

# Micro-Celebrities or Teacher Leaders? An Analysis of Spanish Educators' Behaviors on Twitter

Carlos Marcelo, Paulino Murillo, Paula Marcelo-Martínez, Carmen Yot-Domínguez and Cristina Yanes Cabrera

Faculty of Education, Universidad de Sevilla, Spain

[marcelo@us.es](mailto:marcelo@us.es)

[paulino@us.es](mailto:paulino@us.es)

[pmarcelo@us.es](mailto:pmarcelo@us.es)

[carmenyot@us.es](mailto:carmenyot@us.es)

[yanes@us.es](mailto:yanes@us.es)

**Abstract:** Social networking sites have become affinity spaces for teachers. Many teachers use them with different intentions and motivations, including learning. On social media platforms there are active teachers who have developed a certain leadership and recognition from many teachers. In some areas, like marketing or fashion, people with influence are called influencers. This paper investigates who they are, how their network is configured and how they perceive themselves. The questions that directed our research were: Who are the predominant Spanish teacher leaders on Twitter? What is the network structure that characterizes them? What perceptions do these teacher leaders have about their role and its impact on their professional development as teachers and others? This study has two distinct but interrelated phases. We investigated the structure and relationships among 54 Spanish teacher leaders. Using a social network analysis (SNA) approach, through the analysis of the social behavior of these teachers on the social network Twitter, we first identify educational profiles who have a high degree of centrality in the network. These are teachers who are recognized as opinion leaders by a significant proportion of their fellows. In addition to the degree of centrality that tells us how relevant a user is in a specific digital community, we identified teachers who play a key role in the circulation of information in the network studied. In some way, these teachers share common characteristics with activists in other fields. Of the 54 teachers, we selected 20 who were then interviewed. The findings demonstrate that they don't consider themselves micro-celebrities or influencers. We found a lack of identification not only with the term, but also with the image of an influencer which was understood as banal, superficial, commercial, and far from what they do in social networks. These teachers develop their identity as new digital artisans who foster a culture of collaboration and create affinity spaces that allow informal learning. Their motivation is intrinsic, through recognition and prestige among other teachers, which leads them to build a kind of constructivist leadership.

**Keywords:** Teacher learning, Leadership, Twitter, Social network, e-Learning

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## 1. Introduction

The isolation conditions resulting from the COVID-19 pandemic have favored the increased use of social media by teachers. Social networks have become new spaces for meeting, exchange, dialogue, collaboration, and critique for many teachers (Lay, et al., 2020). Social networks did not explicitly emerge as environments for teacher learning and professional development. Despite this, research has shown that these networks facilitate relationships and communication between teaching professionals, while providing a space to share their practices, classroom activities, and assessment (Carpenter and Krutka, 2014). Social networking sites have enabled the configuration of affinity spaces among teachers (Gee, 2017) not only to exchange information and resources, but also to develop a sense of belonging.

Social networks are occupying an important space in the path to a teacher's professional development. Therefore, informal leadership figures have emerged from active teachers in social networks. Their leadership activity allows the generation and acquisition of learning by other teachers who participate in these social networks (Daly and Finnigan, 2010; Fischer, Fishman and Schoenebeck, 2019). Social Network Analysis (SNA) has been used to analyze the roles, leadership and influence among these active teachers. To do this, the classification of levels of betweenness centrality and closeness centrality is taken as a reference. On the one hand, betweenness centrality of a user indicates to what extent the user is positioned as an intermediary so that the information that flows within a conversation in a social network is distributed among the community. The greater the centrality of intermediation, the greater the capacity for spreading information, even outside its community of followers. On the other hand, closeness centrality is considered, which describes the connections with other users that a user presents within the social network in which conversations take place. Teachers who present a high centrality of closeness and intermediation can distribute information to other teachers more

efficiently, so they represent figures that can be consolidated as disseminators in the network (Daly, et al., 2019; Fischer, Fishman and Schoenebeck, 2019).

The leadership roles that active teachers practice in social networks like Twitter turns them into opinion leaders (Lazarsfeld, Berelson and Gaudet, 1944). These teachers are reference and influence figures for other teachers who have spontaneously turned their practices in social networks into informal learning processes. They have a leadership capacity that has been specifically described as “a type of teacher leadership focused on improving teaching and learning” (Carpenter, et al., 2021, p. 5). They have been called education influencers, teachers with a certain leadership capable of mobilizing the actions and behaviors of other users who share a common affinity (Carpenter, Shelton and Schroeder, 2022). The term influencer is widely used in areas such as marketing or fashion. Influencers are trusted by their followers and, because of this, commercial brands have noticed the possibilities they offer to promote targeted consumption. Social influence theory, applied to the study of commercial influencers, has identified three aspects that can characterize the influencer-follower relationship: dependence, identification, and internalization (Bentley, et al., 2021; McCormick, 2016; Tafesse and Wood, 2021). But are these teachers really influencers?

## 2. Literature Review

In educational research, works have recently emerged focused on studying the use of social networks by teachers as a means for professional development, as well as those expressly focused on the contribution of outstanding teachers in social networks. Thus, different studies have analyzed how teachers use Facebook (Hart and Steinbrecher, 2011), Instagram (Carpenter, et al., 2020) or Twitter (Carpenter, et al., 2019). The latter, according to Luo, Freeman and Stefaniak (2020), is the main platform for creating professional networks that allow knowledge sharing. In fact, teachers value the immediate nature of Twitter communication, which allows them to overcome the isolation they may feel in performing their duties and helps them develop a sense of community for teachers. They perceive Twitter as a tool for furthering their own professional development, rather than as a means of interacting with students or families (Holmes, et al., 2013).

Recent studies have focused on analyzing how and why teachers use social networks for professional development and as spaces to establish contact with other teachers, creating opportunities for affinity and collaboration (Carpenter, et al., 2020). Social networks contribute to expanding what has been called social capital (Rehm and Notten, 2016). Through them, teachers generate interactions that can be stable or temporary, allowing them to gather resources or obtain information from other people considered relevant to their work (Fox and Wilson, 2015). Multiple studies elucidate the reasons why teachers use social networks. Among the main reasons are the following: to inquire (from other more experienced teachers), to find resources, to share resources with other teachers, to receive emotional support, to be trained, to carry out a self-assessment (training needs, reflection), and to dialogue with other teachers (Greenhow and Askari, 2017; Higuera-Rodríguez, Medina-García and Pegalajar-Palomino, 2020; Li, Zheng and Zheng, 2020; Nochumson, 2020; Staudt Willet, 2019). Furthermore, teachers recognize that social networks allow them to take advantage of their learning opportunities over traditional professional development options, feeling a greater sense of achievement from learning acquired from a community (Ross, et al., 2015).

But teachers use social networks with varying degrees of intensity and frequency (Xing and Gao, 2018). On Twitter some teachers only participate as content receivers. They are what Wise, Hausknecht and Zhao (2014) call “active listeners”. Others also retweet messages that seem relevant to them. Few of them systematically and continuously feed the networks with their own proposals and content. Teachers with a higher number of followers and a constant and active presence on social networks are a minority. Antelmi, Malandrino and Scarano (2019) proposed a rule whereby 90% of the profiles that participate in conversations on a social network have a passive role, being represented as punctual or sporadic participants. Only 1% of the profiles that interact are those that the literature highlights as facilitators of information or active teachers. If we transfer this rule to according synchronous conversations on Twitter, we find that they are usually dominated by a few active members of the network, who generate a large volume of tweets (Xing and Gao, 2018).

The presence and intensity of participation of teachers on social networking sites are often related to their structural position in the network. As established by social network theory, according to Daly (2010), the position and capacity to manage the flow of information in the network will depend on the level and degree of links that a given subject has. This is related to the concept of centrality and its different types (Del Fresno García, Daly and Segado Sánchez-Cabezudo, 2016). So Daly, et al. (2019) differentiate different types of actors in social networks. Firstly, transceivers are people who actively participate with high retweeting or mentions by other members, which shows us that they are people highly valued by others within their social network. Secondly,

transcenders are those who are mentioned by many members of the network but at the same time retweet and share contributions from other members. Finally, there are traders, people who are key to the flow of information from one group to another in the network. They are people who, given their high level of participation and followers, find it easier to appear in the accounts of other users who share the same topic of interest. From the perspective of this classification, subjects who participate in a social network and can be categorized as transceivers, transcenders, or traders could be considered to have a certain level of recognition and informal leadership. They are also called influencers (Liou and Daly, 2018).

Research on educational influencers is recent and scarce. Few studies have contributed to highlighting the characteristics, identity, and motivations of teachers with a prominent role in social networks. In a recent article, Carpenter, Shelton and Schroeder (2022) proposed a framework for understanding how the role of the influencer is constructed. A framework that poses challenges between maintaining the principles of authenticity and extracting results through the monetization of their contributions. Therefore, although education may be understood as a public service in which the marketing, advertising, sales, and consumption aspects of products are secondary, some trends that contradict this idea are observed. One of the roles that they highlighted recently are the “teacherpreneurs” (Berry, 2015), teachers with leadership capacity who share educational materials, information and educational content through social networks and are recognized by others as authorities whose materials they can trust and use (Shelton and Archambault, 2018; 2020). The resources and materials generated by these teachers are very attractive to teachers looking for classroom-tested materials that are accessible and ready to use online (Carpenter and Shelton, 2022). The activity that teacherpreneurs develop is based on designing and sharing their own teaching materials and resources available to the educational community through platforms such as [www.tes.com](http://www.tes.com) and [teacherspayteachers.com](http://teacherspayteachers.com). These materials are often provided free of charge, but in other cases they involve a fee. Koehler, et al. (2020) show that the average price of resources downloaded on [teacherspayteachers.com](http://teacherspayteachers.com) is \$3.73 and that only 69% of downloads were free resources. The top 1% of the teachers on the platform account for 81% of total sales. Therefore, a small minority of sales teachers receive the highest financial return for the materials they produce, while the majority do not. As literature shows, there is a differentiated treatment for all those teachers with high activity and leadership in social networks because some of them carry out their activity in social networks to pursue a lucrative goal (Carpenter et al., 2021; Gil-Quintana and Vida de León, 2021), but others do it altruistically.

In this article, we focus on determining who are the active teachers in Spain on Twitter, what are the structure of their relationships, as well as their perceptions and ideas about the leadership role they play. Specifically, the research questions that we intend to answer are as follows.

*RQ1. Who are the predominant Spanish teacher leaders on Twitter? What is the network structure that characterizes them?*

*RQ2. What perceptions do these active teachers have about their role and its impact on their professional development as teachers and others?*

### **3. Methods**

This study has two distinct but interrelated phases. Firstly, to answer the first research question, we identified profiles with relevance on Twitter who could be classified as “educational influencers” (Marcelo and Marcelo-Martínez, 2021). To do this, we use Buzzsumo software, a marketing analytics tool that allows advanced queries to be performed on profiles and topics most consumed and shared on social networks. We started by filtering users by country (Spain) and keywords present in both the user’s biography and their publications, such as “educación, soyprofe, profesor, profesora”. From this analysis, we obtained a sample of 64 Spanish profiles, of which we initially selected 10. We consider those with more than 15,000 followers and more than 5,000 published tweets (Marcelo and Marcelo-Martínez, 2021). Once the most prominent teachers had been identified, we began to analyze the mentions they made on their Twitter posts. We were interested in finding people whom these teachers considered relevant and who were included in their mentions. Once the list of subjects mentioned by these ten active teachers was configured, we established as a criterion that at least four of the profiles in our sample were mentioned. This process allowed us to identify a total of 44 new teachers, which together with the initial ten profiles make up the sample of 54 subjects to be analyzed.

Of the 54 Spanish teachers selected, 38 were men and 16 women. Regarding the educational level towards which their interventions are oriented, we found 23 whose publications are mainly directed toward primary education, 10 toward secondary education and high school, 21 focus their tweets on higher and university education, and 4 of them also address conversations and content related to early childhood education.

Through the first research question, we sought to determine whether the sample configures an integrated or dispersed social network. For this, we applied the procedures of SNA. These procedures require the configuration of an adjacency matrix in which it can be observed how many mentions each teacher receives from the rest of them. To carry out this study, we used data obtained from 167,162 tweets from the 54 profiles. Once these data were downloaded, we proceeded to extract the mentions. This compilation of frequencies generated an adjacency matrix that shows the number of times each teacher was mentioned by each of the other 53. It should be noted that in this case we found some self-mentions by some of them. Once the adjacency matrix was created, we used the GEPHI 0.9.2 program (Bastian, Heymann and Jacomy, 2009) to analyze the relationships. Gephi is an open-source program that allows interactive visualization of networks and provides the tools to generate dynamic and hierarchical graphs. This software has been used because it is the tool that provides a greater and better graphic representation of the relationships established between the analyzed sample.

Secondly, to answer the second question, we invited the 54 previously identified teachers for individual interviews with the research team. There were 18 who agreed to participate in that study phase. Of these, 7 were women and 11 were men. Most of the participants were active teachers in primary education (8), secondary education (1) high school (1) and higher education (4). The rest were professionals dedicated to the education and training consulting sector (2), as well as to writing educational blogs and narratives for young people (2). Data were collected through semi structured interviews on-line. They were carried out through the ZOOM video conference application and lasted an average of one hour. One of the interviewees requested to personally answer the interview script through an audio recording.

The interviewers had a script of questions (Appendix 1) that sought to gather a variety of information about topics such as participation in social networks; the origins and evolution of each one of them; the topics that concern them and their publication process; their self-image as a person with the capacity to influence others; the way they relate to followers and other influential teachers; and the possible learning that is generated through social networks. Once all interviews were completed, two of the interviewers began to transcribe the recordings. To analyze the data, two of the interviewers developed inductively a set of themes (Appendix 2) that allowed us to classify the data. Data analysis was developed inductively as the interviews were analyzed. A system of categories inherent to the themes that emerged and were categorized by both researchers arose. We used the MAXQDA program to perform a theoretical coding based on the scripted questions and analyze the content of the answers of the teachers interviewed. MAXQDA is an intuitive software, which can be used on Windows and Mac and allows and facilitates the coding process. It facilitates the analysis of qualitative data by allowing coding, pattern extraction, etc.

## 4. Results

Below are the results of this study according to the two research questions and phases of empirical work.

### 4.1 Analysis of the Network Structure of Active Teachers in Spain

A total of 54 active teachers in Spain were identified. They were either in practice or retired teachers who had developed a high activity of publication and dissemination of educational content through the social network Twitter. Figure 1 shows their profiles. Those colored in red have been the teachers who subsequently participated in the interview.

The first research question displays an interest in a discussion surrounding the structure of communication between them. We tried to see if identified teachers could be represented as independent micro-celebrities, with limited relationships with the rest of them, or whether they relate fluidly to each other to create collaboration networks. The network analyzed is an undirected network (Hoppe and Reinelt, 2010) since each member can be mentioned individually and by any other member. Analysis with the Gephi tool allowed us to create a network of 54 nodes (profiles) and 1,607 edges (relationships between nodes) (Figure 1).

An aspect of interest when analyzing a social network relates to determining which nodes of the network play an important role in terms of the level of connections they have with the rest of them and the quality of these connections. One of the parameters that is usually analyzed in a network is its density (the ratio between possible and actual connections) (McCulloh, Armstrong and Johnson, 2013). A network will be very dense when the number of relationships between its members is very high, as close to the maximum as possible (Friedkin, 1981). The density of the network we are analyzing is high: 0.718. This value is calculated automatically once the database of profiles is uploaded into the analysis software Gephi. This high density means that interactions occur between 71.8% of all possible interactions. That is, most active teachers in Spain relate fluidly to the rest. This

result is corroborated by the fact that the diameter of the influencer network is 3. In a social network, the diameter is defined as the largest possible distance between any two nodes of the network, that is, the number of steps that must be taken from one member to the other (Wasserman and Faust, 1994). Therefore, we note that the network is very dispersed. See Figure 1.



Figure 1: Representation graph of groups of educational influencers according to centrality

Together with density, it is important to analyze the centrality, as it enables the identification of the most prominent nodes in the network (Del Fresno García, Daly and Segado Sánchez-Cabezudo, 2016). The degree of centrality of a profile is an important indicator of its level of influence in the network. It can be seen in Figure 1 that there are differences in the size of the name of each profile. Through this size, the degree of their centrality in the network is represented. Thus, a teacher whose profile name appears with a larger font size shows greater centrality.

The degree of centrality of a teacher is determined by the ratio between the number of mentions this teacher makes of the others and the number of mentions that are received from others. We refer to the mentions received as in-degree centrality and those issued as out-degree. As we mentioned before, in-degree refers to the number of incoming connections, while out-degree is related to the outgoing relations and interactions (likes, follows, replies, etc). In our study we also included two important values: centrality and betweenness centrality in order to investigate the structure of the network present in these active teachers. In Table 1, we note that there is a certain balance between in-degree and out-degree centrality among active teachers studied. Thus, for 24 teachers, the difference between in and out degree is negative, which means that they make more mentions than they are mentioned (Cha et al., 2012). Furthermore, in 26 cases, the opposite is true and in 4 cases in and out degrees are balanced. However, in particular, the percentage of difference between in-degree and out-degree measures is generally low. We only found four teachers whose ratio between in- and out-degrees is greater than 25% (@anatorres8, @AyudaMaestros, @bvicario2013 y @maestrade pueblo). These teachers are characterized by a more self-centered attitude, with less concern about mentioning other members of the community. To confirm that there are no significant differences between the teachers' in- and out-degree scores, we performed the Wilcoxon W test for two related samples. The significance obtained is .981, which allows us to accept the hypothesis that there are no significant differences between the contrasted scores. Most

of the teachers analyzed present a high sense of community, with the ability to recognize (through mentions) the contributions of the others in the group. See Table 1.

**Table 1: In-degree, Out-degree, Centrality and Betweenness centrality**

Profile	In-degree	Out-degree	Ratio in/out degree	Percentage of difference in / out degree	Centrality	Betweenness centrality
@aaronasenciofer	39	39	,00	,00	78	33,51
@AgoraAbierta	40	34	6,00	8,11	74	16,75
@anam_cid	34	24	10,00	17,24	58	7,71
@anatorres8	11	33	-22,00	50,00	44	5,20
@AyudaMaestros	27	14	13,00	31,71	41	11,37
@bpalop	17	18	-1,00	2,86	35	13,61
@bvicario2013	13	38	-25,00	49,02	51	18,15
@c_magro	37	37	,00	,00	74	23,01
@carmeniglesiasb	42	43	-1,00	1,18	85	38,71
@cccesssarr	17	13	4,00	13,33	30	14,48
@ClaraGrima	21	9	12,00	40,00	30	13,50
@cpoyatos	25	33	-8,00	13,79	58	15,17
@davidcpvm	24	24	,00	,00	48	29,02
@DechantCarla	9	16	-7,00	28,00	25	2,46
@doloresojeda1	40	40	,00	,00	80	41,39
@edusadeci	16	10	6,00	23,08	26	13,73
@eliatron	10	9	1,00	5,26	19	9,70
@Estebandelashg	29	33	-4,00	6,45	62	13,39
@ftsaez	46	43	3,00	3,37	89	80,35
@garbinelarralde	33	39	-6,00	8,33	72	11,48
@Gorkaprofe	36	46	-10,00	12,20	82	45,67
@history_topics	27	34	-7,00	11,48	61	14,96
@hruizmartin	29	27	2,00	3,57	56	19,37
@imgende	44	40	4,00	4,76	84	53,79
@javierpanadero	35	26	9,00	14,75	61	72,64
@JavierPalazon	18	20	-2,00	5,26	38	5,05
@jblasgarcia	41	46	-5,00	5,75	87	57,08
@jhergony	36	29	7,00	10,77	65	25,20

Profile	In-degree	Out-degree	Ratio in/out degree	Percentage of difference in / out degree	Centrality	Betweenness centrality
@jordi_a	37	28	9,00	13,85	65	15,28
@JorgeRuizMN	8	3	5,00	45,45	11	0,40
@Lamunix	28	40	-12,00	17,65	68	21,60
@lepetitpan	31	43	-12,00	16,22	74	40,93
@londones	41	42	-1,00	1,20	83	55,03
@LUISDAVILABAND1	21	37	-16,00	27,59	58	12,76
@maestrade pueblo	43	14	29,00	50,88	57	36,21
@Manu__Velasco	42	48	-6,00	6,67	90	115,36
@manueljesusF	37	40	-3,00	3,90	77	24,61
@manuparadas	26	35	-9,00	14,75	61	10,25
@MiriamLeiros	34	28	6,00	9,68	62	6,02
@monparaiso	19	27	-8,00	17,39	46	11,10
@Nando_Lopez_	39	18	21,00	36,84	57	29,41
@octavio_pr	40	30	10,00	14,29	70	19,28
@OscarRecioColl	39	30	9,00	13,04	69	14,72
@peralias	34	42	-8,00	10,53	76	28,10
@PsicEduM	31	20	11,00	21,57	51	4,77
@ramon_besonias	39	33	6,00	8,33	72	22,39
@raulillodiego	35	32	3,00	4,48	67	18,21
@salvaroj	28	42	-14,00	20,00	70	29,79
@ScientiaJMLN	8	5	3,00	23,08	13	1,29
@smoll73	29	42	-13,00	18,31	71	37,45
@tonigarias	24	29	-5,00	-9,43	53	9,97
@tonisolano	46	39	7,00	8,24	85	38,64
@unicooos	14	12	2,00	7,69	26	4,48
@xarxatic	38	31	7,00	10,14	69	34,52

#### 4.2 Perceptions of Spanish Teacher Leaders on Twitter

As we have previously mentioned, 18 of the total active teachers of the first phase were interviewed. In Figure 1, we have highlighted with a different color the handles of the teachers who participated in the interviews. The analysis of the content of the interviews aims to answer the second research question.

#### 4.2.1 *Neither micro-celebrities nor influencers*

The interviewees are not only not considered micro-celebrities, but also influencers. They do not identify with the term “influencer,” just as they do not identify with the terms “micro-celebrities” (Carpenter, et al., 2021) or “teacherpreneurs” (Shelton and Archambault, 2020). They recognize it as a pejorative connotation due to its commercial, pecuniary, and even superficial or unprofessional perception. First, they do not perceive themselves as influencers simply because they have attracted followers and recognition on social networks, given that they understand participation on these social networks as a contribution to a network of professionals where they offer what they have and encourage collaboration. “If we understand an influencer as someone who has an opinion and wants everyone to follow him because his opinion is selling a product, selling the methodology, etc. Then I am not interested in influencing anyone at all” (Int.05). Second, they do not consider themselves influencers because they want to keep their feet on the ground: “One of the things I have learned is that to participate in networks you have to be humble, you need to know how to behave, you have to be aware of where you are. That humility is fundamental, that humility of not thinking you are more than anyone, because I am still a teacher”(Int.03). Third, rejection of the influencer label is related to the fact that it is a term external to the teaching profession.

The term influencer, as we can see, does not represent them. But this does not mean that they do not exert some influence on other teachers. They develop what Lambert (2002) calls constructivist leadership, who considers that the role of leadership should be to involve people in the process of creating the conditions for learning. These conditions occur through dialogue and the reciprocal construction of knowledge (Rodesiler, 2017). From Lambert’s point of view, constructivist leadership requires dialogue and reciprocity. The capacity for reciprocity is the result of time spent in dialogue and in interacting with others and sharing ideas. This dialogue process is often initiated by participating teachers as they commit to sharing ideas and resources. In this process, the interviewees assume that their activity gives them some visibility in the networks: “In general, I don’t complain about the visibility I have” (Int. 09) “I always create the content that I share. And this is what gives you visibility” (Int. 05). They also recognize that their publications have an impact because they encourage people to talk about them, to pay attention to certain educational issues, to apply ideas, and to reuse resources: “I see on social networks what issues concern me and those are the ones I post about, and that is what gets someone to talk about it. And that serves to get someone to talk about them” (Int. 17).

They consider that their interventions in the network are useful to make people think and bring about change and improvement: “To think that I can turn that into a few sentences that make someone think and maybe change some things in their classroom that could be better or be misaligned with what is known” (Int. 07). It should be noted that they are concerned about the responsibility required by their role in social networking sites and how careful they are with what they say. “Of course, we have influence on what we can say. So if we have it, we must measure it very well” (Int. 04) “... That is, I have an impact due to my work and that makes me feel responsible. That is to say, I try to be very careful of what I say” (Int. 13).

As we can see, the teachers that were interviewed develop what Lambert (2002) calls acts of leadership (as opposed to assuming leadership roles). These acts of leadership are based on a sense of honesty and responsibility with respect to the trust others have placed in them. They do not feel like leaders but recognize their leadership capacity. This is what Lambert means when he states: “The redistribution of power requires that formal leaders construct and interpret themselves as they construct meaning and knowledge with others. Their sense of personal identity allows for courage and risk, low-ego needs, and a sense of possibilities” (Lambert, 2002, p. 60).

#### 4.2.2 *The new “digital artisans”*

Michael Huberman (1993) proposed the idea of teachers as independent artisans, understanding that some teachers act as if they were experts in “bricolage”. He stated: “A subject who creates or repairs learning activities of various kinds with a particular style and signature. Adapting instructional materials on the fly that he has brought, that he has been given, or that he has been able to find” (Huberman, 1993, p. 15). This image of the teacher suggests a professional who, like the sculptor or painter, carpenter, or watchmaker, “works alone” and needs solitude to do his or her job well. In some ways, teachers acting as independent artisans do so to protect themselves from work settings that are not very inclusive or collaborative. Teachers, as artisans, do not always develop their skills in solitude. Talbert and McLaughlin (2002) suggest that the idea of craft communities can work when they are understood as groups of teachers who collaboratively develop solutions and knowledge, working with their own means and resources. Almost thirty years have passed since Huberman’s proposal, and we recovered it to conceptualize the work and personal approach assumed by the teachers we interviewed.

These are teachers who have gradually achieved a certain notoriety by sharing their ideas, opinions, and resources with others online. The teachers we interviewed can be considered independent digital artisans: “Every network begins in solitude” (Int. 14). They are people who feel they have “something to say” and build their discourse around their personal preferences and interests, concerns and experiences: “According to my interests, I write based on those interests” (Int. 06). They freely decide on the topics to be addressed. These may be linked to the content of the topics themselves, for example, mathematics, or they may deal with their teaching: “What I try to do is to disseminate mathematics, looking for an excuse of what is going on around us” (Int. 02). They may also be cross-cutting themes (technology, strategies to facilitate learning, etc.).

They are inspired, up to date, and find the foundation for their content through reading: “I am a big reader. I have always started 3 or 4 books and read them at the same time. In these readings, we open up new fields. The more I read, the more doubts arise, and I realize how little I know” (Int. 06). Through their own social networks, they can easily follow what is published on the topics they are working on or those that are most significant to them. They make their ideas, opinions, resources, experiences, etc. available to others, knowing that there are some who listen.

As digital artisans, they generally do not plan their posts. In the cases where they do, it is usually because they are addressing their students and discussing topics that they are working on or are planning to work on with them. They also do not follow a work method: “I do not program the entries or think about them and store them beforehand. I discuss current events or what happens to me at school or what I read” (Int. 12). They justify an unsystematic, unorganized action, attending to their own conceptions of how and for what purpose social networks should be used by education professionals.

#### *4.2.3 Creators of affinity spaces*

The dynamics of dialogue and exchanges that occur in social networks generate collective spaces of encounter that can be understood as “affinity spaces” (Gee, 2005). In these spaces, people find other people or topics related to their interests (Rosenberg, et al., 2016). This affinity space is configured as a learning opportunity for teachers outside of the confines of formal training (Gee, 2017). Affinity spaces have a more open and somewhat diffuse connotation to the concept of communities of practice popularized by Wenger (2000), since a community of practice has goals and objectives that have a higher level of formality, as well as norms of interaction among community members.

Interviewees have created affinity spaces with their followers and with other educational influencers (Marcelo and Marcelo-Martínez, 2021). They have earned the credibility of their followers by sharing reflections, information, experiences, etc. in social networks. They are on social networks expressly for this purpose, stating: “I see it as an exchange of information or experiences. An exchange with the people who follow me” (Int. 10). This is a relevant achievement if we consider them to be clear about their objectives. Their main purpose is to generate learning opportunities for their followers; also, to build their own learning through the interactions and exchanges that take place. “It gives me a sense of being in tune with many teachers who want to share and want to train and continue training to transform education” (Int. 15).

The vast majority of the followers of the interviewees are teachers at all levels of education. Through their statements, the number of “followers” seems irrelevant: “I don't want to fall into this clientelism” (Int. 13). But they understand that followers provide a means for them to reach out to others. They are like multiplying agents, replicating and disseminating their posts, although sometimes they have some doubts, as this teacher did: “Being an influencer and all this, at certain times it has been a big thing for me, because I used to say: I am not doing anything for this, I am just learning and being curious” (Int. 17).

These platforms have provided them with access to an affinity space that connects them to countless people, as well as to a vast amount of information. “It has put me in contact with many very curious teachers of all kinds. They all contribute in some way” (Int. 18). Around them, they have built their own contact networks, with known and anonymous professionals, who nourish them with content that becomes fertilizer for their activity, as well as a source of learning and employment opportunities. Undoubtedly, networks have become a source of learning for them. “It is a learning space that I would find it very difficult to do without today. For me, if the little blue bird closes tomorrow, I would be upset” (Int. 11).

Interaction with users and followers in social networks often occurs as responses to comments on publications, intervening in debates, responding to a request or direct consultation, etc. There is a general perception that it is insufficient and that there is little interaction with them, although they would like to do it more often. Interaction occurs spontaneously from feedback and questions received, and debates generated about the

publications. They interact when time is available and as long as comments, questions, etc. are formulated with respect. Occasionally, personalized contact is maintained through private messages. “What is clear is that if you want something, you immediately resort to private messages, something that was hardly used before” (Int. 08).

#### 4.2.4 *Recognition and learning as rewards*

Hashim and Carpenter (2019) proposed a model to analyze teachers’ motivations to become involved, engaged, and motivated to use social networks. This participation, when it becomes very active, as is the case for participating teachers, requires time and consistency. Using utility-based theory, these authors differentiated between individual and social motives. Individual motives are related to the need for professional development and learning that teachers themselves perceive (self-efficacy). From these motives, they understand that participation in social networks can support their learning. Another motivation for teachers to use social networks is related to social aspects. With the emergence of social networking sites, the boundaries between school and the outside world have become porous, allowing teachers to develop a sense of identity and professional reputation both inside and outside of their schools.

We identified both motives in the teachers interviewed. Thus, they are satisfied and recognize different benefits of their participation in social networking sites, both on a professional and personal level. They especially emphasize the feeling of being valued by other professionals, which affects them on an emotional level and has an impact on their self-concept and self-esteem. For this reason, the recognition that most satisfies them derives from the words of gratitude of their followers.

Participation in social networks has changed them: “You ask me if I’m the same as I was 6 years ago and the same as I am now, and it has nothing to do with me as a teacher, because I’ve evolved” (Int. 01). Social networks have facilitated learning and professional development and have allowed them to have a greater professional projection: “Some of the training requested from me relates to the impact that my content had... I would not have succeeded if I had not been on social networks” (Int. 15), “As a result of this, they called me to give training courses, to publish on websites” (Int. 18), “When I started looking for work and projects as a freelancer, they opened many doors for me” (Int. 06).

In addition to positioning themselves as referents for specific professional approaches, as this teacher states: “My greatest satisfaction is being able to write several books and meet many people, participating in several projects... I have also learned a lot from other accounts through my participation in networks” (Int. 12).

## 5. Conclusions and Discussion

This study emerged from the extensive use that teachers in Spain are making of the social network Twitter for their own development and learning and the emergence in it of leading teachers that plays a key role in their learning. Within it, we researched the network structure and relationships among 54 active teachers. Using a SNA approach, we first identify teachers who have a high degree of centrality in the network. In addition, we identified influencers who play a key role in the circulation of information in the network studied. As we have analyzed, the network of 54 teachers is horizontally self-organized, with some groups having common characteristics but interacting with the rest of the groups, and where teachers of all educational levels are equally mixed.

Micro-celebrities or teacher leaders? We have conducted the analysis of a group of teachers who are creating new forms of interaction and who have developed informal interactions that allow them to voice their opinions with the ability to generate and share ideas and resources (Fait, 2018). These education professionals don’t perceive themselves with the term “influencers”. They assume a type of informal leadership (Ross, 2019) gained from the trust and recognition that their own peers have been giving them through social networks. This leadership is built on individuality, initiative, and motivation to share and exchange with other teachers. They are artisan teachers who have found a niche in the digital space to expand their possibilities of interacting with other teachers. Taking into consideration the article recently published by Carpenter, Shelton and Schroeder (2022), we find that Spanish teacher leaders opt more for autonomy and the ideal of contributing to the professional development of their colleagues than for receiving remuneration. They do not consider themselves neither influencers nor micro-celebrities. However, they share the tensions to which Carpenter, Shelton and Schroeder (2022) referred; on the one hand, being leaders among teachers, but at the same time not wanting to stand out due to a professional culture that does not reward the visibility of teachers (Patton and Parker, 2017).

The denial of leadership is something we have found informally when interviewing some of these teachers. The analyzed teachers operate as opinion leaders to the extent that they not only redistribute information but also generate their own information, either because they design content or because they find first-hand information based on their position in the network (Walter and Brüggemann, 2020). Therefore, we can assume that digital social networks allow the establishment of new informal leadership among teachers (Daly, et al., 2019). Through them, opportunities are created so that, by sharing their experiences, ideas, conceptions, and reflections, teachers can develop personal or professional learning (Greenhalgh, Rosenberg and Wolf, 2016).

These proactive teachers share some characteristics identified by Gerbaudo (2017) when analyzing the social movements Occupy Wall Street, Indignados, and UK Uncut. According to this author, these movements were characterized by three “technolibertarian” principles: transparency (tendency to open up, to open-source), horizontality (rejection of formal hierarchies) and denial of leadership (tendency to assume that leadership is something to be avoided). The principle of transparency was observed throughout the interviews in the teachers’ insistence on the idea of sharing their opinions and resources altruistically. As we have stated, they do not identify with the term influencer and assume the idea that they are often mere transmitters of ideas to promote the development and learning of other teachers. We see the principle of transparency not only in relation to the accessibility of resources and materials, but that it also has to do with the horizontal manner in which teachers build knowledge among themselves. This knowledge allows teachers to “learn in practice (by doing), through meaning (learning is intentional), through learning in participation with others, and through identity (learning and changing who we are)” (Lieberman and Mace, 2010, p. 80). These teachers are far from the concept of a “teacherpreneur” that has become popular in recent times (Koehler, et al., 2020; Shelton and Archambault, 2020).

Spanish teachers assume the principle of horizontality in teacher learning and professional development processes. Learning can take place at any time anywhere. Therefore, along with formal professional development activities, due to the contribution of the type of teacher interviewed, informal activities have multiplied, such as conversing with other teachers and carrying out independent activities such as searching the internet for teaching resources (Jones and Dexter, 2014). Teachers are accessing the internet to expand their development opportunities through social media platforms (Prestridge, 2019). Social networks enable the establishment of meaningful relationships among teachers. Through them, social learning is generated, as teachers share their experiences, ideas, conceptions, and reflections. For teachers who are active, learning through social networks turns out to be a process that becomes part of their work and continues outside school hours (van den Beemt, et al., 2018). Social networks make it possible to expand what has been called social capital (Rehm and Notten, 2016). Through them, interactions that can be stable or temporary are generated, which allow teachers to gather resources or obtain information from other people that are considered relevant (Fox and Wilson, 2015). The teachers we have interviewed provide teachers who follow them with new ways of learning and professional development (Nykqvist and Mukherjee, 2016).

Agents responsible for teacher learning should be aware of how social networks are contributing to learning and professional development, in line with what is evidenced here. The results presented invite reflection on the consideration that social networks deserve for extending the opportunities for interaction and collaboration. This form of professional development can perfectly complement others of a formal nature such as training through e-learning courses. While it is true that the real penetration of social networks in the practice of teachers must be considered. A line of research could be opened to consider what the current situation is in Latin American countries such as Brazil, Uruguay or Chile.

This study has some limitations. First, the selection of teachers was made based on the number of followers. The additional criteria could have been considered for their selection. Second, we have analyzed the point of view of the wrongly named “influencers”, but we have yet to know the perceptions of the subjects themselves, which give meaning to the work of these proactive teachers. What do the teachers who follow them learn? Why do they follow them? What applications and transformations, both personal and classroom-related, are produced as a consequence of participation in social networks and participation in a virtual affinity space? Do students perceive the effects of their teachers’ participation in social networks? These are questions that remain unanswered and should provide options for further studies.

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The authors report that there are no competing interests to declare.

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## Appendix 1: Interview Script

### Project: HOW DO TEACHERS LEARN IN A CONNECTED SOCIETY?

#### How Do Teachers Learn in a Connected Society? with Reference: PGC2018-096474-B-I00

#### Teacher individual interview script

QUESTIONS
<p><b>1. Some biographical information</b></p> <p>We would like to know some general questions about your professional career and background on social networks.</p>

Tell us briefly about the studies you have done and your professional experience. Are you currently teaching? If not, what is your current profession? Since when do you dedicate yourself to it?

We are also interested in knowing in which social networks you participate? Do you have a low participation profile in any of them? In which do you post more? In the latter, how many followers do you have? Do you pay attention to whether they increase? Do you follow any strategy to increase them?

## **2. Beginnings, the reasons that led you to become an active person on social networks.**

When did you start on social networks? What was the first time you joined? What vital moment did it coincide with (after your studies, before, when you started working...)? Did someone or something motivate you to do it? Did you receive help or advice?

## **3. Know the process you have followed, as well as the factors and variables that have intervened in your interest in the digital world.**

Explain to us the process you followed to become a highly followed person through social networks: how did you achieve it?

What problems have you found in the course of positioning yourself? What facilities? What have you learned along the way? What satisfactions have you found since you started?

Have you had any colleague or person in your immediate environment who has advised or advised you during the course?

Have you been guided by any reference? Do you follow any model?

## **4. Your own perception of your role as an active teacher in social networks.**

Who would you say is following you? Do you know the profile of your followers? What do you think they are looking for in you?

Do you consider yourself a person with influence in the social networks in which you interact?

What do you think the interest in following you is due to? What do you think your followers like about your user profile?

## **5. Format in which you usually present the publications**

Your posts, in what format do you usually present them (text, image, video, text and image...)? What leads you to opt for one or the other?

What type of format do you consider most appropriate to motivate followers?

## **6. Most relevant content that you address in your publications**

What do you publish about? Does the content that you usually introduce in your publications revolve around the same topic or is it varied? What are you most attracted to or what motivates you the most? We would like you to talk to us specifically about the content that you usually introduce on a more regular basis.

What leads you to select the content you publish on social networks? Based on what do you select?

Are you specialized in a specific topic?

## **7. Interaction with your followers on social networks**

Next, we would like you to tell us about some aspects related to the process that you usually follow in your interventions on social networks. First of all, we would like you to explain the procedure or procedures that you usually use.

Do you have a specific method to manage your interventions (think about them, organize them, etc.) that you use with a certain consistency?

Do you write on the go or do you always plan your interventions prior to publication?

Explain to us in a concrete way the procedure you follow to prepare a certain publication.

Do you prepare and/or publish more than one publication at a time?

Do you encourage interactions? Do you frequently allude to those who follow you?

How do you usually react to the participation of those who follow you?

### 8. General perception and degree of satisfaction in relation to your participation in social networks as a person with influence

Nearing the end of our interview, we would like you to make an overall assessment of your practice as a teacher with influence on social networks. In this sense, what difficulties do you usually find in the publication-response process? How do you value the feedback you usually receive?

What does your participation in social networks bring you personally and professionally?

What repercussions do your posts on social media have on your professional life?

What do you think your participation in social networks can contribute to your follower's learning?

Do you think that interaction through social networks is a learning opportunity? If so, can you tell us its advantages over more traditional learning sources?

Now we would like to know if you receive any kind of recognition and from whom, if so.

Finally, what recommendations would you make to someone who is starting this type of experience?

### Appendix 2: Category System

1. **Who am I?:** In this dimension we include personal data, age, gender, academic level where he teaches, social networks in which he participates, number of followers he has, etc. studies completed, academic trajectory
2. **How did I get here?:** In this dimension we include the process of becoming an active teacher: how it starts, who it starts with, if they start with a blog and how they evolve. If they have participated in other networks before. Previous or parallel experiences of contact with other teachers in reality are also included: courses, seminars, conferences.
3. **What do I do? How do I build my discourse?:** In this dimension we describe the process of creating content on social networks (on a blog, Twitter account or another social network). Not only the content they publish but how they publish it. Whether they build intended or spontaneous publications. If they post text, images, videos, etc. Also which area of the curriculum do you specifically address? What topics does it touch on? Problems found. What times of the day do I choose to post, do I do it on the fly or do I plan daily at a specific time?
4. **How do I relate with others? Those who follow me and those whom I follow:** In this dimension we analyze the relationships they maintain with other tweeters. If they are people they follow and if these relationships are maintained beyond the network. If they know their followers or have any relationship with them and if they interact with their followers and how do they do it.
5. **How do I perceive myself?** This is a dimension of identity. Basically answering the question of whether they consider themselves as influencers. Why do you think they follow you (what do they think they contribute, what distinguishes them from others).
6. **What do I get from this?** In this dimension we are interested in knowing what they learn, how it motivates them or what results they perceive from their work in the network. If by being "influencers" they have become more visible by participating in webinars, conferences, workshops.
7. **What is important to me?:** This dimension is related to the values that the interviewees express in the interviews: collaboration, respect, sharing, etc.
8. **How do I learn and how do others learn?** In this dimension we are interested in the opinion on the possibilities of networks to promote one's own learning and that of other teachers. What has changed in your personal and professional life by intervening in networks so intensely?