Comunicar

Networks, social movements and their myths in a hyperconnected world

INDEXED INTERNATIONAL SCIENTIFIC JOURNAL

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JOURNAL CITATION REPORTS (JCR)

JCR 2019 (2020-21): Q1. Impact Factor: 3.375. 5 Year Impact Factor 3.830. Inmediacy Index: 0.775; Eigenfactor Score: 0.000740; Communication: Q1 (13th position from 92, top Spanish journal; Education: Q1 (22th position from 263), the first Spanish and Iberoamerican journal.
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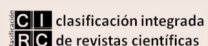H5: 39. Mean H5: 54. In 2021-07-01: H: 89; H5: 74 (44,926 accumulated citations)
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ERIH+

Level INT2 (2020)

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Comunicar 68

Special issue

Networks, social movements and
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22º / 263 Education
13º / 92 Communication

2ª / 1.002 Cultural Studies
19º / 387 Communication
43º / 1.254 Education

The hero and the shadow:
Myths in digital social movements
El héroe y la sombra: Mitos en los movimientos sociales digitales

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ABSTRACT

The general subject of this analysis is the presence of myths on social media, a heritage of the previous century's mass culture, and in particular, for social movements. Social movements within networked communication are particularly endowed with mythologies, which draw on mass culture and on societies' archetypal and psychological backgrounds. This fact justifies the hypothesis that the most effective and popular social movements resort to deeper mythological forms. The specific objective is to describe concrete myths in the language of digital social movements and to review the aspects of mythology in the scholarly literature on mythology from four fields. After tracing contents and impact, a qualitative analysis, focused on two examples justified by their digital origin, is performed: the "Anonymous" movement and "Je Suis Charlie" social mobilisation. Results show the persistence of two mythological motives: the profound hero's monomyth, playing an essential identifying role, channelled through social networks, with hashtags as slogans, and the related myth of the shadow, the dark, "Anonymous" and hybrid identity. Connections and analogies with other recent examples are discussed —such as the "Me Too" and "Black Lives Matter" cases—. The conclusion is the clear connection between these two myths and the communicative strength of social movements transmitted through social networks.

RESUMEN

El tema general de este análisis es la presencia de los mitos en las redes sociales, herencia de la cultura de masas del siglo anterior y en particular, en los movimientos sociales. Los movimientos sociales en las redes digitales se dotan de mitologías, sean retomadas del siglo anterior sean formas del fondo arquetípico y psicológico intemporal. Esta presencia justifica la hipótesis sobre si los movimientos más eficaces y populares recurren a formas mitológicas más profundas. El objetivo específico es describir mitos concretos que aparezcan en el lenguaje de los movimientos sociales específicamente digitales. Se revisan los rasgos de los mitos de acuerdo con los autores más prestigiosos de cuatro ámbitos científicos. Se extraen del rastreo de contenido e impacto dos ejemplos de origen digital: el movimiento «Anonymous» y la movilización social «Je Suis Charlie». Aplicando análisis heurístico, los resultados muestran la persistencia de dos motivos mitológicos muy concretos: el profundo monomito del héroe, que cumple un papel crucial identificativo en las canalizaciones mediante redes como Twitter, a partir del uso específico de los hashtags como eslóganes, y el mito asociado de la sombra, la identidad anónima, híbrida y oscura. Se presentan las funciones y analogías en otros movimientos recientes –como «Me Too» y «Black Lives Matter»–. Se concluye la conexión entre estos mitos y la fuerza comunicativa de los movimientos sociales que se transmiten en las redes.

1. Introduction

If there is a standout feature in the social movements of the beginning of the 21st Century, it is their possible anchorage in imaginative forms related to myths. A peculiarity of the social movements manifested in digital networks is the way in which they seem to be linked to imagination and myth. It is possible to isolate and investigate living myths in digital social movements. The general hypothesis that guides this study is the presence in digital culture of essential mythologies, as an important factor of communicative strength. Myths reappear in digital media to continue fulfilling their vital and social inspiring functions.

The present study develops interdisciplinary research, with an extensive review of myth theories and psycho-social and socio-political literature on myths, to apply these findings to the specific field of digital social media. The fundamental objective is to detect how the most striking social movements in digital networks are endowed with myths, and what function they fulfill. After a selection of impact-related examples, whose current state is detected on social media, the qualitative analysis of two cases shows distinctive traits of fundamental myths. Their specific articulations are discussed, showing how two deep-rooted forms of myths appear in recent digital social movements: the identity of the hero, and the negative and contradictory form of identity, or shadow.

The general research question posed by this work is: What elements do myths, current social movements, and digital networks have in common? Three phenomena of different dimensions come together from within human activities. Myths are fundamentally forms of language whose function is to lend meaning to something that cannot be understood, or that needs to be structured, remembered, or brought to light in human life. As Pánikkar affirms (Kerényi et al., 2004), symbols are the building blocks of the myth. The symbolic formations and representations create mythical forms. As social movements gain strength, they build a gallery of symbolic forms whose last step may be the presence of the myth. This research specifically enquires whether digital language contains such forms.

Figure 1. Video from @howard-lee appeared in Twitter in Spain in spring 2020 (https://bit.ly/3dj1ij9). Reusing popular mythology for social concern in the networks

Isolating two cases, their recent impact is proven using a software tool. The heuristic myth-criticism analysis is elaborated on its materials. The rationale of the two selected cases (the "Anonymous" movement and the "Je Suis Charlie" social mobilisation), resides, in addition to their persistence as influential hashtags, in their essential and native digital caracter, which differentiates them from other movements, and in their international dimension -both movements have different origins, but both became global. The two movements influence other recent ones with their symbolism, and both are representative of the new digital activism; they provide keys to study the communicative force of myths in the networks. Communicative force or energy is defined as the ability to activate and mobilise people, to fix the collective social

memory, and to clearly mark the contemporary imaginary. A recent example, associated with relevant social concerns and contemporary mass culture, shows the presence of simple mythological forms in the networks. One of the heroes most present in the expression of the youngest social media users, travelling from the mass culture of the 20th Century, is Spiderman. Spiderman is a superhero that we can associate with the "monomyth" of Campbell (Campbell, 2016). Spiderman, the hero of many young people in the global web of digital social media, throws communication threads. It is no coincidence that this hero was the myth chosen by those born in an era characterized by networks. In the midst of the Covid19 crisis, social media memes showed superheroes like Spiderman paying tribute to healthcare professionals (Figure 1). The myth of the youth hero was used to convey a collective social sentiment.

Social movements are the most vital political expression of our time - feminism and environmentalism are theoretical traditions with a vibrant presence today. They are increasingly present and are highly valued by society (Aladro-Vico & Requeijo-Rey, 2020), becoming the basis of the legitimacy of political action, and placing themselves at the origin of contemporary social agendas (Zuckerman, 2019; Feliú-Albadalejo & Moltó-Berenguer, 2019). On social media, these movements are mediated by technologies (Maxwell & Miller, 2012). It is also necessary to investigate the essence of that relationship. From the traditional myth to the technical myth (Kerényi, 2012), instrumentalised for purposes beyond its meaning, there is a deep abyss in the digital world that is analysed below.

2. Review of the myth criticism and psychology fields: From the myth in culture, to mass mythology

The literature on myths, its evolution and contemporary cultural transmission, is vast. Not only in terms of quantity, but also of the quality of researchers who have analysed the role of myths in culture. The authors who have studied myths, from Campbell (2016), Jung (2009), Otto (2005), and Cassirer (2016; 1968), to Barthes (2010) or Lévi-Strauss (2005), remarked on their absolute importance in human life. The most prestigious researcher on myths, Campbell, did not hesitate to include forms of contemporary art and popular and mass culture, as myths (Campbell, 2016).

Campbell was, on the other hand, highly influenced by the psychological capacity of myths, identified by Jung (2008), who established the need for the presence of myths in the daily routine of human life. Both authors define myths as guides for the human spirit. This foundational definition is supported by all experts. Myths provide examples, images and directions to guide human beings in their lives. They are stories whose function is the call to be that hero in search of that gift that only he can achieve, and that will definitely improve the world we live in (Campbell, 2016). In Campbell's conception, as in Jung's, the myth has an individual value that is also social-evolutive.

Kerényi insists that the root of the myth comes fundamentally from the Greek etymology for spoken narration (Kerényi, 2012). This idea is shared not only with Otto (2005), according to which myths are a language, but also with the founder of modern anthropology, Lévi-Strauss. Myths communicate something essential in a way that cannot be otherwise achieved. In semiotics, Barthes (2010) defines his mythologies as a language that transforms and changes the mysterious and the questionable into the natural and inevitable (2010: 129). Another element of continuity in the knowledge about myths is constituted by the difference that Kerényi, Jung and Eliade make between the myth in its pure state and the instrumentalised, "infantilised" (Eliade, 2010) or "technified" myth (Kerényi, 2012). Cassirer, reflecting on the use of the myth for purposes of political power and social influence, affirms: "It has been the task of the 20th Century, our great technical age, to develop a new technique of myth. As a consequence, myths can be manufactured in the same sense and according to the same methods as any other modern weapon" (Cassirer, 1968: 333).

In Jung's theory (2009: 134), there are high and low energy channellings of the myth. The most infantilised or superficial forms of myths appear in the contemporary imagination, with less capacity for deep connection with the psychological side of the myth. There are aberrant transformations of the myth in political movements such as Nazism. Jung studied the use of the swastika on the Nazi German flag. The author was able to verify how a religious myth that disappeared in the secularised post-reformist Germany, reappeared forcefully as a socio-political resource aimed at empowering its user. The strength of myths comes from their connection with the "shadow" of our own consciousness (Jung, 2009). As a totality,

the being of each individual is a paradoxical complexity, a *"coincidentia oppositorum."* Myths express the human psychic identity but also its shadow, the unknown deep self. Barthes (2010) analyses the functions of the myth in contemporary society. Every myth is dense in the world of meaning. According to the author, and as Miller has pointed out, myths become natural parts of a language, ceasing to be debatable (Miller & McHoul, 1998). Myths "provide information about a culture in a non-reflective way" (Miller & McHoul, 1998: 16). They can "encapsulate" (the expression is Hoggart's (Miller & McHoul, 1998)) vital contents of human existence, expressing dilemmas in a liberating language.

3. Review of socio-political and communications fields: The theoretical tradition of the myth and digital revolution

Sorel analyses myths from a socio-political perspective. Myths do not have the function of stabilising, but rather of directing energies and inspiring the individual or social group to act (Sorel, 2005). Myths give shape to a dynamic vision of the vital movement. As "means of acting on the present", myths liberate from the dominant ways of understanding reality, and from the restrictions that habits, rationality or beliefs have established in social life. In a similar vein, Gramsci gives a primary role to the myths that shape the great social revolutions. In his Notes on Machiavelli (2018), he explains that the imaginative power of mythical forms acts by generating cultural, passionate and moral changes, because "it is embodied in some image within popular beliefs" (2018: 10), in a way that overcomes simple doctrinal or ideological arguments.

In the field of current cultural studies, it is still interesting how it is possible to use myths as proper languages of social movements. Current research is specifically interested in how myths can serve for the "manufacture of new meanings" (Miller & McHoul, 1998: 15) that allow the expression and affirmation of new communities or identities, rejecting the dominant definitions. Kermode considers that myths "are the agents of stability, and fictions, the agents of change" (2000: 39). Throughout the twentieth and twenty-first centuries, social movements seek and trace myths in the fictions of mass culture. According to Frye, ideologies are considered to be applied mythologies (Frye, 1996: 5).

Myths and other forms of the imaginary can serve as the foundation for institutions and social activities of all kinds. Technologies come wrapped in a halo of mythology, as studied, through the myth of Athena and Ephestos, by Coomaraswamy (1947). In the world of digital technology, the myth involves the sharpest aspects of its impact on our lives (Borisovna, 2019). As Treré and Barranquero (2013) have studied, there is a tradition of analysis of the mythical forms that we associate with the Internet and with social media, in which authors such as Mosco (2011), McChesney (2012) and Morozov (2012) work, from a political economy of communication. There is a mythological sublimation of social media. There are aspects that consider the emergence of the Internet and social media as the realisation of a utopia, in a discourse that acts as "witness of a reality: the technological revolution" (Almirón & Jarque, 2008).

As Morozov studies, the Internet is probably one of the technological phenomena in which, being a communication system, it self-represents a realised utopia. The arrival of a new form of intelligence, a new hyper-connected human being, finally materialises. The aforementioned authors study the double function of the myth of the Internet, because if, on the one hand, it constitutes a phenomenon as unique in human history as the invention of writing (De-Kerckhove, 2010), it is quite true that the technological determinism that this myth implies leads us to a great deception (Morozov 2012), to a make-up wearing and uncritical vision of the network. This technified myth has terrible consequences, as pointed out by Maxwell and Miller, due to its ability to whitewash the exploitation of the planet and the so-called digital "greenwashing" (Maxwell & Miller, 2012; Miller, 2020; Riechmann, 2020). Social media is the object of special observation in this regard, by authors such as Mosco et al. (2018) recently.

The reason for the Internet to be presented as a world of realised myth lies precisely on the fact that the origin of the network is a synergy of creations and contributions (Leporini, 2015). The idealism that inspired the first hackers favoured the Internet to appear marked by utopian myths (Lovink et al., 2017). The relationship between the spirit of collaboration, the great technological confluence, and the fact that they are media of great power, mythologised the new digital world.

4. Material and methods

To analyse two significant cases, two phenomena are selected that we must geopolitically frame in the Western world, although their influence extends globally. First, the choice of the social movement of "Anonymous" is justified because it is a global digital phenomenon, with a long and persistent history. "Anonymous" presents a chain of mythological resonances in its image galleries that is rich and complex (Alexopoulou & Pavli, 2019). It is also associated with the spirit and philosophy of the Internet.

"Anonymous" is the name of a social movement with diffuse profiles generated on the web around 2008. It communicates through a symbology under which different groups are assigned, following the hacker philosophy that was generated at the beginning of the Internet, in defence of freedom of expression and intellectual creation. The movement takes on the fight against censorship movements, and in favour of democracy and free public opinion, essentially using digital hacking weapons and attacks on service distribution. It also filters sensitive information and points out the perpetrators and culprits of manoeuvres against said freedoms. It is committed to established social movements, environmental advocates, and opponents of corporate capitalism (Fish, 2015). "Anonymous" is legendary as a recognisable group, with actions since the early 2010s, despite the fact that the anonymous nature of its members' actions and even the non-closed group structure makes it difficult to establish an identity. The "anona" or members of the group, have appeared in image banks and documentation channels of memes, since the early 2000s. The group undertook actions to defend the WikiLeaks platform as well as mobilised digital resistance against Islamic terrorist groups in the attack against the French satirical magazine Charlie Hebdo, in the fight for freedom of expression and information. In one of his latest actions in 2020, during full global alert over Covid19, it momentarily blocked Facebook and Instagram by issuing a message on Twitter, advising young people to read books and forget social media, a massive irony and paradox. Secondly, the digital social movement "Je Suis Charlie" was chosen for the richness of its creative manifestations, its continuity as an emblem of the fight for freedom of expression, its persistence, (in 2020, new attacks related to the French magazine have again led protesters from this movement to take to the street), and because of its specifically digital origin (Nugier & Guimond, 2016).

In January 2015, a Jihadist terrorist attack led to the deaths of 12 graphic humorists who worked at the French magazine Charlie Hebdo (Nougier & Guimond, 2016). Journalist and graphic illustrator Joachim Roncin devised a slogan identifying himself with the victims of the Paris attack, inspired by the Cold War-era slogan "Ich bin ein Berliner" by J.F. Kennedy. "Je Suis Charlie" became a viral phenomenon that generated more than five million messages/creations in three days, from the massive creative expressions of Twitter users, who in the days following the crimes flooded the web with illustrations, memes, graphic tributes and all kinds of anonymous or collaborative images (Pelletier & Drozda-Senkowska, 2016).

Table 1. Popularity and correlation of hashtag #"Je Suis Charlie" in present days		
Hashtag	**Popularity**	**Correlation**
#JeSuisCharlie	68.8%	Reference
#CharlieHebdo	70.9%	0.1%
#ToujoursCharlie	36.4%	0.1%
#jesuisprof	33.6%	0.1%

Note. Data from 06-10-2020 to 08-12-2020. Software hashtagify.

To illustrate the persistence and nature of the influence of both movements, a recent tracing of the hashtags #JesuisCharlie and #Anonymous was carried out using the Hashtagify software tool. Twitter was chosen because this social network has become relevant to social movements —and not only established politics— and has the greatest influence in shaping dynamic socio-political relations (Congosto, 2015). The tool used performs a rich monitoring of hashtags, with millions of labels in billions of tweets, in close terms. We determined its use to test the persistence of the phenomena chosen for analysis. Focusing on the period of the last two months (October to December 2020), we looked for the correlation between the two identifying labels of both movements, and current political events used as a base reference. Hashtagify provides the popularity percentage and with it, the presence of hashtags in the total set of messages issued in a given period. In the case of "Anonymous", the hashtag #AvengeAssange within the #OperationPayback, organised by the movement, to counterattack companies and organisations opposed to Julian Assange

and his WikiLeaks organisation, impacts today, despite its coming from 2010, due to Assange's recent extradition and imprisonment in the Belmarsh high-security prison, after being arrested at the Ecuadorian embassy in London in April 2019.

In the case of "Je Suis Charlie", the recent event selected is related to a new Islamist terrorist attack. The French satirical magazine republished the Muhammad cartoons at the beginning of September 2020, on the occasion of the start of the trial against those responsible and collaborators in the Charlie Hebdo attack. At the end of the same month of September 2020, a man attacked several journalists from a news agency that occupies the former headquarters of Charlie Hebdo, with a knife. A few weeks later, on October 16, history teacher Samuel Paty is beheaded in Paris for showing the same cartoons to his students in a debate about freedom of expression. The following tables show the current popularity of the two main labels, and their correlation with other popular ones, which exemplifies the degree of diffusion and dispersion of influence.

Table 2. Popularity and correlation of hashtag #"Anonymous" in present days		
Hashtag	Popularity	Correlation
#AvengeAssange	4.2%	Reference
#Ecuador	73.9%	50%
#FreeAssange	58.5%	50%
#ReconectJulian	43.1%	50%
#OperationPayback	21.6%	Reference
#"Anonymous"	71.5%	23.5%
#Wikileaks	68.2%	8.8%
#fineart	66.2%	8.8%
#comtemporaryart	62.5%	5.9%
#graphicdesign	66.8%	8.8%
#artgallery	55.6%	8.8%
#arthistory	53.8%	8.8%
#whatisart	34.3%	2.9%
#Anonymiss	41%	2.9%
#Snowden	64.9%	2.9%
#TeaParty	72.4%	2.9%

Note. Data from 06-10-2020 to 08-12-2020. Software hashtagify.

The study period established is from 06-10-2020 to 08-12-2020 (Table 1). The hashtag #JeSuisCharlie maintained a high popularity during the study period: 68.8%. Its correlated hashtags are also highly popular: #CharlieHebdo (70.9%), #ToujoursCharlie (36.4%) and #jesuisprof (33.6%) (Table 2).

Figure 2. Persistence of the verbal auto-identificative strategy of "Je Suis Charlie" in recent hashtags
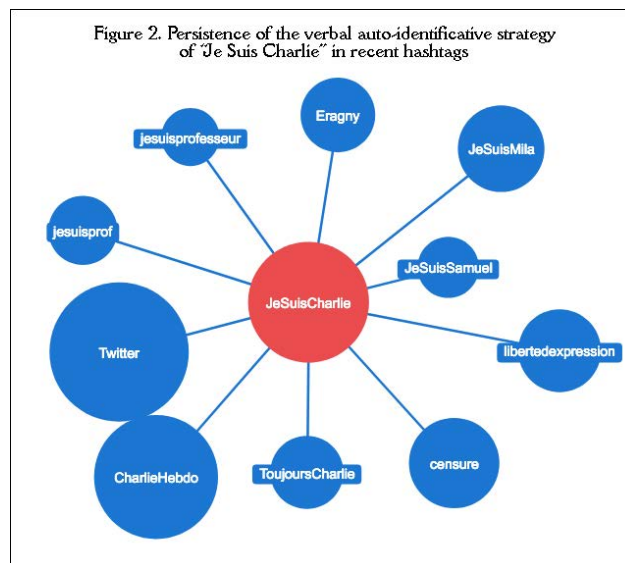
With the hashtag of the #OperationPayback campaign, data from #Anonymous (71.5%) and #Wikileaks (68.2%) were retrieved, both elements were widely disseminated on social networks. The

hashtags correlated with high popularity are framed in the world of social movements for the fight for freedom of expression and privacy on the Internet (#Anonymiss and #Snowden), conventional politics (#TeaParty) and art (#graphicdesign, #fineart, #comtemporaryart, #arthistory).

The relationship with tags such as #arthistory, #artgallery and #whatisart shows the link of the art world with the actions of "Anonymous" in the Assange case. Multiple accounts on social media, portals and websites collect representations of the group of hacktivists and Assange, or develop artivist actions to support them. Given their hidden identity, they usually represent "Anonymous" with the Guy Fawkes mask and the head covered with a hood. For its interest, in the following visualisation we observe the persistence of the strategy of the slogan "Je Suis Charlie" in hashtags and derived slogans (Figure 2).

The hashtag #JeSuis has become a symbol that represents unity and support in the face of different tragedies since the 2015 attack, and which, as we will see below, fulfills profound psychological functions. Heroic identification had already been used before by social movements such as the Mexican #yosoy132 but it did not have the same impact as in the French case. #JeSuis has also been used to criticise the fact that other tragedies and attacks similar to those of the weekly Charlie Hebdo have not had the same international repercussion.

In the case of "Anonymous", the hashtags show us greater dispersion in their correlations with organisations, the media, associations and cultural manifestations. The correlation of the #"Anonymous" movement, without its own diffuser, and all manner of subjects, also disseminates a series of characteristic images, which we analyse below, in which famous artists and cultural organisations are involved. The related images fit perfectly into the shadow mitema that we mentioned above and that we will study further below (Figure 3).

Figure 3. Presence of "Anonymous" in different present subjects (visualisation with Hashtagify)
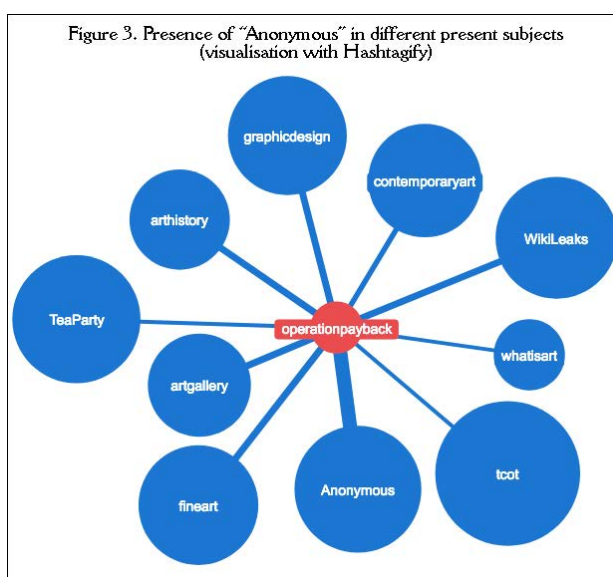
Once the persistence and quantitative importance of both movements has been verified, we use a heuristic method validated in myth-criticism, such as the identification, analysis and classification of mythological contents (Losada, 2015), in the analysis that follows.

5. "Anonymous": A mythology with fictional genealogy and activist functions

1) The image of "Anonymous" is an interesting symbolisation of contemporary identity, associated with an archetypal motive of great antiquity, which we have cited above: the shadow, the double or the hybrid. The "Anonymous" non-hero is an important archetype of personality, contradiction and ambiguity: He unites identification and anonymity in his idea (a coincidence of opposites, also an archetype that is well developed in mass culture (Morin, 2001)). It responds to a long chain of representations, linked with Campbell's monomyth and with the Jungian shadow.

2) "Anonymous" is anchored in mass culture. It is associated with the image of the 1982 comic, and later 2004 film, "V for Vendetta" created by the British artists Moore and Lloyd, in the culture of the 20th century. Much further back, it is related with the mask of an English conspirator Guy Fawkes, from 1605, who tried to blow up the British Parliament in the so-called "gunpowder revolution" in favour of Catholicism and against the country's dominant Protestantism. The trace of modern cultural aspects stemming from fiction is important in this myth.

Figure 4. Image of "Anonymous" (bit.ly/2DTJsYu). The edited photograph documents the myth of the shadow in the identity of the digital social activist

3) As we can see in figure 4, "Anonymous" is a dark hero, that has a double moral character, he is both a hero and a villain. Moral ambiguity is a deep mythical trait. It perfectly encapsulates an ambiguous identification beyond the moral canons of the traditional solar hero, towards more sombre and archaic forms. The hero "V", endowed with a lunar sign symbol, currently translates into an indefinite figure, whose valuation we cannot clearly associate with "good" or "evil". He is the reader of the comic, or anyone who watches the later 2005 film, decides if their actions are saving or vindictive. This trait fits perfectly with the nature of the activist group's actions.

4) "Anonymous" is a hive identity. The plural identity, finally anchored in digital media hackers, is constantly fed back. Its attractiveness in the world of social networks used by youth is linked to this specific trait. "Anonymous" is actually a network, and not an individual identity. It breaks and overcomes the polarity of the self/others, allowing the identification of many young people with the group. It is not a movement, but, as Landers puts it, "It is a group, in the sense that a flock of birds is a group. Why do you know that they are a group? Because they travel in the same direction. At any given time, more birds could join, leave or completely change course" (Landers, 2008).

5) "Anonymous" symbolises digital identity. The idea of a community of meaning, built on action, and collaboration without its own features, timely, free and fluid, is one of the features of digital identity, congregated in activities and interests, but not physical, and fluctuating or liquid. (Bauman, 2005; Robinson, 2007)). In digital modernity, the free circulation of content and the free grouping of authors is the key to a new cultural system. It also embodies the idea of self-invention and free choice of identity, mythical elements of the Internet (Kendall, 1998).

6. "Je Suis Charlie": A social network creating a verbal and visual encyclopaedia of an activist movement

1) The "Je Suis Charlie" movement emerges as a large demonstration against the attack on freedom of thought and expression. The force of language fights against intolerance of beliefs and repression in "Je Suis Charlie". The movement links with the values of French, European and Western culture, in favour of freedom of thought.

2) In the archive of images that we have compiled for this study, examples of which are presented in Figure 5, this social media movement links up with a mythical chain of immense cultural value: the sacrificial hero. The hero-victim is a profound myth: It self-sacrifices or immolates itself in the fight for value. This myth, with millenary religious antecedents (from "You are that" of the Great Forest Upanishad to "This is my body" Christian), emerges in a stylistic pragmatics common to other social movements, with the identifying motto "Je Suis Charlie". This potently identifying phrase with the murdered victims is conveyed through the hashtag, automating the identification of the group through indexical semiosis. But this verbal identification is reinforced with a pragmatic action. In "Je Suis Charlie", thousands of people become cartoonists, reviving the murdered illustrators. The crime response force against communicators is carried out through identification with their actions, generating a fighting response that denies death.

Figure 5. Examples on the #JeSuisCharlie movement meme website (bit.ly/379wsKE).
The image is a sample of the iconic encyclopaedia created in the digital social movement

3) As in the case of "Anonymous", we found a collective and essentially anonymous flow of communication. The creations of this chain of manifestations do not claim authorship. They promote identification with the other, with the cartoonists of the French newspaper assassinated by fundamentalism. The culture of impersonal creation and expressive multiplicity is clearly manifested. The heroic identification becomes massive, giving a new force to the movement. The National Institute of Intellectual Protection of France refused to register the slogan "Je Suis Charlie" as a copyrighted creation, because it considered that the message should be available for use, symbolising freedom of expression and its defence (Provost, 2015).

4) The digital movement triggers the myth of the Internet with a new ethical sense: Creation is an act of protest, and at the same time, the object of said act. This is a deeply valuable aspect of this movement. The anonymous cartoonists and creators who contributed with millions of images to the movement gave symbolic density to it. Each visual message is an immaterial blow that defeats fear and censorship, building a new society. The digital world reaches the myth of its own origin in the expressive strategy of "Je Suis Charlie".

5) "Je Suis Charlie" creates a visual and verbal encyclopaedia associated with contemporary freedom of expression. Multiple modulations with cultural resonances (political, religious, comic book culture, historical political posters) are all linked to the radical defence of the free movement of creation (Titley et al., 2017). Around the myth of the hero-victim, and creator, an encyclopaedia appears (Eco, 1995), that is, a semantic universe full of connotations that is inhabited by the users' community, and that is formed by adhering new encodings to a previous semantic node. "Je Suis Charlie" is the first digital social movement that symbolises the power of digital communication in the face of physical violence. The force of creative energy on the web fights over destruction. The psychological and quasi-religious depth of the myth, in addition to its subsequent influence, is clear (Pelletier & Drozda-Senkowska, 2016).

7. Results, discussion and conclusions

In the two selected examples we find analogies in specific strategies. The most essential is the recovery of the myth of the hero's identity and his shadow. These mythical motifs appear in all their psychological richness, duality and openness to the other (Deseriis, 2012).

The strategy that identifies the hero with the activist powerfully draws attention, through a recreation of the deictic identifying language ("I am", "We are", "I cannot", "You are") that accompanies and verbalises the mobilisation. The creative practice of the activists creates the heroic narrative, the fight against evil. The "Je Suis Charlie" movement, as in the case of "Anonymous", becomes the matrix for future social movements on the web, such as #MeToo and #ICan'tBreathe ("Black Lives Matter"). Note the reuse of identification with the victim in these global digital movements in defence of freedoms, acting through hashtags/slogans in the first person.

Digital activism appears as a spontaneous diffusion, on different supports and with multiple resonances, of a self-identifying language of images, slogans, symbols, created and disseminated by activists.

In the two movements analysed, there is a mythological background whose expression comes together - there is a symbolic identification between "Anonymous" and "Je Suis Charlie", with the use of the same slogans ("We are Legion"), and with other later movements, through the creation of visual and verbal encyclopaedias. In two recent, more hybrid social movements, such as "Me Too" and "Black Lives Matter", the same strategic use of hashtags as slogans and self-identifying deictic labels ("MeToo", "ICan't Breathe") are used, in encyclopaedias rich in fictional, artistic and symbolic resources. The mythological narratives in which they are inserted are the same social actions where they appear. They are myths called out to go to the streets and change the world.

"Anonymous" is a matrix of strategies for other digital social movements. Hive identity and anonymity are essential keys to other subsequent assembly social movements such as Occupy and Extinction Rebellion, which reproduce patterns of rejection of the group hierarchy of traditional social movements. The unknown and masked hero is a myth of digital culture (from the artist Banksy, to the cyborg movement or to the leaderless rebels of Hong Kong). Zuckerman (2019) indicates that movements such as "Anonymous" are especially suitable in a society like the current one, due to their surprising way of combating the global control of information and dealing with it through unexpected resources.

In conclusion, the activist-heroes of the digital social movements analysed appear marked by paradoxes: they are either hero-villains, hero-victims, or shadow individuals (Encarnación-Pinedo, 2020) taking on contradictory natures. The two analysed examples of social movements in social networks show us a digital language associated with heroic mythologies with deep psychological roots, and culturally enriched: The hero and the shadow, the identity and the counter-identity, return with force.

In the cases analysed in their semiotic and symbolic aspects, we appreciate the link between mythology and popular imagination, characteristic of the revolutionary forms of myths that we have studied as a socio-political trait. As indicated by Pinazo-Calatayud et al. (2020), social movements not only become effective when they are conveyed through social media. These researchers indicate that it is necessary for such movements to link their causes with emotions for action. That is where myths act, bringing to light their strength in the deep memory of the human psyche and showing their power in their digital expressive development.

We have used both, a quantitative and a qualitative approach to the phenomenon we wanted to study. From them, in continuity, derives the presence in the digital culture of essential mythologies, as an important factor of communicative force, confirmed in two movements of clear social purpose that persist over time as indicated by the study of their presence in networks. The identity of a sacrificial hero, and that of an anonymous or collective hero, in which contradictory aspects come together, returns to the hyperpersonal society of networks, to appeal to activism.

These conclusions, based on the mythocritical analysis of the psychological and semantic aspects, unite the myths, the current social movements, and the networks, in their languages for action. There are mythological forms in digital movements as the cases studied show. The new activism also joins the fluidity, anonymous collaboration and creativity of the networks. These communicative values also feed the movements studied. The myth of the Internet lives on in digital activists.

Social movements that become myths in the networks transcend the individual/group dichotomy. Beyond logic and rationality, the monomyth of the hero and his sacrificial identity, and the shadowy ambiguous identity, revive in the communities of online activists. With their active naturalisation of the fight for change, shared and recreated by millions of users, these myths in the digital activism networks are the millennial and present call to change the world.

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Archetypes, Me Too, Time's Up and the representation of diverse women on TV

Arquetipos, Me Too, Time's Up y la representación de mujeres diversas en TV

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ABSTRACT

The feminist movements Me Too and Time's Up have showcased the power of the audiovisual industry and social networks denouncing sexual harassment and promoting gender equality. Nevertheless, women in the media –and, specifically, on TV– continue to be underrepresented and stereotyped. Then, according to Time's Up, it is urgent to increase the number of women in front of and behind the cameras, as well as to embed social movements' influences on media productions in order to broaden the archetypal models used for characters' design/analysis. Despite the benefits of archetypes in storytelling, they are based on patriarchal and ethnocentric myths that undervalue female diversity. In response, this paper explores the transference of these feminist movements in terms of female presence and representation on TV series broadcast in the Peak TV era. From an intersectional approach, 25 feminist series were identified, and good practices in the portrayal of female characters are presented as useful role models for co-education which can contribute to egalitarian attitudes in youth. These female characters amplify typical archetypes (i.e., Knower, Carer, Striver, Conflictor, Everywoman) by defying stereotypes. This study concludes that there is a feminist trend in streaming platforms' content, especially in series with a high female presence on-screen/off-screen (many of them linked to feminist movements), that sheds light on a more egalitarian and inclusive television landscape.

RESUMEN

Los movimientos feministas Me Too y Time's Up han mostrado el poder de la industria audiovisual y las redes sociales para denunciar el acoso sexual y promover la equidad de género. No obstante, las mujeres en los medios –y, específicamente, en TV– siguen estando infrarrepresentadas y estereotipadas. Por ello, como señala Time's Up, es urgente aumentar la presencia femenina delante y detrás de las cámaras, así como integrar las influencias de los movimientos sociales en las producciones para ampliar los modelos arquetípicos utilizados en el diseño/análisis de personajes. A pesar de los beneficios narrativos de los arquetipos, estos se basan en mitos patriarcales y etnocéntricos que infravaloran la diversidad de las mujeres. En respuesta, este estudio explora la transferencia de los movimientos feministas a la presencia y representación femenina en las series emitidas en la era Peak TV. Desde una aproximación interseccional, se identifican 25 series feministas en Netflix y HBO y se presentan buenas prácticas de construcción de personajes femeninos útiles para la coeducación y el desarrollo de actitudes igualitarias en jóvenes. Estos amplían los arquetipos típicos (es decir, Conocedora, Cuidadora, Luchadora, Conflictiva, Cualquier mujer) y desafían los estereotipos. Se concluye una tendencia feminista en el contenido emitido en plataformas streaming, especialmente en series con alta presencia de mujeres delante/detrás de las cámaras (muchas vinculadas a movimientos feministas) que arroja luz sobre un panorama televisivo más igualitario e inclusivo.

1. Introduction

During the past years, feminist movements have had a major boost in terms of audiovisual content and social networks, with Me Too (#MeToo) and Time's Up (#TimesUp) as their best examples. #MeToo, aimed at denouncing sexual harassment and supporting victims, has highlighted the capacity of the Hollywood women and social networks to advocate for gender equality (Fileborn & Loney-Howes, 2019). Moreover, #TimesUp calls for increasing women's presence on-screen/off-screen and for showcasing their diversity partly influenced by #BlackLivesMatter. It seeks to confront the female underrepresentation and misrepresentation in the media, which contribute to gender stereotypes (Lotz, 2006; Ward & Grower, 2020).

Psychosocial research has systematically shown that TV can be a strong socializing agent igniting social innovation (Miller, 2010). In this vein, TV storylines and characters are essential for new and diverse female images that could offer role models for viewers, mainly young ones (García-Muñoz & Fedele, 2011; Lotz, 2006). This is particularly significant in shaping attitudes toward minority groups, especially when some people draw information solely from TV (Kidd, 2016). Media portrayals usually employ archetypes based on patriarchal myths that maintain gender and ethnic stereotypes by undervaluing women's experiences and excluding their multicultural backgrounds (Enns, 1994). Therefore, the analysis of how TV represents women and their diversity is needed, embedding the social movements' influences (Enns, 1994; Lotz, 2006; Solomon & Kurtz-Costes, 2018). To address this challenge, our paper aims to explore the translation of #MeToo and #TimesUp in female presence and representation in the Streaming era of TV which implies new forms of production and content consumption, particularly for youth (Bucciferro, 2019; Budzinski et al., 2020). From an intersectional feminist approach, this paper identifies feminist serials and presents good practices of female characters that amplify typical archetypes and promote an inclusive TV. First, #MeToo and #TimesUp are introduced. Second, the model of archetypes, widely used in the design and analysis of characters is presented, linking them with female TV portrayals. Finally, we will describe the methodology in order to present and discuss the results.

1.1. The impulse of feminist movements from the audiovisual industry

#MeToo was popularized in October 2017, when several actresses accused Harvey Weinstein – an acclaimed film producer– of sexual harassment and abuse, breaking the culture of silence rooted in Hollywood for decades. As a form of public denouncement, the actress Alyssa Milano told her story on Twitter appropriating the hashtag #MeToo (Figure 1), which quickly became viral.

Figure 1. The tweet that made the #MeToo online call

Alyssa Milano ✔
@Alyssa_Milano

If you've been sexually harassed or assaulted write 'me too' as a reply to this tweet.

Me too.

Suggested by a friend: "If all the women who have been sexually harassed or assaulted wrote 'Me too.' as a status, we might give people a sense of the magnitude of the problem."

1:21 PM - 15 Oct 2017

24,725 Retweets 53,346 Likes

It was used 12 million times in the first 24 hours alone and shared in 85 countries in the first month of the campaign (CBS, 2017). Thus, many women began to share their experiences and create online communities of trust, exposing the magnitude of sexual violence and condemning patriarchy (Khomani, 2017). The movement had a great impact on the audiovisual industry, with allegations of sexual misconduct by public figures in other areas (e.g., music, education, science, policy). Following Chandra

& Erlingsdóttir (2020: 1), "the movement has burgeoned across social media, moving beyond Twitter and into living rooms and courtrooms. It has spread unevenly across the globe (…) and interacted with existing feminist movements, struggles, and resistances".

The origins of #MeToo date back to 2006, when Tarana Burke, an African-American activist working with ethnic minority youths, launched a campaign under this name when she could not respond to a girl's confession of sexual abuse. While initially a grassroots movement, #MeToo eventually through virtual communities overcame socioeconomic classes, reinforcing the idea that social networks are powerful tools that diffuse feminism and that digital activism enables more effectively raising awareness (Berridge & Portowood-Stacer, 2015). Despite its achievements, #MeToo was also criticized. Mainly, for its failure to address long-term political advocacy, and most of all, for focusing on socially privileged women –making racialized and LBTIQ+ women invisible or underrepresented (Fileborn & Loney-Howes, 2019). In response, on January 2018 #TimesUp was founded by Hollywood celebrities (i.e., Rhimes, Longoria, Stone, and Witherspoon), so as to tackle down male domination, breaking the glass ceiling and achieving greater gender equality and diversity within and beyond the audiovisual industry (The New York Times, 2018). Since then, it has promoted initiatives like the #4percentchallenge, announced in the 75th Golden Globe Awards by Hollywood personalities, which aspired to increase women's involvement in filmmaking crews. It was named after the analysis of the high-grossing films during 2007-2017 developed by the USC's Annenberg School of Communications and Journalism (Smith et al., 2019), which revealed an outrageous percentage of female directors in the film industry. Additionally, #TimesUp, clearly influenced by the Black Lives Matter and sexual rights movements, has been commended for ensuring that the voices of racialized and LBTIQ+ women are equally heard (Desta, 2018). Both movements have also been questioned for instigating a gender battle and generating rejection or indifference in men, who preserve high levels of hostile sexism and rape myth acceptance (Kunst et al., 2019). Hence, it is vital to work in alliance with men, promoting their critical thinking and developing strategies in order to overthrow sexism and gender inequality (PettyJohn et al., 2019). This paper sustains that fictional TV productions could be powerful tools in achieving this, promoting co-education and contributing to the construction of an egalitarian society (Belmonte-Arocha & Gillamón-Carrasco, 2008).

1.2. Female representation on fictional TV: Between archetypes and stereotypes

#MeToo has coincided with the increased use of mobile devices, allowing people to access social media and consume audiovisual contents whenever they desire. This led to the era of streaming television, which is extremely popular among younger generations (Budzinski et al., 2020). Thus, the massive number of streaming platforms brought a wide range of content (Peak TV) responding to current social demands, such as the inclusion of the gender perspective, as seen in Netflix's "Women who rule the screen" and HBO's "Series starring women" categories (Bucciferro, 2019). Nevertheless, it is imperative to wonder whether these content advances in the female presence and representation on TV, are overcoming their historical underrepresentation and misrepresentation (Lotz, 2006; Smith et al., 2019; Ward & Grower, 2020; Zaptsi & Garrido, 2021). Despite the significant increase in female presence on-screen (30-40%) observed in 916 shows broadcast during 2017-2019, their off-screen presence is still unequal (less than 20-30%) and female representation is characterized by gender stereotypes (Hunt & Ramón, 2020). For instance, women are more likely to be linked with care roles or victimization, so as emotional and sensual (Belmonte-Arocha & Gillamón-Carrasco, 2008; Lotz, 2006). Furthermore, these women tend to be white, heterosexual and middle-aged (Smith et al., 2019). When media erroneously attribute certain features on social groups– such as women, ethnic or sexual minorities –sexism, racism or heterosexism are reinforced, resulting in social injustice (Signorielli, 2009). Although media research developed various theories for character design/analysis, most of them are based on archetypes, defined as "story characters –prototypes of culturally important figures–that are learned and recognized implicitly, and whose historical and personal significance evoke emotional reactions" (Faber & Mayer, 2009: 310). These hail from the classical Jungian archetypes (1968), currently employed and updated by psychology and media research. Archetypes offer role models and manifest how the audience reacts upon characters of classical stories that represent universal symbols based on ancient Greek mythology, though present in popular stories of

different cultures (Enns, 1994; Jung, 1968). This study is framed within the Neo-archetypal theory (Faber & Mayer, 2009) that upgraded Jungian premises including knowledge within contemporary psychology. It proposes that archetypes possess five key characteristics: (1) to be story characters; (2) psychologically represented as mental models; (3) they often elicit intense emotional responses in people; (4) most are universal and easily recognized; and (5) some operate at an automatic or unconscious level. Furthermore, this theory gathered archetypes into five clusters, broadly used on media (Faber & Mayer, 2009): (1) Knower: Sage, Creator and Magician; (2) Carer: Caregiver, Innocent and Lover; (3) Striver: Hero and Ruler; (4) Conflictor: Outlaw and Shadow; (5) Everyperson: Every(wo)man, Explorer and Jester. Archetypes on movies and series tell a complete story in a short time successfully, where the audience can identify basic characters and comprehend the basic storyline, but they can also promote stereotypes representing certain groups (Kidd, 2016). According to Enns (1994), their major problem is that they "are based on patriarchal myths that undervalue women's experience and reinforce traditional visions of masculinity and femininity" (p.128). Moreover, the archetypes are based solely on the white history, excluding multicultural myths and perspectives (Kidd, 2016). Thereupon, the challenge is to "identify contemporary archetypal models who defy stereotypes" (Enns, 1994: 131) offering new role models for young people and contributing to their co-education. To address this challenge, our study employs an intersectional feminist approach (Crenshaw, 1991) that enables the simultaneous analysis of how interdependent categories (e.g., gender, ethnicity, age, sexual orientation) define the experience of women within their socio-political and historical contexts.

1.3. Objectives

This study aims to (1) identity feminist serials broadcasted on Peak TV between 2017-2020 (when #MeToo and #TimesUp were popularized) and to (2) describe good practices of female representation, amplifying archetypes and defying stereotypes in terms of gender and diversity. Specifically, we explore (a) the on-screen/off-screen presence of women in these serials and their relation with feminist movements, and (b) the representation of neo-archetypes from an intersectional feminist perspective.

Figure 2. Research phases for selection of feminist serials and female portrayals

Phase 1: Identification of fictional serials broadcast on Peak TV (2017-2020) that have been classified from a gender perspective (n=88)

Selected criteria 1.1: Fictional serials* offered by streaming platforms:
- Netflix in "Women who rule the screen" (n=57)
- HBO in "Series starring women" (n=31)

*Excluding animation series.

Selected criteria 1.2: Produced in USA and UK during the period of #MeToo and #Time'sUp (2017-2020).

Phase 2: Selection of the feminist serials (n=25)

Selected criteria 2.1: High female presence in front of and behind the cameras: Created/produced by women, at least in 50%, or including, at least, 50% female main characters.

Selected criteria 2.2: Covered with feminist topics in the main plot related to #MeToo (i.e., sexual harassment, sexual assault, gender-based violence) and #Time'sUp (i.e., gender discrimination, feminist movements and rebellion, labor inequalities, glass ceiling, life and work-life balance).

Phase 3: Analysis of the main female characters from an intersectional feminist perspective

Analyzed variables:
- Diverse socio-demographic profile: age, background and ethnicity, physical appearance, sexual orientation, marital status, employment and social class.
- Behavior that defies gender stereotypes: speeches, attitudes and relationships.

Phase 4: Selection of female characters that epitomized the neo-archetypes and can be highlighted as good practices

Selected criteria 4.1: Identification of female characters that epitomized one of the archetypes proposed by the neo-archetype theory: Knower, Carer, Striver, Conflictor and Everyperson.

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2. Material and methods

Following Lotz (2001), there are three main tactics examining the inclusion of feminist content on TV series: the representation of female characters, the narrative strategies dealing with feminist issues, and feminism as a theme. Combining these methods with the #TimesUp recommendations for increasing female presence on-screen/off-screen, we developed four research phases described in Figure 2.

Firstly, serials broadcasted on Netflix and HBO between 2017-2020 with a gender perspective were identified. Secondly, we selected those with feminist storylines and female presence. Thirdly, the socio-demographic profile and the behavior of the main female characters of these feminist series were analyzed using an intersectional feminist approach. Finally, researchers consensually selected the characters that epitomized the neo-archetypes and can be highlighted as good practices of female representation. Therefore, this study combines quantitative analysis for describing on-screen/off-screen female presence with qualitative content analysis.

Figure 3. Neo-archetypes' characteristics and examples of feminist serials that include them

Clusters	Neo-archetypes [Characteristics]	Examples of feminist serials that include female characters that epitomize the neo-archetypes (Source of images: IMDb, https://www.imdb.com/)
Knower	Sage [Expert, counselor, scholarly, philosophical, intelligent]	
	Creator [Innovative, artistic, inventive, dreamer, internally driven]	
	Magician [Visionary, alchemist, physicist, teacher, scientist]	
Carer	Caregiver [Protective, sacrificing, parental, helping, trusting]	
	Innocent [Pure, faithful, naive, simple, tranquil]	
	Lover [Romantic, sensual, seductive, passionate, erotic]	
Striver	Hero [Courageous, warrior, rescuer, crusader]	
	Ruler [Influential, dominant, leader, boss, judge]	
Conflictor	Outlaw [Rebel, survivor, misfit, rule-breaker, destructive]	
	Shadow [Violent, haunted, primitive, rejected, emotional]	
Everyperson	Every(wo)man [Working-class common person. The neighbor]	
	Explorer [Independent, adventurer, discover, solitary, indomitable]	
	Jetser [Ironic, mirthful, fun, playful, irresponsible, comedian]	

3. Results

Following the selected criteria, 25 series were identified as feminist. Table 1 (available at https://doi.org/10.6084/m9.figshare.14109701) describes their main elements (i.e., title, original release, streaming networks, genre, accolades), so as their female presence on-screen/off-screen and their relation with #MeToo and #TimesUp, regarding their topics and the inclusion of feminist actresses, directors, etc.

Results show a relation between a high female presence on-screen/off-screen (many of them explicitly linked to #MeToo and #Time'sUp) and the inclusion of feminist content. Thereupon, we will go deeper into this data while good practices of female portrayals are described following the Neo-archetypal theory (Faber & Mayer, 2009). Figure 3 offers an overview.

3.1. The Knowers

Few female knowers were found in this study and, when they appear, are frequently linked to gender stereotypes or are being punished in a way, like Cassandra's Greek myth (Franks, 2019). First, Beth Harmon (Taylor-Joy), from "The Queen's Gambit" (2020), represents the Sage archetype. She is an orphan chess prodigy and a glass ceiling breaker during the Cold War, who "dismantles sexism with battles on a board of 64 squares" (Menon, 2020). However, stereotypes about intelligent women, based on loneliness, sex-affective problems and mental issues like addiction are prevalent in this serial (Szymanowicz & Furnham, 2011). Second, "Mrs. America" (2020) depicts exceptionally numerous brilliant women (e.g. Schlafly, Steinem, Chisholm) who seek to ratify the Equal Rights Amendment in the 1970s. Despite their different backgrounds, all of them must continually prove their intelligence.

In the case of Creators, two examples were detected related to #MeToo, in line with Scheherazade from the "One Thousand and One Nights" who developed her creativity to save herself from male violence (Franks, 2019). On one side, "Dear White People" (2017-2021) presents Sam White (Browning), a media student and leading activist who denounces racism and social injustice at Winchester's campus, until a beloved Black professor is accused of sexually harassing a white student. This show offers two narratives within #MeToo: victim blaming and holding the usual suspect responsible, focusing on the influence of the racial component—which complicates the positioning. On the other side, "She's Gotta Have It" (2017-2019) focuses on how Nola Darling (Wise) used art as a strategy to deal with her trauma derived from her sexual assault. Art is presented as a powerful tool for activism when Nola wallpapered Brooklyn with slogans worthy of #MeToo. Nonetheless, both serials fall in the popular media trope of "angry Black woman", reinforcing the Sapphire stereotype (West, 1995).

Finally, female Magicians have traditionally developed their powers to defend themselves from male abuse, like the mythical Circe, predecessor of all those wise and herbalist women who were hanged for centuries for being witches. The media usually employ the witches' myths, dragging a dark and evil shadow but also representing a patriarchal challenge and liberation (Henesy, 2020). The upgraded Sabrina (Shipka), from Netflix's "The Chilling Adventures of Sabrina" (2018-2020), brings more feminist currents than ever by dismantling conventional patriarchal structures, battling toxic masculinity and overcoming binarism (Henesy, 2020).

3.2. The Carers

This cluster is strongly linked to popular and obsolete feminine representations which were still in force nowadays (Enns, 1994), as Caregivers (from Demeter to Virgin Mary), Innocents (princesses who need rescue in most fairytales) or Lovers (from Aphrodite or Medea to "Lolitas" and "femmes fatales"). In compensation, this paper reflects some good practices to overcome them.

Regarding Caregiver, Red (Mulgrew, "Orange is the New Black", "OITNB", 2013-2019) is the head chef in a prison –providing food, a deeply maternal task –and the leader of some interns who call her "mom". Despite her cold Russian figure, Red is an affectionate and loyal caregiver. This serial deals with multiple problems related to being a woman –inside and outside prison– such as sexism, sexual abuse, motherhood, glass ceilings, etc., and its intersection with many other elements (i.e. ethnicity, social class, age, gender identity, sexual orientation, mental health). "OITNB" broke the stereotypical

image of female imprisonment and gave visibility to multiple femininity models from an intercultural perspective (Enck & Morrissey, 2015). Similarly, Blanca (Rodríguez, "POSE", 2018), in the New York drag ball scene, represents an excluded Latin-Black trans woman, former sex worker and HIV positive as a loving, protective and understanding mother. With effort and love, she builds an inclusive home for homeless LGBT youths. Like Red, Blanca puts her children's needs ahead of her own, perpetuating the typecast sacrificial mother. Nevertheless, both portrayals are ground-breaking regarding their socio-demographic profiles, which have never been depicted as caregivers but rather as troublemakers. Not surprisingly, "OITNB" (with an all-female cast) and "POSE" (with the record for the highest number of transgender actors/actresses in regular series roles) became good #TimesUp examples, setting an inclusive TV landscape. Both shows have been highly acclaimed for the representation of the trans community, whose image has been damaged by the media since its inception (Solomon & Kurtz-Costes, 2018).

Exploring the Innocent archetype on TV, rape and sexual assault are frequently deployed on female characters' storylines, rarely becoming the center plot and almost never addressed with the required complexity (Benson-Allott, 2020). Since #MeToo, serials that either narrate rape stories or include main characters who suffered sexual assault have been produced, such as "Unbelievable" (2019), "I May Destroy You" (2020), "13 reasons why" (2017-2019), "Big Little Lies" (2017-2019), "The Handmaids Tale" (2017-) and "OITNB" (2013-2019). All of these offered a victims' viewpoint, breaking down the traditional passivity linked to the Innocent archetype. Along these lines, we highlight Arabella (Coel) from "I May Destroy You" (2020), a dark-skinned Black woman who after being raped, reclaims the #MeToo movement by achieving high popularity on social media. Furthermore, she also writes a book, joins a support group and raises awareness among her acquaintances about rape culture. Thereupon, she represents a role model for setting online activism in motion in grassroots communities. This British serial is not only a narrative about rape in the 21st Century, but also about empowerment fighting against intersectional oppressions suffered by Black women. This serial "has answered a need for more artistically ambitious television about Black life and for feminist-of-color critiques of rape culture on television" (Benson-Allott, 2020: 100).

Regarding the Lover archetype, portrayals far-off from the typical standards (young, stunning and submissive woman vs. seductive "femme fatale") were found. Namely, the profile of middle-aged women who live their sexual freedom without a guilt is highlighted. Dr. Milburn (Anderson), the mother of the main character in "Sex Education" (2019), a sex therapist who enjoys her sexuality naturally, offers a positive role depicting divorced middle-aged women. Likewise, "Why Women Kill" (2019) relaunches the battle of the sexes through three diverse women (Beth, Simone and Taylor) from different generations. Simone (Liu) is an Asian-American middle-aged woman who, after discovering her third husband's homosexuality, begins an affair with a younger man in 1984. Taylor (Howell-Baptiste), an independent Afro-American woman, proposes an open marriage in 2019, defying social norms when she begins a three-way relationship. In the same vein, an additional character who practices polyamory is Nola Darling ("She's Gotta Have It", 2017-2019), another attractive Afro-American woman. These images sustain the Jezebel stereotype, created to justify the rape of Black women during slavery, which is currently perpetuated by TV content depicting flirtatious and hypersexual Black women (West, 1995).

3.3. The Strivers

The Hero archetype has traditionally been represented by courageous male warriors and superheroes. Therefore, the slim chances to see a woman representing this archetype have diminished social images of heroes/women. Since the 1990s, female heroes' appearances on the media, including "Xena" (1995-2001) or "Buffy the Vampire Slayer" (1997-2003), have provided powerful feminine models, however sexualized (Bercuci, 2016). In the #MeToo era, superheroines emerged, fighting not only against villains, but also against patriarchy (Bercuci, 2016). For instance, "Jessica Jones" (2015-2019) describes victims of gender-based violence as strong and resilient women, far from commonly stigmatized portrayals. Jessica (Ritter), a former superheroine who was abused, starts rescuing other victims out of solidarity, despite struggling with post-traumatic stress. It's no coincidence that, the second season, premiered on March 8, was written and directed exclusively by women. Furthermore, two HBO shows must be named in this

category: "Supergirl" (2015) and "Batwoman" (2020). The first one, starring Benoist (a crucial figure in #MeToo since she publicly revealed that she is a domestic abuse survivor), shows an empowered, altruistic and compassionate superheroine. The second one has been praised due to its diversity though backlashed of toxic fan culture. Batwoman (Rose), Batman's cousin, is feminist and openly lesbian, with quotes such as "I'm not about to let a man take credit for a woman's work". Not in vain, Batwoman was portrayed by Rose (a gender-fluid lesbian) in the first season and by Leslie (an Afro-American bisexual woman) in the second season, a quantum leap in the superhero genre.

Beyond superheroines, we also identified interesting examples of Everywomen who, from misfortunate circumstances, evolve into revolutionary roles, like June/Offred (Moss) from "The Handmaids Tale" (2017-), which is based on the 1985 novel of the same name by Atwood. This serial shares resemblance with Philomena –the classical myth in Ovid's Metamorphoses of disobedient women and sisterhood– being "a depiction of a dystopian society, characterized by an absence of rights and freedoms [and] manifest the importance of storytelling in the creation of modern myths" (Martínez-García, 2020: 43). It incites conversation on important matters such as sexual slavery, abortion, and inflaming nationalism based on gender inequality, all narrated by the feminine voice. Starring Moss– a well-known feminist and producer of the show –this series offers an example of resilience and empowerment. June initiates the eternal struggle against the patriarchy, making her body the territory of revolution, thus empowering other women driven by solidarity and social justice. In addition to its artistic value, "The Handmaids Tale" (2017) has gone beyond the screen and has become a trademark for feminist resistance in the 21st century. For example, one of its most representative phrases, #nolitetebastardescarborundorum, jumped from TV to online activism (Bayne, 2018).

Regarding the Ruler archetype, there are not many examples of women who exercise power and whenever they appear, their performance is considered to be masculine, downsizing feminine attributes such as softness and sensitivity, which are perceived as weaknesses –and opposite to leadership (Özkan & Hardt, 2020). Nevertheless, Annalise Keating (Davis, "How to Get Away with Murder", "HTGAWM", 2014-2020) gives a magnificent portrayal. Acknowledged in highly patriarchal environments, like legal defense and higher education systems, Keating is also defined by an intersectional identity as a middle-aged Black queer woman. During its six seasons, she embarks on complex interracial relationships that allow her to be in positions of great power and leadership (e.g., with her students and employees) or to be her true self, an emotional and vulnerable human being (e.g., with her family). Leaving behind the manipulative and authoritarian leader figure, Keating is warmhearted, with flaws and fears –predominantly coming from her intrafamily sexual abuse as a child. Following this character, the audience can identify the multiple oppressions that a middle-aged Black woman living her sexuality openly must face in her life: sexism, racism, heterosexism, etc. These oppressions are also denounced by Davis and Rhimes (showrunner of "HTGAWM"), who as main public role models brought diverse depictions on the media and public responses to Black women (Sobande, 2019), within and beyond #TimesUp.

3.4. The Conflictors

The Netflix dark comedy "The End of the F***ing World" (2017-2019) became the voice of #MeToo and brought with it Outlaw and Shadow archetypes. Its first season presents the adventures of a teenage couple tormented by a traumatic childhood, who kill a serial-rapist in self-defense. Nevertheless, its second season introduces a new narrative: a past lover (a victim, in fact) of this rapist determine to seek revenge and presents a storyline that goes deeper into the three protagonists' experiences and interpretations. Like "I May Destroy You" (2020), this serial is raising critical awareness for the reevaluation of some "sexual experiences" as abuses. Similarly, "Big Little Lies" (2017-2019) effectively handles intricate issues such as domestic violence or rape, as well as the trauma and guilt they leave in the victims, along with a story about female friendship. This series, based on the 2014 novel of the same name by Moriarty, tell us the story of five American mothers (Witherspoon, Kidman, Woodley, Kravitz, and Dern), who are connected to the killing of the rapist/abuser of some of them. Moreover, in the second season, the mother (Streep) of the murdered man appears and blames the victims entirely. This storyline reminds us the myth of Medusa, a remarkably beautiful maiden who, when Poseidon raped her, was punished and transformed into a

monster. Notwithstanding, the female on-screen/off-screen presence in this series will go down in history as one of the greatest contributions of #TimesUp.

Additionally, an accurate feminist show from a #TimesUp viewpoint is "Good Girls" (2018), which shows three suburban Michigan friends who suffer labor inequities and engage in criminal acts in order to get money and support their families. In addition to its inclusion of ethnical and sexual diversity, "Good Girls" is looking to rewrite this history by mainstreaming female anger in a way that is not aimed at targeting men, but at empowering women" (Carling, 2018).

Finally, these archetypes also surface when women fight against the patriarchal culture/religion, as seen on "Unorthodox" (2020). This series narrated the story of Esty (Haas), a young woman who escaped from the ultra-orthodox Jewish religious community in New York and began a new life in Berlin, leaving behind imposed gender norms.

3.5. The Everywomen

Even in the archetype of Everywoman –including Explorer and Jester– we find female characters that allow the audience to step out of the standardized white heterosexual housewife perpetuating by the "Desperate Housewives" (2004-2012), or further privileged single women like "Girls" (2012-2017) or "Sex and The City" (1998-2004). Although these productions were a remarkable milestone for their feminist gaze, female representation and their female staff (Ford, 2016), they also limited the depiction of feminist women. Currently, more complex archetypes are available so that the audience can identify themselves in a multi-diverse way. Hence, a tendency of addressing motherhood and life and work-life balance was detected. For instance, the Netflix sitcom "Workin' Moms" (2017) narrates the interconnected lives of women who have just become mothers and do not want to give up their professional status. These diverse women (among them an interracial lesbian couple and an Asian-American who economically supports her husband), dismantle the idyllic idea of motherhood stressing the insecurities and obstacles that are implied for a working mother. Another less privileged reality is presented in "One Day at a Time" (2017), through a Cuban-American single parent family. Penelope (Machado), a post-traumatic stress veteran and newly separated mother struggles to raise her teenage children with the help of her mother, Lydia (Moreno). This series challenges the stereotypes associated with Hispanic families humorously, addressing issues such as mental health, sexual orientation and feminism through three different generations.

Furthermore, Everywoman archetype was also found in "Grace and Frankie" (2015-), claiming that women over 65 only get better with age. This comedy narrates a female friendship between two women (Fonda and Tomlin, both longtime supporters of feminist causes) whose respective husbands left them to marry each other. "Grace and Frankie" centers on the importance of redefining identity –regarding gender, age, sexual orientation etc– to be happy, no matter how old you are. Covering older people's main characters like any others, this series opens a door on prime-time television, where elderly women are underrepresented (Vernon et al., 1991), and address little-explored topics as sexuality in old age.

Finally, we point out "Unbreakable Kimmy Schmidt" (2015-2020), which combines the Jester and Explorer archetypes to offer an ironic feminist vision. After spending 15 years kidnapped in a bunker, Kimmy (Kemper) goes back out into the world where she faces multiple changes (technological, social, and political) and tries to overcome her trauma. According to Carlsten (2020), Kimmy breaks the ideal of womanhood as passive and victimized challenging ideas about empowering female anger. Moreover, its four-season focused on feminist issues such as workplace harassment and sexism demonstrates the power of comedies to promote critical thinking and challenge power structures.

4. Discussion and conclusion

This study reveals a feminist trend in the serials broadcast on Peak TV, in terms of female presence (on-screen/off-screen) and representation. Analyzing serials produced since 2017, when #MeToo and #TimesUp sparkled, we found numerous storylines associated with feminist issues and crew members made up at least 50% of women –most of them associated with these feminist movements.

Two decades after the first feminist serials (Lotz, 2006) "Xena: Warrior Princess" (1995-2001), "Buffy the Vampire Slayer" (1997-2003), "Ally McBeal" (1997-2002) and "Sex and the City" (1998-2004), the

analyzed series introduce more complex and diverse female characters than their predecessors. Women who defy gender stereotypes, thus, allowing us to amplify typical archetypes (i.e., Knower, Carer, Striver, Conflictor, Everywomen) from an intersectional perspective. Through these shows, Peak TV achieves more responsive and inclusive forms of activism in the spirit of #MeToo and #TimesUp (Fileborn & Loney-Howes, 2019). To name a few, "I May Destroy You" (2020) draws boundaries regarding who stands for a victim-survivor and what counts as sexual assault. "Big Little Lies" (2017-2019) or "The Handmaid's Tale" (2017) broaden the scope by labeling their oppressing experiences as sexual abuse. Additionally, "She's Gotta Have It" (2017-2019) or Why Women Kill" (2019) reconsider the depictions of female sexual pleasure and desire. Finally, "OITNB" (2013-2019), "Working Moms" (2017), "POSE (2018) and "Mrs. America" (2020) challenge gender norms and relationships, reflecting upon how power and oppression rule. These serials also explicitly express how gender intersects with other identity components such as ethnicity, sexual diversity, age, religion, or ideology. The presented characters highlight female heterogeneity, an important step in TV representation of women, which frequently stereotype minority groups, such as Black women (West, 1995). This stresses the importance of strengthening the convergence between feminism and other social movements like #BlackLivesMatter. Therefore, they present a noteworthy leap overcoming predominant patriarchal and ethnocentric values that have lasted for centuries (Enns, 1994; Franks, 2019).

Following Lotz (2001), the presented series can be classified as feminist because of: (a) exploring diverse relationships that empower women, outlining them as a heterogeneous group; (b) depicting miscellaneous feminist solutions for oppressive situations, even manifold feminist outlooks upon cultural issues; (c) offering a wide-open concept of gender and sexuality, thus breaking their illusory binarism; and (d) displaying struggles faced by women and feminists highlighting their resilience. Thereon, storylines that show the complexity of the oppressions that women face, regarding their intersectional identities, are disclosed, making Peak TV a catalyst that questions the definition and goals of feminism in our hyperconnected era. Moreover, these serials have upended the public conversation about issues such as sexual abuse or gender inequalities in the workplace, finding encouraging ties with social and virtual activist movements (i.e., #MeToo, #TimesUp). In this direction, we consider that the series/characters presented in this study can be very useful for coeducation, especially for young ages (Belmonte-Arocha & Gillamón-Carrasco, 2008; García-Muñoz & Fedele, 2011). Beyond the inexorable influence of these serials in the audience, we propose their use in formal education. Feminist series can offer stories from which to critically reflect on gender inequity, sexual abuse or female empowerment in high schools and universities. Moreover, these can be specially interesting tools to address gender issues with boys, who may have a negative reaction, by addressing them in more direct ways (PettyJohn et al., 2019).

Finally, some limitations should be noted in this study. First, we only analyzed serials broadcasted in Netflix and HBO between 2017-2020 and produced in the USA and the UK. Therefore, notably feminist series that have been broadcasted in other channels or in other countries have not been included, e.g., "Good Girls Revolt" (2015-2016), "The morning show" (2019), "Vis a Vis" (2015-2019), "Las chicas del cable" (2017-2020). Second, the serials and characters' selection was intentional. Therefore, an in-depth systematic analysis should be reinforced, highlighting the need of media research to adapt evaluation instruments that include a feminist perspective (Zaptsi & Garrido, 2021). Future research should explore the impact of this feminist content on audience values and behaviors. It could be specially interesting in countries such as Spain, where feminist movements had little impact on the media and where these movements present many discrepancies, for example, regarding the inclusion/exclusion of transgender women. Then, it might be interesting to explore the impact of series such as "Veneno" (2020).

In short, despite the fact that the mainstream media are still managed by men and yet are based on stereotypes that exclude women and social minorities (Filebon & Loney-Howes, 2019), this paper concludes with a favorable evolution on Peak TV, declaring it a new space that ventures for women's inclusion. A space that could strengthen and make more visible the various forms of feminist activisms. Citing Oprah Winfrey's speech at the 2018 Golden Globe Awards referring #MeToo and #TimesUp: "a new day is on the horizon" for a more egalitarian and inclusive television landscape.

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From the global myth to local mobilization: Creation and resonance of Greta Thunberg's frame

Del mito global a la movilización local: Creación y resonancia del marco Greta Thunberg

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ABSTRACT

In 2019 the climate movement experienced an unprecedented growth in its mobilization capacity and its political and media impact. This success is closely linked to the rise of Greta Thunberg and her global impact, as well as to the organization effort of "Fridays for Future" in hundreds of local groups around the globe. This paper studies the connection between these two elements based on the movement frame analysis and its dissemination on social media. Through an analysis of the activists' speeches and social media messages, Greta's key role in the establishment and evolution of a new frame for the climate movement can be seen. This is reinforced and legitimized with her own personal story told through the hero's journey or monomyth. Then, the inclusion and adaptation of Greta's frame in the local group of "Fridays for Future" in Barcelona based on the content analysis of its publications on Twitter and Instagram will be analyzed. The results show how, despite the reluctance regarding personified leadership, Greta's frame has a significant influence on the discourse of the local movement and on the "Fridays for Future" Barcelona's social media followers. The analysis also provides empirical evidence of the relevance of glocal dynamics in online social movements.

RESUMEN

En 2019 el movimiento climático da un paso adelante sin precedentes en su capacidad de movilización e impacto político y mediático. El éxito del movimiento está muy vinculado tanto a la figura de Greta Thunberg y su impacto global, como a la implantación de «Fridays for Future» en centenares de ciudades de todo el mundo. Este artículo analiza la relación entre estos dos elementos a través del análisis del marco del movimiento y su diseminación en redes sociales. En concreto se muestra, a través del análisis de los discursos y mensajes en redes sociales de la activista, el papel clave de Greta en el establecimiento de un nuevo marco del movimiento climático y cómo este se refuerza y legitima con su propia historia personal contada a través del arquetípico viaje del héroe o monomito. A continuación, se analiza la incorporación y adaptación del marco Greta en las redes sociales de «Fridays for Future» Barcelona a través del análisis de contenido de sus publicaciones en Twitter e Instagram. Los resultados muestran cómo, a pesar de las reticencias a la personalización del liderazgo, existe una destacada influencia del marco global de Greta en el discurso del movimiento local y en el impacto en sus seguidores. Además, el análisis aporta evidencia empírica de la relevancia de las dinámicas glocales en los movimientos sociales en el entorno online.

1. Introduction and theoretical framework

With the emergence of Swedish activist Greta Thunberg and the birth of "Fridays for Future" (FFF), the global climate movement experienced unprecedented growth in 2019. The figure of Thunberg became an FFF myth, spreading quickly in the media and on social networks, and she was even chosen to be Time magazine's Person of the Year at just 16 years old. Her actions and speeches catalyzed the emergence of a global social movement that has multiple local groups worldwide, mobilizing millions of people around the globe in 2019 (Thompson, 2020; Wahlström et al., 2019).

It is not possible to understand FFF's success at mobilizing people separate from the rise of Greta Thunberg and the rapid territorial deployment of the youth movement in its different local expressions and the role of social networks because, as Garrett and Edwards (2007) point out, they promote the involvement of geographically dispersed actors and this means that transnational problems can be responded to quickly and in a variety of ways. But, apart from acting as a foundational element, how has the figure of the Swedish activist contributed to constructing the frame of the new youth wave of the climate movement? How has the myth of Greta Thunberg permeated and been framed in the different local groups of the FFF movement? To answer these questions, this paper will analyze Thunberg's heroization process, the characteristics and evolution of the collective action frame promoted by the activist and references to her by the local FFF Barcelona on social media. Greta Thunberg and FFF represent an exceptional case to analyze how global social movements construct their frames through the use of myths – in this case personified in the figure of Greta – and how they are disseminated and realized at a local level thanks to social networks. Since the mid-1980s, social movement studies have incorporated the analysis of collective action frames, emphasizing their key role as agents that produce ideas and social meanings aimed at mobilization and social change. These frames are constructed seamlessly as supporters of a social movement negotiate a shared understanding of a problematic situation they wish to change, and they attribute responsibilities, propose goals and strategies, ultimately urging others to act. In addition, they play a crucial role as aligners of the individual and collective identities of the group (Benford & Snow, 1994; 2000; Snow, 2016; Melucci, 1989; Laraña, 1999). Ultimately, collective action frames help define the "we" in relation to the others, the problem, the grievance, the strategy and the objectives of a movement.

However, the effectiveness of such frames depends on their resonance. It also depends on their ability to be incorporated and reproduced by an increasing number of actors and also to appeal to their target population (Murray, 2020; McCammon, 2013). The capacity for resonance is closely related to the person or people who establish the frames, the coherence between their actions and messages, their authenticity, their credibility and their status within the movement and society (Benford & Snow, 2000). On the other hand, the frames and the affirmation of a new vision, value or ideal that they promote are some of the keys to building leadership in social movements (Jacobs et al., 2020). Therefore, it is convenient to maintain a holistic approach to studying the impact of collective action frames and the leaders or movements that promote them, while still taking into account that both the elements that define the frame and the actors, thanks to their leadership, are pushed forward while garnering the resonance necessary to promote mobilization.

The way that mythological stories are used contributes to affective bonding with discourse and it has been studied particularly in the field of fiction, advertising, or political and journalistic discourse (Kelsey, 2017; García-García et al., 2011). The telling of the hero's journey or monomyth is a tool used for leadership creation and is based on the archetypal figure of Carl Jung's hero, who must complete a series of milestones. This narrative structure has its origin in Campbell's (1949) "The Hero with a Thousand Faces". It is fitting to point out that most stories and mythologies present in different ancestral and contemporary cultures follow the same pattern, although they are unconsciously adapted to different times and geographical locations. This pattern is schematic and is made up of twelve different steps that come together to create a whole and explain a story that is not limited to the literal meaning of the text. These phases are: the ordinary world; the call for adventure; the refusal of the call; meeting the mentor or supernatural aid; crossing the threshold; tests, allies and enemies; the approach; the ordeal; the reward; the road back; resurrection; and the return with the elixir (Campbell, 1998).

As argued by Goren (2007), the "heroization" process is an interpersonal phenomenon, a product and,

in turn, an instrument that is at the service of the group. This means, therefore, that the hero cannot exist in isolation. The connectivity and integration of the leader within the community and the movement, in fact, are essential requirements for his archetypal leadership in the form of a hero or heroine to endure (Harter & Heuvel, 2020). As with the construction of the frames, therefore, the process of "heroization" is a living phenomenon which is the product of the negotiation between the different members and groups of the movement. This need for connectivity and constant negotiation between the hero or heroine and the rest of the members of the movement means that, apart from analyzing the process of "heroization" and its interrelation with the generation of frames, it is also necessary to study how the connections necessary for both heroes and frames to stay current and relevant are established. For this purpose, and in the specific case of the FFF movement, it is essential to analyze the role of social networks which, as Jung et al. (2020) stated, were key in increasing Greta Thunberg's exposure in a short period of time and that she used and continues to use as a direct communication channel. Thus, social networks play a fundamental role both in the propagation and resonance of the movement's frame and in the dissemination of its actions (Bennet & Segerberg, 2012; Lee & Man-Chan, 2016). This is also more evident in the case of the FFF, which is mostly a youth movement (de-Moor et al., 2020; Fisher, 2019) and one which has expanded rapidly thanks to the Internet. Since the beginning of the last decade, with the global mobilizations of the Indignados and Occupy Wall Street marking a turning point, social movements have increasingly used the Internet for various purposes, including constructing their collective identity, recruiting new activists, and promoting actions and protests at a global and local level. (Bennet, 2012; Ackland & O'Neil, 2011; Anduiza et al., 2014). To describe these dynamics, Bennett and Segerberg (2012) have developed the concept of connective action. According to them, among the characteristics of the connective action are the use of frames of general content instead of political, which can, therefore, be customized and adapted to various situations.

The new wave of the climate movement, and FFF, in particular, represents a paradigmatic case of a glocal movement in which there is a constant dialogue of adaptation of global objectives, messages and strategies to the specific contexts of each local group in the climate movement. This nature of the movement makes the online environment a vital space for the construction of social and political commitment as in the example of digital citizenship (Ceccarini, 2021). Consequently, there are two aspects that are expected to stand out when analyzing FFF Barcelona's social network use: Firstly, initial identification with the collective action frame of the youth climate movement, in which the speeches of Greta Thunberg have a special relevance and leadership value and secondly, adaptation to the local context by the use of speeches detailing the complaints and struggles typical of the platform. The present article examines how the framework of the last wave of the climate movement is constructed at a global level and how it is collected, accommodated, and adapted locally. In particular, it analyzes how the figure and the discourse of Greta Thunberg constructs a new reinforced and legitimized frame through the archetypal journey of the hero or monomyth. To examine how this frame is incorporated into a local reality of the global movement, the social network messages posted by FFF Barcelona are analyzed.

2. Data and methods

The study combines the qualitative analysis of the speeches of Greta Thunberg with a quantitative approach to the content analysis of the social networks of FFF Barcelona. At a chronological level, since the construction of frames in social movements is a progressive and dialogical process (Benford & Snow, 1994), the article studies the period that begins with the emergence of the movement (in August 2018 for Greta and in February 2019 for FFF Barcelona) up until the start of the coronavirus crisis in March 2020, the latter completely altering the movement's messages and strategies, in addition to causing the new cycle of climate protest to slow down (de-Moor et al., 2020).

For the analysis of Greta's figure and her message, the methodological framework of mythological-discursive analysis (Kelsey, 2017; 2020) has been used, systematizing the relationship of Greta's speech with the construction of the monomyth archetype. To this end, the analysis of all her public speeches made at conferences, mobilizations, or climate summits during the analyzed period (a total of 22) has been used. In parallel, all the publications on the activist's official social networks (Twitter, Instagram, and

Facebook) have been reviewed in order to identify key moments of the monomyth that are not present in her speeches but that are part of her public story. With this objective in mind, three online posts that reflect three transitions of Greta's journey are incorporated into the analysis: the approach, the road back, and the return with the elixir. This completes the analogy of Greta's story with the phases of Campbell's monomyth (1949) that are presented in the following section in four major stages. In this same analysis, the appearance and evolution of the framework is systematized, which, based on previous studies (Benford & Snow, 1994; 2000; Snow, 2016; Laraña, 1999), can be broken down into five constitutive elements: the "we", the problem, the grievance, the others, and the strategy.

In the analysis of the way in which the local group of the movement in Barcelona incorporates and adapts the frame proposed by Greta, all the messages from the official Twitter and Instagram accounts of FFF have been analyzed beginning in February 2019 and continuing to March 2020. In this case, a quantitative content analysis that allows the identification and measurement of the elements of the framework previously identified in the analysis of Greta's discourse was chosen. The analysis of the content that the movement publishes on social networks leaves a record of the messages that is particularly useful to study the evolution of her discourse (Polletta & Gardner, 2015). In total, 664 posts (527 tweets and 137 Instagram posts and stories) have been coded, using a codebook specially developed for the study. For each post, 33 variables have been coded, including those that collect the different elements of the Greta frame, the operationalization of which is presented in Table 1 below.

3. Analysis of results
3.1. Greta Thunberg's journey and the construction of the frame

In this section, the heroization process and the construction of Greta Thunberg's framework will be considered together. It is presented as the construction of the frame and its different elements – the "we", the problem, the grievance, the others and the strategy – that go hand-in-hand with the different stages of Joseph Campbell's monomyth embodied in Greta's story.

Figure 1. The monomyth of Greta Thunberg
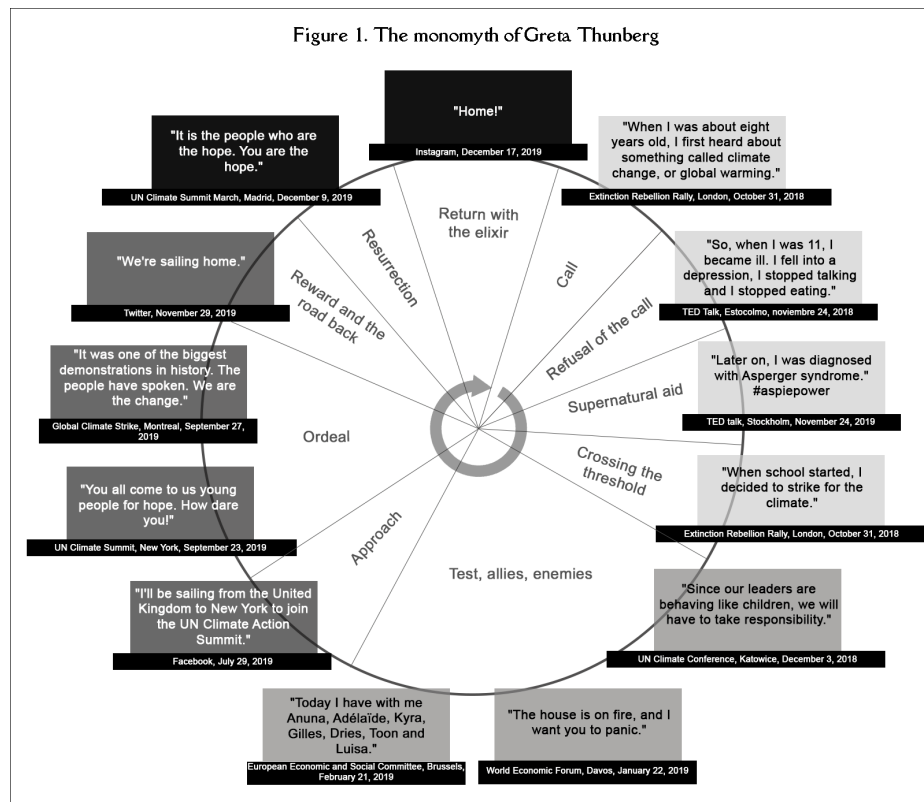
As stated by Espejel-Gómez and Hidalgo-Toledo (2020), Greta Thunberg's speeches and public appearances correspond to important events related to summits and conferences on climate change organized by international organizations. However, Thunberg's strategic communications in speech, actions and social network posts match a strategy that aims to construct the myth of Greta and construct a frame that is suitable for the climate movement through a discourse that, as Leung (2020) points out, has a great emotional charge. Figure 1 shows fragments from her speeches and communications on social networks and illustrates the structure of Greta's storytelling in the form of a monomyth.

a) Stage 1 (October-November 2018): The call, the rejection of the call, supernatural aid, and crossing the threshold. In this stage, the Swedish activist reveals how she first learned about the existence of climate change, her subsequent depression and silence, and the Asperger syndrome that she was diagnosed with that would become her gift or magical knowledge. She crosses the first threshold when in August 2018 she decided to go on a school strike for the climate outside the Swedish Parliament (communications 3 and 4 available at https://doi.org/10.6084/m9.figshare.13491540). This first stage is where Greta introduces the key elements of the frame. The problem is the climate emergency; the grievance is the future being at risk; the objective is for world leaders to commit to the Paris Agreement and limit global warming and therefore promote climate justice (which will remain constant and become the guiding force of the movement). The strategy consists of rebelling through school strikes, the others (world leaders) being accused of remaining silent in the face of the climate crisis or emergency. The "we" is represented by future generations led by Greta. Her story, which, at this time, is highly individualized, serves to emphasize her deep concern for the problem and legitimize the personal strategy of the strike.

b) Stage 2 (December 2018-July 2019): Test, allies, and enemies. The second stage of Greta's journey is plagued by tests, having to face the other for the first time. However, she also demonstrates that she is accompanied by new allies, such as the European Economic and Social Committee, which was held in Brussels in February 2019 (communication 7 available at https://doi.org/10.6084/m9.figshare.13491540). Generational discourse, for its part, is very much present in the first communication of this stage at the UN Climate Conference in Katowice in December 2018 (communication 5 available at https://doi.org/10.6084/m9.figshare.13491540) when she says that since leaders behave like children, the children will have to take responsibility. In this phase of the monomyth, the "we", referring only to future generations, gains importance and the focus on Thunberg herself fades. The figure of the enemy also takes center stage and Greta addresses the others, the antagonists, more harshly, accusing them of inaction. She adds panic to the emotional part of the speech when she tells them that "The house is on fire and I want you to panic" (communication 6 available at https://doi.org/10.6084/m9.figshare.13491540).

c) Stage 3 (August-November 2019): Approach, ordeal, reward, and road back. Before facing the ordeal, the "heroine" of the story must overcome obstacles in the approach phase. A perfect illustration of this is the sailing trip that the activist made across the Atlantic to reach the Climate Action Summit New York (communication 15 available at https://doi.org/10.6084/m9.figshare.13491540). Greta Thunberg has become strong and has gained many allies before reaching the great battle. For this, the "we" not only includes future generations but also some adults and even the people in general, as seen at the Global Climate Strike in Montreal and New York in September 2019 (communication 17 and 19 available at https://doi.org/10.6084/m9.figshare.13491540). In the speech at the Summit on Climate Action in New York, Greta is direct and to the point when she addresses world leaders, whom she accuses of stealing the future and betraying future generations with their empty words, including expressions of anger such as the already iconic "How dare you?" (Communication 18 available at https://doi.org/10.6084/m9.figshare.13491540). After the ordeal and at the end of this stage, thanks to the enormous mobilizing success of the Climate Strike Week, Greta makes her way back to Europe, which represents the road back in her monomyth (communication 20 available at https://doi. org / 10.6084 / m9.figshare.13491540).

d) Stage 4 (December 2019): Resurrection and return with the elixir. Greta's resurrection occurs before COP 25, held in Madrid in December 2019. At this point in the monomyth, generational discourse disappears from Thunberg's frame and the strategy focuses on collective action and social awareness. The others are accused of betrayal and the "we" becomes the people, who are those

that offer hope as seen when she states that "hope is not found within the walls of COP25, [...] you are the hope" (Communication 21 available at https://doi.org/10.6084/m9.figshare.13491540). Greta's journey culminates in obtaining hope, a new vision of the future, which would be equivalent to the elixir in the monomyth. This is what the activist lost as a child when she saw that no one was doing anything to combat the existential threat posed by the climate emergency for the planet and for future generations. Finally, on December 17, 2019, Thunberg returns home (communication 23 available at https://doi.org/10.6084/m9.figshare.13491540). The subsequent speeches made in the months of January and March 2020 correspond to a post-monomyth stage and the biggest change in the framework is the return of generational discourse (communications 24 and 25 available at https://doi.org/10.6084/m9.figshare.13491540).

After analyzing Greta's monomyth and the evolution of the framework promoted by the activist through her communications, it can be clearly seen how the grievance, the problem, and the objective remain constant throughout the story. Changes or nuances occur in terms of what is meant by the "we"; beginning with Greta and future generations and evolving until it becomes "we, the people."

Another aspect that evolves is the blame placed on the others (world leaders), moving from silence to inaction, culminating in empty words, insufficient action, and finally betrayal. Strikes, on the other hand, are a constant in the strategy; although, social awareness, uniting behind the science and other forms of collective action, are included as the story evolves.

3.2. The Greta Thunberg frame in Fridays for Future Barcelona

With the aim of detecting how the FFF movement in its local expression uses the figure of myth embodied by Greta and the elements key to her narrative, this section analyses the presence of Greta and her frame in FFF Barcelona's social media posts.

The analysis of the timeline of the FFF Barcelona Twitter and Instagram accounts in Figure 2 shows that the direct presence of Greta, both through direct references or retweets, is very residual. For instance, Greta is included only nine times through direct mentions or references in the text or photos and she is retweeted 32 times, meaning that she appears only in 3.0% of all posts in the period analyzed. Furthermore, these appearances occur mainly in the initial stages of FFF Barcelona, as an element of identification with the global movement, and her presence declined in the final months of the period.

Figure 2. Evolution of FFF Barcelona posts with direct references to Greta and @GretaThunberg retweets
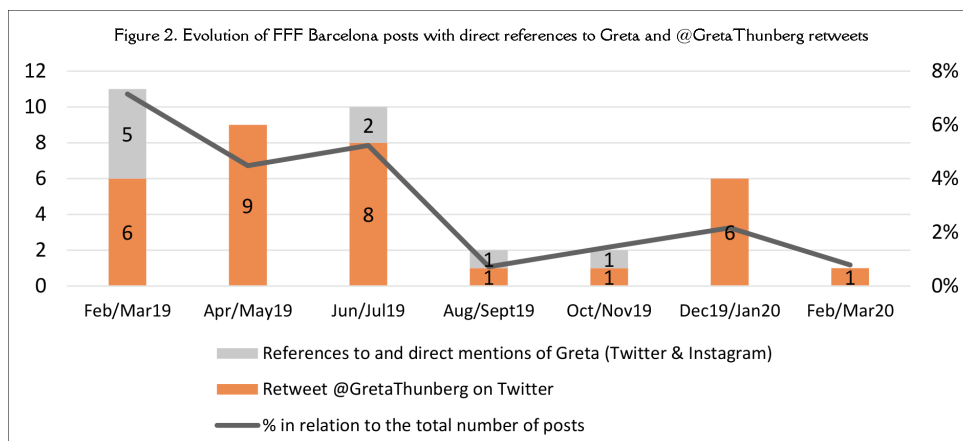
However, apart from the direct presence of Greta in the FFF BCN social media posts, the impact of her figure can be measured in relation to the ability to define the movement's frame in local expressions. The content analysis of Twitter and Instagram makes it possible to monitor the presence and evolution of the constituent elements of the Greta frame that was identified in the above section. Table 1 presents how these elements have been operationalized in the coding for the content analysis of FFF Barcelona's social media posts.

Table 1. Operationalization of the Greta frame on FFF Barcelona social networks			
Frame element	**Development in the story of Greta Thunberg**	**Indicator on FFF Barcelona social networks**	**Coding description**
We	Future generations	Generational discourse	Reference to youth, new generations, or future generations
Problem	Climate emergency	Discourse and mentions of climate emergency	Reference to climate change with the expression of "emergency" or any connotation of urgency or imminence
Grievance	They are stealing our future	References to the future	Explicit reference to the future
The others	World leaders and transnational businesses	Antagonists	Critical interpellation of political actors, businesses, institutions, or national and international organizations
Strategy	Weekly strike	Strike	Direct references to climate strikes and calls for weekly demonstrations on Fridays in Plaça St. Jaume

Figure 3 shows the evolution of the presence of the different elements of the Greta framework in the FFF Barcelona Twitter and Instagram posts, together with the timing of the activist's monomyth stages. As can be seen in the graph, if all posts that contain at least one of the elements are considered, the Greta frame is present in two thirds of the posts at any given stage during the period analyzed.

Figure 3. Evolution of the presence of the Greta frame on FFF Barcelona social media
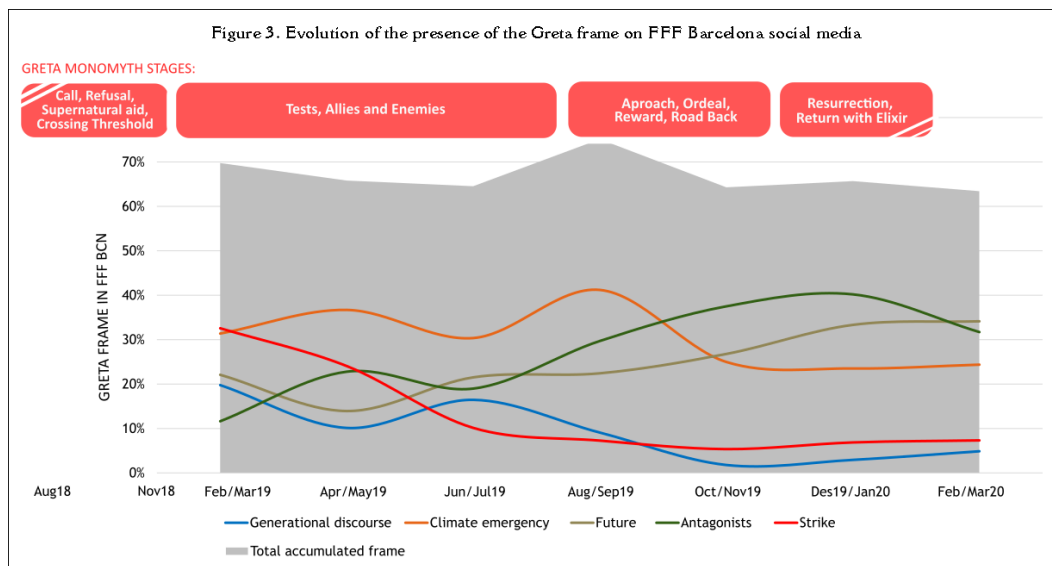
Analyzing the elements in the Greta frame separately allows for a deeper understanding of their incorporation and adaptation in the social media messages of FFF Barcelona as well as their dialogue with the evolution of Greta's discourse in the same period. Similar to that seen in the quantitative analysis of Greta's direct references presented above, in the initial phase of the movement there is a greater alignment with the message of the global movement and Greta in particular. It can be observed that the different frame elements are present in a balanced way during this period. However, the message was quickly adapted to the local characteristics of FFF Barcelona. Thus, the presence of generational discourse and the strike as a strategy of the movement rapidly diminishes. FFF Barcelona stops organizing weekly strikes every Friday in June 2019 and opts for other more reactive methods of protest or those more in tune with the dynamics of its own campaigns. Regarding generational discourse, FFF Barcelona quickly established very close links with other non-youth local environmental organizations and movements, which may have reduced the degree of generational identity of the movement in Barcelona. At this point, it seems that FFF Barcelona is ahead of Greta in the evolution of the movement's frame in that "we, the people" is incorporated sooner than in Greta's case. Conversely, at the end of 2019 Greta is increasingly using the idea of collective action and awareness as key strategies of the movement, in addition to employing strikes as a tool.

Hence, it seems that the evolution of other elements of the frame interact both with the local reality and the dynamics of the movement at the global level as well as instances of Greta's speech and its evolution in the monomyth phases. The presence of the climate emergency, for example, has a peak in August and

September 2019. This is the approach phase in Greta's monomyth, where she must face the ordeal of framing the fight against the climate emergency at the United Nations Climate Summit in New York. At a local level, coinciding with the Climate Summit, FFF Barcelona saw its most intense week of mobilizations that culminated in a demonstration with 100,000 participants. This protest was organized under the slogan "climate emergency". It is at this moment that it is possible to see how the importance of critical discourse with the antagonists grows in the FFF Barcelona social media posts and it is during Greta's speech at the New York Summit at the end of September that she takes on her most confrontational tone with world leaders: "How dare you!" This milestone in Thunberg's story coincides with a turning point in the frames used by FFF Barcelona: For the first time the antagonist frame exceeds the climate emergency frame, and it will continue to be so. At a local level, the increased occurrence of more aggressive discourse aimed at the antagonists coincides with the preparation of the COP25 that was relocated to Madrid. At this point, the message in FFF Barcelona social media influences the criticism of leaders, who meet without taking the necessary precautions as required by the situation.

Finally, there is also a positive evolution in the use of the future from this moment until the start of the pandemic. In Greta's monomyth, it is the time of resurrection and return with the elixir. In her discourse, there are stronger messages of trust towards the power of the people ("we, the people") and of hope about the future. This is also shared in the FFF Barcelona social media posts and this clearly shows a strengthening of their links with other movements and local organizations. The analysis of the evolution of the elements of the Greta frame in the FFF Barcelona social media posts highlights the centrality of this frame in the message that the movement sends out in Barcelona and its relationship with the dynamics of Greta's own discourse and the global movement. But, apart from the activists responsible for the movement's social networks, does the Greta framework have any impact on the followers of FFF Barcelona? The content analysis of social networks makes it possible to measure the effect that the use of the Greta frame has on the impact that posts have on their followers through the "likes" and "retweets" they receive.

Figure 4 shows the predicted impact values of FFF Barcelona posts based on whether they contain elements of the Greta frame. These values are derived from a logistic regression model that allows the effect of other variables[1] on the impact of the posts to be controlled.

Figure 4. Predicted impact values of FFF Barcelona posts based on the use of the Greta frame and the period
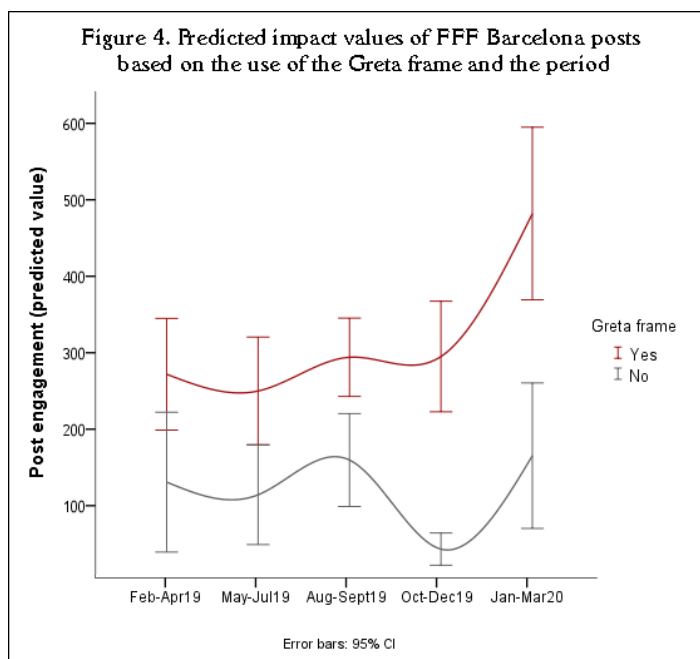
According to the model, the use of the Greta frame in FFF Barcelona posts on Twitter and Instagram always makes them more likely to receive "likes" or be "retweeted". The empirical evidence suggests that

the followers of the Barcelona movement on social networks identify more with the messages that contain elements of the Greta frame. This effect is accentuated as of October 2019, coinciding with the greater proportion of discourse criticizing antagonists in the FFF Barcelona posts. This consistent with results from previous studies that suggest that posts on social networks with a greater emotional and criticizing load create the perception of polarization and increase the post's impact (Espejel-Gómez & Hidalgo-Toledo, 2020; Jung et al., 2020).

4. Discussion and conclusions

In a hyper-connected world, where information circulates at high speed, the appearance of myths and archetypes facilitates understanding and simplifies emotional ascription to complex ideas and phenomena (Kelsey, 2017). This article, by analyzing the case of Greta Thunberg and FFF, shows how this phenomenon also occurs in social movements and that it is not limited to fiction, advertising and political or journalistic discourse. In particular, it shows how the activist's heroization process has contributed to the construction and impact of the powerful new climate movement frame. In this case, the monomyth tool has served to harmonize and match the growing notoriety of Greta's figure with the generation and resonance of frames that the activist promotes and adapts over time. Social networks offer the ideal context for accelerating the exchange of information, essential for connecting these phenomena with the rest of the movement in general and with local FFF groups.

In general terms, Greta's frame and her radical approach to voicing her demands represent an evolution of the existing climate justice frame in the global movement for climate (della-Porta & Parks, 2013), adding a strong generational identity component and a greater dose of urgency with the use of the term's crisis or climate emergency (Murray, 2020; Leung, 2020). The results have shown how the different components of this new global framework are reproduced in FFF Barcelona messages on Twitter and Instagram and how they are being adapted as Greta's monomyth evolves. The use of this frame also increases the impact of the messages among followers on social networks.

It might seem contradictory that, despite the obvious influence of Greta's frame on FFF Barcelona messages, direct references to the activist are very scarce. However, FFF in general and the Barcelona local group, in particular, are characterized by an autonomous and horizontal structure. In addition, in Barcelona, there is a strong legacy of the Indignados movement, characterized by the non-recognition of personalist leaderships and the rejection of formal organization (Castells, 2012). Furthermore, Bennet (2012) and Anduiza et al. (2014) point out that both the characteristics of the connective action seen in the most recent social movements and their use of digital media and social networks, these groups are self-organizing and do not have central actors or leaders. Thus, based on the results from this study and current trends in social movements, the figure of Greta should not be considered from a leadership perspective but from her symbolic-mythological function.

The synchronic analysis of the evolution of the Greta frame and that of FFF Barcelona means that the way in which the activist's narrative is also influenced by the activity of the local groups of the movement can be inferred. In particular, the evolution in Greta's discourse regarding the "we" – which includes and ever-widening range of people – and that of the strategy – which began with a school strike and has since developed to include a wider variety of methods – seems to be closely linked to the direct experience of the groups and local partnerships with other actors. Therefore, despite the centrality of Greta, the global framework of the new wave of the climate movement seems to be constructed in a dialogical and bidirectional way that is based on local experiences and contributions. This result shows how, even in movements of a global nature, there is a dialogue with local contexts, reinforcing Benford and Snow's (2000) idea that collective action frameworks are not static, but dynamic, and are influenced by the elements of the socio-cultural and political context of which they are part. There is no doubt that social networks bring audiences closer together as well as globalize them, but the resonance capacity of collective action frames depends on their dynamism and capacity to adapt to local realities. As the case of Greta and FFF shows, the digital environment offers a space for glocal exchange where values and aspirations emerge through the interaction of individuals who make decisions and construct society, generating digital citizenship (Ceccarini, 2021). This article provides some evidence of the dynamics of

creation and resonance of a frame that has had an unprecedented impact. The gains made by the climate movement in 2018 and 2019 cannot be understood without considering this phenomenon. However, it is the magnitude of the phenomenon that reveals some of the limitations of the present study. First, despite its relevance, the case of Barcelona is insufficient to fully capture the complexity of the effect of the relationship between Greta's global frame and territorialized realities. It is therefore necessary to analyze the role of the frame in the uneven impact of the movement in the Global South. Similarly, in order to fully understand the figure of Greta and the resonance of the frame, it is necessary to take into account the key role of other actors such as the media or even international institutions, as well as the direct testimony of young activists.

All these aspects open the door to an extremely lively and active research agenda which needs to include a fundamental factor from now on, that of COVID-19's impact. For this article, it was decided not to include data from after the start of the global pandemic because it changed the context entirely. But it is precisely for this reason that it makes this an exceptional moment to study the extent to which Greta and the climate movement are able to adapt the frame and regain the attention of a world dealing with multiple emergencies while rebuilding itself.

Notes

[1] The control variables introduced in the regression model are: the social network (Twitter or Instagram), the date of the post, the presence of multimedia content (photos, posters or videos), the purpose of the post (call to action, coverage of actions, dissemination of internal activities of the movement or recruitment), dissemination of appearances in the media, mention or reference to FFF international, mention or reference to Greta Thunberg.

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Online research, new languages and symbolism of digital activism: A systematic review

Investigación en red, nuevos lenguajes y simbologías del activismo digital: Una revisión sistemática

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ABSTRACT

In recent years, digital networks have given rise to new spaces for socialization, action and protest, favouring the emergence of new forms of social participation that generate their own languages and new symbolic strategies. In order to analyze online mobilization within the Spanish context and in order to explore these realities in more depth, a systematic review of empirical articles with their own methodology was carried out. It includes those manuscripts published over the last decade by Spanish Sociology journals with the highest impact factor. After identifying 101 general studies that met the initial inclusion criteria, 34 were chosen whose subject of study included online social mobilization and/or used virtual ethnography as a research technique. The final sample for analysis was drawn from these, comprising the 16 publications that addressed this issue as the central topic. Among the main results obtained we have the scarcity of publications on the virtual dimension of social mobilization, as well as the growing use and adaptation of virtual ethnography as a research methodology for studying this field of knowledge. Likewise, the potential of the Internet to amplify the impact of demands, the need to break the online-offline dichotomy, the creation of new narratives and the transformation of the symbolic production of contemporary social movements are noteworthy.

RESUMEN

En los últimos años, las redes digitales han dado lugar a nuevos espacios de socialización, acción y protesta, favoreciendo la aparición de nuevas formas de participación social que generan lenguajes propios y nuevas estrategias simbólicas. A fin de analizar la movilización online en el contexto español y de profundizar en estas realidades, se ha llevado a cabo una revisión sistemática de los artículos empíricos, con metodología propia, publicados en la última década por las revistas españolas de Sociología de mayor índice de impacto. Tras identificar 101 estudios generales que cumplían los criterios de inclusión iniciales, se seleccionaron los 34 que tenían entre su objeto de estudio la movilización social online y/o utilizaban la etnografía virtual como técnica de investigación; de ellos se derivó la muestra de análisis final, compuesta por los 16 que abordaban esta cuestión de forma central. Entre los principales resultados obtenidos se encuentra la escasez de publicaciones sobre la dimensión virtual de la movilización, así como el creciente uso y adecuación de la etnografía virtual como metodología de investigación para el estudio de este campo de conocimiento. Así mismo, destaca la potencialidad de la red para ampliar el impacto de las reivindicaciones, la necesidad de romper la dicotomía online-offline, la creación de nuevas narrativas y la transformación de la producción simbólica de los movimientos sociales contemporáneos.

1. Introduction

Social mobilization has been normalized in contemporary society, to the extent that some authors call it the "society of movements" or the "society of collective behaviour" (Javaloy, 2003). Although all forms of social action and mobilization aim to transform reality through collective participation, each context, each conflict and each initial situation are different, with a large diversity in their configuration and development. This situation, along with the fact that social movements are purely practical agents undergoing constant transformation, make their study and theorization difficult, while they may be explained based on highly different variables (Asún & Zúñiga, 2013), particularly taking into account the particularities entailed by combining the virtual and the material.

The use of electronic resources and the development of ICTs have favoured the emergence of new forms of expression, transforming social movements, in a way, into communication media (Valderrama, 2010). This has enabled them to organize and develop within the many available online platforms, leading to the creation of a wide variety of spaces for action and protest via the Internet. Thus, online participation enables "avoiding media enclosures" traditionally managed by the State and conventional mass media (Castells, 2009) and political mobilizations ceasing to be considered a form of "alternative communication" to become experiences of "total communication" (Treré, 2016: 45).

Beyond the aesthetic and promotional impact that "digital activism" (Joyce, 2010) or "digital activation" provides social action, it is necessary to explore in more depth the new languages, and the deep and symbolic aspects generated through the different forms of online mobilization.

Thus, this study is carried out amid a virtual non-existence of systematic reviews on social movements in the Spanish context; although it is possible to find some reviews in recent years on specific topics, such as political results (Aguilar, 2019) or housing (Sala, 2018), none directly linked to forms of online mobilization have been found. Therefore, a systematic review of the literature on social participation in the digital sphere within the Spanish context has been carried out based on empirical publications from the last ten years in Spain's most important Sociology journals. Instead of using the usual review methodology, consisting of searching for publications in bibliographical databases, and despite the greater difficulty of the process, the decision was made to directly consult the journals with the most impact, given their appropriateness as a formal source in this type of scientific literature analysis (Sánchez-Meca & Botella, 2010). When analyzing the results, particular attention was paid to the relationship between virtual and in-person activism, as well as the new languages used by contemporary social movements and the symbolic universe they operate in.

1.1. Studying contemporary social movements

The analysis of social action in the field of Social Sciences has traditionally focused on the political consequences that social movements have in the contexts where they develop (Poma & Gravante, 2017), and on their capacity to disseminate new frameworks of meanings and promote changes in the social order.

Starting with the Arab Spring in 2011 and the "indignant" movements it led to, mobilization is globalized from the local level and participation takes place simultaneously in the streets and on the Internet, leaving behind the concept of "activist networks", widely used until then, to now speak of "connected crowds" (Rovira, 2017). This global dissemination of protests, both through classic media and through new technologies, produced a contagion effect in different contexts, "but also imitation in the forms of action, discourses and symbolic frameworks among movements" (Candón-Mena, 2019: 27). In the case of Spain, the emergence of the 15M movement was a turning point in the organization and dynamics developed by social mobilizations, contributing towards its integration or "Europeanisation" (Della-Porta, 2013). From an academic point of view, it led to the appearance of new debates on contemporary social movements and was a challenge for sociological research, increasing the interest in its analysis, particularly the aspects related to virtual spaces, which require new interpretative keys and updated methodologies for analysis.

Thus, although they are still scarce, in recent years there has been an increasing amount of research focused on spaces of action and protest on the Internet, mainly analyzed by means of virtual, digital or online ethnography, a research technique that adapts classical ethnography concepts and guidelines to the analysis of new digital environments and online relationships (Hine, 2000). This methodology is presented

as an interstice between the researcher/subject of study, making it possible to "transform the method itself and reassess the theoretical and epistemological assumptions" of the field of study (Ardèvol et al., 2003: 18).

1.2. Deep languages and symbols of Internet mobilization

In the hyper-connected society, the concept of public space is transformed, leading to new contexts for collective action. At the start of the century, Ibarra already pointed out the possibilities that the Internet was starting to offer social movements, enabling them to achieve "a growing impact that significantly raises their potential to mobilize" (Ibarra, 2000: 285). Digital networks make it possible to increase collective action due both to the low cost of digital activism and to the possibility, even through local mobilization, of coordinating globally (Garrett, 2006; Alonso, 2013). These spaces are shown to be adequate for the development of what Jenkins et al. (2017) call "participative politics", political initiatives by the younger sectors of the population based on civic movements and innovative activists, transforming both the communities where they take place and the historical actors that comprise them (Gutiérrez et al., 2019). At the same time, apart from the possibilities of promotion and participation, digital environments lead to new languages, new forms of socialization, and new ways of establishing interpersonal bonds (Rodríguez & Valldeoriola, 2009).

However, although the new social movements or cyber-movements use digital resources to an increasing extent, "they do not depend exclusively on them" (La-Rosa, 2016: 50), as they are created on the Internet, but are legitimized on the streets (Castells, 2009; López-Carrillo, 2016) intertwining digital and in-person action; i.e., the online and offline dimensions of mobilization. Therefore, they must be analyzed as social constructions that redefine, through shared action, the meanings of the different elements that make up the culture of the community where they are developed (Melucci, 1999). Based on questioning the established cultural models and the general orientations of society (Touraine, 1997), they question different symbolic codes and propose alternative social meanings, using elements from popular and media culture, but also creating new elements (Candón-Mena, 2019).

The use of new technologies increasingly determines the practices and proposals of contemporary social movements, but also their collective imagination (Tascón & Quintana, 2012), as they involve "a re-creation and re-signification of society's symbolic universes" (Villafuerte, 2007: 177), which makes it necessary to pay attention to the symbolic strategies they develop, the use they make of artistic and cultural elements or the shared symbols that build group and community identities (Cohen, 1985). It is, therefore, necessary to take into account the collective imagination of social movements, redefined in recent years around the Web 2.0 and social networks (Treré & Barranquero, 2013).

In short, each social movement is built developing a series of values, languages, symbols, rituals, and myths that help to establish social and psychological identities (Martínez-Herrera, 2011). At this point, the forms of social action on the Internet, as the materialization of the redefinition and innovation of classical mobilizations, present their self-defining and most differentiating elements. Thus the importance of analyzing, both theoretically and empirically, their new communicative processes by addressing these realities, in order to learn about their nature as a whole.

2. Material and methods

2.1. Research question and objectives

This study proposes the following research question: How is sociological research analyzing the online dimension when studying social movements within the Spanish context? Based on this question, three specific objectives are established:

- To analyze current research into social mobilization in Spain, exploring both the fields of study, and the methodologies used, in particular those related to virtual environments.
- To establish the link between the online and offline dimensions of social participation, with research focusing on the use of digital spaces or collective action.
- A deeper sociological analysis of the construction of new languages and symbolic elements by contemporary social movements.

2.2. Methodology

The systematic review of the literature is a rigorous methodology, as it limits bias and error (Cook et al., 1995), which makes it possible, using a pre-established and explicit method (Sáenz, 2001), to identify, evaluate and interpret scientific production in a specific field of knowledge in an organized manner (Fink, 1998). In this case, the systematic review carried out focused on the analysis of social movements, specifically on their online dimension, by empirical sociological research with its own methodology developed within the Spanish context during the last decade. To carry out this task, the PRISMA standards were used for the protocol, search process, selection and synthesis of results (Moher et al., 2009; Urrútia & Bonfill, 2010), adapted to our subject of study. Thus, the initial inclusion criteria applied based on the PICoS strategy (Pertegal-Vega et al., 2019), which takes into account the population, the phenomenon of interest, the context, and the design of the study, were the following: empirical research into social movements; primary studies; analysis of the Spanish sphere; publications in the last 10 years (2010-2019); publications in Spanish sociology journals with the highest impact.

Firstly, five journals were chosen due to their inclusion in the 2019 edition of Journal Citation Reports (JCR)[1] and after that, the 34 present within the section of Political Sciences and Sociology of the 2020 edition of the visibility and impact ranking of Spanish Humanities and Social Sciences Scientific Journals with the FECYT seal of quality (Sanz-Casado et al., 2020), bearing in mind that four of them had already been chosen due to their inclusion in the JCR[2]. Thus, the final list was comprised of 40 journals, after adding five more due to their thematic relationship, present in the ESCI (Emerging Sources Citation Index) list with the criterion of belonging to the field of Sociology and inclusion in Latindex[3]. The search process was carried out in each journal based on eight key reference terms and access to the publications of interest. The concepts chosen were: "social movements", "social movement", "mobilization", "mobilizations", "collective action", "social participation", "activism" and "protest". This initial search was carried out between the months of February and May 2020.

Figure 1. Flowchart of the systematic review process
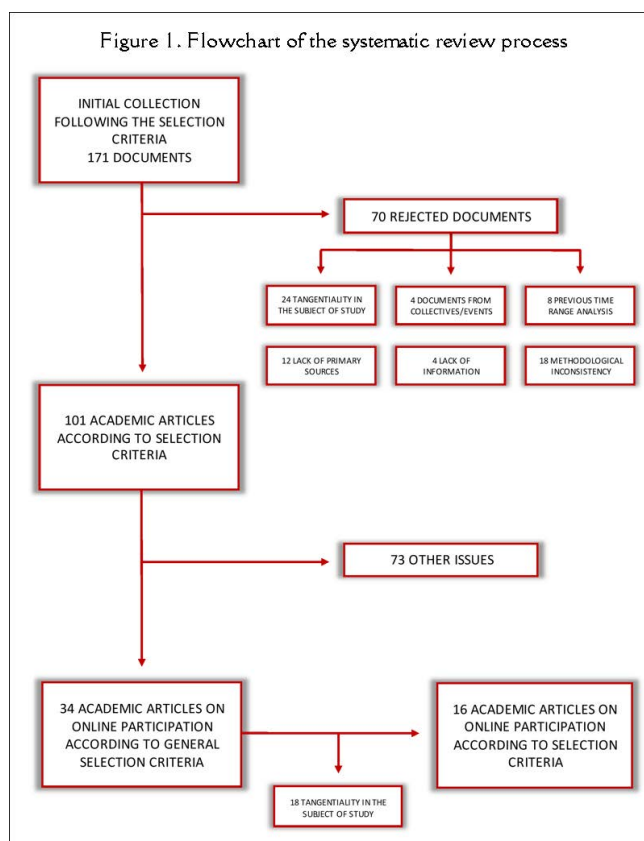
A database with all the references chosen on empirical research into social movements was created. In this first phase, after ruling out the large volume of theoretical publications and individually assessing each one of them, a total of 171 articles were found. Their complete texts were analyzed independently by two of the researchers who have carried out this review. 70 articles that did not meet the following criteria were eliminated: prioritization of social movements in the subject of study (24); use of primary data sources (12); exhaustive methodological information (22).

Once this first search was completed, the 101 bibliographical references found were organized using the Mendeley manager, creating a database with the following variables of each article: author/s, year of publication, journal, topic/s analyzed, online participation as the subject of study, type of study, methodological strategy and use of virtual ethnography.

After this first general selection, a second database was obtained with the 34 publications that met the criteria of online participation analysis and/or the use of virtual ethnography as a research technique. Of these, 18 were eliminated as this was not their central focus. Thus, a final selection of 16 articles was obtained (see the resulting database on https://bit.ly/32iUWgf).

No.	Reference	Year	Journal
Table 1. Final sample selected			
1	Candón-Mena, J.	2019	Teknokultura
2	De-La-Garza-Montemayor, D.J., Peña-Ramos, J.A. & Recuero-López, F.	2019	Comunicar
3	Núñez-Puente, S. & Fernández-Romero, D.	2019	Investigaciones Feministas
4	Sádaba, I. & Barranquero, A.	2019	Athenea Digital
5	Lizaso-Elgarresta, I., Sánchez-Queija, I., Parra-Jiménez, A. & Arranz-Freijo, E.	2018	OBETS
6	Márquez-López, M.	2018	Teknokultura
7	Pecourt, J. & Villar, A.	2018	Athenea Digital
8	Rodon, T., Martori, F. & Cuadros, J.	2018	Derecho y Política
9	Martínez-Rolán, X. & Piñeiro-Otero, T.	2017	Prisma Social
10	Saura, G., Muñoz-Moreno, J.L., Luengo-Navas, J. & Martos, J.M.	2017	Comunicar
11	Casas, A., Davesa, F. & Congosto, M.	2016	REIS
12	Ortiz-Galindo, R.	2016	OBETS
13	Rivero-Santamarina, D. & Larrondo-Ureta, A.	2016	Teknokultura
14	Romanos, E.	2016	RIS
15	Romanos, E. & Sádaba, E.	2016	RIS
16	García-Galera, M.C., Del-Hoyo-Hurtado, M. & Fernández-Muñoz, C.	2014	Comunicar

3. Analysis and results

In this final selection of 16 articles, (see summary on https://bit.ly/3aQNVXW) the years 2016 and 2018 stand out, with five and four publications respectively, as those with the highest production. This tells us that both online participation and the use of the Internet as a resource for research are increasingly installed in our society. Thus, in half of the cases the researchers focused on social mobilization in generic terms, on the Internet, as a topic to be studied, while in the rest, the virtual dimension of specific social movements such as feminism (4), the 15M movement (4), or political demands were analyzed. This is when the forms of action particular to each movement connect with the possibilities that ICTs offer for the visibility and expansion of their demands and proposals.

The fact of being analyzed "via its own method" is characteristic of this field of research, as the main methodological technique used is virtual ethnography (in 12 of the 16 publications), making it the most appropriate way of learning about these spaces, given its flexibility and the possibility it offers for studying groups whose access for researchers is difficult in in-person environments (Sádaba, 2012).

As for the platforms studied, Twitter is a prominent social network, used both for monitoring specific accounts and, in most cases, hashtags used as the emblems of the different struggles. Profiles or groups on Facebook or specific web spaces are also analyzed.

As for the way of doing it, the combination of techniques is not the most common, since there are only four publications that simultaneously use qualitative methodologies (studies 1, 12, 14, and 15), where virtual ethnography is used alongside documentary sources twice (studies 12 and 14) and alongside participant observation and interviews in a third (study 15). In any event, a lack of use is observed of a virtual ethnography that goes beyond mere direct observation and uses other research techniques linked to the digital sphere (participation in forums, interviews via chat, online discussion groups, etc.), as traditional ethnography does in in-person environments.

Only four of the articles in the sample have studied online participation by means of other techniques (studies 1, 2, 5 and 16), three of them doing so from a quantitative perspective via a survey (studies 2, 5 and 16). Thus, it can be observed that the methodology used to study social mobilization in its online dimension is mainly qualitative.

If we now analyze in more depth the contents of the 16 articles selected, we can see some common points and recurring issues in several of them. Firstly, the political dimension cuts, in a more or less explicit way, across nearly all of the studies, which shows the capacity and intentionality of these movements to have an impact and provoke changes in the political and social agenda (studies 2, 6, 7, 8, 10, 12 and 15). This seems to indicate that citizens frequently use the Internet and the visibility it offers to manifest their political and social demands (studies 6, 7 and 11), whereby social networks such as Twitter, in certain moments, become the main space for protest (studies 3, 7, 8, 10, 11 and 13).

This is linked to the fact that virtual spaces are mainly used for communicative purposes (studies 1, 2, 4, 5, 7, 8, 10, 12, and 13). On the one hand, for the consumption and dissemination of information in a more passive and/or unidirectional way, where its potential to raise the visibility of conflicts, struggles and movements developing in the offline space can be found, reinforcing them and generating tools or elements for their growth. On the other, by creating spaces for debate and agreement among individuals or collectives with a variety of positions, which may lead to the creation of online support networks, but also of confrontational dynamics which, although not usually materialized beyond the Internet, can become extreme as there is no mediation in this space (studies 3 and 8). Due to this main communicative function of ICTs, the creation of new ways of understanding and carrying out communication is enabled (studies 10, 12 and 14), offering more proximity, accessibility and immediacy than traditional media. Thus, virtual innovation leads to the development of specific spaces for social participation, such as the "Change.org" website, support and solidarity initiatives such as the "Wombastic" platform (study 6) or "crowdfunding" platforms, and to the use of tools such as humor for networked social action, as it enables the subversion of established cultural codes using a symbolic strategy (studies 6, 9 and 14).

In this sense, the collective imagination of 15M is built through shared references of popular culture (film, series, video games, music, celebrities, emoticons…), making use of artistic and cultural elements to symbolize their different demands. At the same time, messages are reinforced through symbolic elements, exemplified by the use of different colors to identify certain struggles ("Green tide" for education demands, purple to make reference of feminist struggles, etc.).

Another common element that researchers of online social mobilization highlight is the capacity of these scenarios to generate and reinforce collective identities, based on multiple existing actors and discourses (studies 8, 11, 13 and 14). In fact, the Internet makes it possible to maintain the collective memory of social movements, and from that foundation, it builds its identity (study 1). These identities favor the merging and strengthening of shared demands (studies 4, 6, 10, 11 and 12) and facilitate the creation of new spaces of agreement. Based on autonomy and horizontality as basic implicit values of this type of mobilization, organizations are made up of "distributed horizontal networks" (study 12) that manifest themselves through collaborative experience, spontaneous creativity and innovation.

These characteristics of social participation and Internet activism are not so different from traditional forms of protest. With openness and communitarianism as a distinctive feature, contemporary social action media make it possible to broaden traditional circles of participation (studies 5, 10, 12 and 14) by offering greater accessibility, which has been particularly highlighted among the younger population (studies 2, 5, 6, 7, 15 and 16). Thus, free access has been considered the most important key to favor social mobilization in virtual spaces, which seems to have been scarcely tapped by some collectives or struggles

with limited Internet propagation (studies 4 and 13). Consequently, a shared characteristic among online social movements involves passive participation dynamics, for the mere consumption and reproduction of information, without in-depth debates about the basic content of each reality and issue (studies 2, 4, and 13). On the other hand, there is also acknowledgment of the danger of mythologizing new technologies with an illusion of participation that does not correlate with reality, overestimating its real scope, which in many cases does not go beyond "ephemeral mobilization" (studies 7 and 9). As a result, a large proportion of the research analyzed concludes that both dimensions feedback and complement each other, although currently there is a larger volume of online than offline social participation (studies 2, 5 and 16).

As for the use of language by online mobilization, first of all the way in which the researchers themselves refer to the phenomenon studied should be highlighted, with terms already widely used such as "cyberactivism" (studies 1, 2, 12 and 16) or "cyber movements" (study 12), with their concretion as "cyberfeminism" (studies 4 and 13), as well as other more specific terms such as "techno-political movements" (study 1) and "techno-activism" (study 15), or "connective social movements" (study 11).

Now, focusing on the analysis of the digital spaces used by contemporary social movements, a shift from traditional discourses and languages towards new discursive and expressive forms that provide access to a more diverse and plural audience is observed (studies 1 and 11). Each movement creates its own new concepts, such as the widespread use of the terms "precariat" by 15M or "sorority" by feminism (study 6). At the same time, specific discourses with a more creative, imaginative, referential, and open language are disseminated, related to popular forms.

This language that is particular to virtual and networked activity is adapted to each platform, organizing the discourses by means of concision, hypertextuality and the use of keywords, as happens with hashtags (studies 3, 7, 8, 9 10, 11 and 12), used as emblems of positions taken (study 8), or with the defense of political demands in the "graphical battlefield" (study 6). In this sense, social networks become ideal spaces for the dissemination of specific messages and the condensation of complex ideas into simple contents, generally light-hearted, which cause the "contagion effect" and which make it possible to speak of a new language (study 9). Thus, for example, tweets are a simplified expressive form of participation, for rapid consumption and propagation, which can elicit action and make the empowerment of citizens possible (study 10), while memes are presented as a type of spontaneous, syncretic and visual communication that generates a chain of creative feedback (study 9). In any event, this context is likewise prone to the proliferation of hoaxes, "fake news" and other types of disinformation that distort reality (study 3). On these types of platforms, the users themselves make up a "multimodal landscape […] of shared authorship based on comments and cross-references" (study 4) which, despite generating a large number of interactions on the web, not always lead to mobilization as such (studies 7, and 9).

In conclusion, we can talk about the emergence of a "global digital culture of mobilization" linked to Internet culture, through which a large number of social movements consume, transform and create a culture at a local level based on a series of shared references (study 1), which generate languages and symbologies of their own. Thus, the online space becomes a new political and social element, a new agent that can cross borders and generate and establish feelings of identity, a "virtual us" (study 13) which sometimes inspires collective action.

4. Discussion and conclusions

Based on the systematic review carried out we have been able to verify, firstly, the scarcity of publications in Spanish Sociology journals on the nature and particularities of online social mobilization, which undoubtedly contrasts with the apparent proliferation of these movements in Spain in recent decades, with a more exhaustive analysis in other contexts such as the Latin American or Anglo-Saxon.

In terms of the methodology used, the difficult access from other types of methods to the new realities brought by the use of digital spaces by contemporary social movements means that the research included in the final sample analyzed finds virtual ethnography to be the ideal technique for their analysis. However, although complementary techniques are used in some cases, none of the articles in the final sample use a mixed research methodology, which should be promoted and broadened in order to offer more complete and comprehensive knowledge of the subject. Likewise, there is a significant limitation in the almost

exclusive use of direct observation as a technique in virtual ethnography, missing out on the potential offered by other research techniques linked to the digital sphere. Therefore, new specific methodological approaches that adapt to these new forms of virtual relationships and action that are transforming the meaning of social participation are needed.

As for the contents of the publications chosen, we find that more exhaustive and deeper analysis of the symbolic and mythological universe transmitted by contemporary social networks and social movements is lacking, which has prevented us from exploring these realities in more depth. However, we have been able to observe the intentionality and transformative capacity that the new forms of citizen participation and action have for social change, and how the online dimension enables the emergence of new discourses and languages that are more open and accessible.

The set of articles analyzed shows that, although social participation on the Internet and cyberactivism are different forms of mobilization, they have features in common such as horizontal, flexible and multimodal organization, confirming statements by classical authors such as Melucci (1996) or the search for a change in mindsets, in line with statements by, among others, González-Lizárraga et al. (2016). By means of new dynamics in the forms of protest and in communicative strategies, contemporary social movements are capable of influencing the political and social agenda, with prominence of the potential of web spaces to amplify the impact of demands, and the capacity of social networks to reinforce social bonds and promote civic commitment, although there is the risk that these new forms of activism can be limited to a form of passive participation that is not matched in the streets.

In this sense, and despite the fact that, to a large extent, analog mobilization has been replaced by digital action, as stated by authors such as Flesher-Fominaya and Gillan (2017), the online and offline dimensions of mobilization feedback into and complement each other (Herrero et al., 2004). For this reason, it is necessary, particularly in the sphere of academia and research, to break this dichotomy and link all forms of action in order to create a panoramic view of the current state of social mobilization. To achieve this, in future research it would be interesting to establish links between both forms of participation. In particular, it can be focused on their contents and on their internal dimension (messages, languages…), and to analyze the proposals for action that lead to activities at both levels, so that they can be analyzed "through a logic of broadening the repertoire and not through a dynamic of replacing the physical with the virtual" (Treré, 2016: 48).

On the other hand, the research papers revised show the existence of a new narrative in online social mobilization that uses a more approachable, referential and open language, and in which hypertextuality and the visual component become particularly relevant. Thus, each group finds its own voice within the framework of the different expressive formats, giving them greater visibility and more possibilities of access to the population as a whole. At the same time, starting from the local level, there is a symbolic resignification that is globalized from popular and digital culture, creating a collective identity and turning each movement into "a laboratory of symbolic production that it needs to communicate" (Rovira, 2017: 9).

Lastly, there is a debate between those who defend the power for transformation and social production of digital networks with ideas such as that of "participatory culture" by Jenkins et al. (2016), sometimes falling prey to "techno-fascination" or "techno-utopianism", in line with authors such as Orihuela (2008), and those, like MacKinnon (2012), who criticize this techno-determinism, pointing out the limited impact of social networks and focusing on negative issues such as online counter-information, which uses post-truth as a rhetorical element of the political narrative. Most of the studies analyzed, however, seem to defend an intermediate point, in line with authors such as Treré (2018) or Rendueles and Sádaba (2019) who, assessing the potential nature of these spaces, consider their real impact for mobilization to be limited.

In any case, although it is necessary to acknowledge the limitations of this study as it only analyses articles from journals with a high impact factor and does not take into account other types of publications, the systematic review carried out has made it possible to verify the potential that the Internet, and specifically social networks, have as a tool for citizens, showing the forms of action of online social mobilization as a reflection of the plurality of thought that exists in contemporary society. In short, as we have been insisting, a deeper analysis of the new dynamics generated by contemporary social movements is required, as well as

the implementation of methodological strategies which, along with virtual ethnography, integrate different qualitative research techniques that enable a comprehensive, but detailed, approach to these complex realities.

Notes

[1] "REIS. Revista Española de Investigaciones Sociológicas" (included in the Sociology area); "RIS. Revista Internacional de Sociología, Historia y Política" (Political Science), "Revista de Estudios Políticos" (Political Science) y "Comunicar. Revista Científica Iberoamericana de Comunicación y Educación" (Education & Educational Research and Communication; also included in the FECYT 2019 within the area of Social Sciences).

[2] "América Latina Hoy"; "Arbor", "Áreas, Revista Internacional de Ciencias Sociales"; "Ciudad y Territorio, Estudios Territoriales"; "Cuadernos de Trabajo Social"; "Digithum"; "Empiria, Revista de Metodología de Ciencias Sociales"; "Encrucijadas", "Revista Crítica de Ciencias Sociales"; "Gestión y Análisis de Políticas Públicas"; "IDP, Revista de Internet", "Derecho y Política"; "Investigaciones Feministas"; "Masculinities and Social Change"; "Methaodos, Revista de Ciencias Sociales"; "Migraciones"; "OBETS. Revista de Ciencias Sociales"; "Papeles del CEIC", "International Journal on Collective Identity Research"; "Papers, Revista de Sociología; Política y Sociedad"; "Relaciones Internacionales"; "Res Publica, Revista de Historia de las Ideas Políticas"; "Revista CIDOB d'Afers Internacionals"; "Revista de Estudios Internacionales Mediterráneos"; "Revista de Paz y Conflictos"; "Revista Española de Ciencia Política (RECP)"; "Revista Española de Discapacidad (REDIS)"; "Revista Iberoamericana de Ciencia, Tecnología y Sociedad" (CTS); "Revista Española de Sociología"; "Sociología del Trabajo"; "Teknokultura: Revista de Cultura Digital y Movimientos Sociales"; y "adComunica, Revista Científica de Estrategias, Tendencias e Innovación en Comunicación".

[3] "Athenea Digital. Revista de Pensamiento e Investigación Social"; "Aposta, Revista de Ciencias Sociales"; "Gazeta de Antropología"; "Prisma Social"; "Sociología y Tecnociencia, Revista digital de Sociología del Sistema Tecnocientífico".

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Myths in visual environmental activism narratives on Instagram

El mito en las narrativas visuales del activismo medioambiental en Instagram

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ABSTRACT

Images are part of the communication strategies of both the hegemonic powers and political activism. Images have recently been the focus of studies on social movements, highlighting the importance of visual activism in social media. However, the relationship between these visual narratives and mythological structures and how they operate to mobilize social change has not been significantly explored. This study analyses the role of environmental activism memes on social media and how, in anthropological terms, they can be understood as myths or narratives that offer a model for perceiving, understanding, judging and acting in the world. We draw from ongoing research into eco-influencers on Instagram, taking environmental memes characterized by binary oppositions of "before" and "after" as the study subject. This contrast establishes a temporal narrative and future prediction, involving a cause-and-effect relationship and a moral judgement of our actions. We argue that, in the case of the environmental meme, the myth-based approach helps in understanding its role in articulating the cosmic, social and personal orders as it brings human action into harmony with the cosmic order while projecting its images onto the human experience.

RESUMEN

Las imágenes forman parte de las estrategias y prácticas comunicativas de los poderes hegemónicos y del activismo político. Recientemente se ha incorporado la imagen al estudio de los movimientos sociales, destacando la importancia del activismo visual en las redes sociales y sus nuevas formas narrativas. Sin embargo, se ha explorado con menor profundidad la relación entre estas narrativas visuales y las estructuras mitológicas y cómo operan para movilizar el cambio social. En este artículo analizaremos el papel de las imágenes meméticas en el activismo medioambiental en las redes sociales y cómo podemos entenderlas desde una perspectiva antropológica como mitos o narraciones que proponen un modelo para percibir, comprender, juzgar y actuar en el mundo. Nos basaremos en una investigación en curso sobre los «eco-influencers» en Instagram, tomando como objeto de análisis memes medioambientales caracterizados por plantear oposiciones binarias entre un «antes» y un «después». Este contraste establece una narrativa temporal y una proyección de futuro, que conlleva una relación de causa y efecto y una valoración moral de nuestra acción en el mundo. Argumentaremos que, en el caso del meme medioambiental, la aproximación desde el mito nos ayuda a comprender su agencia en la articulación del orden cósmico, social y personal en cuanto armoniza las acciones humanas con un orden cósmico a la vez que proyecta imágenes de este al plano de la experiencia humana.

KEYWORDS | PALABRAS CLAVE

Myths, memes, activism, sustainability, Instagram, influencers.
Mitos, memes, activismo, sostenibilidad, Instagram, influencers.

1. Introduction and state of the art

Use of Social Media in politics and activism has been widely studied in recent years (Castells, 2013; Rovira, 2017; Postill, 2018; 2014; Treré, 2018; 2012), but less attention has been given to the role of image and visuals as a performative part of social movements. Nevertheless, the impact of memes as an element of communication that is specifically digital, now present in almost all political debate and mobilization, is generally recognized (Costanza-Chock, 2012; Piñeiro-Otero & Martínez-Rolán, 2016).

According to Shifman (2013:365), memes "shape the mindsets, forms of behavior, and actions of social groups" appealing to a community and the existence of a common goal. Rowan (2015) situates the role of memes in politics and their importance to the *indignados* and Occupy Wall Street movements. According to this author, memes introduce young people to a rare political sphere, of expressing opinion, but also of discussion establishing clear positions. Behind the joke, we find an expression of concerns, sensitivities and desires that we cannot ignore. According to Rowan, memes may be defined as "sets of images that are normally accompanied by an amusing text that may or may not be directly related to the image" (Rowan, 2015: 298). They are characterized by their replicability, the creation of copies (ideological or figurative) through imitation (Vitiuk et al., 2020: 53) and their lack of artistic pretensions, offering an informal, unpolished aesthetics (eventually one of their main traits).

It is interesting to observe the insertion of memes and analyse their function on Instagram, given the importance of meticulously crafted images in this social media platform. We suggest that these images are used precisely because of their economy of production and their educational potential as mythological narrative, despite their lack of aesthetics. Furthermore, in the specific case of environmental activism, memes appeal to a primordial eschatological myth: they are harbingers of the future, the end of the world, if human action is not reversed. Although in most eschatological myths, the destruction of the world is caused by a non-human agent (a god, alien, natural cataclysm), in many cases it is associated with a moral failing in humanity (the Great Flood). In the case of environmental myths, the cause of the end of the world is direct human action against which nature is retaliating.

1.1. Myths, images and environmental activism

Myths are powerful, affective stories that seek to answer humanity's most profound questions. According to authors such as Mircea Eliade, Claude Lévi-Strauss or Clifford Geertz, they have several functions, one of the most important being to provide models of behaviour. According to Geertz (1989), myths harmonize human actions with a cosmic order while projecting images of that order onto the plane of human experience. Thus, by formulating conceptions of a general order of existence, mythological narratives articulate individual and collective emotion and belief, link the cosmic to the social order, and the latter to the personal and corporeal order.

Like other traditional narrative genres, myths are oral narratives in their origins, generally featuring gods and heroes, with details that vary through transmission, giving rise to new versions. With the invention and spread of writing, myths have become the subjects of literary retelling, thus broadening their range of versions and variations. Myths have not disappeared in the contemporary world; they are just presented and transmitted via different media, such as social media, thus increasing the speed of their propagation and the narrative and communication possibilities of the myth.

Contemporary mythology has been examined in the field of cultural studies, which sees modern mythologies as part of the so-called "mass culture", or contemporary media culture (Barthes, 2014). According to Ortoleva (2009), contemporary mythological production differs from traditional mythologies, such as those of Classical Greece, as the latter maintain constant themes and characters, while the former are not canonical, but newly invented narratives. This author maintains that one transformation of mythological narrative in its contemporary form is the abandonment of the sacred dimension; however, even in modern life, where rationality establishes the criteria for reality, there is still a need to provide deep emotional meaning to our lives, that connects our specific experience and the universe of sense making, between reaffirmation of the world of recognizable patterns and the world open to uncertainty, driving us toward exploration, between empirically verifiable truth and the deep and constant structure of great narratives.

In order to understand the persistence of myths in contemporary societies, a number of different approaches have been developed that interpret the myth as an allegory or through symbolic reading, rather than as a true story, where the myth appeals to truth, though not in its immediate content, but rather in relation to social structures, cultural patterns, deep psychology, or the expression of authors' and audiences' hopes, yearnings, worries, and fears (Lowenthal, 1995).

Nevertheless, analysing environmental activism from the mythological perspective shows us that the movement is built on a scientific truth in relation to climate change, which is then presented in the media in condensed form through images, thereby increasing its effectiveness in expressing fears, hopes, and desires, and mobilizing people on both the rational and emotional levels.

In environmental activism, images play a major role in establishing narratives to mobilize action against climate change and the destruction of nature. More traditional forms of environmental activism, promoted by organizations such as Greenpeace, have generally emphasized negative images, some of which have become iconic in the struggle and have been widely reproduced in various forms of media (Hariman & Lucaites, 2007). However, recent studies (Leviston et al., 2014; O'Neill et al., 2013, Bashir et al., 2013) suggest that negative images on the impact of climate change can cause emotional rejection in audiences, while images showing possible solutions usually generate more positive responses. According to Roser-Renouf et al. (2014), this form of activism should promote specific beliefs on climate change, build perceptions, and foster interpersonal communication on this topic, in order to improve its effectiveness.

Environmentalism and many other types of activism are present on social media from a variety of actors and in different forms, fostering interpersonal communication on this topic (Roser-Renouf et al., 2014). Firstly, there are well established organizations, such as the previously mentioned Greenpeace, together with new, more heterodox groups, such as the Instagram account @about_environment. We also find celebrities who have joined the environmental cause, such as Leonardo di Caprio, who posts on issues of climate change in his social media accounts, along with media activists, such as Greta Thunberg. In addition to these worldwide organizations, celebrities and activists, we find a new type of social actor who, in the case of environmental activism, displays certain specific characteristics that differ from more traditional, political activism, for whom the term environmental influencer or eco-influencer may be applied (San Cornelio et al, 2020). We understand the figure of influencer as the cultural evolution of the so-called "micro-celebrities" (Senft, 2013; Marwick, 2013), whose activity is characterized by using self-branding strategies, managing their visibility and community of followers, and building aspirational storytelling based on their lifestyles (Leaver et al., 2020).

Such actors have user-generated, environmentally committed profiles, although they are not necessarily involved with non-governmental organizations, and often promote their own eco-friendly products, books on healthy living or environmentally sustainable brands and products. They promote a sustainable lifestyle through personal example, turning their passion for an environmentally friendly life into their main communication goal.

The overlap between digital activism, lifestyle and consumption found among these eco-influencers creates a specific type of social movement that Haenfler, et al. (2012) describe as "Lifestyle Movements". These are characterized by using lifestyle choices as tactics for social change (where personal identity plays a central role as an engine for change) and adopting a diffuse organizational structure.

The visual narratives in the types of digital activism described here adopt different perspectives to imply this relationship between the cosmic, social and personal-embodied orders proposed in the mythic structure. In the case of environmental activism based fundamentally on denunciation or protest, we see how negative images are generally used as incentives to mobilization. This type of social movement sees mass street or social media protest as the main element in political action, obtaining a high degree of visibility which forces governments and industry to respond. In terms of mythological analysis, the narrative links the cosmic order to the social order, while failing to connect with the personal and corporeal order. Responsibility for re-establishing the broken cosmic order is falling mainly on government and business.

In the case of visual narratives created by lifestyle-based movements, such as eco-influencers, the main or most powerful association is between the cosmic and personal-corporeal orders. Re-establishing the cosmological order (living in harmony with nature) in the future, is proclaimed through a reordering of

personal life. In this case, the weakest link is to the social order, as the narrative only implies that this will be reordered through changes in personal life and in the sphere of daily experience.

1.2. Memes and their orientation to the future

As stated above, use of imagery in environmental activism is related to nature and it indicates a breach in the cosmic order leading to the end of the world, caused by human agency. This places us at a point of transition, where we "still have time" to avert it. Memes are a recurring part of such imagery and can be seen as a form of visual activism, in that they represent a politically oriented visual practice expressing the need for change in our way of life.

According to Meso-Ayerdi et al. (2017) the digital meme is used in political conversation because it condenses a complex issue into brief multimedia content (image, video, gif, etc.) which is powerful and effective. Thus, memes can be vectors for a particular ideology with the aim of participating in a social or political debate in a way that is available to all, thanks to the ease with which memes can be created and shared (Ross & Rivers, 2018). Matalon (2019) goes even further: digital memes have a categorically public communicative function; regardless of their style and creative process, the important thing is effective transmission of information. Other authors such as Penney (2020) recognize that the potential for memes as instruments for political demands and peer persuasion is already fully accepted among most researchers and academics, who no longer see them as jokes, but understand them as an integral part of digital rhetoric. Similarly, Costanza-Chock (2012) recognizes the growing interest in social media among activists and the expansion of media culture in different social movements, including meme production in the digital culture social practices when promoting a cause.

The meaning of memes is contextual to a greater extent, as they address a specific audience that must know what they are for (Norstrom & Sarna, 2021). In this context, memes help develop our understanding of the world and propagate faster when they "resonate" with our inner feelings. Thus, the force of the meme lies in its "resonance" with our concept of how the cultural order should be, not in its ability to "alter" or "question" our closely held convictions, as we would fail to see the humour, take offence or miss the point. It is at this point when the memetic conversation is interrupted or activated,opposing, renegotiating or arguing by modifying and remixing so that the meme works in our favour, thus contributing to its spread beyond replication. This is one of the attributes that make the meme unique compared to other visual formats and it is also from this perspective that memes can be considered mythological narrative, in that they make a true statement about the world, even though they do so through humour and irony and are subject to rejection, change or transformation by its recipients. Waddell et al (2020), state that to understand how social change comes about, we need a better understanding of changing memes or the changes in memes and how they transform narratives that act as frameworks that open or close our horizons of opportunity. Thus, mythological narrative is not a framework restricted to repetition and closed to social transformation, nor does it consist solely of repeating archetypical formulas to stabilize and naturalize the social order; rather, it can act as an agent that naturalizes other possible orders.

2. Material and methods

This study is part of a broader research project on narrative cultures, social action, and audience building in contemporary society, and more specifically, in the field of digital media. The focus on Instagram is the result of our interest on the emergence of new forms of activism based on images and personal narratives (Georgakopoulou, 2016; San Cornelio & Roig, 2018) which are characteristic of the so-called "influencers" (Abidin, 2017) and that are spreading as a form of environmental activism (Murphy, 2019) in social media. In addition to these personal narratives there is certain memetic production, which is the object of study here. Specifically, in this paper we are interested in understanding how digital narratives in environmental activism articulate mythologies oriented to the future, in such a way that text and image constitute meaningful narrative units for both their creators and audiences.

Our methodological approach is qualitative in nature and the empirical fieldwork is limited to digital media. The study of digital technology-mediated communication was already well established at the start of this century in which different types of methodological approaches and online research techniques

(Mann & Steward, 2000), virtual methods (Hine, 2005), and digital methods (Rogers, 2009), have been developed. Markham (2013) stresses the duality of the Internet as a field and method of study, suggesting it is not just a research tool for compiling data but also a field in which to conduct research, i.e. the social context in which people (including the researcher) meet and interact. These digital methods include adapting and reformulating conventional research techniques, such as participant observation and interviews (Kozinets, 2010; Postill & Pink, 2012; Ardèvol & Gómez-Cruz, 2012; Pink et al. 2016).

Our fieldwork is based on participant observation after creating a research account on Instagram, after which we drew up a theoretical sample (Strauss & Corbyn, 1994) consisting of 60 accounts selected on the basis of these criteria: a) topic related to climate change, sustainability and ecologically responsible consumption, preferably with an identifiable personal profile; b) maximum variety with the aim of identifying relevant categories and drawing up a grounded typology; c) language; given that the sample universe is global and local, we decided to select profiles in both English (30) and Spanish (25), while also including other languages such as Catalan and German (5); d) volume of followers: we consider the number of followers significant in defining an eco-influencer. Hence, the minimum criterion was 1,000 followers in the case of languages such as Catalan, whereas 10,000 was considered more adequate for English and Spanish language profiles, although there is currently no consensus as to the minimum number of followers needed for a profile to be considered an influencer[1].

It is interesting to highlight that most of the profiles in our sample were personal (82%) while the rest belonged to couples or families (4.2%), groups and organizations (8.4%) or brands, selling or promoting eco-sustainable products (5.4%), although many personal accounts also promote their own products or eco-sustainable brands.

Drawing from the fieldwork carried on between June and December 2020 we decided to focus for the present study on a total of 12 profiles belonging to ecologist activists, groups or organizations (such as @ecoinventos, @reducewastenow, @aboutenvironment, @theplasticfreepeople, @thezerowasteguide, @greenpeace and @ecologistasenaccion), chosen due to their status as the most prolific in terms of memetic spread and production. Within these accounts we selected a sample of 50 memetic images for the narrative-mythological analysis. The criterion for selection was that they could be identified as memes by their style and replicability. Moreover, in the selection process, we realized that many of them (20 out of the 50 images selected) presented a binary opposition narrative. Hence, we centred our analysis on this subgroup of 20 images, since this "binary opposition" format is a well-established and recognized cultural form in mythological structures (Lévi-Strauss, 1987).

To analyse the corpus of environmental memes, we used Daiute and Lightfoot's (2004) concept of narrative analysis, which presents an analytical model in social sciences based on narratives as cultural forms for sorting experience in a meaningful way, following certain schemes, scripts or patterns, in which the action is developed, including a root metaphor that organizes the story thematically. Our analysis is based on memes as containing a story and narrative structure.

On the other hand, in order to undertake a mythological reading of these narratives, we have taken into account the elements used to construct myths, as argued above. These are: a) the narratives have a highly symbolic component (condensed into images) related to beliefs that are considered as truths; b) the type of narrative explains a given state of things in the world (past, present and future); c) they establish a link between this order of things and human experience, generally a correlation between the cosmic, social and personal-corporeal orders, where disorder in one of the terms leads to disorder in all the others; d) they provide knowledge or teachings for action.

Analysing these meme-based micronarratives allowed us to explore the climate change-related myths emerging on social media: existing narratives regarding the future, threats and possible outcomes, and the actions and attitudes proposed as suitable ways of combating them.

3. Analysis and results

The images in our corpus use the meme format, containing a minimum of an image, generally a photo, and an accompanying text, structured around a combination of two images organized as binary opposition. Firstly, we establish that the visual contrast of two ideas is a very economical way of telling a

story, facilitating the understanding of complex problems, while helping to express a moral value associated with each of the terms and a future-oriented temporality or change in dynamic.

Within this scheme, the most frequent narrative structure in our corpus, is that of "before-after", characterized by introducing a time vector toward improvement or deterioration. It is a very popular format on the social media as it is used to show change (generally for the better) in the state of a person or thing[2]. The discursive strategy uses the binary opposition, showing antagonistic images from right to left or from top to bottom. The text may vary in length, but it is the image that carries the narrative weight.

In this first typology, temporality is explicit in the text: "then and now", "how it started and how it's going", "old me and new me", and so on. These forms of temporality indicate a change in the state of things. They can be very specific, providing the date in years, or very vague and abstract (referring to planetary change); they can also be indeterminate or refer to personal or day-to-day change (Figure 1).

Figure 1. Sequences of change over time

The first image shows a change over time: from desertification to a green, irrigated landscape, thanks to the action of the photographer Sebastião Salgado and his wife Lélia Deluiz Wanick. The second is a projection into the future, toward future outcomes, while the third and fourth show positive change in the personal sphere (presenting everyday objects and food) by learning more sustainable habits. This type of meme ("old me-new me") suggests that changes at the personal level affect the planet and the environment. Appealing to identity, the "me" is transformed into a more responsible "other me", seeking to generate empathy and serve as an example.

Secondly, this form of planetary transformation through people's positive action also has a collective dimension and places us in the social order through coordinated action. These are the "how it started, how it's going" type of meme. In the image from the @reducewastenow account (Figure 2), on the left we see a dirty beach, but on the right, we see the clean beach after a group of people have mobilized to remove the rubbish and the return of certain animal species.

Figure 2. Developmental sequences (how it started-how it's going)

The @greenpeace image shows how the struggle has grown (before there were few us, now we are many). In this case, the images on the "before" side show a worse situation than those on the "after" side. These two examples show that our actions bring about improvements (first image) and how the

environmental struggle is spreading (second image). The third example of this type shows negative change using the same text. This example is interesting in that, unlike the previous two, it does not contain a human figure, hence the message refers to people's lack of action: this is how things will develop and what will happen if we do not take action.

In the third typology, the change of state is presented by contrasting two orders of things, such as an image of a polluted city and an idealized image of nature. Once again it appeals to the individual: in the first image of the @ecoinventos account, pollution is the product of many (or possibly of people other than the individual in the scene) but just one individual appears to have carried out the action, strengthening the idea that "your" action has a global effect on the planet (implying both individual and collective responsibilities and benefits). The second image presents the negative impact of humans compared to animals (where would you prefer to live?) The next image is possibly more conceptual, as it uses infographics, superimposed over an image of nature. The pictograms are, respectively, pyramidal (evoking the "I", ego, the individual) and circular, a much more harmonious shape (appealing to "eco", the circular economy and, thus, nature). In these cases, there is not always a clear temporal vector, but a dilemma (Figure 3).

Figure 3. Contrast of two orders or states

The fourth typology raises the degree of abstraction, the following images contrast cause and effect, presenting the dilemma of: if you do something, you'll have to be held accountable for it. In other words, your actions have consequences. Once again, the effect of a collective process is personalized. In both the first image, "envenena el río y el río te envenenará a ti" [if you poison the river, the river will poison you], and in the second (if you prioritize money over the environment you'll become just as polluted), industrial pollution or the capitalist economic systems are transformed due to human irresponsibility and greed. In both cases, a single image condenses the contrast made explicit in the text (Figure 4).

Figure 4. Contrasting cause/effect

Finally, these contrasts can also present a dilemma through a good solution-bad solution dichotomy. Examples of this are shown in Figure 5, where two images are used to express good and bad practices for

the planet, through visual contrast. This contrast between two mutually exclusive terms or ideas establishes an aspirational narrative that is projected towards a desirable future, or how things should be. It is suggested as personal choice, appealing to taste and aesthetics.

Figure 5. Contrast through dilemma
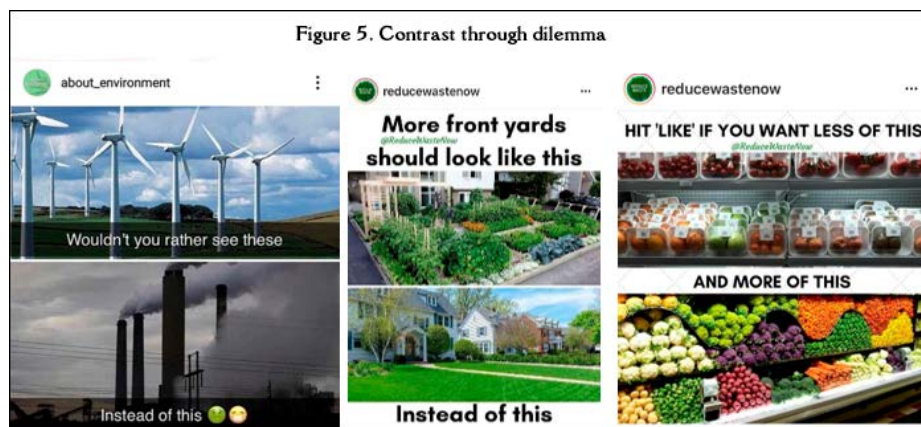
To end, Figure 6 shows some examples of images which construct a narrative based on different temporalities and implying causality, but involving very different actors and emotional tones. The first one is referring to the near past and the near future, and uses a meme from *The Simpsons*; it is Homer Simpson who throws plastic into the sea and suffers the apocalyptic consequences. This is a clear example of a popular meme adapted to the environmental issue, copying the pattern of an iconic meme (such as the use of two shots from the singer Drake's *Hotline Bling* video of the second image). In the memes analysed, a humorous tone is only used on a few occasions, to ridicule inappropriate behaviour, highlight the difficulties and contradictions in activists themselves, or report a "false belief" such as negationism of climate change.

The third image, using the same before-and-after format, the time scale is much shorter, in the present, and there is total individualization (it is "me" whose heart is broken). This identification with the individual "me" includes the maximum emotional impact, linking the pain of the tree to that of the self.

Figure 6. Example contrasting temporality, cause and effect, and emotionality
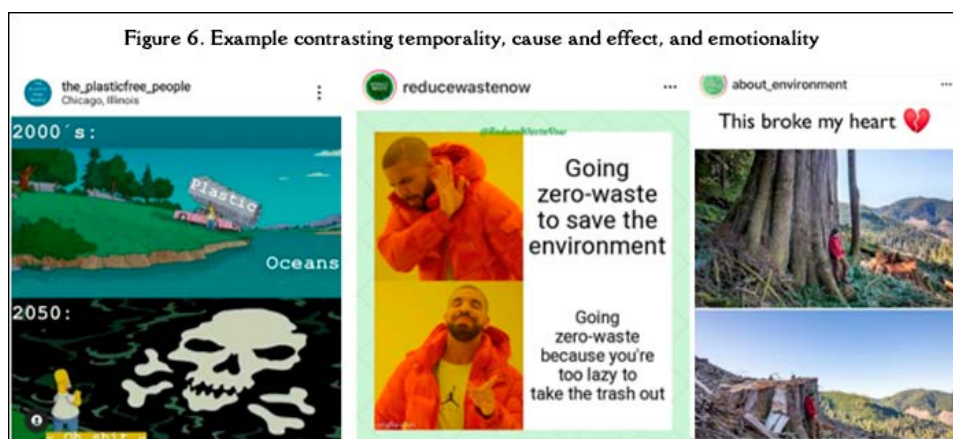
Whatever the case, besides the degree of humour used, the visual presentation of the set of images analysed here is typical of memes in general: simple composition; predominance of message over aesthetics; rehashed, or hastily created images; and short but powerful texts. Nevertheless, as we have observed in our corpus of study, seriousness, and a relatively careful image predominate in memes with environmental content on Instagram, differing from popular memes on other social media. We also have seen that, in the different types found, this contrast between two mutually exclusive terms or ideas establishes a temporal narrative and a future prediction (improvement or deterioration), implying a cause-and-effect relationship

and a moral judgement on our action in the world, moving us toward a transformation in the state of things through personal action.

4. Discussion and conclusions

One characteristic that is common to the meme-based narratives analysed here is that the root metaphor, topic or fundamental truth expressing the myth is related to the end of the world (eschatological myth), in the sense that climate change and environmental degradation will lead us to an irreversible catastrophe caused by human activity, but which can still be reversed by a change in our behaviour at the planetary level and as a species ("redemption" is possible).

Another feature of these memes is that they involve moral judgement, which in some cases becomes normative (imperative), expressed powerfully in texts such as "what they want you to think, what you ought to think". Thus, the myth is built on a truth (climate change) which is the consequence of collective actions related to corporations, industries and governments, our economic systems and environmental policies, but the myth personifies them in individual action (you poison the river) that demands an individual response (you must put an end to this). We will see below that, regardless of type, all the memes analysed imply that individual action is part of collective action. If each of us commits to change, we will bring about positive transformation. This personal involvement is what connects the cosmic order or disorder to the personal order, and it gives meaning to human action, which is where the power of mythological narrative lies.

However, the future-oriented environmental myth does not directly denounce the institutions or corporations that soil the river or beach; they address the individual instead. We will only avoid disaster through the sum of individual actions, whether this be cleaning rivers and beaches, or transforming our personal lifestyle and changing our consumption habits ("old me, new me"). Social order is then re-established by addition.

This leads to the idea of memes as tools which, despite their informal and sometimes jokey appearance, help approach topics considered as serious and important in the environmental, social and even political agenda, such as the Agenda 2030 of the United Nations for Sustainable Development. This seems to question the idea in Vitiuk et al. (2020), whereby memes entertain and mitigate stress caused by problems in daily life, conflicts, risks and uncertainties. We agree, nevertheless, with Nowak (2016) and other authors, stating that the creation and spreading of memes, beyond entertainment, serves to spark debate and discussions about reality and being informed. Memes can be considered products of participatory digital culture, characterized by producing and interchanging their own creations and the belief of their participants in the importance of their contributions.

In the cases analysed here our analysis shows that, memes take these conflicts, risks, problems and uncertainties and, far from distancing us from them to provide peace of mind, they make them the centre of attention so that, firstly, we react (emotionally, rationally or affectively) and then reflect on them, thereby pushing us toward practical action through ideological or attitudinal change. It must be stated that this is a form of activism that starts from an individual commitment, aimed at individuals rather than groups or institutions, thus constituting a new type of political action, "from me to you", neatly digital.

According to our results, the "visual activism" discussed here clashes with the idea offered by other authors on the same concept. Indeed, most studies on visual activism refer to it as specific artistic practices supporting specific causes, as in Cozen (2013), whose work most closely relates to our case and examines images produced by activist artists focusing on climate change. The same occurs with other authors, such as Demos (2016) who, although defining visual activism as politically targeted visual practices calling for social, political and economic change, also interprets it from the artistic perspective. However, our study sees visual activism as going beyond art, thus challenging the views of these authors and broadening the concept to cover all visual manifestations of digital folklore that contribute to the same cause, regardless of authorship, degree of artistry or aesthetics, as is the case of social media memes, which are clever, sometimes humorous, motivational and even educational.

To conclude, the structure of the eschatological myth is reused in environmental activism to naturalize the truth of the movement, making it self-evident while imbuing it with dramatic tension that implicitly leads to resolution. Thus, mythological narrative for climate change through social media memes, firstly,

contributes to creating new spaces for participation and, secondly, helps in understanding complex topics through concise visual impact, promoting and calling for action through emotional and personal involvement.

Notes

[1] Based on the classification proposed by Launchmetrics www.launchmetrics.com, the categories are defined as: micro-influencer (10,000-100,000), mid-tier (100,000-500,000), mega (500,000-2,000,000), and all-star (> 2,000,000).

[2] An exception to this would be the famous "dog meme", in which the dog from the past always enjoys better conditions that the one in the present.

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Alfamed media education curriculum for teachers

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Águeda Delgado-Ponce (coords.)

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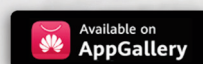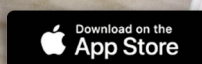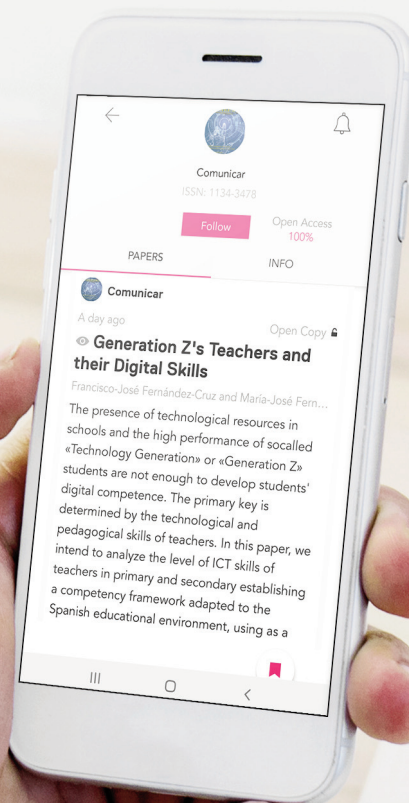
Educational influencers on Twitter.
Analysis of hashtags and relationship structure

Influencers educativos en Twitter. Análisis de hashtags y estructura relacional

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ABSTRACT

In this article we research Spanish educational influencers with major presence on Twitter: what are the most common topics or hashtags used by them, whether there are groups based on the topics of their interventions or what type of social network they configure. To meet these goals, we selected 54 educational influencers with a high number of followers. We analyzed and classified the "hashtags" included in a total of 106,130 tweets. The analysis of hashtags has shown us that the most labelled topics correspond to educational content in different areas of the curriculum, collaboration, exchange and dissemination of digital materials, documents or resources, as well as activities related to training or discussion about innovative teaching methodologies. Using the Gephi software, we carried out a Social Network Analysis, determining the degree of centrality and betweenness centrality of the 54 influencers, which allowed us to identify influencers with greater recognition by the rest. Through a modularity analysis, we were able to identify five groups of influencers that do not work as closed groups but maintain frequent interactions with other influencers in other groups. This research highlights the need to better understand the contents and procedures that may promote informal learning by teachers.

RESUMEN

En este artículo indagamos acerca de los influencers educativos españoles con mayor presencia en Twitter: cuáles son los temas o hashtags más difundidos por ellos, las temáticas de sus intervenciones o qué tipo de red social configuran. Para dar respuesta a estos objetivos, en primer lugar, seleccionamos 54 docentes con alto nivel de seguidores. Analizamos y clasificamos los «hashtags» incluidos en un total de 106.130 tuits. El análisis de los hashtags nos ha mostrado que los temas más etiquetados corresponden a contenidos educativos en diferentes áreas del currículum, la colaboración, el intercambio y la difusión de materiales, documentos o recursos digitales, así como de acciones de formación o de debate sobre metodologías docentes innovadoras. Utilizando el programa Gephi hemos realizado un análisis de redes sociales, determinando el grado de centralidad y centralidad de intermediación de los 54 docentes, lo que nos ha permitido identificar influencers con mayor reconocimiento por parte del resto. A través del análisis de modularidad, hemos podido identificar cinco grupos de influencers que no funcionan como grupos cerrados, sino que mantienen frecuentes interacciones con el resto de influencers de otros grupos. A través de este estudio se pone de manifiesto la necesidad de conocer mejor los contenidos y procedimientos que pueden estar favoreciendo aprendizajes informales por parte de los docentes.

KEYWORDS | PALABRAS CLAVE

Digital activism, social network analysis, informal learning, teacher training, influencer, Twitter.
Activismo digital, análisis de redes sociales, aprendizaje informal, formación del profesorado, influencer, Twitter.

1. Introduction

The mechanisms that teachers use to improve their knowledge and skills have changed radically in recent years. The emergence of social networks such as Facebook, Twitter or Instagram has allowed teachers to choose what they want to learn and who they trust to guide their learning. As we move forward in the digitization of society, there seems to be a growing consensus on the need to adopt a broad perspective on activities that promote teachers' professional development. Currently, such development has been considered as the "coherent sum of activities aimed at improving and expanding teachers' knowledge, skills and conceptions so that they can assume changes in their behavior and way of thinking" (De-Rijdt et al., 2013: 49). Thus, professional development is not limited to formal training scenarios, but includes a broader and more varied set of non-formal and informal training activities (Bound, 2011; Russ et al., 2016; Moore & Klein, 2020).

One of the ways in which many teachers keep up to date involves the use of social networks. 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 allow us to expand what has been called social capital (Rehm & Notten, 2016). Through them, they generate interactions that can be stable or temporary, allowing teachers to gather resources or obtain information from other people considered relevant to their work (Fox & Wilson, 2015).

Social networks create social capital not only through the exchange and dissemination of information. The social capital they generate can also be analyzed through the influence, control and power that can be granted to those with whom an informal monitoring relationship is established (Adler & Kwon, 2002; Seok-Woo & Adler, 2014). To understand the process by which social networks generate social capital, Nahapiet and Ghosha (1998) established three elements that must be taken into account: structure, relationships and cognition. The structure refers to the patterns that configure the network, its morphology, density and internal hierarchies among members. The relational dimension is associated with the type of interactions that take place in the network. Finally, the cognitive dimension refers to the contents, resources, interpretations and meaning systems shared by the members of a network.

Following Nahapiet and Ghosha (1998), one characteristic of the network structure is related to leadership. In every network there are people who play a prominent role and are considered opinion leaders. Opinion leaders (influential teachers) are those people who occupy a central and structural role in a network (Rogers, 2005). They are people who can influence the attitudes or behavior of other people consistently over time (Del-Fresno García et al., 2016). They exercise this role to the extent that they are accepted by others (peripheral actors) as influential subjects (Wang & Fikis, 2017). As demonstrated by Izquierdo-Iranzo and Gallardo-Echenique (2020) when studying the "studygrammer" phenomenon, these subjects can be adults or not, namely young people who create informal learning opportunities for their peers on Instagram (Izquierdo-Iranzo and Gallardo-Echenique, 2020). Another component identified by Nahapiet and Ghosha (1998) in relation to the social capital generated by social networks is cognition. Analyzing it within social networks, we can refer to hashtags or labels that serve to group certain topics present in a Twitter publication. A hashtag gathers words or groups of words preceded by the # symbol that allows users to participate in conversations on a specific topic and thus group them under the same label. They also serve to organize and structure these conversations, making it easier for users to find tweets on a particular topic or discussion (Greenhalgh & Koehler, 2017). They can be understood as "affinity spaces" (Gee, 2005) in that certain users find others akin to their interests based on the tags they use (Rosenberg et al. 2016). According to Gee (2005: 67), an affinity space is a "place where people affiliate with others based primarily on shared activities, interests, and goals". These spaces generate communities comprised of people who seek connection and collaboration with each other (Carpenter et al., 2020). Affinity spaces encourage users of the same social network to meet and interact around a common interest, hobby, identity or ideology. The environments of these affinity spaces can be varied. In their study on the use of social networks among young people, García-Martín and García-Sánchez (2015) determined that the main reason for using these networks, including Twitter, was to have fun or be entertained. Similarly, in another analysis developed on the patterns of use of social networks and web

2.0 environments among young Spaniards, platforms such as Twitter or YouTube were found to provide greater personal satisfaction among young people (García-Martín & García-Sánchez, 2015).

Affinity spaces can create the conditions for teachers' informal learning. Eraut (2004) differentiated three levels of intention in informal learning: implicit learning, reactive learning and deliberative learning. Deliberative learning is the one that interests us in this paper, since it occurs when teachers intentionally seek and receive information through digital media, coming from opinion leaders (influencers) whom they trust and follow (Van-Den-Bossche & Segers, 2013). In the case of Twitter, Santoveña-Casal and Bernal Bravo (2019) showed how the use of this network improved the motivation and satisfaction of teachers in training. Other analyses carried out on Twitter have made it possible to investigate some of the topics or hashtags that are most frequently used in the educational and academic sector (Carpenter et al., 2020). We are referring about hashtags such as #michEd (Greenhalgh et al., 2016), #Edchat (Britt & Paulus, 2016; Staudt-Willet, 2019) and #PhDChat (Veletsianos, 2017).

In this article we focus on Twitter as the main affinity space. Following the dimensions identified by Nahapiet and Ghosha (1998), we set out to answer the following questions: Who are the most prominent Spanish educational influencers on Twitter? What are the most popular topics or hashtags among Spanish educational influencers? What is the relational structure that characterizes the network of Spanish influencers on Twitter? In this article we use the term "influencer" to refer to those educators who have an active presence in social networks. We understand that the term influencer may not be accepted by some of the subjects investigated due to the possible commercial or merely recreational connotation of the activity.

2. Material and methods

In this study we aim to understand the relational structure and content promoted by Spanish educational influencers on Twitter. Twitter is not the only social network. Other studies have analyzed how teachers use Facebook (Hart & Steinbrecher, 2011) or Instagram (Carpenter et al., 2020). We chose this social network because, as indicated by Luo et al. (2020) in their recent review, it is the main platform for creating professional learning networks and sharing knowledge. The first objective was to identify those people who could be classified as "educational influencers" with relevance on Twitter. To do this, we used the Buzzsumo software, a marketing analytics tool that enables advanced queries to be performed on people, profiles and topics most consumed and shared on social networks. We started by filtering users by country (Spain) and keywords present both in the user's biography and in their publications. The keywords used for this ranking were: enseñanza [teaching]; soyprofe [iamateacher]; educación [education]; escuela [school]; profesor [teacher]; aprendizaje [learning]. From this analysis we obtained a sample of 64 Spanish profiles from which we initially selected the ten most representative. We considered as outstanding influencers those with more than 15,000 followers and more than 5,000 tweets published. The profiles initially selected were the following: @xarxatic; @ScientiaJMLN; @Manu_Velasco; @maestradepueblo; @unicoos; @smoll73; @salvaroj; @ftsaez; @edusadeci; @AyudaMaestros.

Once the most prominent Spanish influencers had been identified, we proceeded to analyze the mentions that made by them in their tweets. We were interested in finding the people whom these teachers considered relevant, and who were included in their mentions. The analysis of mentions showed different types of profiles on Twitter: individuals, institutions (government, agencies, official centers), politicians (ministers), national and educational press, radio, television, music or universities. We selected only those mentions that referred to individuals. Once the list of subjects mentioned by these ten influencers was configured, we established as a criterion that they were mentioned by at least four of the influencers in our sample. This process allowed us to identify a total of 44 new influencers, which, together with the ten initial influencers, make up the sample of 54 subjects analyzed.

The list of influencers is as follows: @aaronasenciofer; @AgoraAbierta; @anam_cid; @anatorres8; @AyudaMaestros; @bpalop; @bvicario2013; @c_magro; @carmeniglesiasb; @cccesssarrr; @Clara-Grima; @cpoyatos; @davidcpvm; @DechantCarla; @doloresojeda1; @edusadeci; @eliatron; @Estebandelashg; @ftsaez; @garbinelarralde; @Gorkaprofe; @history_topics; @hruizmartin; @imgende; @javierfpanadero; @JavierPalazon; @jblasgarcia; @jhergony; @jordi_a; @JorgeRuizMN; @Lamunix;

@lepetitpan; @londones; @LUISDAVILABAND1; @maestradepueblo; @Manu___Velasco; @manuel-jesusF; @manuparadas; @MiriamLeiros; @monparaiso; @Nando_Lopez_; @octavio_pr; @Oscar-RecioColl; @peralias; @PsicEduM; @ramon_besonias; @raulillodiego; @salvaroj; @ScientiaJMLN; @smoll73; @tonigarias; @tonisolano; @unicoos; @xarxatic.

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

To address the second research question, we focused on the hashtags used by the selected influencers. To obtain the data, we used, throughout the month of September 2020, the Twlets application, which is an application that enables the download of a maximum of 3,200 tweets from each subject in Excel format. We collected 106,130 hashtags included in a total of 167,162 tweets from the 54 selected influencers.

In relation to the third question, we analyzed the structural and relational dimensions of the influencers' network through a process of social network analysis (SNA). To do this, we analyzed the mentions made by each of the 54 selected subjects in their Twitter messages about the rest of the influencers. To carry out this study we used data obtained from 167,162 tweets from the 54 profiles. Once this data was downloaded, we proceeded to extract the mentions. This compilation of frequencies generated an adjacency matrix that shows the number of times each influencer mentioned and 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 program GEPHI 0.9.2 (Bastian et al., 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.

3. Results

3.1. # Hashtag content analysis

One of the aims of this article was to inquire about the affinity spaces that, according to Gee (2005), allow teachers to create shared activities, interests and objectives. To this end, we analyzed the hashtags that the selected influencers included in their messages. Of the total of 106,130 hashtags, we grouped them into 22,812 and classified them according to their content. The criterion for including a hashtag was to have more than 30 mentions. Table 1 shows the categories and subcategories found in the analysis, indicating the frequency in the total number of subjects.

First, we found a set of hashtags that we have called Generic and that refer to general educational concepts, such as #educación [education], #profesores [teachers], #aprendizaje [learning], #tic [ICT] or #redessociales [socialnetworks]. A second set of hashtags that we want to highlight includes references to processes of collaboration, exchange, support and, in short, informal teacher learning. The results show us that through these hashtags teachers assume a commitment to share and support other teachers. Of all the hashtags used in this category, we must highlight the one called #claustrovirtual [virtualfaculty], which has a frequency of 1058 references. This hashtag is particularly relevant because, although it was created before the pandemic, it has proved to be a means of support for teachers who, through it, shared their doubts, concerns and questions about tools, resources and materials for online teaching. On the other hand, Twitter has also been used by educational influencers as a space to disseminate more or less formal training initiatives: conferences, colloquiums, seminars, MOOCs, organized by institutions or by individuals.

A fourth category found in the analysis of hashtags is what we call educational content. These are links to addresses, resources or pages related to: History, Reading, Mathematics, Science, Language and Literature, Drawing, Music, Physics, Art, Physical Education, Philosophy or Drawing. Along with educational content we find hashtags that refer to teaching methodologies that could be characterized as innovative: visual thinking, gamification, problem-based and game-based learning, flipped classroom, etc. Special attention should be paid to hashtags related to the coronavirus. Obviously, this topic has occupied an important part of the messages by the educational influencers analyzed.

The hashtags we have analyzed show content that is closely related to the training needs identified by the TALIS report (OECD, 2014). This report highlighted that the main need expressed by teachers was to improve their knowledge of the content they teach, as well as the way they teach it. In this sense, the existence of hashtags related to innovative methodologies shows the interest not only of influencers, but of followers in general to inquire about new ways of teaching. The same is true for attention to diversity and inclusion. On the other hand, the numerous hashtags that emphasize support and collaboration among teachers (#recomiendo [irecommend], #profesesinnovadores [innovatingteachers], #sosdigitaldocente [sosdigitalteacher], #compartirentiemposdecoronavirus [sharingintimesofcoronavirus], #profesesqueayudan [teacherswhohelp], etc.) show us a trend towards a horizontal relationship, of selfless support among the teachers participating in the network.

Table 1. Ranking and frequency of hashtags related to education	
Categories	**Categories**
Generic (f=2.707)	Generic (f=2.707)
Collaboration among teachers (f=3.582)	Collaboration among teachers (f=3.582)
Training activities for teachers (f=3.074)	Training activities for teachers (f=3.074)
Educational content (f=5.610)	Educational content (f=5.610)
	Lectura: #hastanuncapeterpan (f=171), #celsius2020, (f=136), #libros (f=116), #recomiendoleer (f=111), #harrypotter (f=94), #harrypotterquizchallenge (f=85), #lectura (f=76)
	Matemáticas: #matemáticas (f=518), #derivando (f=105) y #mujeresmatemáticas (f=77)
	Dibujo: #dibujamelas (f=105), #dibucedario (f=73)
	Arte: #ceroonair (f=572), #cineyeducación (f=521), #labodaderosa (f=312), #coserrelatos (f=195), #educacionnosinartes (f=153), #conmúsicalollevomejor (f=102) y #yovoyalcine (f=81)
	Ciencias: #ciencia (f=289), #fisica (f=160) y #quimica (f=62)
	Educación física: #edufis (f=92)
	Ciencias sociales y filosofía: #geografía (f=68), #filosofia (f=68)
Teaching methodologies (f=1.759)	Teaching methodologies (f=1.759)
Coronavirus (f=2.543)	Coronavirus (f=2.543)
Inclusion (f=310)	Inclusion (f=310)

3.2. Analysis of structure and relationships in the influencer social network

The hashtag analysis previously carried out provides an initial idea of the number and content of the interactions of the 54 subjects in our study. But, in order to know a little more about the structure and relationships between these educational influencers, we also analyzed the network of interactions they generate. The network we analyzed is an undirected network, since each member can mention and be mentioned by any other member. The analysis with the Gephi tool allowed us to create a network of 54 nodes (subjects) and 1,607 edges (relationships between nodes). One aspect of interest when analyzing a social network has to do with determining which members (nodes) of the network play an important role both in terms of the level of connections they have with the rest of the members and the quality of these connections. One of the parameters usually analyzed in a network is its density (the ratio between possible and actual connections) (McCulloh et al., 2013). A network will be very dense when the number of relationships between its members is very high, close to the maximum possible. In the case of the influencers' network we are analyzing, its density is average, i.e. it does not stand out either for the intensity of relationships or for the lack of them.

Together with density, it is important to analyze the concept of centrality in the network, since it enables the identification of the most prominent nodes in the network (Del-Fresno et al., 2016). Centrality can be analyzed using Gephi network analysis in two main ways: degree centrality and betweenness centrality. The degree of centrality of a person in the network has to do with the number of relationships he/she maintains with the other members. The relationships can be in-degree (in our case, the number of mentions that the other people in the network make of the influencer in question) or out-degree (the mentions that the subject makes of the other network participants).

Table 2 shows these data for those influencers who obtained a grade higher than 70. We can see that in most cases the input grade is very similar to the output grade. This means that teachers mention as

much as they are mentioned, which represents a balanced flow in the communication process within the network.

Table 2. Degree of centrality (in-degree and out degree) and intermediation of the most prominent influencers				
Influencers	in-degree	out-degree	Degree of centrality	Betweenness centrality
@Manu___Velasco	42	48	90	115.36
@ftsaez	46	43	89	80.35
@javierfpanadero	35	26	61	72.64
@jblasgarcia	41	46	87	57.08
@lepetitpan	31	43	74	40.93
@carmeniglesiasb	42	43	85	38.71
@tonisolano	46	39	85	38.64
@imgende	44	40	84	53.79
@londones	41	42	83	55.03
@Gorkaprofe	36	46	82	45.67
@doloresojeda1	40	40	80	41.39

The degree of centrality of an influencer is an important indicator of his or her level of influence in the network. But along with this index, network analysis incorporates another index called betweeness centrality. In this case, it is not only a question of knowing the centrality of a subject, but the extent to which he/she is a necessary intermediary for information to flow to another subject. Betweeness centrality is important to determine how a person in the network is key for information to flow (or not) to other subjects or nodes. In this case, we find influencers who stand out in the degree of centrality and at the same time in the betweeness centrality, and others who stand out in only one of these indexes.

Figure 1. Representation graph of groups of educational influencers according to modularity
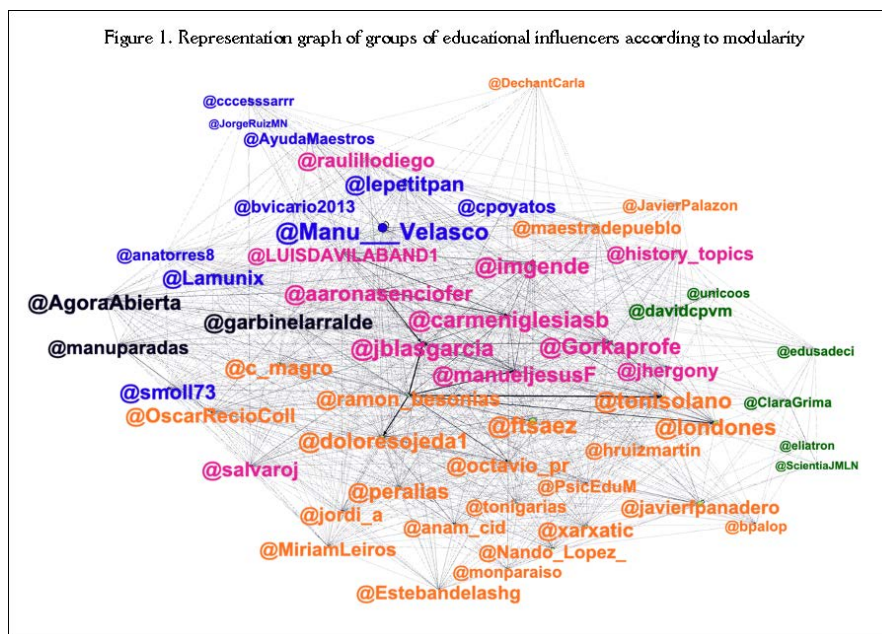
But beyond the identification of these apparent individual leaderships, we were interested in finding out whether there are specific synergies between certain influencers. To this end, we have applied the modularity analysis offered by Gephi. Modularity is a measure that establishes the structure of a network, in order to identify groups or clusters of subjects or network nodes. When modularity is high, the groups are homogeneous among themselves and with little interaction with the rest of the groups. When it is low, there are frequent interactions between the different groups (Sihag et al., 2014). The result of the modularity calculation of the network we are analyzing is low: 0.261. This means, as we have indicated earlier, that it is a group of people who interact openly with other individuals. But the modularity analysis also allows us to create groups of influencers who share a special affinity, and for this purpose Gephi

uses the Louvain algorithm (Blondel et al., 2008). This algorithm allows the creation of communities of individuals sharing affinity spaces (Gee, 2005). The result of the modularity analysis allowed the identification of five groups of influencers.

As can be seen in Figure 1, the different colors identify the subjects that are grouped through modularity analysis. We can observe that the size of the label of each node is different because it represents the degree of centrality of each one. To the extent that the text is larger, these are teachers who mention and are mentioned in high frequency. The first group, (green color) is comprised of six members: @davidcpvm, @ClaraGrima, @edusadeci, @unicoos, @eliatron and @ScientiaJMLN. This group includes subjects whose common ground is the teaching of science and mathematics at different educational levels. We find the user @davidpvm, the founder of the YouTube channel @unicoos, and other teachers dedicated to mathemathics teaching, such as @ClaraGrima, @edusadeci or @eliatron.

In the second group (blue) we find a clear affiliation of these influencers in terms of the dissemination of educational information or knowledge in the press or magazines. They are subjects who usually participate as authors or contributors in educational magazines and/or the press. We find examples such as @Manu__Velasco, collaborator in @AyudaMaestros, teacher and writer. Similarly, @Lamunix, vice president of Espiral Association, Education and Technology. They usually write about innovation in teaching and teacher training (especially in methodologies and technologies for teaching), as in the case of @cccesssarrr, communicator and teacher who collaborates in articles and publications published by Fundación Telefónica. The last and clear example is @anatorres8, journalist at @el_pais newspaper and writer on educational topics.

The third group of influencers is the largest (orange), comprising 24 people. Given the wide variety within this group, we performed a specific modularity analysis within the same group. We then obtained two subgroups that show significant similarities, allowing us to group these subjects. On the one hand, we found a group of current university teachers, such as @ftsaez, professor and communicator at the University of Granada, as well as @jordi_a, teacher of educational technology at Jaume I University. This group also includes @balop, professor in the area of Didactics of Mathematics at the University of Valladolid. We found university teachers, as well as teachers who are experts in continuous teacher training, such as @smoll73 or @JavierPalazon, author and coordinator of the virtual magazine Educación 3.0 and @c_magro, educational consultant in digital strategy. On the other hand, in the second subgroup, we observe a grouping of female teachers who teach at different levels of the compulsory education system. We find primary school teachers such as @doloresojeda1, a language and literature teacher and @MiriamLeiros, a social studies teacher and activist in TeachersForFuture, a digital platform that brings together teachers in the fight for climate change. This group also includes pedagogues and psychologists such as @anam_cid, who is a teacher and psychologist, and @peralias, pedagogue and retired teacher. This grouping clearly shows how the teachers who belong to the group have similar profiles not only in the contents they publish, but also in what they share with their followers.

In the fourth group (black) we find people whose profile is close to experts and/or communicators who are specialized in innovative and technology-based teaching methodologies. In this group we include @AgoraAbierta, a trainer specialized in gamification and Visual Thinking, or @garbinelarralde, a high school teacher of technical drawing and ICT coordinator, whose publications often mention the Visual Thinking methodology. In addition, we find @manuparada, a primary education teacher who mentions methodologies such as problem-based and game-based learning in his interactions.

Finally, the fifth group (pink) includes 11 influencers who interact regularly by sharing resources, materials and information they find on Twitter. They often post tweets intended to express acknowledgement or to share resources that reach them through different followers. These tweets are not directed to a single user but are rather focused on the mention of several subjects to disseminate the work or digital resources created by the teachers' followers. They take on the task of disseminating and recognizing the work created by teachers, enabling them to reach more followers. As mentioned, we find profiles as diverse as that of @imgende, the person with the highest "indegree" rate in this group. This may be explained by the fact that she is one of the most active teachers in our social network analysis, being a university teacher who designs and disseminates resources and materials so that other teachers can acquire

knowledge and strategies for their online teaching. We found other teachers who, altruistically, design and share materials with the rest of the community, such as @Gorkaprofe, a primary school teacher, in subjects such as robotics, mathematics, ICTs, etc. or @aaronasenciofer, a primary school teacher who regularly creates materials on cooperative learning, gamification and flipped classroom and shares them with his community.

4. Discussion and conclusion

Throughout this article we have made a first approach to find out who are the teachers who have a proactive presence on Twitter, their interaction with each other and the content of their messages. These influencers create what Gee (2005) calls "affinity spaces" around a wide variety of educational topics. By tagging their own messages or retweeting the messages they receive, these influencers somehow establish and legitimize certain topics with a variety of content (Wenger, 2000). The analysis of hashtags shows that the most tagged topics correspond to educational content in the different areas of the curriculum. This finding should not be surprising given that the content taught is one of the main concerns of teachers (Berry et al., 2016). The influencers studied act as "knowledge brokers" (Plair, 2008), or necessary intermediaries who select, create, share, evaluate resources or information. The lockdown resulting from the pandemic has led many teachers to create and share educational resources and make them available to other teachers. Some of these hashtags were ephemeral, but some have been maintained throughout this time, such as the case of #claustrovirtual. This is an example of how Twitter can shape a community of practice (Wenger, 2000) and be a space that creates "opportunities for social, situated and distributed learning among teachers" (Luo et al., 2020: 1675) as it contributes to blurring the boundaries between formal and informal teacher learning (Evans, 2019).

However, in addition to the educational content shared on the network, in this study we have investigated the structure and relationships that occur among the 54 influencers analyzed. Using a social network analysis (SNA) approach, we have identified, first of all, the subjects who have a high degree of centrality in the network. These are teachers who are recognized as influencers by a significant proportion of their peers. In addition to the degree of centrality, we have also identified influencers who play a key role in the circulation of information in the network studied. The social network analysis carried out has allowed us, through modularity analysis, to find five groups or clusters of influencers with different affinities. These groups do not have exclusive relationships with respect to influencers in other groups. Rather, they are groups that, while sharing some characteristics of their own, tend to interact with the rest of the groups. In some way, the influencers we have analyzed share common characteristics with activists in other fields. The analysis of recent social movements (Occupy Wall Street, Indignados and UK Uncut) conducted by Gerbaudo (2017) shows a common orientation in relation to three so-called "techno-libertarian" principles: transparency (tendency to openness, to open-source), horizontality (rejection of formal hierarchies) and denial of leadership (tendency to assume that leadership is something to be avoided).

Although in this article we did not analyze the extensive content of the messages, the analysis of the hashtags shows a clear coincidence with the above principles. Through the analysis of hashtags, there is a tendency to share resources or learning objects that are open and freely accessible (transparency). On the other hand, as we have analyzed, the network of 54 influencers is self-organized horizontally, with some groups having common characteristics but interacting with the rest of the groups, and where teachers of all educational levels are equally mixed.

Finally, the denial of leadership is something that we have found informally when interviewing some of these influencers as part of the research that we now present. As we can see, the influencers analyzed 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 & Brüggemann, 2020). We can thus assume that digital social networks are enabling the establishment of new informal leadership among teachers (Carpenter & Harvey, 2019). Through them, opportunities are created so that, by sharing their experiences, ideas, conceptions and reflections, teachers can develop personal or professional learning (Greenhalgh et al., 2016). The results of this study show the need for a better understanding of how these informal leaderships

are generated among the influencers analyzed, their perceptions, intentions, orientations and principles that lead these people to share their time, knowledge and resources with other people in the network. However, although this is important, it will also be necessary to understand the point of view of the recipients of these interventions. By understanding who follows these influencers, we will be able to determine whether the information distributed on the network is really transformed into knowledge and teaching practice. We should not assume that the information, resources and content shared directly generate learning in teachers. Research must determine what is learned, what is applied, how the transfer of learning occurs and what the results are for teachers' professional development.

Finally, this study has some limitations. First, the selection of the influencers was made on the basis of the number of followers. Also, additional criteria could have been considered for their selection. Secondly, the complete content of the messages has not been analyzed but only the hashtags, with the understanding that such tags summarized the content. Thirdly, an evolutionary study of the hashtags over time was not carried out. Knowing the evolution of certain hashtags over time could help us to know which are trending topics and which are permanent topics that concern teachers.

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Drivers for the development of computational thinking in Costa Rican students

Facilitadores del desarrollo del pensamiento computacional en estudiantes costarricenses

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ABSTRACT

This study provides evidence about factors that facilitate the development of computational thinking (CT) in Costa Rican elementary school students, including the description of the contribution of the LIE++ proposal that addresses CT knowledge and practices through programming and physical computing projects. A quasi-experimental design was used to compare a group of students from the LIE++ educational proposal with a group of students from another proposal called LIE-Guides, which emphasizes learning with digital technologies. The study sample comprised 14,795 voluntary students, who answered an online test that was constructed and validated to estimate the scores achieved in CT. The results showed that the students participating in the LIE++ proposal obtained better scores compared to the LIE-Guides group. A multilevel regression model demonstrated that students' personal and social variables, as well as the proposal's execution scheme, positively affected student learning in CT. This research is a first approach to the subject in this context. It refers to the importance of providing educational opportunities that focus on more advanced computing knowledge and skills, as well as the relevance of continuing to develop tools and methodologies that help generate evidence about CT in education in order to improve educational interventions.

RESUMEN

Este estudio proporciona evidencia sobre factores que facilitan el desarrollo del pensamiento computacional (PC) en estudiantes costarricenses de primaria, incluyendo el aporte de la propuesta de LIE++ que aborda conocimientos y prácticas del PC mediante proyectos de programación y computación física. Se utilizó un diseño cuasiexperimental para comparar un grupo de estudiantes de LIE++ con un grupo de estudiantes de otra propuesta llamada LIE-Guías que enfatiza aprendizajes con tecnologías digitales. En el estudio participaron 14.795 estudiantes, respondiendo voluntariamente una prueba en línea que se construyó y validó para estimar los puntajes alcanzados en PC. Los resultados mostraron que los estudiantes participantes de LIE++ obtuvieron mejores puntajes en comparación con el grupo de LIE-Guías y mediante un modelo de regresión multinivel se identificaron que variables personales y sociales de los estudiantes y de la misma ejecución de la propuesta inciden en el favorecimiento de estos aprendizajes. Esta investigación es un primer acercamiento al tema en este contexto, que se refiere a la importancia de brindar oportunidades educativas que apunten a conocimientos y habilidades más avanzadas de la computación, así como a la relevancia de seguir desarrollando herramientas y metodologías que ayuden a generar evidencias sobre el PC en el ámbito educativo y así mejorar las intervenciones educativas.

1. Introduction

Global trends in the use of technologies in education have focused on more specific areas of enhancement and application due to social transformations and the role of digital technologies in recent years. Some of these approaches emphasize computational thinking (CT) as an essential skill that everyone, not just computer scientists, should develop (Wing, 2006) to better understand the technologies and generate new forms of reasoning, creation, expression, and problem-solving (Resnick, 2013).

Although no consensus exists on how to define CT and its components (Tang et al., 2020), most concepts of CT refer to ways of thinking for formulating and solving problems that can be represented and processed through the use of machines (Chen et al., 2017). This approach began to garner attention several decades back with the contributions of Papert, who proposed that people needed to acquire the necessary skills for understanding and participating in the construction of the new computer culture and advanced uses of computers, notably programming (Tang et al., 2020; Webb et al., 2017).

CT is more than just solving informatics problems and programming with the computer, since it entails the comprehension of computational concepts that can be used to manage everyday life (Wing, 2006). A major challenge today, then, is to define what needs to be learned and how CT can best be taught in the classroom (Papert, 1998), as well as how to match that with students' capacities and characteristics (Zhang & Nouri, 2019).

Technology by itself does not lead to change, and CT does not develop spontaneously through mere contact with computers, so educational proposals that include specific objectives and strategies to develop this learning are needed. As Papert (1987) noted, technology is not the key to improving education. Rather, it is the culture of thinking and learning that helps change people, and thus create the conditions for tackling twenty-first-century challenges.

In recent years, various educational efforts have been made in different countries to teach CT at the elementary and secondary levels (Grover & Pea, 2013). These initiatives have driven research to gain insights into learning achievements. Nevertheless, assessment of CT knowledge and practices is still being developed in educational systems, as it is crucial to the creation of instruments for achieving successful integration of CT in the curriculum (Bocconi et al., 2016; Grover & Pea, 2013; Román-González, 2015).

This points to another overriding challenge, considering that different emerging studies are leading to a universally agreed-upon concept of CT. In the strategies used up to now, scales or tests, analyzers of programmed outputs, achievement tests, and more qualitative techniques (interviews, field notes, focal groups, observations, etc.) have been included, seeking to approximate key programming skills and concepts associated with CT (Atmatzidou & Demetriadis, 2016; Brennan & Resnick, 2012; Dagien & Stupurien , 2016; Leonard et al., 2016). There is an agreement, however, that a general void exists in instruments and tools for measuring CT (Román-González, 2015), as well as conditions for ensuring their ecological validity (Salkind, 2010).

Despite the foregoing, the results are quite positive since it has been seen that student participation in educational interventions promoting aspects of CT leads to enhanced skills such as algorithmic thinking (Grover et al., 2015), self-efficacy in programming, creation and understanding of programming codes (Jun et al., 2017), algorithm development, the notion of action-instruction correspondence in a robot, and program debugging (García-Valcárcel & Caballero-González, 2019). The findings have in turn suggested intervening factors in the students' results such as prior computer experience and math skills (Grover et al., 2015). The issue of gender influence is still under study since contradictory evidence has been found (Dagien et al., 2014; Dagien & Stupurien , 2016; Kalas & Tomcsányiová, 2009), and a certain association between CT and students' cognitive capacities has been mentioned (Ambrosia et al., 2014).

Given this scenario, it is important to continue developing educational proposals that specifically address CT, and identify the factors that could foster this kind of learning. Useful and valid assessment tools are also needed for incorporating CT into education and contributing to a theoretical understanding of this construct.

The goal of this study, then, is to provide evidence of factors that facilitate CT in elementary school students, including the potential contribution of LIE++, which addresses specific CT practices and knowledge, in comparison to the LIE-Guides proposal, where CT is not explicitly addressed. The

following research questions were asked: 1) What are the factors associated with students' results on a CT learning test? and 2) To what extent does LIE++ foster this learning in comparison with the LIE-Guides proposal?

2. Conceptualization of the educational proposals

Since 1988, programming has been included in Costa Rica's public education system (from preschool to lower secondary school) through the National Educational Informatics Program (PRONIE MEP-FOD) implemented by the Ministry of Public Education (MEP for its initials in Spanish) and the Omar Dengo Foundation (FOD for its initials in Spanish). The goal has been to build students' high-level cognitive capacities such as problem-solving and collaboration (Omar Dengo Foundation, 2016) to drive personal development in connection with the country's technological, social, and economic growth (Fallas & Zúñiga, 2010).

This has been done primarily by including two weekly educational informatics lessons in the curriculum, taught by an informatics teacher in a computer laboratory. In 2009, LIE-Guides, a proposal based on student performance standards for learning with digital technologies, was implemented. LIE-Guides has emphasized skill-building with programming in project development (prioritizing the use of Scratch) based on the social appropriation of digital technologies (Muñoz et al., 2014). Three dimensions have been emphasized within this framework (Figure 1).

Figure 1. Dimensions promoted in LIE-Guides
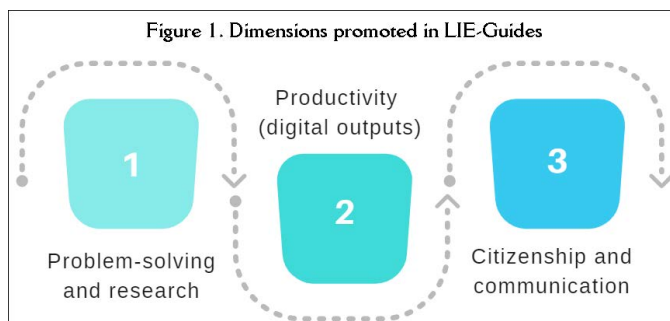
Due to rapid changes in recent years deriving from the scientific and technological revolution, in 2015 the program reformulated the proposal to what is known as LIE++. The distinctive feature of this initiative is its introduction of the explicit teaching of CT knowledge and practices in project programming with physical computing (i.e., the use of cards such as Arduino, Circuit Playground, and Micro: bit) and collaborative work, bringing innovative equipment into the schools. The skills to be developed in students are grouped into five CT competencies (Figure 2).

Figure 2. Competencies promoted in LIE++
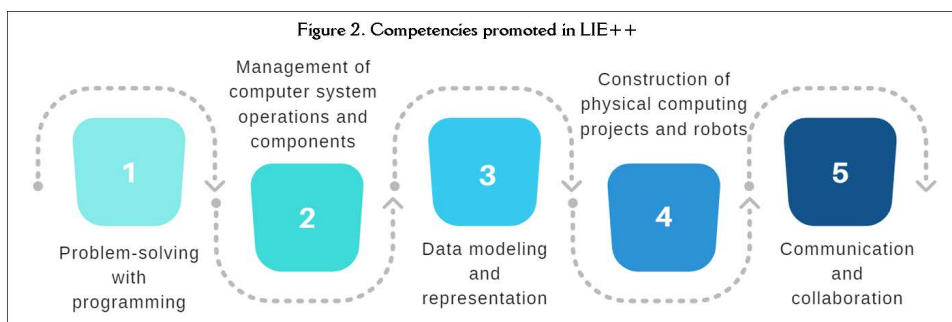
The implementation of LIE++ has been progressive, entailing training and accompaniment of informatics teachers. Currently, the two proposals coexist while the transition is being completed in all the participating schools. Advantage has been taken of this period to learn from the implementation and move forward on developing CT learning assessment tools, with the idea of generating the information needed to improve the different program actions, and to report on the attainment of the stated goals.

3. Methods and materials

3.1. Research design

A quasi-experimental cross-sectional design was used to compare the scores obtained on a CT learning test in two interest groups: one group of LIE-Guides students and another group with at least one year of participation in the LIE++ proposal. In addition, other factors affecting the students' test results were also explored.

3.2. Participants

At the time the data was collected (October 2019), PRONIE MEP-FOD was benefitting a total of 984 schools with educational informatics. However, only 532 met the requirements for the study due to the aforementioned transition from one proposal to the other. Of these, 210 schools were still implementing LIE-Guides and 322 schools were implementing LIE++.

After voluntary participation was ascertained, a sample of 348 schools and 14,795 sixth-grade students was obtained, covering 65% of the schools and 56% of the student population (Table 1).

Table 1. Target Population and Sample, by Study Group				
Group	**Target Population**		**Sample Obtained**	
	Schools	**Students**	**Schools**	**Students**
Total	532	26.343	348	14,795
LIE-Guides	210	7.534	108	3,151
LIE++	322	18.809	240	11,644

3.3. Instrument and item design

In the initial study stage, indicators were created for the expected learning results in sixth-grade students with regard to both CT and specific programming, and physical computing contents. These indicators were refined with the literature review and experts in the area until a final group of 18 CT-associated learning indicators was defined.

Figure 3. Sample Item Structure

Indicator: Interpret the final result (output) of an algorithm.

Question:
Andres is using a game that gives instructions to a painter to create flags of different countries with blocks of color, drawing them towards the right. To do this, he uses the instruction: `PaintBox(color)`.

For example, the output of the instruction PaintBox(red) =

If he wants to paint another line below, he has to use the instruction `NewLine()`.
What would be the result of the following set of instructions?

```
repeat 3 times
PaintBox(green)
NewLine()
repeat 3 times
PaintBox(yellow)
NewLine()
repeat 3 times
PaintBox(Blue)
```

Answer Options:
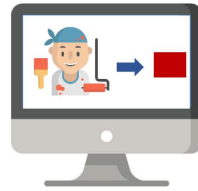
A.

B.

C.

D.

Correct Answer: A

Since the design compared two different educational proposals, independent items were developed in a programming language (similar to the "Bebras" tasks in Palts et al., 2017) to ensure potential differences in the results were not due to a lack of familiarity with a specific language. Most items were single-choice and associated with an indicator, giving a total of 20 items (i.e., Figure 3). These were constructed through the collaborative work of the researchers and the team responsible for implementing LIE++, including material review and discussion sessions. The content was also validated by judges who were computer science and programming experts, and educational informatics teachers. Once all the necessary corrections were made to the items, cognitive interviews were conducted with six sixth-grade students

participating in the proposals (three males and three females). This allowed to further refine the items and verify if the students were able to transfer their learning into their answers. In addition, a set of questions was added to the test to identify student characteristics.

3.4. Description of the variables

The dependent variable is the score that approximates the CT-associated learning achieved by the students on the test, based on a Rasch model and transformed on a scale of 100 to 900 points (the higher the score, the greater the skill), with an expected average of 500 points and a standard deviation (SD) of 100 points. Below are the independent variables that were considered (Table 2).

Table 2. Independent variables considered in the regression analysis	
Variable	**Description**
Educational proposal implementation	
Educational proposal	Indicates the proposal taught in the school (LIE-Guides or LIE++)
Years of participation	Years the student has participated in educational informatics classes in elementary school (first to sixth grade) without distinction of educational proposal
Class attendance	Frequency of weekly laboratory attendance
Faithfulness of proposal implementation	Indicator of teacher's adherence to the activities established in the educational proposal; this ranges from 0 to 10, where a higher number means greater adherence to the proposal
Technology in the home	
Devices	Number of technological devices in the home that the student can use (video game console, tablet, and computer)
Frequency of computer use	Weekly frequency of home computer use (4 points=every day, 0 points=no computer)
Computer Internet access	Access to the Internet from the home computer (1=access, 0=no access)
Cell phone Internet access	Access to the Internet on the cell phone (1=access, 0=no access)
Home characteristics	
Overcrowding	Overcrowded conditions (1=more than 2.5 people/room, 0=fewer than 2.5 people/room)
Cultural capital	Indicator that measures cultural capital (Bourdieu, 1998), constructed from a series of consultations according to the literature (Desjardins & Ederer, 2015). Ranges from 0 to 10; the higher the number, the more cultural capital in the nuclear family
Student characteristics	
Sex	Sex of student (1=male, 0=female)
Age	Age in number of years completed, from 10 to 15 years
Grade repetition	If the student has repeated at least one grade (=1) or none (=0)
Grades	Approximates between 0 and 10 the range of grades reported by the student in basic subjects; a higher number indicates the student has better grades. The factor analysis gave a Cronbach's alpha of 0.85 and showed that the first factor explains 71.1% of the variance (eigenvalue of 3.55)
School characteristics	
Area	Location of the school (urban=1, rural=0), according to the country's geographical classification
IDS	Social Development Index ("Índice de Desarrollo Social", or IDS) by canton (Ministry of National Planning and Economic Policy [MIDEPLAN], 2018). This index ranges from 0 to 100; the higher the number, the more the social development

3.5. Data collection procedure

The test was administered digitally with a duration of 50-60 minutes. The items were ordered according to difficulty, based on the information provided by students in the cognitive interviews, with the easiest ones first to prevent reluctance to take the test. A tutorial was prepared for teachers to give the test during their classes.

Prior to the data collection, the required permissions were obtained from the educational authorities and data confidentiality and the voluntary nature of student participation were ensured.

3.6. Test analysis and psychometric properties

To provide evidence of the validity and reliability of the scores obtained on the test, a rigorous process was followed for conceptual framework creation and item construction, and quantitative analyses were carried out using the R platform (version 3.3.2) and Winsteps (version 3.75.1).

Overall, the test was found to have adequate psychometric properties. The single dimensionality assumption was corroborated, and the items showed adequate internal consistency, discrimination, and

degree of difficulty. In turn, no bias was found to favor results due to the student's gender. Below are the statistical procedures that were used and the main findings that support the above statements:

- The exploratory factor analysis found that most of the rotated factor loads are greater than 0.2, indicating adequate association of the items with the construct. The sedimentation graph showed the relevance of the first factor, explaining 11.84%, so single dimensionality was assumed based on the theoretical backing and these results.
- With classical test theory, it was found that most of the items have acceptable discrimination (scores of more than 0.12), and the Cronbach's alpha shows adequate internal consistency.
- In the differential performance analysis[1], it was found that only one of the items has a moderate effect in favor of males (Magis et al., 2010).
- Using the Rasch model to estimate the students' skill levels on the test, items were obtained with different levels of difficulty that are within the expected ranges, and the infit and outfit statistics suggest a good model fit (Linacre, 2002).

The differences in the average test scores of the two compared groups were explored with one-way ANOVA for each group, considering variables of interest. Finally, CT-associated factors were explored using a multilevel regression model to consider the nested data structure (Holmes et al., 2014).

The co-variables that were used were chosen based on evidence in the literature or prior research experience. Schools in which fewer than 15 students participated were excluded in these analyses to get a better regression model fit, leaving a total of 297 schools. The analysis included a total of 13.213 students, after cases with lost values in the considered variables were excluded.

4. Results

4.1. Participants' sociodemographic and educational information

The total number of students who participated in the study (n=14,795) is characterized by an equal percentage in terms of gender (49.3% females and 50.7% males) and an average age of 12 years (SD=0.64). Most reported a high level of access to technology: their own cell phone (84.9%), Internet on the cell phone (72.4%), and Internet at home (60.8%). However, only 25.2% said they used a computer at home at least three days a week, and its use tends to be more recreational.

Data revealed that students have an intermediate level on the cultural capital indicator (M=5.1, SD=2.3) since they have regular access to books at home, but their reading habit is infrequent. Educationally, according to the grade indicator (M=7.4, SD=2.5), students have good performance and only 3.4% say they had repeated at least one grade during elementary school. This percentage agrees with the national average (some 3%, according to the Ministry of Public Education [MEP], 2019).

In general, the study groups have similar characteristics, but differences were found in some context variables. The LIE++ students show more favorable characteristics since 83.9% go to schools in urban areas and are in territorial areas with a higher average on the IDS (M=64.3) compared to the LIE-Guides group of students, where 70.4% belong to urban areas and places with a lower IDS average (M=53.9). These effects, however, were controlled with regression.

As for the areas, it should be mentioned that 69% of the participating schools are urban and 31% are rural. This is because the data collection involved Internet use, which kept more rural schools from participating.

4.2. Performance test results by educational proposal

Although the average scores of both groups did not exceed the scale average (X=500), significant differences were evident between the two groups (Figure 4)[2]: LIE-Guides, 474.1 (SD=79.2) points vs. LIE++, 486.6 (SD=85.0) points (F(1.13914)=53.08, p<0.00).

Figure 4. Overall Score Comparison2 by Study Group (n=13,916)
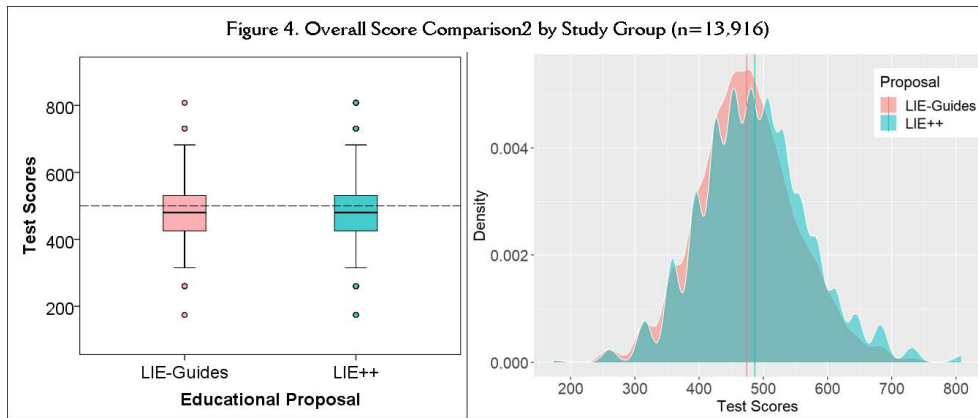
In a first exploration, it was found that the LIE++ students performed better on the test than the LIE-Guides group (Figure 5)[3] . This difference between the groups is maintained in the LIE++ students if they are from an urban area, have not repeated grades, have more years of participation in educational informatics (5 or 6 years), and correctly recognize the concept of programming. This trend is maintained regardless of sex.

Figure 5. Average test score confidence intervals (95%) by student characteristic
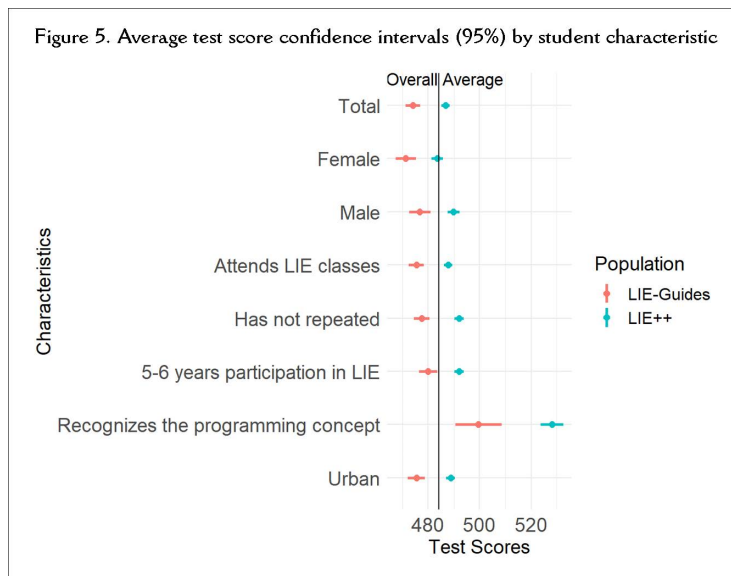
The foregoing indicates that the type of student participation and variables in the proposal implementation itself might be contributing to the development of CT learning. The next section, however, specifies the factors with the most weight in these results. Regarding the test's level of difficulty, according to the Rasch map the difficult and easy items resulted in the same for both groups. This is significant, since it rules out the possibility of the evaluated content being the reason for any differences between the groups, as well as the possibility of one group having an advantage over the other. In addition, upon delving deeper into the content of the items, the most complex ones were found to be aimed at programming topics (functions and code debugging), while the easiest ones refer to problem-solving and logical reasoning.

4.3. Contribution of the factors associated with the results

Based on the standardized coefficients[4] (Table 3), the factors with the most influence on the students' scores were found to be as follows: average scores, IDS, years of participation in educational informatics, gender, cultural capital, no repeated grades, participation in LIE++, and the faithful proposal implementation indicator.

Table 3. Multilevel Regression Model (n=13,213)			
Variable	**Standardized Coefficient**	**Coefficient (SD)**	**P-Value**
Intercept	0.00	346.88 (19.07)	***
Educational proposal	**0.04**	**8.90 (4.52)**	*
Years of participation	**0.07**	**3.63 (0.45)**	***
Class attendance frequency	0.01		
Almost never went to class		0.33 (6.89)	
Once a month		-14.27 (7.12)	*
Once every fifteen days		8.48 (5.85)	
Almost never missed / Once a week		1.48 (4.32)	
Twice a week		7.06 (9.39)	
Faithful proposal implementation indicator	0.04	1.29 (0.34)	***
Devices	-0.02	-1.71 (0.84)	*
Weekly computer use frequency	-0.02	-1.20 (0.71)	
Computer Internet access	0.03	4.84 (2.14)	*
Cell phone Internet access	0.01	0.99 (1.55)	
Overcrowding (vs No overcrowding)	0.00	-0.49 (2.45)	
Cultural capital indicator	**0.06**	**2.12 (0.30)**	***
Gender (vs Females)	**0.07**	**10.87 (1.35)**	***
Age	0.00	0.20 (1.35)	
Grade repetition (vs Yes, I have repeated)	**0.06**	**13.13 (2.43)**	***
Grades	**0.21**	**7.32 (0.30)**	***
Area	0.02	4.28 (4.87)	
IDS	**0.08**	**0.29 (0.10)**	**
Variance Components	**Estimated**	**SD**	
Residual	5527.10	74.34	
School	975.80	31.24	
Intraclass correlation	15%		
AIC	152012.4		

Note. *p<0,05 **p<0,01 ***p<0,001.

In terms of the educational proposal, participation in LIE++ has a positive effect on the test results, since these students obtained a higher average than the LIE-Guides group (8.90 points on average). The following are other variables that help boost test scores: adherence to the proposal's expected scheme of work (work collaboratively and do programming projects) and having more years of participation in informatics classes.

Other factors that affect the results refer to home and school conditions and students' intrinsic characteristics. Regarding home conditions, students with home Internet access and more cultural capital obtained better test results. About having technological devices at home, the results were unexpected, the more technological devices students had, the lower their test scores were (averaging 1.71). This may be due to more recreational use of technology in the home, as reported by the students.

As for the school context, the more developed the area where the school is located, the better the students' average test scores tended to be. Since 15% of the data variability is explained by the school the student attends, educational context is a factor that might be affecting the level of CT learning.

Concerning individual characteristics, students who had not repeated any grades and who had high grades in their subjects - both variables related to academic performance - were found to have better results on the CT test. As for gender, the average test score for males is higher than for females (10.87 points on average).

5. Discussion and conclusions

This study is a first approach to the factors affecting CT learning in elementary school students, including an analysis of the contribution of LIE++. It generates evidence in the region, there being few studies that report on the impact of technologies on the development of core competencies (Martínez-Restrepo et al., 2018). It also helps highlight elements from the LIE++ experience that could be considered by other initiatives for reflecting on the use of donated equipment and educational actions to further the development of advanced computer skills in education. A key finding of this study is that, for both proposals, years of participation and faithful implementation have a significant impact on CT learning.

This reflects the cumulative nature of the knowledge required for CT development and the importance of continuity in this kind of state program, along with adherence to what is set out in the proposals. As for LIE++, better results were obtained than for LIE-Guides. Although the difference in the scores of the two groups is small, it is the first evidence of the potentialities of LIE++, considering its recent implementation and the fact that the comparison group was also participating in a technology initiative.

The differences that were found could be explained by certain characteristics that distinguish LIE++ from LIE-Guides. In the first place, LIE++ explicitly addresses CT learning, which may achieve a stronger impact compared to other initiatives. This has been seen in other studies, such as the one by Román-González (2016), where informatics curricula aimed at CT literacy and development show moderate to large effects, unlike more traditional ICT curricula. Secondly, LIE++ promotes a work dynamic that uses physical computing and student teamwork, seeking to create a practical, fun space by building physical computing projects and robots. Regarding this, Sullivan & Bers (2018) and Caballero-González & García-Valcárcel (2020) point out that several experiences using robotics and programming help students learn computer science and engineering concepts and practices and at the same time permit greater student engagement, even at an early age. Thirdly, although there has been teacher training and assistance in both proposals, priority has recently been given to LIE++ support due to the transition process; in addition, LIE++ incorporates many of the lessons learned from the program throughout its course. Program implementers need to consider complementary strategies for ensuring the intervention's adherence and sustainability. According to Martínez-Restrepo et al. (2018), one of the weaknesses in Latin America is that ICT interventions in education fail to achieve certain effects because they go no further than mere donation of equipment. Another aspect to consider is that CT development is complex and multifactorial by nature, since in addition to proposal-linked variables, the students' personal and social factors have also shown influence on results. Among the relevant intrinsic variables are academic performance and gender. Although school success depends on many factors beyond the individuals, it must be acknowledged that there are intrinsic characteristics of each student that favor learning, to a greater or lesser extent, such as in the case of fluid intelligence and other cognitive capacities that play a key role in this type of learning (Ambrosio et al., 2014).

As for differences due to gender, males were found to obtain higher test scores than females. This finding has not been consistent in other studies. It has been found, though, that these differences in favor of men may be related to socialization and culture, where the idea has been promoted that the field of technology is predominantly masculine, creating a certain amount of unwillingness and fear among women to tackle challenges in this field (Espino & González, 2016). It is therefore extremely important to establish inclusive, gender-bias-free educational proposals that consider the learning limitations and strengths of all students in order to reduce such gaps. These findings mark major challenges regarding measurement capacity and adherence of teachers to the proposal, as well as to the potential offsetting of the different student characteristics by the educational strategies themselves.

In terms of the student's home and school characteristics associated with better results, such as greater cultural capital and IDS, Jara et al. (2015) note that other studies have found the achievement of educational goals to be linked to the context's economic, social, and cultural elements. It is therefore important to understand that students are immersed in a broader context that influences the teaching and learning processes, such as the motivation of students and conditions that strengthen learning in their immediate surroundings (i.e., the support and education of their parents, access to resources, etc.). Despite the foregoing, variables related to technology use and access in the home (computers and Internet) did not have much effect on CT test scores, since even when students had technology available, they reported using it more for recreation. This reinforces the idea that consumption of technology is not enough for developing CT but rather there must be actions or initiatives geared to teaching it (Zapata-Ros, 2015).

Today's new generations are required to go beyond the mere consumption of technology and digital media, so CT includes skills needed for tackling twenty-first century social demands. Parallel to this, updated educational interventions intended to develop these competencies are required. To foster the desired learning, these should consider not only the educational proposals, but also the individual characteristics of the students and their surroundings.

6. Limitations

Several difficulties were faced in this study, namely:

- The educational context in which the proposal is being implemented: Although the experimental designs are the ones with the greatest potential for demonstrating causal effects, the evaluated contexts do not always have adequate conditions for doing so. PRONIE MEP-FOD has extensive national coverage (92.2% of daytime public education in December 2019), which limited the definition of a control group with no type of intervention. For this reason, comparisons of different proposals were used to better estimate the effects. An additional consideration was that LIE++ is in the initial stages of implementation, implying that many teachers and students are still not familiarized with this proposal.
- Digital application: Due to the resources available for the study, digital data collection was prioritized. This limited the participation of all schools contemplated in the study, particularly those in rural areas where there are serious Internet connection problems.

7. Future studies

As LIE++ becomes more consolidated, this type of study should be replicated to obtain more points of evidence of its impact on students. One way to define the control group, and to improve assessment conditions, is to partner with countries in the region without this type of intervention in their educational systems.

In addition, as a result of the study a test was created to assess CT learning in elementary school students. In the future, the test should continue to be strengthened by improving its psychometric properties, expanding the number of items, strengthening the conceptual model, and exploring other associated factors. Also, as other studies have found, the use of this type of test could be enriched with the use of other instruments and tools for a more comprehensive assessment of CT.

Notes

[1] The Mantel-Haenszel asymptotic test, standardization, and logistic regression were used for the differential item analysis and the size of the effect was estimated using the Delta-DIF.

[2] Scores could not be estimated for some students, so the sample used for A was 10,962 and the sample for B was 2,954.

[3] Differences significant to 5%.

[4] The continuous versions of the standardized variables were considered for these analyses.

Funding Agency

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The effects of children's Internet use:
A Chinese longitudinal study
Los efectos del uso de Internet por niños:
Un estudio longitudinal en China

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ABSTRACT

In this study, we investigate the mediating effects of children's Internet use on the relationship between family socioeconomic status and their academic achievement, and whether the mediating effects vary across different academic subjects. We used the data from the China Family Panel Studies on the socioeconomic status of children's families, children's Internet use, and their academic performance. In the 2014 sample, there were 2,686 participants (females=1,272). In 2016, there were 2,330 participants (females=1,069), and in 2018, there were 2,485 participants (females=1,151). The socioeconomic status and the Internet use were measured by a questionnaire. Standardized tests measured the academic performance. Our findings showed that family socioeconomic status was positively related to math performance, but not significantly related to Chinese performance. The results also indicated that Internet use did not significantly mediate the relationship between family socioeconomic status in 2014 and math performance in 2016, while the frequency of Internet use to study in 2016 partly mediated the relationship between family socioeconomic status in 2016 and math performance in 2018. Our findings suggest that Internet use can only mediate the relationship between family socioeconomic status and math performance and the mediating effects become stronger over time.

RESUMEN

En este estudio investigamos los efectos mediadores del uso de Internet por parte de los niños en la relación entre el nivel socioeconómico de la familia y su éxito académico y si los efectos mediadores varían entre diferentes disciplinas académicas. Usamos los datos de Estudios de Paneles de las Familias Chinas sobre el nivel socioeconómico de las familias de los niños, el uso de Internet por parte de los niños y su rendimiento académico. Hubo 2.686 participantes en 2014 (mujeres=1.272), 2.330 participantes (mujeres=1.069) en 2016 y 2.485 participantes (mujeres=1.151) en 2018. El estado socioeconómico y el uso de Internet se midieron mediante un cuestionario. Las pruebas estandarizadas midieron el rendimiento académico. Nuestros hallazgos mostraron que el nivel socioeconómico de la familia se relaciona positivamente con el éxito en matemáticas, pero no significativamente con los puntajes chinos. Los resultados indicaron que el uso de Internet no mediaba en la relación entre el estatus socioeconómico familiar en 2014 y el rendimiento matemático en 2016, mientras que la frecuencia de uso de Internet para estudiar en 2016 mediaba en parte la relación entre el estatus socioeconómico familiar en 2016 y el rendimiento matemático en 2018. Nuestros hallazgos proponen que el uso de Internet sólo puede mediar en la relación entre el nivel socioeconómico de la familia y el éxito en matemáticas, y los efectos mediadores se vuelven más fuertes con el paso del tiempo.

KEYWORDS | PALABRAS CLAVE
Socioeconomic status, Internet, academic achievement, children, math, language.
Nivel socioeconómico, Internet, éxito académico, niños, matemáticas, idiomas.

1. Introduction

The Internet is an integral part of the daily lives of children and adolescents. It's not surprising to see a 5-year-old child using an iPad, watching videos on Apps or playing games. Children now have greater autonomy in Internet use and are subjected to its influence from an early age (Kirkorian & Anderson, 2008). Over the past ten years, researchers have paid more attention to how the Internet mediates the effects of the real world on children's developmental outcomes rather than to examine its direct effects. They are interested in investigating whether the influence of family, education, culture and society is reconfigured in the technical age or not (Livingstone et al., 2017).

Among the diverse developmental outcomes, there is no doubt that academic achievement is not only an important indicator of children's learning abilities, but also a key outcome to see the influence of family, educators, culture, and society. Recently, a longitudinal study in Switzerland revealed the mediating role the Internet played in the relationship between family socioeconomic status and children's academic performance (Camerini et al., 2018). They found that children with lower socioeconomic status used the Internet more frequently for entertainment and online communication which reduced their academic performance.

However, until now, few studies have examined whether this phenomenon can be generalized to other cultures. In the present study, we first examine the mediating effects of children's Internet use on the relationship between socioeconomic status and academic performance in a Chinese sample. In previous research, some evidence showed that the strength of the relationship between Internet use and academic performance varied across different academic domains (Habriichuk & Tulchak, 2017; Zhou et al., 2020 Gómez-García et al., 2020). Hence, the second objective of the present study is to investigate whether the mediation is consistent across different academic domains.

1.1. Socioeconomic status and academic performance

Since Brooks-Gunn and Duncan's work (1997) which revealed a high correlation between children's academic achievement and their parents" occupation, numerous studies have documented that socioeconomic status (SES) which was usually measured by parents' jobs, parents' education attainment, and family income was associated with children's school achievement and intelligence (Liu & Xie, 2015; Marks & Pokropek, 2019; Baker et al., 2018; Assari et al., 2020). As families can transfer advantages to their children via their greater resources (Duncan et al., 1994), "powerful parents" usually help children get better education resources (Liu & Xie, 2015). By contrast, children who experience greater socioeconomic adversity, in particular during early developmental periods, exhibit lower academic achievement compared to their peers from socio-economically advantaged backgrounds (Bradley & Corwyn, 2002; Farooq et al., 2011; Fergusson et al., 2008).

In empirical research, a number of studies from different countries have found that family's SES is related to children's academic achievement in general (Liu & Xie, 2015; Marks & Pokropek, 2019; Baker et al., 2018; Assari et al., 2020) as well as achievements in math (Anders et al., 2012; DeFlorio & Beliakoff, 2015; Wang et al., 2014; Gómez-García et al., 2020), and reading (Cheng & Wu, 2017; Liu et al., 2016). However, there are also some inconsistent findings regarding this relationship across different academic domains. For example, based on a rural basic education survey of elementary school students (from Gansu province, China), Park and Hannum's study (2001) found that parents' educational level was related to students' math performance but not related to Chinese language performance.

1.2. Socioeconomic status and Internet use

In the past, purchasing media devices and supporting an Internet connection were so expensive that they posed a financial barrier for low socioeconomic status families to access the Internet (Resta, 1992; Sutton, 1991). Hence, there was a digital divide (first-order) which is described as a binary opposition between those who had access to online technologies and those who did not (Mascheroni & Ólafsson, 2015; Norris, 2001). With the development of digital technology, the cheap cost of Internet access and the common use of smart phones are making the first-order digital divide gradually disappear. The digital divide was no longer about owning media devices or not, but about the difference in Internet using skills.

More specifically, the digital divide (second-order) has been defined as a user's competence to transform the information reached on the web into knowledge (Hargittai, 2001; Dijk & Hacker, 2003).

Some previous western studies have confirmed the existence of a second-order digital divide (Park, 2015; Scheerder et al., 2017; Vigdor et al., 2014). Children from families with higher SES possibly use the Internet for informational needs, while those from lower SES families use the Internet more frequently for entertainment. In China, the Internet usage by children and adolescents has changed a lot during the past decade. In 2005, there were only about 16 million Chinese teenagers who could access the Internet (Cao & Su, 2007), but about 175 million teenagers had online access by June 2018 (China Internet Network Information Center, 2018), which indicates that the first-order digital divide is gradually disappearing in China. However, until now, little is known about the phenomenon of digital divide (second-order) in an Eastern context (Camerini et al., 2018).

1.3. Internet use and academic achievement

There is no doubt that the Internet is a powerful learning environment. In terms of the relationship between children's Internet use and academic performance, there have been mixed findings. Fairlie and Robinson (2013) conducted a field experiment which randomly provided free computers for home use to 1,123 grade 6-10 students in California, they found increased computer ownership and use did not influence children's educational outcomes. Hunley et al. (2005) also found that the correlation between computer use and adolescents' grade point was not significant. Meggiolaro's (2018) study revealed that Internet use was not associated with children's mathematical achievement. However, several other empirical studies have documented both positive (Kim et al., 2017; Mitra, 2019) and negative (Stavropoulos et al., 2013; Huang, 2018) effects of Internet use on academic achievement.

Moreover, some evidence has implied that different purposes of using the Internet might deferentially influence children's academic outcomes (Camerini et al., 2018). For example, Kubey et al. (2001) found that recreational Internet use was significantly correlated with poorer academic achievement, Kim et al. (2017) found that using the Internet to study for more than 2 hours per day was positively correlated with Korean adolescents' academic achievement.

Additionally, some studies showed that the strength of the relationship between Internet use and academic performance varied across different academic domains (Habriichuk & Tulchak, 2017; Zhou et al., 2020; Gómez-García et al., 2020; Mitra, 2019). For instance, Internet use could improve children's reading comprehension (Mitra, 2019), while it was not associated with children's mathematical achievement (Meggiolaro, 2018).

1.4. Research hypotheses

In the present study, we investigate the mediating effects of the different purposes for children's Internet use on the relationship between family's SES and their academic achievement, and whether the mediating effects vary across different academic subjects.

Based on the previous findings, we expect that (1) children's Internet use can mediate the relationship between family's SES and their academic achievement; and (2) the academic domain can moderate the mediating effects.

2. Material and methods
2.1. Data source

In this study, we used the data from a national longitudinal survey: the China Family Panel Studies (Xie, 2012). The baseline survey of the CFPS started in 2010. It collected data of 33,600 adults and 8990 children from 14,960 families and 634 communities, which cover 25 provinces, municipalities, and autonomous regions in China. A number of variables in several different areas such as health, education, and sociology were measured. As a longitudinal project, the participants were invited to complete the questionnaire again every 2 years.

In the present study, we used data on the socioeconomic status of children's families (2014 and 2016), Internet use (2014 and 2016), and academic performance (2014, 2016, and 2018). In the 2014

sample, there were 2,686 participants (females=1,272, 47.36%). The mean ages of males and females were 12.42 (SD=1.75) and 12.52 (SD=1.75), respectively. In 2016, there were 2,330 participants (females=1,069, 45.88%), and there were 2,485 participants (females=1,151, 46.32%) in 2018.

2.2. Measures

2.2.1. Families' socioeconomic status

Families' socioeconomic status (SES) was measured by five indicators: (1) a family's total income in the past 12 months, (2) father's education (one for illiteracy, two for primary school, three for middle school, four for high school, five for junior college, six for bachelor, seven for master, and eight for PhD), (3) mother's education(one for illiteracy, two for primary school, three for middle school, four for high school, five for junior college, six for bachelor, seven for master, and eight for PhD), (4) father's occupation measured by International Socio-Economic Index of occupational status (ISEI), and (5) mother's occupation (ISEI).

2.2.2. Frequency of Internet use

A four-item scale measured the frequency of using the Internet to study, to entertain, to do commercial activities, and to socialize. A seven-point scale ranging from 1= "never" to 7= "almost every day" was used. The internal consistency of this scale was good (α=0.81).

2.2.3. Academic achievement

Standardized tests by interview were conducted to measure children's verbal and mathematical abilities. In 2014, for verbal test, children were asked to read out the words on a card (a total of 34 cards ranging from easy to hard).When the number of 'missed' words equalled three, the test ended (Liu & Xie, 2015). Children's scores were recorded. The mathematical test included the operations of addition, subtraction, multiplication, division, exponential, logarithmic and trigonometric functions, series and permutation, and combination.

The scores were computed according to the highest difficulty a child could reach. In 2016, a word recall and number series test adapted from theHealth and Retirement Study was used to test children's verbal and math performance. For verbal performance, interviewers read out ten words (e.g. mountain, rice, river, etc.) to children and asked them to recall the words immediately and once again after a few minutes (delayed test) after the reading.In this study, we used the score of the delayed test to measure children's verbal performance.

An adaptive test based on modern test theory was used to measure children's math performance. A child was presented with three items and a score ranged from 0 to 3 based on the number of correctly answered items was calculated. Then, the child got a new set of items according to her/his prior score. Those children with better prior performances received more difficult items.

Children's test scores on the two tests were recorded. Then, a new score was computed by the Rasch model (one type of Item Response Theory models) based on their test scores, which represents their math performance. In 2018, the tests were the same as the tests used in 2014. Standardized z-scores of the scores in all the three years were used for our analysis.

3. Results

3.1. Descriptive results

Descriptive data including mean and standard deviation is shown in Table 1. The data indicated that children often used Internet to study, to socialize and for entertainment, but seldom used it to do commercial activities.

Table 1. Descriptive data				
Variable	Mean (round1)	SD (round 1)	Mean (round 2)	SD (round 2)
Family income	4.72	9.34	5.57	4.15
Father's education	2.80	1.18	2.68	1.47
Mother's education	2.78	1.20	2.39	1.91
Father's occupation	3.61	14.56	32.06	11.75
Mother's occupation	29.25	16.34	28.77	11.60
Frequency of using Internet to study	4.19	1.92	4.37	1.88
Frequency of using Internet to socialize	4.77	2.17	4.90	2.08
Frequency of using Internet to entertain	4.85	1.80	5.26	1.88
Frequency of using Internet to do commercial activities	1.26	.96	1.34	.82
Math performance	528.46	4.56	13.71	28.61
Word performance	5.47	1.30	22.53	2.10
Prior math performance	10.47	4.50	524.15	30.18
Prior word performance	21.37	7.39	5.43	2.02
Age	12.47	1.68	12.41	1.75
Gender	.53	.50	.54	.50

3.2. The relationship between family SES and children's academic achievement

In the present study, we examined the relationship between family socioeconomic status and children's Chinese achievement and math achievement respectively in a two-rounds design (round 1: 2014 SES on 2016 academic performance and round 2: 2016 SES on 2018 academic performance) by structural equation model. The analysis was conducted in MPLUS 8.0 (Muthén & Muthén, 2016).

Regarding the fit index, the general cut-offs for accepting a model are equal to, or greater than, 0.90 for CFI, and equal to, or less than, 0.08 for RMSEA and SRMR (Hu & Bentler, 1999), In Table 2, our results indicated that the fitting of our models were good.

The results of the two rounds both showed that family SES was positively related to math performance (for the round 1 β=.24, p<.01; for the round 2, β=.35, p<.01), but not significantly related to Chinese scores (for the round 1 β=.07, p>.05; for the round 2, β=.22, p>.05).

Table 2. Fit index of the mediation models					
	$\chi2$(df)	p	RMSEA	CFI	SRMR
Round 1 (2014-2016)					
SES——Math	41.25(8)	.00	.04	.98	.04
SES——UITS——Math	92.30(30)	.00	.03	.97	.04
SES——UITSO——Math	192.95(30)	.00	.05	.91	.06
SES——UITE——Math	80.38(30)	.00	.03	.97	.04
SES——UITC——Math	105.09(30)	.00	.03	.96	.04
SES——Word	4.84(8)	.00	.04	.98	.04
Round 2 (2016—2018)					
SES——Math	79.68(9)	.00	.06	.97	.02
SES——UITS——Math	243.46(32)	.00	.05	.93	.04
SES——UITSO——Math	156.38(30)	.00	.04	.96	.03
SES——UITE——Math	263.46(32)	.00	.06	.93	.05
SES——UITC——Math	285.82(32)	.00	.06	.92	.05
SES——Word	89.60(9)	.00	.06	.96	.03

Note. SES, Socioeconomic status; UITS, Using Internet to study; UITSO, Using Internet to socialize;UITE, Using Internet to entertain; UITC, Using Internet to do commercial activities; Math, Math performance; Word, Word performance.

3.3. The mediating effects of Internet use on the relationship between family SES and children's math achievement

We then tested the mediating effects of the different purposes for using the Internet on the relationship between family SES and children's math performance. The conceptual model used for the analysis is illustrated in Figure 1.

Figure 1. Mediation model for current study
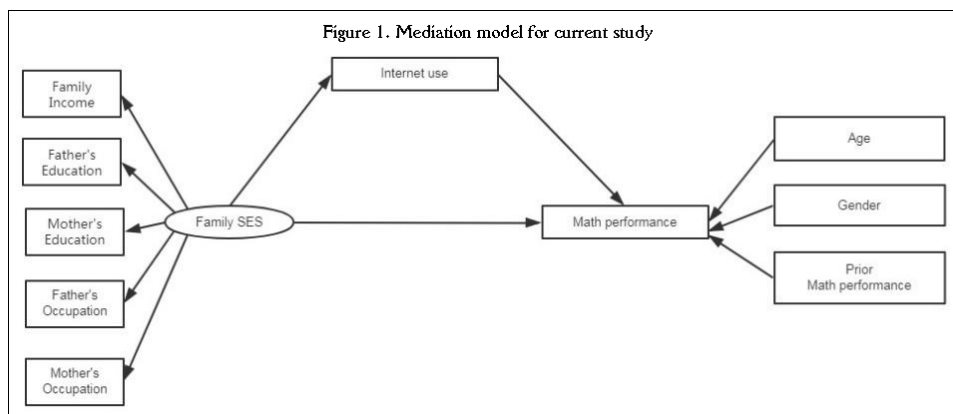
The results indicated that the fit index of the mediation models were good as well (see Table 2). As shown in Table 3, the results indicated that the four purposes for using the Internet did not significantly mediate the relationship between family SES in 2014 and math performance in 2016. However, the results indicated that the frequency of using the Internet to study in 2016 partly mediated the relationship between family SES in 2016 and math performance in 2018.

Table 3.The Mediating effects of the Internet use on the relationship between family socioeconomic status and math performance				
	To study	To socialize	For entertainment	To do commercial activities
Round 1 (2014-2016)				
SES—Internet use	.14**	-.07	.12**	.12**
Internet use — Math	-.05	-.05	.08.	-.04
SES—Math	.15**	.14**	.15**	.15**
Indirect effects	-.01	.00	-.01	-.01
Round 2 (2016- 2018)				
SES—Internet use	.20**	.01	.01	.09*
Internet use — Math	.13**	.02	-.01	-.06*
SES—Math	.26**	.28**	.28**	.29**
Indirect effects	.03**	.00	.00	-.01

Note. *p<.05 ,**p < .01 (two tailed).

4. Discussion and conclusion

Our study contributes to the existing literature in several important ways. First, the previous research mostly relied on a cross-sectional design (Cheng & Wu, 2017; Kim et al., 2017; Assari et al., 2020), in this study, we used a longitudinal design, which can explore the changes of the mediating effects of Internet use on the relationship between family socioeconomic status and academic performance with the development of the Internet. Second, we used a Chinese youth sample to test the generalization of prior western findings. Third, this study investigated the mediating effects of the different purposes for Internet use, so that the mediating effects of Internet use could be analyzed in more detail. Fourth, we examined the mediating effects of Internet use on the relationship between SES and academic performance across two academic areas, which enabled the comparison of the strength of these mediating effects across different academic domains.

In the present study, we hypothesized that (1) Internet use can mediate the relationship between family socioeconomic status and academic performance and (2) the academic domain can moderate this mediation. Our findings partly support the two hypotheses. We found that only the frequency of using the Internet to study can mediate the relationship between SES and math performance. That is, children with higher socioeconomic status used the Internet more frequently for study which increased their math performance.

In previous research, a number of studies have linked family SES to students' math achievement (Anders et al., 2012; DeFlorio & Beliakoff, 2015; Wang et al., 2014; Gómez-García et al.,2020). In the longitudinal Chinese sample, our results from the two rounds showed that family SES was significantly related to

mathematical scores. This finding is in line with the prior empirical findings from various cultures (Wang et al., 2014; Kim et al., 2017; Gómez-García et al., 2020) and it supports the view of Ferraro et al. (2016) that low family economic status has a cumulative disadvantage for the development of children's mathematical abilities. With regard to the relationship between family SES and verbal achievement, the previous empirical findings showed mixed results. Our results provide supportive evidence to studies which reveal a non-significant link between family SES and verbal achievement (Park & Hannum, 2001). Taken together, our findings indicated that family SES was more likely to be related to Chinese students' math achievement than verbal achievement. In previous research, some researchers proposed that compared to the learning of Chinese, Chinese parents are more likely to buy learning materials, hire private tutors, and support outside school learning to help children learn math (Wang et al., 2014). Hence, the relationship between family SES and math achievement may be stronger than the relationship between family SES and verbal achievement.

We then examined whether children's Internet use can help explain the mechanism of the relationship between family SES and math achievement. We used four models to test the mediating effects of four reasons for using the Internet (to study, for entertainment, to do commercial activities, and to socialize) on the relationship between family SES and math achievement. Our data showed that only using the Internet to study can mediate the relationship between family SES and math performance, while the other purposes cannot. The findings are in line with the assumption of the second-order digital divide that individuals with a higher educational level and more financial resources are more likely to use the Internet for informational needs which directly benefits academic development (Bonfadelli & Heinz, 2002). Our findings also imply that the purposes for using the Internet can moderate the mediating effects. In previous research, the evidence from Switzerland revealed that children with lower socioeconomic status used the Internet more frequently for entertainment and online communication, which reduced their academic performance (Camerini et al., 2018). Our findings suggest that this cannot be generalized to Chinese children and that there are cultural differences in the mediating effects of the different purposes for using the Internet. Moreover, our results indicated that the frequency of using the Internet to study in 2016 mediated the relationship between family SES in 2016 and math performance in 2018, while it did not significantly mediate the relationship between family SES in 2014 and math performance in 2016. These findings suggest that with the development of the Internet, the role of Internet use in the relationship between family SES and academic performance becomes more significant over time.

This study has some limitations that could be improved in further research. First, the data on the Internet use relied on participants' self-reporting, which may be influenced by some bias caused by personal perceptions. Further research may measure the frequency of the Internet use by using some objective measures to record the frequency of children's Internet use. Second, this study only focused on two major subjects (mathematics and Chinese), future research could continue to examine the consistency of the mediating role of Internet use between family socioeconomic status and other disciplines. Third, our study only used data from four years, in further research, data from more points in time may be helpful to investigate the dynamic relationship between family's SES, Internet use, and academic performance.

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Flipped learning and good teaching practices in secondary education

Flipped learning y buenas prácticas docentes en educación secundaria

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ABSTRACT

Flipped learning is a didactic method that requires the teacher to have a series of competences for its application. The aim of this research is to analyse the abilities of Spanish teachers of Compulsory Secondary Education (CSE) to develop good practices in flipped learning and to discover the factors which influence the development of good practices in these teachers. The research method is based on a quantitative methodology with a descriptive and correlational design. A total of 1,743 teachers in Spain participated in the study. The instrument used was the Flipped Classroom Teacher Scale (FCTS) questionnaire. The results show that 758 teachers, less than half the teachers surveyed, show competences to adequately develop a methodology based on flipped learning, where age, use of information and communication technologies (ICTs) in education, time spent using them in the personal sphere, number of devices and teaching experience have an influence on the application of the method. The conclusion reached is that there is a linear relationship between institutional support, technological self-efficacy, teaching beliefs and teaching strategies for the development of good practices in flipped learning in the teachers analysed, so these factors are postulated as conditioning factors.

RESUMEN

El flipped learning se considera un método didáctico en el que el docente requiere de una serie de competencias para su aplicación. El objetivo de esta investigación es analizar las capacidades para desarrollar buenas prácticas sobre flipped learning en docentes españoles de Educación Secundaria Obligatoria (ESO) y descubrir los factores que influyen en el desarrollo de buenas prácticas en dichos docentes. El método de investigación se fundamenta en una metodología cuantitativa, con un diseño de tipo descriptivo y correlacional. En el estudio participaron 1.743 docentes del territorio español. El instrumento usado es el cuestionario Flipped Classroom Teacher Scale (FCTS). Los resultados muestran que menos de la mitad de los docentes encuestados revelan competencias para desarrollar de forma adecuada una metodología fundamentada en el flipped learning, concretamente 758 docentes, donde la edad, el uso de las tecnologías de la información y comunicación (TIC) en el ámbito educativo, el tiempo de uso de las mismas en el ámbito personal, el número de dispositivos y la experiencia docente influyen en la aplicación del método. Se concluye que existe una relación lineal entre el apoyo institucional, la autoeficacia tecnológica, las creencias docentes y las estrategias de enseñanza para el desarrollo de buenas prácticas con flipped learning en el profesorado analizado, por lo que se postulan como factores condicionantes.

KEYWORDS | PALABRAS CLAVE

Flipped learning, ICT, teaching innovation, teaching methods, educational research, quantitative analysis.
Flipped learning, TIC, innovación docente, métodos de enseñanza, investigación educativa, análisis cuantitativo.

1. Introduction and state of the question

The progression of the 21st century has brought about momentous changes in all social levels, caused by access to information (López & Bernal, 2019) and the impact of COVID-19 (Tang et al., 2020). These changes have had a direct impact on the education sector (Jurado et al., 2020), leading to an evolution in training processes for the integration of information and communication technologies (ICTs) (Starkey, 2020). They have allowed teachers to be more flexible in learning, while providing the opportunity to try new pedagogical approaches (Sargent & Casey, 2020). Accordingly, the educational administration and university sectors have strongly committed to the inclusion of ICTs in educational centres as a complement to innovative learning practices (Cabero et al., 2019, Fernández et al., 2018). Such educational innovation based on technology requires the active involvement of the student for successful learning processes (Jovanovi et al., 2017), as well as teaching staff adopting new roles and professional competences (Zheng et al., 2020).

A methodological approach that has taken centre stage in existing educational processes is flipped learning (Zainuddin et al., 2019). This educational modality of a mixed (Lee et al., 2017) and ubiquitous (Díez-Gutiérrez & Díaz-Nafría, 2018) nature has attracted attention in the educational community for its pedagogical effectiveness and potential by moving away from more traditional academist formulas (He et al., 2016), standing as an adaptation and therefore an evolution of conservative practice (Karabulut-Ilgu et al., 2018). Thus, flipped learning is defined as a pedagogical approach where the traditional classroom roles are reversed (Bergmann & Sams, 2012). This way, the student begins their learning outside the traditional classroom, and continues, reinforces and complements learning in their usual school lessons (Long et al., 2016), encouraging a practical learning supported by technology (Froehlich, 2018).

The effectiveness of flipped learning in relation to traditional learning styles, which do not make use of technology, has been reflected in the scientific literature, with students showing an active attitude before, during and after class, as well as a teaching role which guides the educational process (Santiago & Bergmann, 2018).

Moreover, flipped learning results in high levels of student motivation (Hwang et al., 2020); better use of classroom time (El-Miedany, 2019) so that the students construct their own knowledge in interrelation with a group of equals (MacLeod et al., 2017); a high degree of commitment and willingness to perform metacognitive exercises which involve higher level skills (Cabero & Llorente, 2015); greater student participation in the ordinary classroom due to the high degree of flexibility which online materials provide; as well as encouraging collaborative work between students both inside and outside the traditional classroom (Touron & Santiago, 2015). In addition, research carried out by Thai et al. (2017) confirmed that motivation and performance in students in a flipped learning approach are higher than in other kinds of pedagogical approaches with similar technological characteristics.

For the implementation of this flipped classroom methodology, the study developed by Chou et al. (2019) establishes four fundamental dimensions for preparing and developing the flipped learning pedagogical model. The first refers to the need for institutional support, which Joo et al. (2011) identified as support from superiors, support from colleagues and a positive organisational atmosphere. For the implementation of flipped classrooms, it is necessary for supervisors to value the work of teachers who incorporate technology in their learning practice. In addition, this support should be reciprocated by their colleagues, helping with its design and implementation (Joo et al., 2011). Similarly, teachers need support, including suitable training, tools, guidelines and both online and classroom components for teacher development (Hamdan et al., 2013).

The second dimension refers to technological self-efficacy, understood as "the individual's beliefs regarding their personal abilities to organise and undertake the actions required to produce the expected results" (Bandura, 1997: 3). From this perspective, previous studies have identified technological self-efficacy as a factor with a significant influence on teachers' decisions to integrate technology in their classrooms (Khan et al., 2018; Shaw et al., 2018).

Teachers' beliefs constitute the third dimension which should be considered in the implementation of the flipped learning methodology. This dimension touches upon teachers' beliefs about the epistemological nature of the subject area they teach and the syllabus (Ertmer, 2005). Teachers should focus the teaching

and learning process on the student body and determine the optimum procedures in order to attain meaningful learning. From this perspective, it has been shown that teachers' beliefs affect the practical implementation of the flipped classroom, the relationships between learners and teachers, and student participation (Demanet & Van-Houtte, 2012).

The fourth and final dimension is related to the teaching strategies used by teachers in their classes. The flipped classroom focuses on the active participation of learners through collaboration, problem-solving in the classroom and the implementation of case studies, leaving passive activities such as reading textbooks, watching presentations and videos, and active listening to recordings for home (Thai et al., 2017). These flipped classroom strategies improve learning performance in students as demonstrated by Leo and Puzio (2016), although their implementation by teaching staff in the classroom is not easy to learn or carry out. For this reason, teachers should be able to understand different teaching strategies as a crucial element for their successful application. According to Ekici (2021), teachers should carry out a careful selection of teaching methods and thorough design of strategies for active learning, so they can be combined with traditional teaching instead of spending considerable time and resources in developing online videos and other materials intended to be used outside the classroom.

There is no doubt that several socio-educational variables such as the teaching staff´s gender, age, teaching experience, training and understanding of ICTs influence the successful implementation of active methodologies such as flipped learning. A review of the scientific literature shows few studies in this regard. Accordingly, only studies addressing teacher training in this methodology at the university level, as part of a teaching innovation project (Ojando et al., 2020) or the teaching Master´s training of future teachers (Cid et al., 2018) have been found, where the necessity of space and time for methodological innovation is considered. This requires time, patience, and support of the teaching staff, among other factors (Ojando et al., 2020).

1.1. Objectives and research questions

On the methodological spectrum, flipped learning is increasingly prevalent in learning and teaching processes, being used for different subjects and educational levels (Mengual-Andrés et al., 2020). Accordingly, the scientific literature brings together exploratory studies on the efficacy of this methodology in diverse contexts (Lin et al., 2019). However, little research has been found addressing flipped learning from an evaluative perspective of the skills for good staff teaching practices to materialise. Therefore, the objectives of this study are a) to analyse the ability of Spanish teachers in Compulsory Secondary Education (CSE) to carry out good practice for flipped learning and b) to discover which factors influence the development of good practice in these teachers.

Based on these objectives, the following research questions (RQ) were formulated:
- RQ$_1$: What is the proportion of teachers trained for the development of good practices in flipped learning at the CSE educational level?
- RQ$_2$: What are the socio-demographic factors which determine the development of good practices in flipped learning in CSE teaching staff?
- RQ$_3$: What influence is there between interactions of the conditioning factors in the development of good teaching practices for flipped learning in CSE?

2. Material and methods

This study followed a quantitative research methodology, based on a descriptive and correlational design (Hernández et al., 2014).

2.1. Participants

A total of 1,743 CSE teachers in Spain participated in the study. Participants were selected by convenience sampling from all the educational centres in Spain, consulted at the database of the Ministry of Education and Vocational Training (https://bit.ly/2Zs9ZmX). Integrated in public, private and state-subsidised private centres, 43.3% of the total participants were men and the rest women. Teachers were of different ages (20-35 years old=31.5%; 36-45 years old=45%; 51-65 years old=18.9%; older than 65 years old=4.5%). More than half the participants use ICTs (66.6%) and consider flipped learning to be

a suitable methodology (74.8%). Regarding the number of electronic devices, they own, 1.2% have no devices, 33% have one to four devices, 48.8% have between five and ten devices and 17% own more than ten devices.

Concerning ICT training, 12.9% carry out at least one training course a year, 48% between two or five courses and 39.1% state that they carry out more than five training courses. With regard to use of technology, 40.8% allocate between one and two hours, 32% between three and four hours, 15.7% between five and six hours and 11.5% of teachers more than six hours. Regarding teaching experience, 11.6% of subjects have between one and ten years´ experience, 33.2% have eleven to twenty years, 20.3% twenty-one to thirty years and 34.9% have more than thirty years´ experience.

2.2. Instrument

The data was collected through the adaptation of the Flipped Classroom Teacher Scale (FCTS) questionnaire (Chou et al., 2019), an instrument designed specifically to determine good practices in CSE teaching staff for the development of flipped training activities. In its original version, the questionnaire consists of 19 items structured in the following dimensions: institutional support (IS-4 items); technological self-efficacy (TSE-6 items); teachers' beliefs (TB-5 items); teaching strategies (TS-4 items). The responses are configured on a five-point Likert scale, with 1 being the lowest rating and 5 the highest.

The FCTS has high reliability (Cronbach´s alpha=0.904). The Kaiser-Meyer-Olkin test was relevant (KMO=0.86) and Bartlett´s test of sphericity delivered suitable figures ($\chi 2$=3063.71; p<0.001). Thus, it is an empirically validated instrument through an exploratory and subsequent confirmatory factorial analysis. Likewise, for its adaptation to the Spanish context, it was translated and validated following the same statistical procedures used by the authors.

The tests carried out show a valid and reliable tool for its application to the Spanish population (KMO=0.83; Bartlett=$\chi 2$=2951.37; p<0.001; Cronbach´s alpha=0.85). In the adaptation of the questionnaire, 10 socio-demographic variables were added (gender, age, use of ICTs, appropriate use of flipped learning, number of digital devices, ICT training, technology usage time, teaching experience, educational centre and location of the centre). The questionnaire applied had a total of 29 items.

2.3. Procedure and data analysis

The research started at the beginning of the 2019/2020 academic year. A convenience sampling method was applied to select the educational centres from the 17 autonomous communities and the two autonomous cities which make up the Spanish state. The management teams at the educational centres were contacted. The research objectives were explained to those who showed interest and the necessary permission was obtained to carry out the research activity. The researchers distributed the instrument digitally through the Google Forms application. The selection of the instrument was based on being able to use a validated tool both in the Spanish context and in the educational stage under study. Teacher participation was therefore voluntary. Participants were aware of the research objectives and informed consent was obtained from all participants.

The statistical study was performed using the twenty-fourth version of the IBM SPSS and IBM SPSS Amos programmes. Average scores and standard deviations of the sample according to each of the socio-demographic factors were established. Similarly, possibly significant differences between factors were analysed with the t-test calculation for independent samples and the ANOVA test.

Two path analyses were also performed in order to determine which factors studied influence the development of good teaching practice, as well as the type of influence produced between dimensions. Prior to its implementation, the multivariate normality hypothesis was tested based on the Mardia coefficient (Mardia, 1970). Similarly, different goodness of fit indices was collected in order to confirm the suitability of the two models (Byrne, 2013).

3. Results

43.48% of teachers (n=758) were quantified as showing optimal skills for implementing the flipped learning method, so just under half the total teachers studied show a suitable profile for its development. For this, scores higher than 71 out of a total of 95 were considered. In Table 1, the mean obtained by

teachers in each of the socio-demographic variables are shown, as well as determining whether there are significant differences in each variable.

Table 1. Descriptive statistics and differences between groups				
Variables	**n**	**M**	**SD**	**p**
Gender				
Male	335	80.80	6.81	0.633
Female	423	80.57	6.28	
Age				
20-35	235	81.17	6.75	0.000
36-50	319	80.07	6.34	
51-65	125	78.04	5.66	
Older than 65	79	85.72	4.69	
Use of ICTs				
Yes	493	81.04	6.46	0.030
No	265	79.97	6.59	
The use of flipped learning is suitable				
Yes	603	80.81	6.51	0.245
No	105	80.12	6.53	
Number of devices				
0	9	79.11	5.39	0.042
1-4	256	81.57	6.45	
5-10	367	80.36	6.66	
+10	126	79.84	6.18	
ICT training				
0-1 courses	291	80.51	3.61	0.558
2-5 courses	376	80.92	6.32	
More than 5 courses	91	80.39	6.4	
Technology use time				
1-2 hours	378	81.78	6.73	0.000
3-4 hours	229	79.78	6.07	
5-6 hours	98	79.22	6.41	
6+ hours	53	79.24	5.80	
Teaching experience				
1-10	102	83.11	7.24	0.000
11-20	285	80.45	6.37	
21-30	153	79.56	5.89	
+31	218	80.59	6.54	

Note. n=sample; M=mean; SD=standard deviation; p=p value.

Regarding gender, men (M=80.8) show a slightly higher mean than women (M=80.57), although this difference does not show significant differences (p=0.633). With respect to age groups, teachers older than 65 years old (M=85.72%) attained higher mean than the rest of the established age groups. Concerning training for developing good practice in flipped learning, there is no upward relationship with respect to the mean, since the group of teachers with the next highest mean corresponds to ages between 20 and 35 years old (M=81.17). In this case, there were significant differences between age groups (p=0.000). In the use of ICTs, a higher mean was observed in teachers who use them (M=81.04) than teachers who do not use them in training processes (M=79.97), with there being significant differences in this respect (p=0.030). Regarding the consideration of whether the use of flipped learning is suitable, a higher mean was observed in those who considered them to be so (M=80.81) than those who did not consider them suitable (M=80.12), despite no significant differences between them being confirmed (p=0.245). Regarding the number of devices, those who had between one and four (M=81.57) show a higher mean than the rest of the groups established. There is no increase or decrease regarding the number of devices, but a significant relationship was observed (p=0.042). Regarding training on the use of ICTs in teaching and learning processes, teachers who carry out between two and five courses a year (M=80.92) show a higher mean than the rest, with there being no significant differences (p=0.558). In terms of technological devices usage time, the highest mean was observed in teachers who used the devices for between one and two hours (M=81.78), with significant differences being observed between the different groups (p=0.000), in addition to an inversely proportional relationship between the mean value and time using the devices. Finally, in relation to teaching experience, the highest mean corresponds to the sample group between one and ten years of professional experience (M=83.11), followed by the group with more than 31 years of experience (M=80.59) and with statistically significant differences being observed

(p=0.000). The various goodness indices of the statistical data have been analysed in order to be able to establish the various structural equation models (SEM) and to apply the two path analysis models. Firstly, Mardia´s coefficient for model 1 (Mardia=1.555) and model 2 (Mardia=3.741) were analysed. In both cases, the values obtained were lower than 288, so they were considered suitable values as established by Bollen (1989). The fit indices, required to determine whether the model applied is suitable or not, were then analysed. In this case, as shown in Table 2, the values fulfilled all the assumptions established by Byrne (2013).

| Table 2. Goodness and fit indices of the analysis models			
Fit index	**Value obtained**		**Expected value**
	Path 1	Path 2	
χ^2	82.16	113.68	
df	24	51	
χ^2/df	2.93	2.22	≤3
GFI	0.918	0.921	0.90–1
AGFI	0.903	0.909	0.90–1
RMR	0.088	0.072	The closest to 0
RMSEA	0.031	0.47	<0.05
CFI	1	1	0.90–1
NFI	0.924	0.951	0.90–1
NNFI	0.913	0.928	0.90–1

Note. GFI=Goodness of Fit Index; AGFI=Adjusted Goodness of Fit Index; RMR=Root Mean Square Residual Index; RMSEA=Root Mean Square Error of Approximation; CFI=Comparative Fit Index; NFI=Normed Fit Index; NNFI=Non-normed Fit Index.

In the first path analysis applied (Table 3), all the socio-demographic variables of the study were taken into consideration, which are directly related to good teaching practice in the use of the flipped learning method. The results obtained show that only ICT usage time (from a personal perspective) shows a significant relation with the development of good practice using the flipped approach. Significant relationships were not observed in the rest of the established links.

Table 3. Path analysis 1 model parameters					
Association between variables	**RW**	**SE**	**CR**	**p**	**SRW**
FGP ← Gender	-0.025	0.027	-0.943	0.346	-0.035
FGP ← Age	0.049	0.019	2.617	0.009	0.112
FGP ← ICT_Educational_Use	-0.057	0.031	-1.824	0.068	-0.072
FGP ← Flipped_Use	-0.019	0.035	-0.560	0.575	-0.021
FGP ← ICT_Devices	-0.011	0.024	-0.480	0.631	-0.020
FGP ← ICT_Training	0.016	0.020	0.768	0.442	0.029
FGP ← ICT_Usage_time	-0.060	0.017	-3.461	***	-0.141
FGP ← Teaching experience	-0.017	0.014	-1.220	0.222	-0.047

Note. FGP=Flipped Good Practice; RW=regression weight; SE=standard error; CR=critical ratio; SRW=standardised regression weights; ***p<0.001=significant relation.

The SEM of the path 1 model reflects in graphical form the relationship and connection established between the different variables of the socio-demographic dimension with good practice in the use of flipped learning. In this case, the model placed good teaching practice on the central axis, showing the influence exerted on this by the different socio-demographic variables. Likewise, it is shown how ICT usage time in the personal sphere shows a significant relationship with good practice in flipped learning. In particular, the different socio-demographic variables explain 11% of the established model (Figure 1).

Figure 1. SEM of Path analysis model 1

Note. ***Significant in p>0.001.
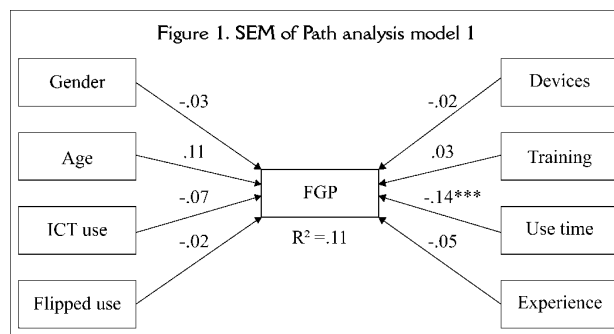
The dimensions that make up the FCTS questionnaire and the socio-demographic dimensions were analysed in the SEM of the Path analysis model 2. Of the diverse connections established, the only model which showed suitable goodness index values is that shown in Table 4 and in Figure 2. In this case, the variables pertaining to gender, devices, training and time of use were related with IS and TSE. In turn, these two dimensions together with the variables of use of flipped learning and use of ICTs were related to TB. Finally, this dimension, in addition to the age and experience variables, was related to TS. Of all the established connections, only two proved to be very significant. These were TSE with TB and TB with TS. There is also a significant relationship between gender and IS, time of use and TSE, IS and IB, and age and TS. All these relations influence or show a direct influence on the development of good practice in the use of flipped learning in learning and teaching processes.

Table 4. Path analysis 2 model parameters					
Association between variables	**RW**	**SE**	**CR**	**p**	**SRW**
IS ← Gender	-0.140	0.066	-2.140	0.032	-0.083
TSE ← Gender	-0.014	0.032	-0.430	0.667	-0.017
IS ← ICT_Devices	0.095	0.056	1.716	0.086	0.072
TSE ← IC_Devices	0.028	0.027	1.014	0.310	0.043
IS ← ICT_Training	0.070	0.050	1.403	0.161	0.055
TSE ← ICT_Training	0.009	0.025	0.378	0.706	0.015
IS ← ICT_Usage_Time	-0.010	0.042	-0.235	0.815	-0.010
TSE ← ICT_Usage_time	-0.043	0.021	-2.060	0.039	-0.087
TB ← IS	-0.072	0.024	-3.073	0.002	-0.112
TB ← TSE	0.361	0.049	7.323	***	0.274
TB ← Flipped_Use	0.067	0.050	1.347	0.178	0.049
TB ← ICT_Educational_Use	-0.060	0.044	-1.358	0.174	-0.050
TS ← TB	0.270	0.038	7.108	***	0.258
TS ← Age	0.057	0.027	2.088	0.037	0.083
TS ← Teaching_experience	0.002	0.021	0.085	0.932	0.003

Note. RW=regression weight; SE=standard error; CR=critical ratio; SRW=standardised regression weights; ***p<0.001=significant relation.

The SEM of the path analysis model 2 (Figure 2) graphically shows the IS, TSE, TB and TS dimensions as its main construct. In this main construct, the various socio-demographic variables which have an influence on the set of these dimensions are associated. In the same way, the direction of the relations is shown. This model reflects the factors which may have an influence on the development of good practice with flipped learning. In this case, the percentage of variation for each construct, set by the coefficient of determination, was 2% for IS, 1% for TSE, 9% for TB and 7% for TS. In this model it can be observed how TSE has a significant influence on TB, and TB on TS.

Figure 2. SEM of the Path analysis model 2
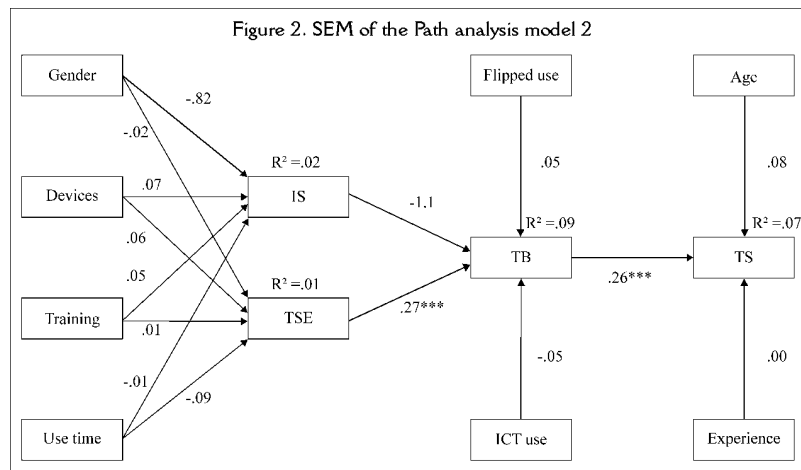
4. Discussion

The flipped learning method is considered to be an active teaching method, since it promotes active pedagogical activity in students, giving the teacher the role of guide in the educational process (Zainuddin et al., 2019). This method turns the classroom around, with the more theoretical learning being acquired

outside the classroom due to the use of various technological resources, aiming to consolidate them in the classroom with practical activities (Santiago & Bergmann, 2018). Flipped learning leads to improvements in motivation, interaction among students, commitment levels, academic performance and collaborative learning, among many other factors (Cabrero & Llorente, 2015; El-Miedany, 2019).

Thus, it is necessary for the teacher assumes a series of skills which allow them to successfully develop this pedagogical method in learning spaces. In this case, institutional support, technological self-efficacy, teacher beliefs and teaching strategies should be strengthened (Ertmer, 2005; Joo et al., 2011; Khan et al., 2018; Leo & Puzio, 2016).

This study states that only 43.48% of teachers are prepared to undertake –with a minimum of success– a methodology based on flipped learning, in agreement with that established by Cid et al. (2018). Thus, the need to train CSE teachers in the use of flipped learning is demonstrated. This coincides with that established by Ojando et al. (2020), where teachers require time, patience and orientation for this training, regardless of the educational level they teach.

After analysing the differences between groups of socio-educational variables, it has been shown that there are significant differences in age, use of ICTs, number of devices, ICT usage time and teaching experience, regarding good teaching practice in the use of flipped learning. This demonstrates that these variables have an influence on training for developing flipped learning in teaching and learning processes. Regarding the age of teachers, it is noteworthy that the range with the highest rating was those older than 65, which may be determined by the choice of an opinion-based and nonprobablistic study sample. Another noteworthy aspect is the evaluation of the use of ICTs in pedagogical processes, where the fact of normally including them in teaching practice has a direct influence on the application of the aforementioned teaching method. The same happens with the number of devices, where having between one and four shows a direct influence on the use of the flipped learning method. ICT usage time is another aspect which has an influence on training in order to apply the didactic method, especially among teachers who use ICTs weekly for one or two hours. Finally, the last factor analysed which may have an influence on the development of the use of flipped learning is teaching experience, especially in teaching staff who have between one and ten years´ experience. Accordingly, all the elements noted reveal significant differences in the training of teachers in order to develop good practice in flipped learning. In contrast, no significant relationship was observed according to gender, valuations on the adequate use of flipped learning or ICT training.

Taking into account the results obtained in path analysis 1, a direct, significant influence between ICT usage time and age on training CSE teachers in order to develop good practice with flipped learning is highlighted. Thus, the amount of time dedicated to ICTs has an influence on this training, proving the need for optimal use of resources, as shown by Ekici (2021).

More specifically, and considering the diverse dimensions studied which make up the instrument used, it has been demonstrated that a significant relationship exists between TSE and TB and TB and TS. There is also a significant relationship between gender and IS, time of use and TSE, IS and TB and age and TS. This shows that the dimensions of the instrument influence each other in the development of good practice in flipped learning. In addition, it is worth highlighting how gender, time of use and age may be factors that specifically affect each of the dimensions in the development of good practice with the flipped approach.

This study is a supporting model for the didactic application of flipped learning as a teaching method. Broadly speaking, the results shown have both theoretical and practical implications. While the knowledge society favours this teaching method, the skills required should be considered in order to promote good practice. Therefore, if we analyse the theoretical level, it is easily observed how this research demonstrates the increase in scientific and educational literature on flipped learning. However, the results shown also indicate new trends which are created for the application of this teaching method, and the consequences this involves. Evidently, this allows the underlying profile of the different studies on the state of this issue to be understood.

Nevertheless, the results obtained contribute to the development and subsequent application of an efficient model which may act as a guide for future research studies, as well as for other professional sectors interested in the application of technology in the educational sector. There is no doubt that flipped

learning is a focus of particular attention in didactic processes and may have great benefits for teaching staff at different educational levels. To date, the research carried out shows the pedagogical prospect this teaching method offers in its area of application in education and specifically in pedagogy. Thus, this study fulfils a double function, since it contributes to the development of future research and to its application in different educational contexts.

Therefore, this research does not only provide a set of theoretical implications, but at a practical level it also encourages the participation of different agents who play a part in educational processes: advisors, legislators, researchers and councillors, as well as teaching staff themselves. The key consideration lies in the integration of educational technology as a teaching method and support tool, taking advantage of the numerous possibilities the creation and consolidation of new inputs may generate.

Lastly, it is essential to offer teaching staff the necessary training so they can make educational technology the best teaching support. This will encourage the development of the required educational and training activities which will contribute to improving didactic processes. Accordingly, this research also helps other educational institutions to develop training processes in accordance with this knowledge and information society.

5. Conclusions

In conclusion, 43.48% of CSE teachers have appropriate training to develop good teaching practice regarding the use of flipped learning in teaching and learning processes. In addition, several factors are seen to influence the development of good practice in staff, such as age, the use of ICTs in the education sector, the number of available devices, ICT usage time and teaching experience. Likewise, a linear relationship was observed between IS, TSE, TB and TS for the development of good practice in flipped learning in CSE teaching staff, which is why they are considered to be conditioning factors for its didactic application.

The prospect of this research focuses on showing the scientific community more data on the application of the flipped learning method in teachers who teach in CSE. In addition, it aims to present the required skills to the educational community and by extension the competent authorities in the education sector, with a view to developing training programmes geared towards the specific training of teaching staff.

Among the limitations of the study are the fact of having applied a nonprobablistic study sample method, which is why the results obtained here should be used with caution, above all if the intention is to generalise them to other contexts. Another limitation was the participation of teaching staff in the research, as it was difficult for the members of this study to manage to get the number of subjects which finally make up this study sample. In addition, in order to be able to access the sample, constant communication with the educational centres and administration was necessary to obtain permissions and collect data. The aim of future research would be to analyse the training of teaching staff at other educational levels, such as Primary Education, Vocational Training or Higher Education, regarding the development and application of the flipped learning method in learning and teaching processes. Likewise, the intention would be to include a qualitative analysis approach in future studies in order to complement the findings presented here.

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Cyber-plagiarism as digital support for the submission of academic writing

Ciberplagio como soporte digital en la realización de trabajos académicos

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ABSTRACT

Access to the Internet and digital technologies has become the primary source of information used in academic papers, and, according to numerous studies, is therefore accountable for the greatest number of cases of cyber-plagiarism. The aim of this study is to determine whether the type of format used by university students for their academic papers (paper/electronic) has an influence on plagiarism or cyber-plagiarism. The research is based on a quantitative methodology, and it is characterized as exploratory, descriptive, and explanatory, using the questionnaire as a tool for data collection. Purposive non-probability convenience sampling provided a sample of 8,943 students from the Autonomous Community of Galicia. The findings show a preference for the use of the electronic format for submitting academic work. Exceptions are made in several cases in which statistically significant differences are observed both in the acts of plagiarism that are initiated and in the main reasons given to justify such acts. A discussion of the findings correlates the findings of the research with the analysis of previous studies in this area, and the conclusions focus on the need to train students in informational skills so as not to commit plagiarism when using the Internet as an academic source.

RESUMEN

El acceso a Internet y a las tecnologías digitales se ha convertido en la fuente fundamental en la búsqueda de información para la elaboración de trabajos académicos y por ello, de acuerdo con numerosos estudios, es una de las causas con mayor incidencia en la comisión de ciberplagio. En este estudio se pretende verificar si el tipo de soporte (papel/electrónico) empleado por el alumnado universitario para hacer sus trabajos presenta diferencias en cuanto a la comisión de plagio o ciberplagio. Partiendo de una metodología cuantitativa, se caracteriza la investigación como exploratoria, descriptiva y explicativa, utilizando el cuestionario como instrumento para la recogida de la información. La muestra, de carácter no probabilístico, intencional y por conveniencia, se compone de un total de 8.943 estudiantes de la Comunidad Autónoma de Galicia. Los resultados muestran el empleo preferente del formato electrónico. Se exceptúan varios casos en los cuales se aprecian diferencias estadísticamente significativas tanto en las actuaciones de plagio que se ponen en marcha como en cuanto a las principales causas establecidas para justificar dicha comisión. Se realiza una discusión de los resultados relacionando los hallazgos de la investigación con el análisis de estudios precedentes en esta temática y se establecen conclusiones centradas en la necesidad de formar al alumnado en competencias informacionales para no incurrir en plagio a través del empleo de Internet.

1. Introduction

Many studies focus on the ease of Internet access and the possibilities offered by technologies as the most frequent causes of academic fraud, and more specifically of plagiarism: "The most recurrent form of academic dishonesty is the practice of plagiarizing, and the main source of information for committing plagiarism is the Internet" (Morey et al., 2013: 239).

This study performs a review of the literature on this topic in order to identify existing research and contribute to the construction of knowledge, to then incorporate the methodological aspects followed in prior studies. The term plagiarism was consulted in the Scopus database in order to identify publications with a high impact index, accompanied by a search in Google Scholar, selecting documents from the last ten years. From among these articles, papers focusing on cyber-plagiarism in the university sphere were selected. Finally, while no articles of characteristics similar to those set forth by this paper were identified, 27 other documents were used, an assessment of which follows.

To begin with, we should highlight the existing variety of terminology used to refer to the topic of study, among which we can find concepts such as cyber-plagiarism (Caldevilla, 2010), electronic dishonesty (Akbulut et al., 2008), electronic plagiarism (Alemán et al., 2016), cyber plagiarism or digital plagiarism (Díaz-Rosabal et al., 2020; Ennam, 2017). Thus, Ruiz-Bejarano (2016: 216) highlights "the printed or digital nature of formats and sources as the element that differentiates both groups of dishonest practices" (plagiarism and cyber-plagiarism).

In this sense, Caldevilla (2010: 151) defines cyber-plagiarism as "the use of information and communication technologies to access papers or studies carried out by third parties with a view to acquiring them (either partially or in their entirety) and presenting them as one's own, i.e. without indicating the source or reference used". For Díaz-Rosabal et al. (2020: 7), it can be considered as a typology of academic plagiarism, understanding that "it is committed with the use of ICTs, but it is not an inherent problem of technologies. This practice arises from a lack of ethical values, as well as from a gap in the knowledge, skills and proficiency required for preparing academic papers". In this line, Luis-Solano (2020: 52) identifies it as "an act of academic dishonesty that focuses on the use of digital resources through ICTs, through which information is sought, accessed and used, which may be partially or wholly appropriated".

Secondly, there is an excessive reliance on the Internet, which is used as an end in itself, leading students and academics to commit cyber-plagiarism, which, as indicated, can be considered a dishonest practice (Casasola, 2015; Domínguez-Aroca, 2012; Gallent & Tello, 2017; López-Gil et al., 2017; Zrnec & Lavbic, 2017). However, the Internet should be used as a means for preparing academic papers (Al-Thwaib et al., 2020; Martínez-Sala et al., 2019) and, more generally, for research and academic development.

Thirdly, investigations such as those of Cevallos et al. (2016), Sanvicen and Molina (2015), and Zarfsaz and Ahmadi (2017) have concluded that the Internet is the main source of document consultation and content development for scholarly work in the university field. They assert that immediate use of the Internet results in students inserting fragments of different electronic texts into their academic papers and, in the worst-case scenario, directly accessing academic papers that are available free of charge, or through purchase (Comas-Forgas & Sureda-Negre, 2008; Devlin & Gray, 2007; Flint et al., 2006; Moreno, 1999; Park, 2003). As to the causes of this, research indicates that it is due to the availability of a large amount of information, the speed of access and the ease of the copy and paste tool (Mejía & Ordóñez, 2004; Guangwei & Xiaoya, 2016; Miranda, 2013). McGowan and Lightbody (2008) point out that students do not perceive the same type of intellectual property attached to an electronic document as to a conventional document (paper format), and they do not perceive the need to cite and reference documents that are on the web. Comas-Forgas and Sureda-Negre (2010) associate it with the belief that copying from the Internet is not bad, with student perception that teachers are not qualified enough to use the Internet and discover the plagiarism, and with the idea that teachers will not read the submitted works.

Finally, most of the studies consulted assert that the Internet facilitates plagiarism (Sorea & Repanovici, 2020) which may be due to the fact that, in the analyses carried out, this was one of the reasons given by both teachers and students, but few studies focus on whether different format types (electronic versus paper) can actually affect results.

Studies on cyber-plagiarism in higher education, as indicated by Olivia-Dumitrina et al. (2019: 112), "are framed within research examining academic honesty, and have addressed both the plagiarism of printed sources and the appropriation of digital materials". In light of the above, it can be assumed that information and communication technologies have encouraged the expansion of digital plagiarism in the face of print-based plagiarism and, therefore, the objectives of this study are focused on determining which format is most frequently used by Galician university students for submitting their academic work, and on ascertaining whether the type of format used has an impact on the frequency of plagiarism. This analysis involves valuing the importance of honesty and academic integrity in the work of university students, as well as an advance in identifying the phenomenon of cyber-plagiarism. Its originality lies in the fact that it more directly addresses the influence that the type of format used (digital or paper) can have on cyber-plagiarism.

2. Materials and methods

A quantitative, exploratory, descriptive and explanatory methodological approach was used to address the objectives of the study. This type of study is in line with those performed by Balbuena and Lamela (2015) and Tayan (2017), because it is intended not only to describe the problem of cyber-plagiarism, but to investigate, explore and analyze perceptions, experiences, attitudes, behaviors and causes of plagiarism in the context of student learning.

The survey technique used for this study is based on a questionnaire, as are the studies performed by Akbulut et al. (2008), Balbuena and Lamela (2015), Caldevilla (2010), Cevallos et al. (2016), Dias et al. (2013), Mejía and Ordóñez (2004), Morey et al. (2013), and Tayan (2017). The questionnaire is a widely used tool for conducting research, and, in particular, for use with large cohorts, especially for the purposes of identifying aspects related to perceptions and in order to improve certain types of practices (Martínez-Sala & Alemany-Martínez, 2017).

2.1. Participants

The population under study consists of students from the Galician University System. Participants were selected by purposive non-probability convenience sampling (Akbulut et al., 2008; Tayan, 2017). Selection critiera included: holding at least one degree per branch of study in two of the three universities participating in the study, with one of these being a double degree, as well as an additional degree from a university campus; in the case of master's degrees, the criterion was to obtain the participation of one third of the degrees offered in the three universities by branch of study.

The data sample consists of 8,943 students in undergraduate (95.3%) and master's (4.7%) studies at the Universities of Santiago de Compostela (41.3%), A Coruña (39.7%) and Vigo (19%), of whom 33.5% are male, 65.7% are female, and the remaining 8% unspecified. Average participant age is approximately 21 years ($\mu=21.32$; $\sigma=3.79$). Regarding the branch of study, just over half of participants study Social Sciences and Law (57.1%), 16.6% Health Sciences, 10.2% Engineering and Architecture, 9.2% Sciences, and only 6.8% Arts and Humanities.

2.2. The instrument

Within the framework of the project entitled "Study on plagiarism by students in the Galician University System", the Questionnaire for the Detection of Coincidences in Academic Papers (CUDECO) (Muñoz-Cantero et al., 2019) was used throughout the 2018-2019 academic year as a tool to detect plagiarism and gauge the academic integrity of the students at the three universities when writing their papers.

This instrument covers a range of 47 items grouped in five categories. After performing the corresponding exploratory factor analysis, the structure of the questionnaire reveals a model of five factors that refer to the concept of plagiarism and its types (partial and total), the causes that lead to plagiarism, both internal (related to the subject) and external (unconnected to the subject), and the attitudes of the peer group towards plagiarism (Muñoz-Cantero et al., 2019). The present study makes use of 19 items from this instrument: first, the type of format that students use for their academic work (paper or electronic); second, seven items related to student plagiarism throughout their university studies; and finally, the eleven items linked to the causes that lead students to engage in plagiarism on their academic papers. The items are measured using a Likert scale of seven response options ranging from "strongly disagree" to "strongly

agree", in addition to an open-ended question that aims to determine students' opinions and suggestions on possible ways to avoid plagiarism.

The instrument yields a Cronbach's alpha coefficient for reliability for the three universities of .865 (.851 for the University of Santiago de Compostela, .868 for the University of A Coruña, and .877 for the University of Vigo), registering a high overall reliability factor. The reliability of the instrument for the identified sample is .827 for the university studies category, and .886 for causes.

2.3. Data collection procedure

The instrument used for the research was applied in university classrooms during the academic period, April 2019. The guidelines issued by the Research and Teaching Ethics Committee of A Coruña University (the university coordinating the project) were followed, with the informed consent of each university and the school steering committees and a selection of those classes with the highest number of students.

Once in the classroom, the students were informed of the most relevant details regarding the purpose and benefits of the research, based on the information highlighted in the Ethics Committee report, as well as the guidelines regarding the anonymity of participation in the study.

2.4. Data analysis

The data was scanned by an optical reader, converted into a data matrix for the three universities under study, and analyzed using version 24.0 of the IBM SPSS Statistics package.

The findings of the most relevant descriptive statistics are presented first: mean, median, mode and standard deviation for each of the items for the total sample of participants, distinguishing between those that use paper or electronic formats.

The Kolmogorov-Smirnov normality test and Lilliefors Significance Correction (K-S-L) were then used, rejecting the null hypothesis (H_0) of normality for all items in the total sample (K-S=.129, p=.000). Levene's test of homogeneity of variance was performed, resulting in the rejection of the null hypothesis (H_0) of homogeneity of variance, with a Levene's value of F=10.983, and significance of p<.001.

On the basis of these validating tests, non-parametric tests were used to analyze whether or not statistically significant differences existed between students using paper or electronic formats with regard to the frequency of plagiarism throughout the period of degree studies and the causes of these actions. For this purpose, we used the Mann-Whitney U-test, a non-parametric equivalent that does not require the assumption of normality (Goss-Sampson, 2018).

3. Findings
3.1. Descriptive analysis

Table 1 shows that a large majority of the students surveyed used an electronic format to submit their academic papers (91.2%), while only 8.8% prepare their scholarly work using paper as their main medium.

Table 1. Main format used for the submission of academic papers				
		Frequency	**Percentage**	**Valid percentage**
Valid	Electronic format	7.968	89.1	91.2
	Paper format	771	8.6	8.8
	Total	8.739	97.7	100.0
Loss to follow-up	NR/DK	204	2.3	
Total		8.943	100.0	

3.2. Prevalence of academic plagiarism by university students depending on the format used for submission

An analysis of the prevalence of academic plagiarism according to the format used to present scholarly work reveals a trend for both sample groups to negatively assess the items related to having committed plagiarism throughout their university studies (Mo=1), independently of the type of format used. Table 2 shows very low incidences of the following practices in both sample groups (paper/electronic): downloading a full paper from the Internet and submitting it as one's own, with no modifications (paper: $\mu=1.42$, $\sigma=1.22$; electronic: $\mu=1.31$, $\sigma=1.05$); submitting a paper that has been submitted by others in previous courses (paper: $\mu=1.90$, $\sigma=1.68$; electronic: $\mu=1.89$, $\sigma=1.68$); submitting a paper composed

solely of literal excerpts extracted from other papers (paper: $\mu = 1.95$, $\sigma = 1.54$; electronic: $\mu = 1.99$, $\sigma = 1.60$); or submitting a paper based on printed sources without citing the author(s) (paper: $\mu = 2.04$, $\sigma = 1.63$; electronic: $\mu = 1.96$, $\sigma = 1.56$).

Table 2. Descriptive statistics of the items included in the University Studies category, according to the format used to submit academic papers							
	Paper format				Electronic format		
	μ	Md	Mo	σ	μ	Md	Mo	σ
Item 1. I have submitted a paper written by someone else in a previous course	1.90	1.00	1	1.68	1.89	1.00	1	1.68
Item 2. I have copied excerpts from web pages and incorporated them into my own work without citing the sources	2.98	2.00	1	1.99	3.22	3.00	1	2.02
Item 3. I have copied excerpts from printed sources (books, newspapers, magazine articles, etc.) and incorporated them into my own work without citing the sources	2.94	2.00	1	1.96	2.92	2.00	1	1.95
Item 4. I have downloaded a full paper from the Internet and submitted it as my own, with no modifications	1.42	1.00	1	1.22	1.31	1.00	1	1.05
Item 5. I have submitted a paper composed solely of literal excerpts extracted from online sources	1.95	1.00	1	1.54	1.99	1.00	1	1.60
Item 6. I have submitted a paper composed solely of literal excerpts extracted from printed sources, without citing the author(s)	2.04	1.00	1	1.63	1.96	1.00	1	1.56
Item 7. I have used excerpts from my teachers' notes in a paper without citing the source	3.40	3.00	1	2.06	3.35	3.00	1	1.99

With values closer to the median, we find the items related to copying excerpts from teachers' notes (paper: $\mu = 3.40$, $\sigma = 2.06$; electronic: $\mu = 3.35$, $\sigma = 1.99$); copying excerpts from online sources and incorporating them into their own work without citing the source (paper: $\mu = 2.98$, $\sigma = 1.99$; electronic: $\mu = 3.22$, $\sigma = 2.02$); or copying excerpts from printed sources (books, newspapers, journal articles, etc.) and incorporating them into their own work without citing the source (paper: $\mu = 2.94$, $\sigma = 1.96$; electronic: $\mu = 2.92$, $\sigma = 1.95$). It should be noted that higher values also show a greater variance in responses.

3.3. Differences in academic plagiarism by university students depending on the format used for submission

The Mann-Whitney U-test for two independent samples was again used to verify the association between the frequency of plagiarism and the correct citation of documentary sources as an evaluation criterion.

Table 3. Mann-Whitney U-test						
Student body	Format	n	Range	U	Z	P
Item 1. I have submitted a paper written by someone else in a previous course	Electronic	7.930	4345.95	3016944.000	-.230	.818
	Paper	764	4363.62			
Item 2. I have copied excerpts of text from web pages and incorporated them into my own work without citing the sources	Electronic	7.960	4383.52	2824252.500	-3.351	.001
	Paper	764	4070.51			
Item 3. I have copied excerpts from printed sources (books, newspapers, magazine articles, etc.) and incorporated them into my own work without citing the sources	Electronic	7.930	4341.17	2993449.000	-.040	.968
	Paper	764	4344.91			
Item 4. I have downloaded a full paper from the Internet and submitted it as my own, with no modifications	Electronic	7.930	4342.73	2941136.50	-2.606	.009
	Paper	764	4482.38			
Item 5. I have submitted a paper composed solely of literal excerpts extracted from online sources	Electronic	7.960	4346.92	3004946.500	-.263	.072
	Paper	764	4325.00			
Item 6. I have submitted a paper composed solely of literal excerpts extracted from printed sources, without citing the author(s)	Electronic	7.960	4343.37	2971356.000	-1.047	.295
	Paper	764	4430.29			
Item 7. I have used excerpts from my teachers' notes in a paper without citing the source	Electronic	7.960	4352.51	3011586.50	-.424	.671
	Paper	764	4392.29			

The findings collected in Table 3 lead to the rejection of the null hypothesis (H_o), which provides evidence of the existence of statistically significant differences in two of the seven items analyzed: Item 2, "I have copied excerpts of text from web pages and incorporated them into my own work without citing the sources", and Item 4, "I have downloaded a full paper from the Internet and submitted it as my own, with no modifications".

The range values show that the figures for the group of students submitting their work electronically are higher for the first of these two items (Item 2), which means that it is more common to copy excerpts from web pages and incorporate them into their own work, as compared to the second of these items (Item 4), where it is more common for students who predominantly submit their work on paper to use complete works downloaded from the Internet without modifying them, submitting them as if they were their own.

3.4. Prevalence of the causes of academic plagiarism by university students depending on the format used for submission

If we analyze the prevalence of the causes that university students cite to justify plagiarism, we again find a similar trend in the responses from each group, regardless of the format used to submit their academic work. The only point of note is that for most items the figure for students who opt to submit their work on paper tends to be higher than that of the other group. For example, assessment of the item "Unaware that citing sources is mandatory" was higher for the group submitting on paper ($\mu=3.21$, Mo$=3.00$, $\sigma=2.18$) than for the electronic format group ($\mu=2.96$, Mo$=2.00$, $\sigma=2.07$).

Table 4 reveals values above the mean for both sample groups in reference to items considered external to the student body, such as work overload (paper: $\mu=4.41$, $\sigma=2.16$; electronic: $\mu=4.56$, SD$=2.11$), the ease and convenience of access to material via the Internet (paper: $\mu=4.08$, $\sigma=2.00$; electronic: $\mu=4.27$, $\sigma=2.03$), or lack of time (paper: $\mu=4.06$, $\sigma=2.16$; electronic: $\mu=4.18$, $\sigma=2.11$). Again, higher values also show a greater variability in responses.

In terms of the lowest score, students are assigned to the item "Penalties are not serious", regardless of whether they submit their academic work electronically or on paper (paper: $\mu=2.60$, $\sigma=1.90$; electronic: $\mu=2.44$, $\sigma=1.78$).

Table 4. Descriptive statistics of the items included in the Causes category, according to the format used to submit academic papers							
	Paper format				Electronic format			
	μ	Md	Mo	σ	μ	Md	Mo	σ
Item 1. It is a "shortcut" that is generally accepted	3.04	3.00	1	1.95	3.21	3.00	1	1.96
Item 2. My classmates do it	2.71	2.00	1	1.93	2.78	2.00	1	1.93
Item 3. Access to online material is easy and convenient	4.08	4.00	5	2.00	4.27	5.00	5	2.03
Item 4. It guarantees better academic results	3.15	3.00	1	1.91	3.28	3.00	1	1.92
Item 5. I was unaware of regulations at my university penalizing this practice	2.79	2.00	1	2.06	2.58	2.00	1	1.97
Item 6. Penalties are not serious	2.60	2.00	1	1.90	2.44	2.00	1	1.78
Item 7. I was unaware that citing sources is mandatory	3.21	3.00	1	2.18	2.96	2.00	1	2.07
Item 8. Lack of precise instructions on how to write the paper	3.93	4.00	1	2.13	3.92	4.00	1	2.07
Item 9. Lack of motivation	3.41	3.00	1	2.05	3.54	4.00	1	2.05
Item 10. Lack of time	4.06	4.00	1	2.16	4.18	4.00	1	2.11
Item 11. Work overload	4.41	5.00	7	2.16	4.56	5.00	7	2.11

3.5. Differences in academic plagiarism by university students depending on the format used for submission

The findings collected in Table 5 lead to the rejection of the null hypothesis (H_o), as statistically significant differences were found for four of the eleven items analyzed: "It is a 'shortcut' that is generally accepted", "Access to online material is easy and convenient", "I was unaware of regulations at my university penalizing this practice", and "I was unaware that citing sources is mandatory".

The range values show that the figures for the group of students submitting their work electronically are higher for the first two items (Items 1 and 3), which means that plagiarism is considered to be a generally

accepted shortcut, and that accessing online material is easier and more convenient for preparing academic papers.

On the other hand, the values registered for the third and fourth items (Items 5 and 7) show that it is more common for students who predominantly submit their work on paper to be unaware that their university has policies that penalize plagiarism, and that citing one's sources is always mandatory.

Table 5. Mann-Whitney U-test						
Student body	Format	n	Range	U	Z	p
Item 1. It is a "shortcut" that is generally accepted	Electronic	7.846	4313.03	2779775.500	-2.291	.022
	Paper	744	4099.74			
Item 2. My classmates do it	Electronic	7.846	4306.36	2852769.00	-1.241	.215
	Paper	744	4192.97			
Item 3. Access to online material is easy and convenient	Electronic	7.846	4312.50	2762534.000	-2.514	.012
	Paper	744	4076.63			
Item 4. It guarantees better academic results	Electronic	7.846	4295.96	2818692.000	-1.599	.110
	Paper	744	4147.35			
Item 5. I was unaware of regulations at my university penalizing this practice	Electronic	7.846	4266.81	2750751.500	-2.422	.015
	Paper	744	4483.27			
Item 6. Penalties are not serious	Electronic	7.846	4255.27	2787367.500	-1.587	.113
	Paper	744	4396.71			
Item 7. I was unaware that citing sources is mandatory	Electronic	7.846	4270.39	2721690.000	-3.040	.002
	Paper	744	4549.45			
Item 8. Lack of precise instructions on how to write the paper	Electrónico	7.846	4292.67	2892941.500	-.225	.822
	Papel	744	4313.90			
Item 9. Lack of motivation	Electrónico	7.846	4302.94	2813247.000	-1.595	.111
	Papel	744	4153.75			
Item 10. Lack of time	Electrónico	7.846	4305.73	2825568.000	-1.442	.149
	Papel	744	4170.31			
Item 11. Work overload	Electrónico	7.846	4312.37	2812776.500	-1.648	.099
	Papel	744	4157.70			

4. Discussion and conclusions

The two main objectives of the study were to determine the format (paper/electronic) most frequently used by university students for submitting their academic work and to determine whether format influences plagiarism rates. Here we shall compare our own findings with those of other studies to identify similarities, new contributions, and limitations.

It has been shown that university students predominantly submit their academic work electronically and that "the use of ICTs is widespread among students, as is the use of –and to some extent a certain dependency on– the Internet as a tool for preparing academic papers" (Segarra-Saavedra & Martínez-Sala, 2020: 421).

According to Devlin and Gray (2007), Flint et al. (2006), Moreno (1999) and Park (2003), the most common use of the Internet in writing academic papers is associated with copying excerpts from digital texts. In view of these findings, it is shown that university students admit to copying excerpts from texts published online.

If we look at the causes of plagiarism cited by students submitting their work electronically, university students point primarily to the volume of work required of them and the short deadlines allowed to prepare their work. This can lead to the assumption that there may be other causes related to ethical values or academic honesty itself, as indicated by Reche et al. (2016) and Espiñeira-Bellón et al. (2020) when they call attention to the need to train students in digital and information skills, as well as in the internalization and application of a code of ethics in everyday life. However, the students surveyed also point to the ease and convenience of access to information through the Internet as one of the causes, as indicated by Mejía and Ordóñez (2004), Miranda (2013) and Guangwei and Xiaoya (2016).

As discussed in the first part of this article, many studies establish that the Internet facilitates plagiarism, but few of these focus on determining whether differences exist according to the format that students use for submitting their academic work. In this sense, the findings of this study show the general trend of university students to negatively assess the act of engaging in plagiarism, regardless of the format they have used for submission. This confirms the findings provided by Lau et al. (2013), which indicate that there were no significant differences between the attitudes of students towards Internet plagiarism and

their attitudes towards ordinary plagiarism. However, statistically significant differences have been found for two of the items:

- A greater number of students who submit their work electronically indicate that they have copied excerpts from web pages and incorporated them into their own work without citing their sources, compared to those who submit on paper.
- A greater number of students who submit their work on paper indicate that they have downloaded a full paper from the Internet and submitted it as their own, with no modifications, compared to those who submit electronically.

Stephens et al. (2007) conducted a similar survey of 1,305 undergraduate students at two universities. Consonant with the present study, the findings indicated that students used conventional media more often than digital media to copy full tasks, and preferred to use digital media to plagiarize sentences, i.e. excerpts from texts.

Statistically significant differences have also been observed for several of the causes established by the study to justify cyber-plagiarism by university students. It should be noted that students who use the electronic format consider that plagiarism is a shortcut that is universally accepted and that it is easier and more convenient to access material online for the preparation of their academic work, which is contrary to the findings of Comas-Forgas and Sureda-Negre (2010: 228) when they point out that "the Internet is not the origin of plagiarism in academic environments".

Notwithstanding, and with a view to resolving these situations, Gómez-Espinosa et al. (2016: 39) show that "it is possible to reduce the incidence of plagiarism by designing activities in which students are encouraged to come up with their own ideas, and in which they use the Internet as a vehicle to locate existing information to help them find solutions, but not as a means of fulfilling the main task".

As an inference for future research, we might point out that the instrument used should be supplemented by an interview with students to obtain more in-depth information on the scale used, and that it is important to continue advancing in the subject with studies that address the empowerment of students for the development of higher-level proficiency so as not to engage in plagiarism. Additionally, with regard to data analysis, other variables not studied here could also be taken into account, such as differences in student response by gender or by prior academic background.

As a limitation to this study, we should point out that social-desirability biases may have been a factor in determining student response.

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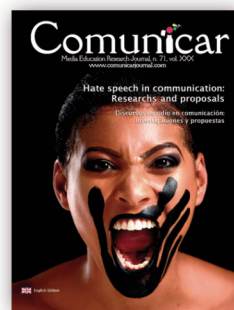
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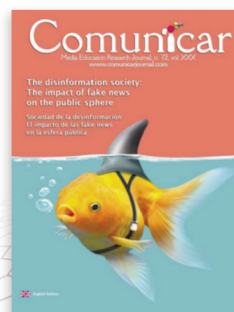
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