a desired innovative future; fourth, change the ongoing process to accelerate innovation, assuring commitment.

Leadership style plays a prominent role in promoting innovation environments, highlighting the influences of instructional, transformational, transactional, and empowering leadership (Anthony & Hermans, 2020; Atik & Celik, 2020; Canute & Thompson, 2020; Cheong et al., 2016; Daniëls et al., 2019; Gil et al., 2018; Hargreaves & Fullan, 2012; Pellegrini et al., 2020; Vermeulen et al., 2020). Considering the influence of leadership on the capacity that organizations present to operate innovation, the study conducted by Gil et al. (2018) showed that leadership has a positive effect on the learning culture and the structure of the organization, and these two factors influence the capacity for school innovation. Transactional leadership, being constructive, can promote the team's creativity and will bring efficient organizational information processing, as well as knowledge sharing to support decisions (Gao et al., 2021; Pellegrini et al., 2020). The empirical study conducted by Anthony and Hermans (2020) allowed the identification of several items as being conspicuous of transformative leaders: idealized attributes and behavior of the leader, as well as inspiring motivation, intellectual stimulation, and individual consideration of the leaders over the led. Transformational leaders encourage unconventional thinking, pay attention to high-level goals, can improve collective effectiveness and individual efficacy, and, in general, promote organizational creativity (Gao et al. 2021) which are main features regarding innovation. Taking in

perspective the effect of empowering leadership, Atik and Celik (2020) found interdependencies between the leadership behaviours of school principals and teacher's satisfaction at work due to mediating effects of trust and psychological empowerment. Empowering leadership is a process that creates a supportive environment meant to improve teacher's sense of meaning, competence, self-determination, inspiring teacher's intrinsic motivation and fostering innovative behaviour by motivating their psychological empowerment (Zhu et al., 2019).

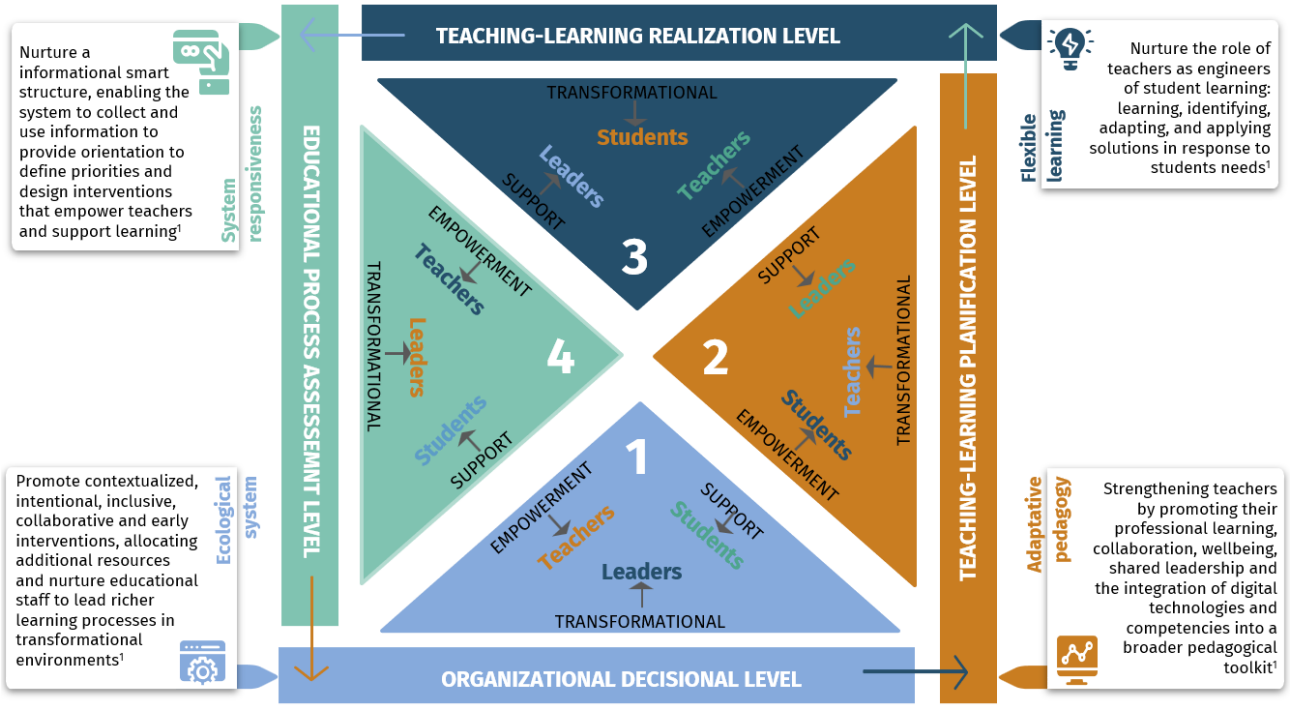
Leaders are understood by Andrews and Conway (2020) as being the key to success and school improvement, along with the comprehension of collective responsibility in terms of the progression of school results. Communication is basilar in an institution and the idea of language having multiple and contested meanings must be considered because it is a mediating tool that shapes every aspect of activity (Tan & Hung, 2020). Communication is needed for improving the school, which, according to Mogren et al. (2019), means developing a common holistic vision at the school's organizational level. Tools for effective communication include platforms for teachers' dialogical processes, leader-teacher connections, and student-teacher interactions. Communication is necessary for the whole community to embrace the school mission and achieve better pedagogical goals.

Leaders must be aware of the difficulties of the process of diffusion innovation and manage strategically human resources considering that there are different individual characteristics according to Rogers (2003): innovators, early adopters, early majority, late majority, and laggards. For laggards and average performers, to grow faster is necessary to construct growth-enabling narratives to identify and then address the obstacles impeding innovation. Hargreaves and Shirley (2009) defend seven principles for sustainable leadership: depth of purpose in developing student learning; breadth so this purpose and its achievement are shared; endurance over time so that improvement continues across reforms; justice in attending to all students' learning; resourcefulness in using financial resources and human energy; conservation in connecting future

visions to traditions in narratives of commitment and hope; and diversity of curriculum, pedagogy, and team contributions in organizations and networks where ideas are cross-pollinated instead of being cloned.

Leadership appears as a complex and multifaceted activity blended with holism, coherence, transparency, competence, determination, resilience, knowledge, and skills related not only to organizational management and pedagogical process but also to human resources management, including interventions in relevant psychological domains due to motivational aspects and due to the perspectivism indexed to controversial school cultures. Concerning innovation focused on pedagogical and organizational experiences, leaders' actions, as well as teachers' and students' actions, contemplate three dimensions: empowerment, transformation, and support (fig. 3). The first one, empowerment refers to, strategically, assuming control and making positive decisions supported by knowledge, based on a vision and predefined goals. Transformation is moving to action focusing on the defined goals and on a strategy to transform teaching and learning assured by the school's professional capital. At last, support ongoing innovative processes focused on improving and refining practices, assume both individual and collective responsibility, a shared responsibility across the system. In different levels of school structure, empowerment, transformation, and support are shared by leaders, teachers, and students even though the role accomplished by each element changes.

Figure 3 *Integrate perspective of innovation strategy in schools considering the role of the educational actors*



Note [1]OECD (2021), Education Policy Outlook 2021: Shaping Responsive and Resilient Education in a Changing World, OECD Publishing, Paris, https://doi.org/10.1787/75e40a16-en.

A classification of promoters and hindrance factors in educational innovation

Currently, the social demand for innovation and school transformation imposes the adoption of a systemic culture of innovation in educational systems. To support this metamorphosis (Morin, 2010; Nóvoa, 2019), is vital for principals, teachers, policymakers, and scholars to access a common understanding of the multiple factors that demarcate innovation. The classification built considers metaclasses, higher-order operators in the typology, defined as structural domains of the educational process of schools' transformation as well as the related dimensions (Table 1). The typology built (Table 2; Figs. 4 and 5) harmonizes criteria that concern functional/strategic, relational, behavioral, and environmental aspects of innovation and aims to fulfill an epistemic, phenomenological, and propositional purpose. The two domains defined, organizational capital (fig.4) and professional capital (fig.5), reunite factors that, by themselves, combined or depending on de degree of their manifestation, impact positively or negatively school transformation. Schools

are complex systems and the equation for understanding it means to build strong leaderships that can establish ethical and organizational control in building knowledge capital, so that the result will be, according to Sujudi et al. (2020) a reflection of the leadership needed in this current era of disruption. Considering the broader factors that influence innovation and consequently the school transformation, changing becomes a huge and complex process that requires the real mobilization of the whole institutional school system. The transformative radicality, as Edgar Morin (2021) refers to it, needs to be implemented through professional capital, using school knowledge and decisional capital and "enabling teachers to learn from each other within and across schools" (Hargreaves & Fullan, 2012, p.89).

Table 2 *A typology for innovation centered on the fostering factors and obstacles*

Structural domains			***Dimensions***	***Categories***
Transformational capital	**Intellectual capital**	**Educational leadership capital**	***Leadership style***[1] Leaders' characteristics used for school managing	• Visionary, progress-focused • Instructional, supportive, and communicative • Transformational, challenging, and communicative • Transactional, performance-focused • Empowered, enhancing self-efficacy and performance • Authentic, focused on team culture and positive work relationships • Participated leadership, fostering responsibility, involvement, and autonomy • Coaching, motivation-focused • Servant, humble and protective • Autocratic, authoritarian, and result-focused • Democratic, supportive, and innovative • Bureaucratic, hierarchical, and duty-focused • Hands-off, autocratic, and delegatory
			Leader Behaviour[2] Leaders' actions for school managing	• Leader • Strategist • Organizer • Coordinator • Controller • Motivator
			Cognitive support Leadership activity oriented to improving the intellectual consciousness of teachers	• Individual consideration of teachers • Inspiring the motivation of teachers • Intellectual stimulation of teachers • Fostering involvement of teachers • Fostering innovative behavior Boost divergent thinking in teachers
		Struct ural	***Focus*** The core of the leadership activity	• Focus on school results • Focus on student learning • Focus on teachers' practices • Focus on systemic organizational learning

			concerning school management	• Focus on developing human individual capital • Focus on empowering professional capital
			Strategy Leadership strategic action orientation for school management	• Problem identification oriented • Management of existing operational capacity oriented • Monitoring and supportive, being pedagogical action-oriented • Building collaborative culture-oriented • Systemic wide learning-oriented • Pedagogical solutions and pedagogical experiments builder-oriented • Holistic school vision commitment-oriented
			Supervision focus Orientation of leadership supervision activity of teachers	• Centralize, defining orientations for educational action • Decentralize, valuing participation of the community in decision making and organizational autonomy • Conservative focused on presentism, and short term-oriented • Reformist focused on innovation and innovative behavior and is future-oriented • Disciplinary knowledge-oriented, investing mainly in disciplinary curricular approach • Interdisciplinary knowledge-oriented, investing in integrated knowledge and methods from different subjects as part of the teaching-learning process • Eudaimonic, inducing self-realization and well-being, and trust among teachers • Collegial, fostering collective reflection and cooperation, as well as shared, diffusion, and circulation of professional capital • Vision-oriented, fostering organizational consciousness through a shared holistic vision and mission • Transformational, oriented to the operationalization of transformational generative school grammar • Iterative, oriented to systemic and internalized mutual accountability
	Professional capital	**Decisional capital**	***Vision and focus*** Sets the direction for education due to the school's self-knowledge process	• Focus on results assessment • Focus on institutional learning, results, and teaching-learning school practices • Focus on institutional goals assessment • Focus on the identification of weakness and strongness • Focus on empowering pedagogical action through in force school resources management • Focused and oriented by external assessment referents • Focused and oriented by internal assessment referents aligned with the school mission • Focused and oriented for school transformation and innovation
			Procedural principles Characteristics of the process conducted by internal school assessment	• Autonomous and independent • Transparency and responsive • Systemic and focused on organizational cohesion • Normalizing and focusing on organizational unity
			Meaningfulness Value and significance of data produced by internal school assessment	• Tool for performance description • Tool for performance explanation • Tool for compliance regulation • Tool for emancipation regulation
			Responsiveness Regarding the nature of the reaction adopted by the internal school assessment	• Passive, delaying action and non-empowering • Reactive, being iterative, and analytical • Proactive, being intentional, and reflexive • Agency-centred, being comprehensive, empowering, and creative

		Social Capital	***Professional practices*** Nature and the way how teachers' work is conducted	• Collegiality • Forced or apparent collegiality • Balkanization • Superficial collaboration • Professional isolation and individualism
			Climate for transformation Work environment oriented to school transformation	• Shared school vision and mission • Confidence and well-being climate • Focus on innovation • Focus on presentism • Bureaucratic load at work • Action in communities of practices • Exploitation of the organizational flexibility and autonomy • Collective sense of experimentation • Use of a generative and transformative school grammar • Opportunity to reflect
		Individual Human Capital	***Individual behavior*** Actions and responses of teachers due to internal and external stimulus	• Motivation for teaching • Passion for teaching • Sense of mission • Criticism and reflexiveness • Flexibility and adaptability • Resilience • School identity assumption • Collaboration and cooperation • Sharing skills • Conservatism
			Innovative behavior Perceptions and feelings about the application of new methods, strategies, and solutions to the educational process	• Impulse to experimentation • Wish for novelty • Creative/inventive • Innovativeness • Adherent to innovation • Risk-taking • Professional divergent thinking • Self-confidence • Favorable self-concept
			Individual morale Well-being feelings of teachers in the work context	• Recognition by leaders • Recognition by peers • Satisfaction with co-workers • Incentive to innovate • Sense of belonging • Intellectual stimulation • Lack of hope
			Working posture Ability to drive self-professional capital factors	• Self-questioning attitude • Professional autonomy • Organizational involvement • Self-efficacy perception • Ability to conduct self-learning • Perception of school vision and mission • Wish for professional growth • Positive self-assessment • Satisfaction with teaching experiences

Note [1](Demirtas & Karaca, 2020); [2](Tyunnikov, 2017)

Figure 4 *Dendrogram of factors that influence innovation in schools reported as organizational capital*

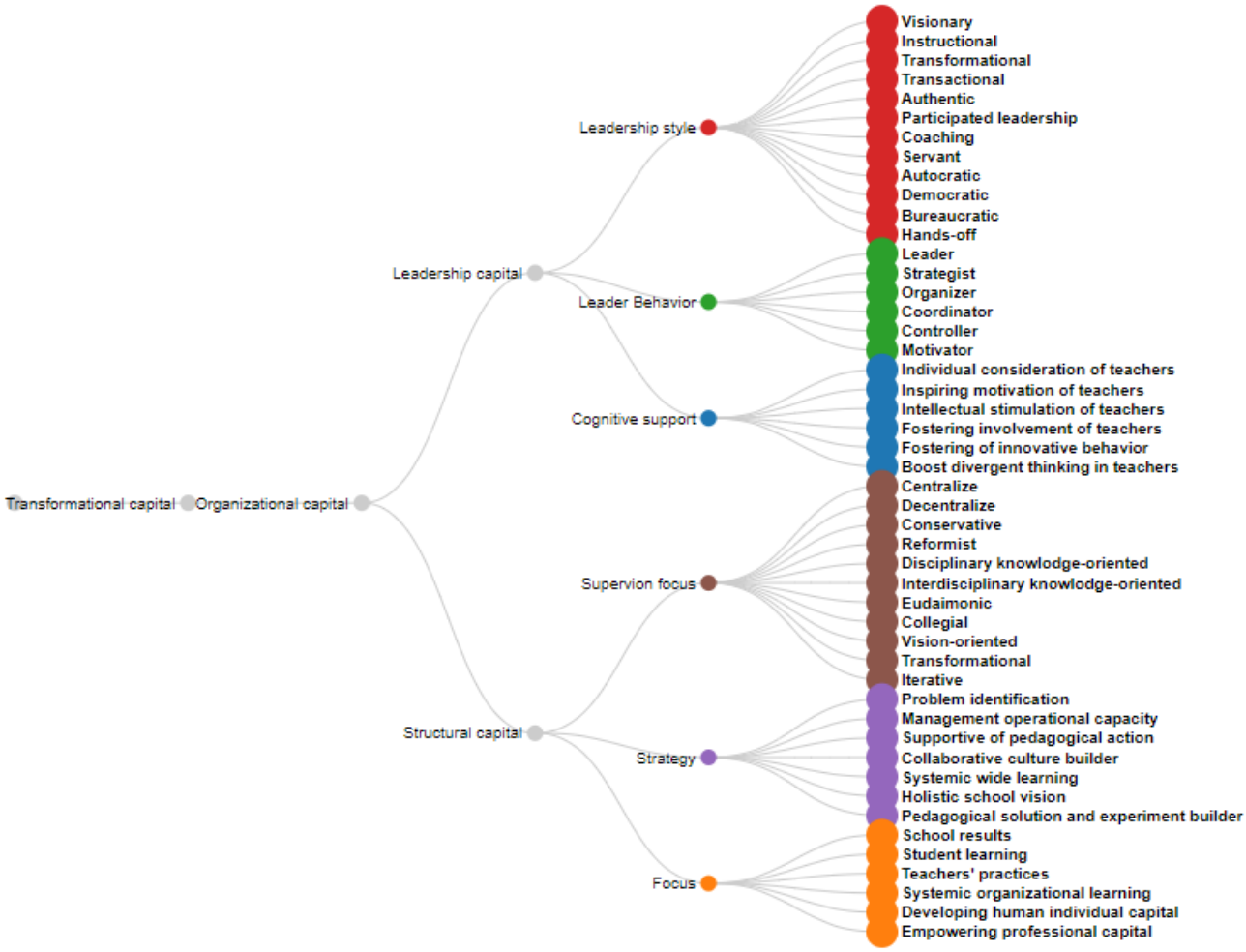
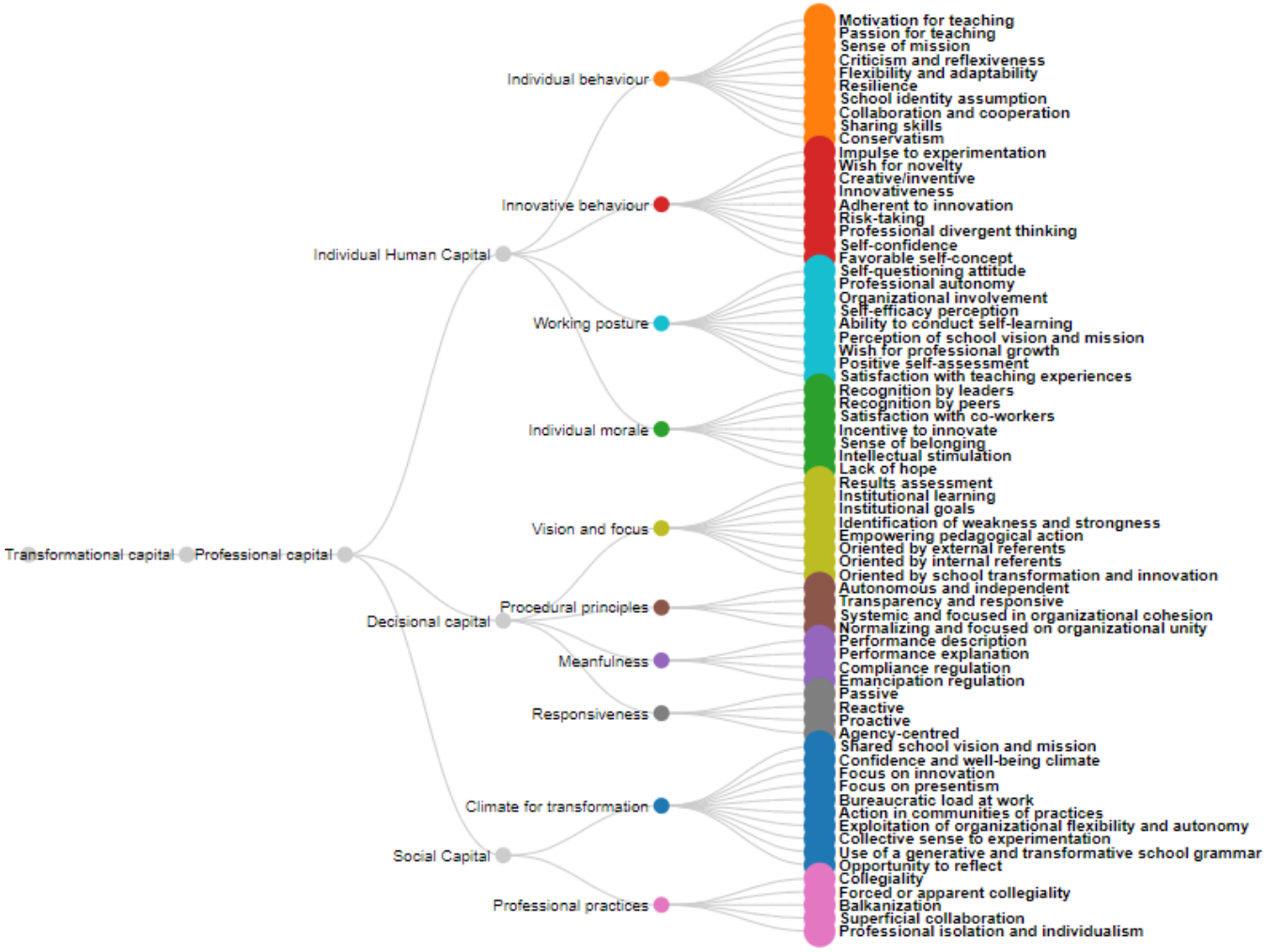


Figure 5 *Dendrogram of factors that influence innovation in schools reported as professional capital*



Conclusions and final considerations

Highlighted by a theoretical model for studying innovation in educational systems, a methodology was developed for classification focused on four main strands that entangle schools' organizations which are organizational, pedagogical, cultural, and technological. These four strands conducted the whole process of reuniting, from literature, factors identified as being promoters and obstacles to innovation. We presented a discussion centered on the identification and typification of the factors that positively mark innovation phenomenon, as well as the barriers to innovation. Being innovation an imperative for a future-oriented teaching profession, the framework that was built outlines the potential paths for implementing innovation in schools and for deepening the study of the innovative process. The typology appears as a pragmatical tool that challenges the current thinking to develop and support education focused on innovation, with the

main purpose of improving students' learning and making the innovative process more sustainable. The typology gives indications to principals on the complex, multitask, plural, interrelated, adaptative, creative, and challenging process of leadership because it points out numerous factors that might impact the work of the whole school organization. The typology also attempted to arrange a significant and common language to understand and study the problem that assembles innovation and schools' leadership.

Two main domains were pointed to classify factors that entangle innovation. The first one was organizational capital which points out for the whole school management and administration. The second one is professional capital which "consists of simultaneously building individual and collective efficacy and creating links of lateral accountability that push and pull team members to get better at their practice" in a process "described as accountability for student learning" (Fullan et al., 2015, p.8). This approach does not intend to substitute other classifications or taxonomies on innovation proposed by other scholars but aims to provide a rational typology on determinant factors that impact educational innovation and schools' leadership, making it possible to differentiate agendas for school transformation and to uncover interesting and relevant research questions and issues to follow-up.

The large number of factors included in the typology, promoters, and obstacles to innovation, make us signal a perspective on the topic of school transformation that may have remained obscured. Even though many factors were identified, studied, and appear as being crucial elements, perhaps, one or two unfavorable factors influencing an organization when combined with other favorable factors might have a minor impact. The opposite is also a hypothesis and in the context of the predominance of positive combined factors due to school transformation, there might be a single or a few factors that might have a considerable impact. This classification and the model that frames the typology present a possible approach for studying comprehensively and globally schools. Finally, the typology acts as a groundwork for continuing study schools because provides a wide matrix of variables, that by themselves or combined, might be correlated or act as moderators or

mediators for innovation. The typology presented may suggest new lines of analysis and catalyze studies that may provide a further understanding of the innovative phenomenon.

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