

# Desarrollo profesional para el liderazgo escolar: un enfoque desde las ecologías del aprendizaje

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## A learning ecologies approach on school leaders' professional development

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### Resumen:

Los líderes escolares generalmente cuentan, para su desarrollo profesional, con programas totalmente estructurados dirigidos por la administración. La investigación publicada identifica algunos atributos comunes para el liderazgo que tales programas intentan transmitir. Aunque esto es y será una parte importante del desarrollo profesional de los líderes escolares, la gran cantidad de contenido digital abierto y cursos abiertos disponibles y la accesibilidad de redes especializadas y comunidades virtuales amplían las oportunidades para el autoaprendizaje y el autodesarrollo. En este contexto, el marco de análisis de las ecologías del aprendizaje resulta útil para ampliar el conocimiento sobre lo que hacen los líderes escolares para el desarrollo profesional, cuáles consideran que son los medios más útiles para su actualización continua y cuáles son los componentes de sus ecologías de aprendizaje individuales. Este artícu-

### Abstract:

School leaders are usually provided with administration-led, fully structured programs for professional development. Research in this field identifies some common attributes for leadership that such programs try to convey. Although this is, and will continue to be, an important part of school leaders' professional development, digital open content and open courses available and the easy accessibility to specialized networks and virtual communities expand opportunities for self-learning and self-development. In this context, the learning ecologies analysis framework proves useful in extending knowledge on what school leaders do for professional development, what they consider the most useful means for continuous updating and what the components of their individual learning ecologies are. This paper presents the most common strategies for professional development that school leader's use in Catalonia (Spain), their bal-

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lo presenta las estrategias más habituales de desarrollo profesional que utilizan los directores escolares en Cataluña (España), su equilibrio entre las actividades de desarrollo profesional organizadas y el autoaprendizaje, y cómo evalúan el papel que juegan las tecnologías digitales en sus ecologías de aprendizaje. Se realizó una encuesta de 48 preguntas con el objetivo de recopilar información sobre el desarrollo profesional continuo, a un total de 212 líderes escolares en las escuelas catalanas. Los resultados se centran en las ecologías del aprendizaje, con especial énfasis en las estrategias que demuestran el aprendizaje informal, las formas de formación privilegiada, el uso de las TIC y la participación en redes y comunidades profesionales, y demuestran que casi la mitad de los encuestados consideran que su estrategia habitual de desarrollo profesional es el autoaprendizaje. Los resultados también muestran que los líderes escolares que se mantienen actualizados mediante estrategias de autoaprendizaje, prefieren el aprendizaje en línea (recursos, actividades, cursos) y utilizan la tecnología de manera más intensiva. Las ecologías del aprendizaje demostraron ser un marco útil para el análisis de las estrategias de desarrollo profesional de los líderes escolares.

**Palabras clave:**

Liderazgo escolar; desarrollo profesional; ecologías de aprendizaje; transformación escolar; cambio educativo

**Résumé:**

Les chefs d'établissement s'appuient généralement sur des programmes entièrement structurés gérés par l'administration pour leur développement professionnel. Les recherches publiées identifient certains attributs communs du leadership que ces programmes tentent de transmettre. Bien que cela constitue et constituera une part importante du développement professionnel des chefs d'établissement, la richesse du contenu numérique et des cours ouverts disponibles et l'accessibilité des réseaux spécialisés et des communautés virtuelles élargissent les possibilités d'auto-apprentissage et d'auto-développement. Dans ce contexte, le cadre d'analyse des écologies d'apprentissage est utile pour élargir les connaissances sur ce que les chefs d'établissement font pour le développement professionnel, sur ce qu'ils considèrent comme les moyens les plus utiles pour leur mise à jour continue, et sur les composantes de leurs écologies d'apprentissage individuelles. Cet article présente les stratégies de développement professionnel les plus courantes utilisées par les chefs d'établissement en Catalogne (Espagne), leur équilibre entre les activités de développement professionnel organisées et l'auto-développement, et la manière dont ils évaluent le rôle des technologies numériques dans leurs écologies d'apprentissage. Une enquête de 48 questions visant à recueillir des informations sur

ance between organized professional development activities and self-development, and how they assess the role digital technologies play in their learning ecologies. A survey with 48 questions was conducted with the aim of gathering information on school leaders' continuing professional development in Catalan schools. Two hundred twelve school leaders answered the survey. Results focus on learning ecologies, more specifically on strategies for informal learning, forms of privileged training, ICT use and participation in professional networks and communities. Results demonstrate that almost half of the participants hold self-learning their usual professional development strategy. Results also show that school leaders who stay up to date through self-learning strategies, prefer online learning (resources, activities, courses) and use technology more intensively. Learning ecologies proved to be a useful framework for the analysis of the professional development strategies of school leaders.

**Keywords:**

School leadership; professional development; learning ecologies; school transformation; educational change

le développement professionnel continu a été menée auprès d'un total de 212 chefs d'établissement dans des écoles catalanes. Les résultats se concentrent sur les écologies d'apprentissage, avec un accent particulier sur les stratégies démontrant l'apprentissage informel, les formes de formation privilégiée, l'utilisation des TIC et la participation aux réseaux et communautés professionnels, et montrent que près de la moitié des répondants considèrent que leur stratégie habituelle de développement professionnel est l'auto-apprentissage. Les résultats montrent également que les chefs d'établissement qui se tiennent à jour grâce à des stratégies d'auto-apprentissage préfèrent l'apprentissage en ligne (ressources, activités, cours) et utilisent la technologie de manière plus intensive. Les écologies d'apprentissage se sont avérées être un cadre utile pour l'analyse des stratégies de développement professionnel des chefs d'établissement.

**Mots-clés:**

Leadership scolaire; développement professionnel; écologies d'apprentissage; transformation de l'école; changement éducatif

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## Introduction

Change is one of the current pivotal elements in educational discourse. A common claim is transforming schools to adapt them to society's ever changing needs. But societal needs are very complex, and 'the more complex society gets, the more sophisticated leadership must become' (Fullan, 2020:ix).

Schools need leadership that can deal with building a school vision, establishing school goals, providing intellectual stimulation and individualised support, promoting best practices and organisational values, setting high academic standard expectations, creating a productive school culture, and fostering participation in decisions. These are the seven dimensions that transformational leadership (Balyer, 2012) brings into schools that are usually associated with establishing an innovative climate.

School leaders' attributes are close to these seven dimensions. As the research literature shows, the prevalent characteristics of effective school leaders are the building and development of a shared vision (Holmes, Clement, & Albright., 2013; Leithwood, Harris, & Hopkins., 2020), self-confidence, social intelligence and the development of relational trust and organisational awareness (Leithwood et al., 2020; Williams, 2008), flexibility in solving complex problems, leadership in teaching and learning, engagement with the wider community (Holmes et al.,

2013), achievement orientation (Williams, 2008) and understanding and developing people (Leithwood et al., 2020).

Fullan (2010) considers six features of effective school leaders dealing with actual organizational challenges: a strong motivation for action, a position as learner alongside their teachers, a consistent focus on improvement of instruction for the benefit of all students in the school, a helpful attitude towards others' complex problems, a good network of contacts and a highly developed moral purpose.

Effective leaders in schools can have a transformational impact on student learning outcomes (Holmes et al., 2013). For this transformational impact to occur, school leaders' educational background becomes a key (Balyer, 2012).

### **Professional development for school leaders**

There is wide agreement that professional development for school leaders is the key to good school organisation and climate (Dinh, Lord, Gardner, et al., 2014), providing a focused environment for learning (Holmes et al., 2013) and for leading teachers and students to the highest possible levels of quality teaching and learning (Darling-Hammond, Meyerson, La-Pointe, et al., 2009). An inclusive definition of professional development for school leaders is provided by Goldring, Preston & Huff (2012:224): 'from formal training sessions to informal interactions between principals and teachers and amongst principals themselves'.

The importance of professional development for school leaders is demonstrated by the fact that most countries have administration-led compulsory programmes. Several papers have been published analysing the outcomes of some of these programmes: in China, a framework of strategic directions for systemic professional development for school leaders ensuring the alignment of the educational priorities, school effectiveness performance, and professional development (Chu & Cravens, 2012); New Zealand, a pilot leadership development initiative with a school-based inquiry project as a highly effective component (Cardno & Youngs, 2013); Hong Kong, where portrait methodology has been tested to support school principals (Wong, 2013); and the US, with the application of adult learning theory in four schools in Georgia to analyse the practices of principals' professional development (Zepeda, Parylo & Bengtson, 2014). The current situation caused by the COVID-19 pan-

democratic reinforces the need for a stronger school principal's leadership in supporting teachers' response to new, unexpected hybrid scenarios (Darling-Hammond & Hyler, 2020), so schools leaders' professional development needs grow proportionally.

Although school leaders, and particularly principals, are usually compelled to take official administration-led formal programmes, either pre-service or in-service, complementary training through professional development still remains pivotal (Peterson, 2002). This author presents a number of examples of professional development sources with many different approaches, most of them formal or non-formal, but there is no analysis regarding the opportunities of informal interactions potentially benefiting the development of school leaders. The lifelong learning ecologies approach constitutes a powerful means of exploring the still poorly studied dimension of how school leaders could benefit from informal learning opportunities for their professional development.

### **Lifelong learning ecologies**

Since Brown (2000) introduced the concept of learning ecology, it has evolved and gained a more central position in the analysis of different socio-educational processes. Authors such as Barron (2004), Jackson (2013), Luckin (2010), Sangrà, González-Sanmamed & Guitert (2013) and Sangrà, Raffaghelli & Guitert (2019) agree that the learning ecologies approach is a comprehensive analytical framework for understanding how people interact with each other and with a large quantity of tools, resources and content over the Internet, as well as how these interactions combine with more traditional forms of learning throughout one's life. The potential space for learning has expanded through the use of ICT, thus providing broader and more diverse opportunities for learning (Jung & Latchem, 2009).

The learning ecologies approach widens the sources for professional development identified by Peterson (2002), by entering the non-formal and informal spheres, as well as taking advantage of the digital environments (Maina & Garcia, 2016).

The concept of learning ecologies provides explanation and understanding that there are further professional development opportunities for school leaders than those mentioned by Oleszewski, Shoho & Barnett (2012), i.e. school districts, universities and professional and third

party associations. As Barron (2004:6) states, a learning ecology is 'the set of contexts comprised of a unique configuration of activities, material resources, relationships, and the interactions that emerge from them, found in physical or virtual spaces, that provide opportunities for learning'. Personal learning ecologies widen the opportunities for learning from contexts and environments and enlarge the initial definition of school leaders' professional development, as stated by Goldring, Preston & Huff (2012).

Based on the assumption that professional development is accomplished through formal, informal and non-formal mechanisms understood as a continuum of levels from formality to informality (Livingstone, 2006; Van Noy, James, & Bendley, 2016), in face-to-face, blended and virtual environments, the adopted analytical framework supports the study of learning ecology configurations from a personal, individual perspective (Sangrà, González-Sanmamed, & Guitert, 2013). This framework works as an instrument to place the different kinds of activities, resources and relationships in a double-axe relating environments and the level of formality in the mechanisms they use. Different authors have applied the same approach to study other groups, such as teachers (Van den Beemt & Diepstraten, 2016), graduates (Peters & Romero, 2019) or doctoral students (Esposito, Sangrà & Maina, 2015).

## **Research design**

### **Research question and objectives**

This research seeks to answer the question of how principals and teachers in leadership positions in Catalonia stay up-to-date and continuously develop their career in the context of ubiquitous technology through the articulation of their learning ecologies.

Specifically, we examine the strategies, together with the resources and tools leaders mobilise for their professional development, with special reference to the importance they give to self-learning and the degree to which they use ICT for this purpose. We also outline the influence of the profiles of the people answering the survey and the type of schools in which they work.

## Research context

This research was carried out in the Spanish context, which has some particularities that have to be taken into consideration for the purposes of transferability. Spanish school leaders are elected by their teacher colleagues at each school for a period of 4–8 years, after which they return to their role as teachers (Bolivar & Ritacco, 2016). This temporary role makes it even more difficult to establish a specific school leader identity and highlights the importance of teachers' professional development simultaneously with that of school leader. For the purpose of this study we adopt Schleicher's 2012 interpretation that effective leaders at schools include 'system leaders, principals, teacher leaders, senior teachers and head teachers, as well as strong support systems' (p. 14). Thus, considering the aforementioned regulatory framework, principals and heads of studies (deputy principals) are the roles included as school leaders in our investigation.

A survey with 48 questions was conducted with the aim of gathering information on school leaders' continuing professional development in Catalan schools. As previously stated, the study includes both school principals and heads of studies, as both play leadership roles.

The survey was structured into 4 blocks:

- Block 1: Participant's profile;
- Block 2: Characteristics of the school;
- Block 3: Training and self-learning strategies, both related and unrelated to ICT;
- Block 4: Assessment of personal learning ecologies.

## Data distribution, collection and analysis

The survey was distributed by email to schools and managed through the Netquest 1 tool to facilitate distribution in schools and monitoring of answers, as the tool permits control of addressees, response monitoring, production of basic reports and export of data to quantitative data analysis tools.

The quantitative data analysis was performed using the SPSS tool, quantifying frequencies for each question and providing the basic descriptive analysis of the mean, standard deviation, mode, maximum and minimum, as well as the Mann-Whitney U test to determine the sig-

nificance of differences between the leaders giving much relevance to self-learning strategies for their professional development versus those who don't. The bivariate Pearson's correlation was applied to determine differences in items regarding the groups' preferences regarding forms of training, ICT, socialization practices, and institutional organization.

Two operations were carried out to analyse the data from the survey. The first consisted of grouping semantically similar items (e.g. Google, Bing and other search engines) in a single item; the second involved recoding the original 4-level scale (never, sometimes, often, very often) into a dichotomous scale.

## Sample

Given the number of questions in the survey, the sample, with a total of 212 participants, can be considered statistically representative of the reality in the study.

Most participating school leaders were women (144 out of 212). The total school leaders have a median age of 50 and an average of 26 years' experience in education. Out of the total participants, 79.7% worked in state schools, and leaders from large (22.5%), medium-sized (21.5%), small (35.9%) and very small towns (18.8%) were represented.

## Results and discussion

The data analysis and interpretation focus on learning ecologies, with special emphasis on strategies demonstrating informal learning, forms of privileged training, ICT use and participation in professional networks and communities.

The results demonstrate that almost half the respondents consider their usual professional development strategy to be self-learning, which means a significant percentage.

For the analysis, school leaders who stated they used self-learning often and very often were put in one group and those stating they used it rarely or never were put in another. Thus one group of leaders who consider self-learning of key importance (97 out of a total of 208, from herein 'group A') and another group who consider it virtually or completely irrelevant (the remaining 111, from herein 'group B') can be identified



(Table 1). This grouping also arises from a question on whether most continuing professional development is based on self-learning in which the Mann-Whitney U test shows a significant difference ( $U = 3526.0$ ;  $p = < 0.001$ ) for the data segmented by groups (Table 1).

Table 1

*Importance of self-learning in continuing professional development, using the Mann-Whitney U test*

Group	N*	mean	SD	Mann-Whitney U test	p (two tails)
A	93	3.52	1.221	3526.0	<0.001
B	106	2.92	1.240		

\* Lost data: 9

The group that considered self-learning relevant also stated they predominantly used this method. The results show that the mean for group A is higher than for group B ( $\bar{X}_A = 3.52$  and  $\bar{X}_B = 2.92$ , respectively).

## Ecologies and informal learning

Learning ecologies not only permit differentiation but also highlight coordination between instances of programmed and episodic training, all of them understood as achieving a more or less conscious objective. This study focuses particularly on this 'movement', with special emphasis on assessing the informal learning that respondents were able to elucidate in their continuing professional development.

Although there is recognition that informal learning contributes to professional development, it is understood as a factor without special weight. The question on whether informal learning is more effective than courses organised by the institution (labelled as 'informal learning' in Table 2) is valued similarly by groups A and B ( $U = 4253.0$ ;  $p = 0.139$ ). This point is backed up by a reverse statement on whether training at the school is the most appropriate for perceived needs ('suitability of the school's training' in Table 2), providing inverse results with no significant difference between the groups ( $U = 4954.0$ ;  $p = 0.865$ ) (Table 2).

Table 2

Mean and difference by group in the assessment of informal learning and training at the school, using the Mann-Whitney U test

	Group A			Group B			U	p
	N	mean	SD	N	mean	SD		
Informal learning	91	3.23	1.136	106	3.04	1.257	4253.0	0.139
Suitability of school's training	93	4.14	1.230	108	4.17	1.308	4954.0	0.865

## Ecologies and forms of training

The configuration of personal learning ecologies demonstrates individuals' preferences regarding forms of learning, ranging from classroom-based to entirely online, or from formal to non-formal.

The analysis of the results of preferred forms of training show that, although there are no statistically significant differences for classroom-based or blended formal, non-formal and informal training ( $\alpha = 0.05$ ) between the two groups, there are statistical differences for online training in terms of formal ( $r = 22.468$ ;  $p = < 0.001$ ), non-formal ( $r = 12.584$ ;  $p = < 0.001$ ) and informal ( $r = 9.016$ ;  $p = 0.003$ ) (Table 3) training. Thus, the group of leaders who placed importance on self-learning used online training and, therefore, ICT more frequently than those who did not self-train.

Table 3

Preferences for different forms of training by group, using Pearson's test

Preferences with regard to forms of learning	Group A		Group B		Pearson's r (degrees of freedom = 1)	p
	N	Percentage strategy use	N	Percentage strategy use		
Classroom-based formal	97	89.7	110	94.5	1.703	0.192
Classroom-based non-formal	96	74	109	70.6	0.280	0.597
Classroom-based informal	93	54.8	105	46.7	1.318	0.251
Blended formal	90	44.4	102	41.2	0.209	0.648
Blended non-formal	87	14.9	97	8.2	2.033	0.154
Blended informal	84	20.2	94	13.8	1.300	0.254
Online formal	89	44.9	101	13.9	22.468	<b>&lt; 0.001</b>
Online non-formal	88	29.5	98	9.2	12.584	<b>&lt; 0.001</b>
Online informal	87	19.5	97	5.2	9.016	<b>0.003</b>

## Ecologies and ICT

A relevant aspect in this research is the way school leaders integrate ICT to support different professional development actions and strategies. As mentioned above, the preferences of the group that consider self-learning important (group A) are also notable for the significance given to different forms of online learning. This necessarily involves the use of ICT, which we study in greater detail in this section.

For the question on the importance given to ICT in their training (Table 4), the scores were higher in the group of leaders (group A) who mostly used self-learning ( $\bar{x}_A = 4.72$ ) than among those who did not ( $\bar{x}_B = 4.01$ ). This result is corroborated by the score for the statement 'I make little use of the Internet for my training', which produced coherently inverse results ( $\bar{x}_A = 1.86$  and  $\bar{x}_B = 2.49$ ). The inverse values are explained by disagreement to the statement in group A compared to group B. The U test (Table 4) confirms the statistically significant differences between both groups ( $U = 3304.0$ ;  $p < 0.001$  and  $U = 3470.5$ ;  $p < 0.001$ ).

Table 4

*Mann-Whitney U test for the groups on the importance of ICT and the Internet in self-learning*

	Group A			Group B			U	p
	N	mean	SD	N	mean	SD		
Importance of ICT	92	4.72	1.243	106	4.01	1.327	3304.0	< 0.001
I make little use of the Internet	93	1.86	1.273	104	2.49	1.468	3470.5	< 0.001

In the same context, Pearson's test on 'information search' for content, methodologies and tools in microblogs (16.9% vs 6.1%) ( $r = 5.391$ ;  $p = 0.020$ ), social media (48.9% vs 26.5%) ( $r = 10.181$ ;  $p = 0.001$ ), blogs (71.1% vs 49.5%) ( $r = 9.233$ ;  $p = 0.002$ ), digital publications (66.3% vs 40.8%) ( $r = 12.707$ ;  $p < 0.001$ ) and open educational resources (81.9% vs 56.4%) ( $r = 13.299$ ;  $p < 0.001$ ) were mostly used by the group of leaders who systematically used self-learning. Search engines, education portals and printed publications were used to a similar extent by both groups (Table 5).

Table 5

Comparison of different uses of various information search strategies, using Pearson's test

Information search strategies by:	Group A		Group B		Pearson's r (degrees of freedom = 1)	p
	N	Percentage strategy use	N	Percentage strategy use		
Search engines	96	96.9	110	92.7	1.745	0.187
Microblog	83	16.9	99	6.1	5.391	0.020
Social media	88	48.9	102	26.5	10.181	0.001
Specialist portals	96	90.6	109	85.3	1.341	0.247
Blogs	90	71.1	101	49.5	9.233	0.002
Printed publications	92	60.9	107	55.1	0.666	0.415
Digital publications	92	66.3	103	40.8	12.707	< 0.001
OER	83	81.9	94	56.4	13.299	< 0.001

With regard to content generation, application of methodologies and the use of tools for teaching-learning (Table 6), the predominantly self-learning leaders, group A, were more predisposed to using digital networks and technologies: they participated more actively in social media (36.4% vs 17%) ( $r = 7.954$ ;  $p = 0.005$ ); they contributed their ideas to blogs (49.4% vs 27.3%) ( $r = 8.650$ ;  $p = 0.003$ ); they participated in online seminars more often (29.3% vs 8.1%) ( $r = 12.185$ ;  $p = < 0.001$ ); and they made greater use of online learning environments (48.6% vs 27.8%) ( $r = 6.911$ ;  $p = 0.009$ ).

*Table 6*  
*Comparison of different uses of various content generation strategies, using Pearson's test*

Item: content generation strategies using:	Group A		Group B		Pearson's r (degrees of freedom = 1)	p
	N	Percentage strategy use	N	Percentage strategy use		
Microblog	71	2.8	87	8	1.990	0.158
Social media	77	36.4	88	17	7.954	0.005
Blogs	79	49.4	88	27.3	8.650	0.003
Printed publications	79	43	89	44.9	0.062	0.804
Digital publications	78	41	90	31.1	1.789	0.181
Classroom-based seminars	81	60.5	93	51.6	1.384	0.239
Online seminars	75	29.3	86	8.1	12.185	< 0.001
School LMS	72	48.6	79	27.8	6.911	0.009

One curious result is that use of microblogs for this purpose was low in both groups. This similarity is also shown in more traditional practices such as participation in classroom-based seminars and publication in printed and digital journals. This use of digital publication, which might be expected to be higher in the 'self-learning' group, can also be explained in at least two ways: the action does not depend directly on the school leader and publishers mostly choose the digital format.

Based on the analysis of the data presented here, we may infer that those leaders more likely to use self-learning are more accustomed to using digital technologies and make greater use of the potential of ICT to keep up to date and competent.

### **Ecologies and socialisation of practices and knowledge**

Learning ecologies involve mobilising resources and content but also participation in and building of specialist networks, and making and maintaining contacts with key persons in the profession (Barron, 2004; Jackson, 2013; Sangrà, Raffaghelli, & Guitert, 2019). Asked about different activities relating to exchanging experiences, the frequent self-learning group of leaders (group A) showed a greater propensity for discussing and working with colleagues than the group preferring more traditional, formal training (group B).

A breakdown of the different items (Table 7) identifies significant dif-

ferences between groups A and B with regard to being active in the pertinent on-site professional network ( $\bar{x}_A = 4.26$  vs  $\bar{x}_B = 3.61$ ) ( $U = 3146.0$ ;  $p = 0.004$ ) and online network ( $\bar{x}_A = 3.61$  vs  $\bar{x}_B = 2.66$ ) ( $U = 2543.5$ ;  $p = < 0.001$ ), establishing new contacts at academic events ( $\bar{x}_A = 3.81$  vs  $\bar{x}_B = 3.23$ ) ( $U = 3337.0$ ;  $p = 0.010$ ), maintaining contacts on the social media ( $\bar{x}_A = 3.12$  vs  $\bar{x}_B = 2.58$ ) ( $U = 2913.5$ ;  $p = 0.009$ ), taking part in research and innovation groups ( $\bar{x}_A = 3.94$  vs  $\bar{x}_B = 3.05$ ) ( $U = 2826.0$ ;  $p = < 0.001$ ) and taking part in internal school projects ( $\bar{x}_A = 4.91$  vs  $\bar{x}_B = 4.41$ ) ( $U = 3715.5$ ;  $p = 0.010$ ). However, both groups of leaders were similar in terms of their willingness to take part in formal and informal on-site school and association meetings.

Table 7

Means and differences between the groups regarding exchanging experiences, using the Mann-Whitney U test

	Group A			Group B			U	p
	N	mean	SD	N	mean	SD		
Being active in a professional network (on-site)	84	4.26	1.522	99	3.61	1.583	3146.0	0.004
Being active in a professional network (online)	80	3.61	1.619	95	2.66	1.492	2543.5	< 0.001
Participating in informal on-site meetings with colleagues (at the school)	90	4.53	1.124	103	4.35	1.304	4344.5	0.438
Participating in informal on-site meetings with colleagues (at teaching associations)	87	3.66	1.354	96	3.22	1.675	3511.0	0.058
Establishing new contacts at conferences, congresses and seminars	86	3.81	1.385	99	3.23	1.511	3337.0	0.010
Keeping contact over social media	81	3.12	1.373	93	2.58	1.484	2913.5	0.009
Taking part in research and innovation groups	86	3.94	1.521	96	3.05	1.558	2826.0	< 0.001
Taking part in internal school projects	90	4.91	0.979	104	4.41	1.326	3715.5	0.010

## School characteristics and their possible influence on school leaders' professional development

The impact of the profile and characteristics of people in positions of leadership in schools in the organisational set-up and its working atmosphere have been demonstrated in previously mentioned studies (Balyer, 2012; Fullan, 2010; Holmes et al., 2013; Leithwood et al., 2020; Williams, 2008). When the leaders' schools and, thus, the context in which they work are analysed, we mostly find similarities (Table 8), except for three statistically significant differences between centres with leaders who claim to self-learn (A) and those who do not (B). Specifically, more frequent self-learning leaders came from centres that promote participation in school projects ( $\bar{x}_A = 3.51$ ) ( $U = 4309.0$ ;  $p = 0.026$ ), in educational and technological innovation groups ( $\bar{x}_A = 3.18$ ) ( $U = 4117.0$ ;  $p = 0.007$ ) and experience exchange with other groups ( $\bar{x}_A = 3.06$ ) ( $U = 4199.5$ ;  $p = 0.017$ ). However, it is also true that centres with both types of leaders (self-learning and otherwise) promote training programmes to a similar degree, are concerned with securing technological infrastructures and tools, incentivise production of in-house resources and the implementation of curricular projects based on innovative methodologies, and contribute to exchange of educational experiences both of an interdisciplinary nature and within their immediate environment. In addition, the results show that all the school leaders' generally promote European projects to a very small extent.

Table 8

Means and differences between the groups regarding characteristics of the schools, using the Mann-Whitney U test.

	Group A			Group B			U	p
	N	mean	SD	N	mean	SD		
Promotion of training programmes	97	4.40	1.239	110	4.32	1.226	5062.0	0.512
Securing technological infrastructure	97	3.77	1.246	109	4.07	1.252	4580.5	0.088
Providing technological tools for innovation in the classroom	97	3.85	1.302	110	4.02	1.327	4900.0	0.299
Promoting innovative methodologies	97	4.15	1.431	108	3.85	1.190	4450.5	0.057

	Group A			Group B			U	p
	N	mean	SD	N	mean	SD		
Taking part in inter-school projects	95	3.51	1.390	110	3.08	1.321	4309.0	0.026
Presence of spaces and opportunities for experience exchange between teachers	95	3.47	1.236	110	3.48	1.171	5162.5	0.879
Participation in educational and technological innovation groups	96	3.18	1.322	109	2.71	1.307	4117.0	0.007
Exchange of educational experiences with other groups	95	3.06	1.295	109	2.65	1.197	4199.5	0.017
Participation in European projects	96	2.10	1.504	110	1.93	1.386	4953.0	0.400
Producing resources	96	3.77	1.302	110	3.56	1.208	4837.0	0.286
Designing, developing and assessing in-house curricular projects	97	3.80	1.374	109	3.62	1.332	4849.5	0.295
Developing interdisciplinary projects	96	4.13	1.348	109	4.17	1.302	5149.0	0.841
Working with the immediate environment	96	4.27	1.341	109	4.09	1.337	4804.0	0.299

## Conclusions

One of the first conclusions that can be drawn regarding school leaders' preferences in professional development is that self-learning is a strategy for professional development and knowledge updating used by a large number of them (half of those answering the survey). This leads to a situation in which this group of leaders find their own means and resources for training and development and do not limit themselves to established, traditional forms of learning. The comparison between self-learning and non-self-learning school leaders' preferred approach shows differences on how they build their learning ecologies and their attitudes towards the use of technology, the value of collaboration, and the scope of their professional role.

We observe that school leaders who state they mainly use self-learning



are also more likely to use online training and less likely to use traditional training. Given the characteristics and functions of these leaders, it is not surprising that they prefer training solutions that provide greater flexibility and more precise customisation. This positions them to strengthen their digital learning ecologies (Christen, Sangrà & González-Sanmamed, 2016).

The same group of school leaders who use self-learning and prefer online training focus on generating content, more than just using technology for searching for content, which is a more widespread and common use. Thus their technological profile is not limited to viewing content but also involves playing an active role in generating their own, new and shared knowledge, demonstrating not only interest for learning but also engagement with the wider community (Holmes et al., 2013).

Leaders who privilege self-learning strategies, far from isolating from the group or community, they promote exchange through professional networks inside and outside of the school. It is important to stress that most of the self-learning school leaders who prefer online training, far from acting in an individualistic way or running their schools towards their own improvement, place very high value on the exchange of experiences within the school and with other schools and professionals. Indeed, if we analyse the schools in which they work and exercise their leadership, they are schools characterised by high participation in innovation and improvement projects with other schools and education centres. Results show that these leaders promote interaction and collaboration between colleagues in an extended space where ICT plays a crucial role, in the way the good synergies self-learning and social media could establish (Matzat & Vrieling, 2016).

Results also show that school leaders who stay up to date through self-learning strategies, prefer online learning (resources, activities, courses) and use technology more intensively. These leaders also provide greater encouragement to teamwork among teachers, both inside and outside the school. Leaders' interest points to the development of relational trust (Leithwood et al., 2020), the engagement with the community (Holmes et al., 2013), and an attitude of humility, which recognizes the value of collaborative work (Fullan, 2010).

The practice of collaborating in teams fostering shared work with other schools and participating in professional networks is clearly a distinctive trait of school leaders who routinely recur to self-development. Having

a good network of contacts is considered one of the key features of effective school leaders (Fullan, 2010). Goldring et al. (2012) highlight the importance of these networks, related to the on-site and digital learning ecologies, which broaden flexible opportunities for learning.

Leaders who move away from professional development through formal and traditional learning build their own learning ecology with a vision that goes beyond their own needs, considering also those of the professional community, whether school or school network, and promoting collaboration (Kanokom, Pongtorn & Ngang, 2013). As Fullan (2020) states, “complexity means change, but specifically it means rapidly occurring, unpredictable, nonlinear change” (p. ix). Although school leaders have always been dealing with concurrent and heterogeneous challenges (Tintoré, Cunha, Cabral, & Alves, 2020) the COVID-19 pandemic has significantly and rapidly put them into a complex situation that seems to last or have long-term consequences. And this complexity will persist.

Learning for leadership in our complex current times also should be rethought as an on-going activity, nonlinear, fuzzy and multiple shaped. Learning ecologies provide the framework for it.

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