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Formula for measuring the engagement of the viewer on YouTube: exploratory research on the main Spanish youtubers

Fórmula para medir el engagement del espectador en YouTube: investigación exploratoria sobre los principales youtubers españoles

Abstract

This exploratory research focuses on providing empirical data on the interaction on YouTube, providing a useful formula to measure the engagement rate, applicable through public data from the social network. The aim is to contribute an initial series of empirical data and general approaches that will drive future research in accordance with YouTube and user interaction. The application of the formula is an opportunity to carry out comparative studies of engagement on YouTube, as long as figures of interactivity - applause and conversion - and impact are gathered, data that the YouTube social network affords any user to collect. The results, derived from applying the proposed formula on the main Spanish youtubers, confirm the increase in interaction in the Spanish YouTube user. In an exploratory way, a high engagement ratio is observed in videos uploaded in 2019 compared with that obtained with older videos (2009). This confirms that the real interactivity of the Spanish Internet user no longer has a low involvement with the content, as concluded by Gallardo-Camacho and Jorge-Alonso in 2010 and, as they predicted, their conclusions have changed over time.

Resumen

Esta investigación exploratoria se centra en la aportación de datos empíricos sobre la interacción en YouTube, aportando una fórmula útil para la medición de la tasa de participación, aplicable mediante los datos públicos de la red social. El objetivo es contribuir con una serie inicial de datos empíricos y los planteamientos generales que impulsen futuras investigaciones relacionadas con YouTube y la interacción del usuario. La aplicación de la fórmula es una oportunidad para realizar estudios comparativos de interacción en YouTube, siempre y cuando se tengan en cuenta las cifras de interactividad —aplauso y conversación— y de impacto, datos que la red social de YouTube permite recoger a cualquier usuario. Los resultados, aplicando la fórmula propuesta sobre los principales youtubers españoles, confirman el aumento de la interacción en el usuario español de YouTube. De forma exploratoria, se observa un mayor compromiso en los videos subidos en 2019 frente a videos más antiguos (2009), esto corrobora que la interactividad real del internauta español ya no tiene una baja implicación con el contenido, como concluyeron Gallardo-Camacho y Jorge-Alonso en 2010 y, que, tal y como vaticinaron, sus conclusiones han sufrido cambios en el tiempo.

Keywords

Engagement; Engagement rate; Interaction; YouTube; Youtuber

Palabras clave

Engagement; Interacción; Tasa de participación; *YouTube*; *Youtuber*

1. Introduction

1.1. Calculating engagement on *YouTube*

YouTube is the biggest video distribution platform in the world (Wattenhofer, Wattenhofer & Zhu, 2012). Created to share videos that allows users to upload their own material and view material posted by others (The Tech Terms Computer Dictionary, 2009), this social networking service is considered a convergence of traditional music film, television entertainment options (Shao, 2009).

"YouTube" is the most searched term in Spain after "Google", and its website had more than 400 million visits a month in 2019. It is one of the most widely used social media platforms in Spain, rated by Spaniards as the most preferred social networking service (Hootsuite & We are social, 2019). Its specific features as a social networking site include its multi-directional interaction between users, its hosting of both synchronous and asynchronous content, and the role played by its users as *prosumers*, i.e., simultaneous creators and consumers of content (Tapscott & Williams, 2008). The connection between YouTubers and their audiences is reinforced by the possibility of subscribing to their channels. Through subscription, users signal that they are particularly interested in the content posted by the YouTuber. For López-Gil & Angulo-Rasco (2015), subscriptions allow users to be even more connected to their favourite YouTubers, creating and developing bonds that grow stronger over time. In parallel with the growth of YouTube, studies identify a drop in television consumption among children and youth (Roca-Sales, 2009). Various researchers have sought to explain why teenagers are leaving television behind in favour of online platforms. Van-Dijck (2007) demonstrated that the popularity of YouTube was due to the fact that its content is created by young people and for young people, with YouTubers drawing in millions of young viewers who subsequently become subscribers. It is also one of the first platforms used by children when they begin interacting with the digital environment (Cánovas, 2014).

In the field of social media communication, we define "engagement" as interactivity initiated by a user with a social networking account (Gluck, 2012). Such interactivity implies an emotional involvement in and/or commitment to posted content on the part of the user. It is therefore a measurement of the success of posts that have been accepted and valued by followers (Ure, 2018). When interacting with content, users dedicate time and energy to their connections with other users on a platform, demonstrating interest (Evans, 2010; Goodman, 2012). This suggests a higher level of involvement than mere content selection, asynchronous consumption and clicking (Gallardo-Camacho & Jorge-Alonso, 2010). Its importance lies in users' digital interaction with the content they consume (Raso, 2016). While "engagement" refers to the connection that a brand (channel) has with its social network, the metric calculated by means of a formula to measure it is known as the "engagement rate" (Suárez-Ramírez, 2016).

There is no single formula for measuring engagement rates, as the method differs depending on the social media platform concerned. Interactions in the form of likes, comments, and shares are common aspects for measuring user participation on social media platforms (Campillo-Alhama & Martínez Sala, 2019; Huertas-Roig; Setó-Pàmies & Míguez-González, 2015; Laeeq, 2016; Sánchez-Olmos & Hidalgo-Marí, 2016). There are also measurements that take into account the frequency of content creation and the impact on the calculation of interaction in specific time periods (Havas Media, 2013). In the case of YouTube, the influence of YouTubers can be measured based on the number of subscribers and views registered on their channels (Burges & Green, 2018). To determine the effectiveness of activity on social media platforms, it is necessary to identify the percentage of users exposed to a post and ascertain whether they engaged with it in some way (Ure, 2018). To this end, two major variables are examined: impact (exposure to content); and interaction (user involvement).

Kaushik-Aushik (2011) identifies three types of interaction that can be used to calculate the emotional involvement of users: 1) Applause. Actions that indicate different degrees of agreement, interest, or empathy; 2) Conversation. Generated in response to content, this includes both comments (direct responses) and replies to other users (indirect responses); 3) Amplification. Actions that reproduce content, through sharing by users other than the content creator, both on and outside the social media platform itself. A distinction is thus made between "viral" and "non-viral" engagement, depending on whether it occurs on the social network platform itself or elsewhere (Ure, 2018). Applause and conversation indicators are considered non-viral, while amplification indicators are considered viral if the action is taken outside the social media platform (as is the case of YouTube).

Social interaction on YouTube itself reflects all actions involving participation (likes, dislikes, comments, and video uploads) except for sharing videos (Laeeq, 2016). The sharing option takes place outside YouTube and may be done in various ways, such as sharing on other social media platforms, emailing the link to the video, or showing the video directly to other users.

1.2. Online viewer interaction

With the creation and development of online video platforms,[1] a debate arose over the behaviour of internet users and their role (passive or active) in interacting with online content. There were authors who argued for the need for television to join forces with the internet (Castells-Oliván, 2007), and predictions of a passive role for viewers in response to online audiovisual content (Robinson & Geofffrey, 1997; Wolton, 2000). Others distinguished between passive consumption (viewing and reading) (Takahashi, Fujimoto & Yamasaki, 2003) and active participation (click-based interactions) (Nonnecke & Preece, 1999). In the absence of conclusive findings, some authors pointed to a lack of clarity for defining the video-user connection (Díaz-Arias, 2009).

To contribute empirical data to the debate, Gallardo-Camacho & Jorge-Alonso (2010) calculated the actual interactivity of Spanish internet users on YouTube, finding a low level of engagement with content, although these authors predicted that this lack of interactivity could change over time. Our view is that user engagement should be calculated based on three factors that could yield different findings from those of previous studies and help to identify the percentage of user activity:

1) Passage of a decade since the studies highlighting online viewer passivity were conducted. Given that the YouTube community is constantly changing, it is difficult to draw definitive conclusions about how YouTubers reach their audiences (Mingione, 2014). The nature of the liquid network (Bauman, 2000) underscores the need for empirical data to obtain a preliminary picture of Spain's current engagement rate.

2) Development of Generation Z and consolidation of the millennial generation (Schroer, 2008). YouTube has become a key social media platform for both these generations, although it has a higher rate of use among Generation Z-ers (75%), who are more inclined than millennials to choose YouTube as one of their favourite social networking services. Moreover, 43% state that they follow some kind of influencer (a person with credibility, presence, and influence on social media) compared to 29% of millennials (*IABSpain*, 2018).

3) Greater penetration of technology, devices, and social media use in Spain. Increased internet speeds (Spain has the 10th fastest internet in the world, with an average of 105.58 Mbps, according to Surfshark's *Digital Quality of Life* report for 2019) and the growing use of mobile devices have boosted video consumption (Laeeq, 2016). 92% of Spaniards use the internet, and 85% use social media. In addition, 95% of the population access social media on smartphones, which have replaced computers as the most commonly used device for connecting to social media platforms (*IABSpain*, 2019). This new context facilitates content consumption from different locations and devices (Hootsuite & We are social, 2019).

2. Methodology

This exploratory study presents empirical data that offer a picture of interaction on YouTube, calculating the engagement rates of Spain's top YouTubers (according to subscriber numbers). The objective is to offer an initial set of empirical data and some general observations that will be able to support future research related to YouTube and user interaction, while providing a useful formula for measuring engagement rates that can be applied using publicly available data on the social media platform.

Our research questions are as follows:

Question 1 (RQ1). Is there any difference in YouTube user interaction in Spain today compared to 10 years ago?

Question 2 (RQ2). Is there a correlation between the number of views (impact) and the engagement rate (interaction) for the YouTubers studied?

Question 3 (RQ3). Do the categories studied show similar engagement rates for different YouTubers?

Question 4 (RQ4). Do the YouTubers studied have similar engagement rates in general?

The data was selected and obtained on 11 October 2019 using Social Blade, a website that compiles data directly from YouTube's public API,[2] offering the information in a visual format (Social Blade, 2020). Due to the causal relationship between a channel's views and its number of subscribers (people who voluntarily request to receive notifications when a new video is uploaded to the channel) (Hoiles, Aprem & Krishnamurthy, 2017), for this first dataset we have chosen the three Spanish channels with the largest numbers of subscribers (Table 1). We selected 12 videos by each YouTuber (Table 2) based on four categories: a) videos with the most views; b) videos with the highest level of estimated earnings; c) videos with the most likes; and d) videos most recently uploaded to the channel. 50% of the videos analysed were

uploaded to the platform in 2019; 22% were uploaded between 2017 and 2018; and 28% were uploaded between 2013 and 2016.

Table 1. Profiles of YouTubers analysed

YouTuber	Videos uploaded	Subscribers	Total views	Average views/video
ElRubiusOMG	817	35.9 M	8,033,806,952	9,833,301
Vegetta777	5,502	27.5 M	11,091,937,688	2,015,982
AuronPlay	393	18.4 M	2,384,182,568	6,066,622

Source: compiled by authors based on YouTube API

Table 2. Videos analysed

YouTuber	Most views	Biggest earnings	Most likes	Most recent
ElRubiusOMG	Minecraft – "Miner" ft. StarkinDJ ("Torero – Chayanne" Parody (2015)	Lie detector Challenge (2016)	Rubius and Mangel in Norway | Epic Vlog (2018)	*Pato, No Seas Malo* (2019)
	Gross bean boozled challenge (2016)	*Maneras de molestar a tu compañero de piso* (2013)	*Whisper Challenge with AuronPlay (2019)*	*Escapando del área 51* (2019)
	Si te ríes pierdes Challenge (2015)	Goal Challenge by Rubius (2017)	Questions and answers and stupid challenges #4 (2017)	*Mis gatos conocen a un perro* (2019)
Vegetta777	*Planeta Vegetta: una gran aventura nos espera #1* (2015)	*Escapa de la lava - Willy Vs Vegetta* (minijuegos Minecraft) (2017)	*Minecraft con Noobs – Me regalan un panda #44* (2019)	*Karmaland – Los dioses se enfadan (mejores momentos) #1* (2019)
	GTA V online: carreras entre amigos-enemigos (2015)	Lucky Blocks – Minecraft Mortal (2014)	*Hemos vuelto! Nuevo mapa Willy vs Vegetta* (2019)	*Minecraft con Noobs – Las pruebas del dragón* (2019)
	Escapa de la bestia #2 | Olimpocraft (2014)	*Mi primera vez en desastres naturales!* (2017)	*¿Quién es el asesino? *Murder Mistery** (Minecrafat con Noobs) (2019)	*Karmaland – Mi nuevo hogar #2* (2019)
AuronPlay	YouTube's most annoying child (2018)	*Me ha denunciado el presidente del Barça* (2019)	Whisper Challenge con Rubius (2019)	*El colchón que se hunde* (broma telefónica) (2019)
	Prank calling Jordi Wild (2017)	*Esto se ha ido de las manos #2* (2019)	Reacting to my memes #2 (2019)	*Las supremas de Dios* (2019)
	Buuuuu… Do I scaaaare you? (2017)	*El canguro loco* (2016)	TikTok's Hell #4 (2019)	*Comentando "Exponiendo traviesos" #4* (2019)

Source: compiled by authors based on YouTube API.

The three YouTubers analysed all began their careers around the same time, in 2012. Vegetta777 has the biggest number of videos uploaded (nearly 7 times that of ElRubiusOMG and 14 times that of AuronPlay), although this dominance does not carry over to number of subscribers or total number of views. As a result, this YouTuber has a lower average of views per video than the other two.

Setup (2015), Holmbom, (2016), and Pérez-Revilla (2016) describe the formula for calculating engagement rates as a tool for social media users to estimate their own levels of user engagement. There is therefore a limitation in relation to data access: we can only access the data that the platform makes public if we want to compare different channels.

The YouTube API facilitates data mining on conversation and applause but not amplification interactions. This limitation means that we can estimate participatory engagement but not viral engagement (amplification). Amplification involves sharing content outside the social media platform, thereby increasing its potential impact. Applause and conversation help retain users, which boosts the content on the social media platform itself thanks to the platform's algorithm (Origami Logic, 2016).

The choice of one formula over others will affect the results obtained. It will therefore be necessary to use the same formula in future research in order to obtain comparable results. In this sense, what matters is not so much the engagement rates obtained (figures) but the use of the formula itself to identify how those figures evolve in comparative studies.

The formula chosen for this study is: 1) participatory, as it includes the variables of applause and conversation on the social media platform itself; 2) absolute, with no time restriction, as it includes all impact and interaction from the moment the content is uploaded to the platform; and 3) replicable, since the use of public data allows for future research and tracking of engagement rates.

Formula used:

Absolute participatory engagement

$$Engagement\ rate = \frac{comments\ and\ replies + likes\ + dislikes}{views} * 100$$

Also expressed as follows:

$$Engagement\ rate = \frac{non - viral\ interaction\ (applause + conversation)}{impact\ (views)} * 100$$

3. Results and discussion

The results are presented in the order of the research questions listed in the previous section.

3.1. Is there any difference in YouTuber user interaction in Spain today compared to 10 years ago?

Comparing our data with those of previous studies (Gallardo-Camacho & Jorge-Alonso, 2010), the results show an increase in the average engagement rate of more than 8.5 percent (Table 3). In order to compare this study with previous studies, the absolute participatory engagement rate was calculated based on the data obtained. The resulting engagement rate is 8.72%, while the result obtained was 0.23% for 2008 and 0.16% for 2009.

Table 3. Engagement rate time comparison

Time	Applause (%)	Conversation (%)	Participatory engagement rate (%)
2008	0.08	0.15	0.234
2009	0.067	0.087	0.155
Current data	8.406	0.316	8.723

Source: Gallardo & Alonso (2010) and authors

The results show a lopsided increase between types of interaction (Graphic 1). Applause grew dramatically, multiplying 105 times from its 2008 rate to reach 8.41%, compared to 0.08% in 2008 and 0.067% in 2009. The results for conversation also experienced an increase, although a more moderate one: while in 2008 it was 0.15% and in 2009 it was 0.087%, in the current data it reached a level of 0.32%, representing a markedly smaller increase than that for applause.

Graphic 1. Engagement rate comparison: 2008, 2009 and current sample
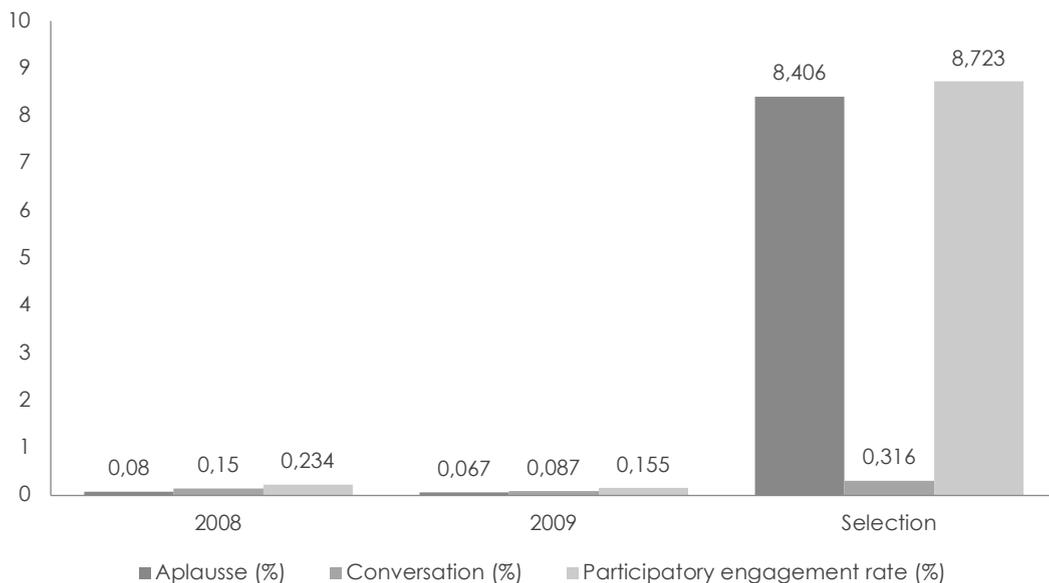
Source: compiled by authors.

The much greater growth in applause compared to conversation could be due to the nature of engagement as described at the beginning of this article. Users dedicate time and effort to connecting with the platform (Evans, 2010; Goodman, 2012). The action of applause (likes or dislikes) involves less time and effort (requiring just a click) compared to conversation (writing comments and replies). It should be noted that in 2009, YouTube introduced changes to its applause system, simplifying it from 5 options (stars) to only two (likes and dislikes). Even so, the data compared reflect only the number of ratings, not their quality.

The weight of these two interactions combined raises the participatory engagement rate to 8.72%, confirming an increase in YouTube user interaction in Spain.

3.2. Is there a correlation between number of views (impact) and engagement (interaction)?

The data (Table 4) reveal an inverse relationship between number of views and engagement: the higher the number of views, the lower the engagement rate (Graphic 2).

Table 4. Impact and interaction of selection

Video	Views	Engagement rate (%)
V1	70,200,000	0.596
V2	63,200,000	2.767
V3	45,100,000	2.368
V4	43,000,000	3.772
V5	42,800,000	1.063
V6	35,600,000	2.896
V7	35,100,000	3.897
V8	33,700,000	6.219
V9	25,000,000	6.396
V10	22,900,000	0.921
V11	21,800,000	7.110
V12	18,100,000	10.497
V13	17,300,000	6.109
V14	13,800,000	10.718
V15	12,800,000	1.211
V16	11,800,000	10.669
V17	11,700,000	12.397
V18	10,500,000	11.02

V19	9,700,000	10.712
V20	9,700,000	14.515
V21	9,500,000	12.097
V22	8,900,000	11.359
V23	8,600,000	11.911
V24	7,300,000	11.834
V25	6,400,000	4.607
V26	6,000,000	13.002
V27	4,400,000	13.587
V28	3,700,000	6.462
V29	3,500,000	10.331
V30	2,700,000	4.318
V31	2,600,000	9.803
V32	995,300	20.489
V33	921,900	15.589
V34	744,800	14.702
V35	724,700	11.728
V36	596,900	16.352

Source: compiled by authors.

The line chart shows the inverse relationship between number of views and engagement rate.

Graphic 2. Impact and interaction in sample
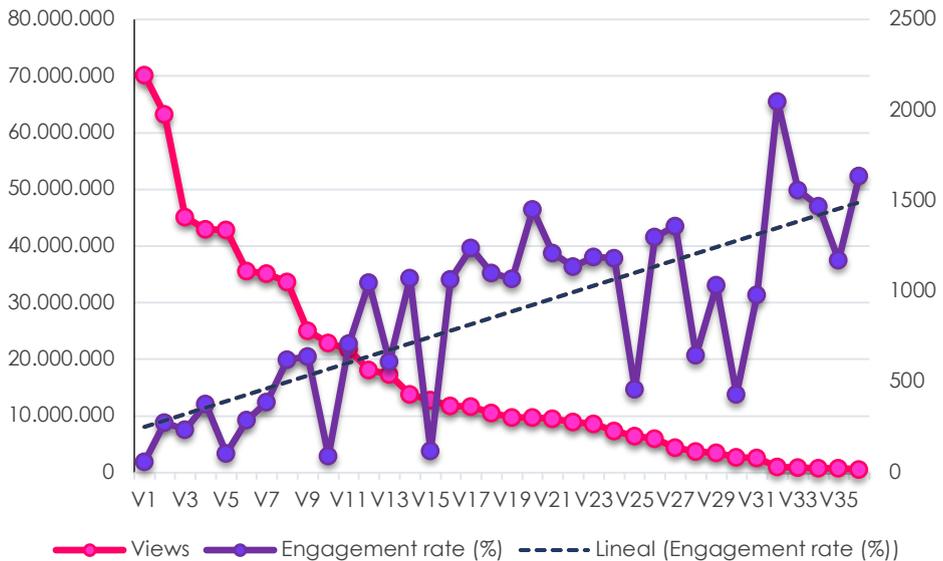
Source: compiled by authors.

As can be seen from the chart, engagement goes up as views decrease.

The results obtained show that V1, the video with the largest number of views in the sample, has 70,200,000 views and an engagement rate of just 0.59%. This behaviour is notable in the videos with the biggest impact. Thus, V2 and V3 have 63,200,000 and 45,100,000 views respectively, and an engagement rate of 2.76% and 2.36%.

The datasets for views remain above the engagement rate up to V11, and are then all below it except for V15, which has 12,800,000 views and an engagement rate of 1.21%. From that point on, the graphic shows a progressive rise in the engagement rate and a drop in views. The widest difference is observed in V32, with 995,300 views and an engagement rate 20.48%, and V36, the video with the fewest views in the sample, with 596,900, and an engagement rate of 16.35%.

The biggest number of views was obtained by the video "*Planeta Vegetta: una gran aventura nos espera #1*", with more than 72 million, while the video with the lowest number is "*Minecraft con Noobs – Las pruebas del dragón*". The most viewed video is included in the "most views" category (Table1), and the video with least views is included in the "most recent" category. The video with the highest engagement rate is "*Minecraft con Noobs – Me regalan un panda #44*" with 20.48%, while the lowest rate was for "*Planeta Vegetta: una gran aventura nos espera #1*", with 0.59%. The video with the highest engagement rate belongs to the "biggest earnings" category, while the one with the lowest rate falls under "most views". All these videos are posted to Vegetta777's channel (Table 5).

Table 5. Videos with highest and lowest engagement rates and view numbers

YouTuber	Video	Category	Result
Vegetta777	*Planeta Vegetta: una gran aventura nos espera*	Most views	Most views
Vegetta777	*Minecraft con Noobs – Las pruebas del dragón*	Most recent	Least views
Vegetta777	*Minecraft con Noobs – Me regalan un panda #44*	Biggest earnings	Highest engagement rate
Vegetta777	*Planeta Vegetta: una gran aventura nos espera #1*	Most views	Lowest engagement rate

Source: compiled by authors.

The 15 videos with the highest engagement rates—from V21 to V36—were all uploaded to the platform in 2019. Conversely, of the 15 videos with the biggest number of views, one is from 2018 (6.67% of the sample), 26.65% are from 2017, and the rest (66.67%) are from 2013 to 2016; none of these videos were uploaded to YouTube in 2019.

3.3. Do the categories analysed show similar engagement rates for different YouTubers?

Table 6 summarises the averages based on the categories and YouTubers in the study. Some categories show similar rates for all YouTubers. Conversely, others reveal significant differences.

Table 6. Average engagement rate by category and YouTuber

Category	Engagement rate		
	ElRubiusOMG	**Vegetta777**	**AuronPlay**
Most views	2.969%	0.860%	9.750%
Biggest earnings	4.337%	3.997%	6.538%
Most likes	11.202%	16.927%	8.878%
Most recent	12.753%	12.628%	11.278%
Overall average	7.815%	8.603%	9.111%

Source: compiled by authors.

In the "most views" category, AuronPlay stands out with an engagement rate 6.8% higher than the YouTuber in second place for this metric. The other two YouTubers both have similarly low engagement rates: 2.97% for ElRubiusOMG; and 0.86% for Vegetta777.

Indicative of these results is the fact that AuronPlay's video with most views, "YouTube's most annoying child" with 25 million, has 76,000 comments and 1,523,000 total votes, while Vegetta777's most viewed video, "Planeta Vegetta: una gran aventura nos espera #1" with a total of 70,200,000, has only 47,000 comments and 372,000 total votes. Finally, "*Minecraft minero*", the most viewed video by ElRubiusOMG with 63 million, has a total of 118,000 comments and 1,631,000 total votes. The pattern observed is similar to that observed in section 3.2, as there is an inverse relationship between views and impact-interaction.

In the category of biggest estimated earnings, AuronPlay has the highest engagement rate, with an average of 6.53%. However, there is much less variation between YouTubers in this category: ElRubiusOMG has average of 4.34% and Vegetta777's is 4%. The rates are thus much more similar.

In the category of "most likes", the engagement rates are similar to or higher than the average, with notable differences between the subjects analysed. The YouTuber Vegetta777 obtained a rate of 20.49% for his most liked video, "*Minecraft con Noobs – Me regalan un panda #44*". The video has 995,300 views, 200,000 likes out of a total of 200,930 votes, and 3,000 comments.

By comparison, the most liked video by ElRubiusOMG, "Rubius and Mangel in Norway", has 9,700,000 views, with 998,000 likes out of a total of 1,004,100 votes, and 35,000 comments, resulting in an engagement rate of 10,71%. Meanwhile, AuronPlay's "Whisper challenge with Rubius" obtained a rate of 12.1% thanks to 9,500,000 views, 1,100,00 likes out of a total of 1,107,300 votes, and 42,000 comments.

The smallest variation between the rates of the different YouTubers is found in the category of most recent videos. The engagement rates are higher in this category than anywhere else except for Vegetta777's rate in the "most likes" category, and the subjects all have very similar rates: ElRubiusOMG with 12.75%; Vegetta777 with 12.63%, and AuronPlay with 11.28%.

In an analysis of engagement by category only (Table 7), the "most views" category has the lowest average engagement rate, with 4.53%, while the "most likes" category has the highest (13.14%), slightly above the "most views" category (12.56%).

Of the 9 videos in the "most likes" category with the highest engagement rates, 77.78% are videos uploaded to the channel in 2019, compared to 11.1% in 2018 and 11.1% in 2017.

The data detailed in this section reinforce the findings described in section 3.2 related to low numbers of views and less time on the platform correlating with higher engagement rates.

Table 7. Average engagement rate by category

All videos (36)	Average (%)
Most views (9)	4.526
Biggest earnings (9)	5.738
Most likes (9)	13.136
Most recent (9)	12.563
Overall average	8.99

Source: compiled by authors.

3.4. Do the YouTubers analysed have similar engagement rates?

Although there are significant differences if we analyse each category separately, the overall averages are similar for all three subjects analysed (Table 8).

Table 8. Summary of applause, conversation and engagement rate by YouTuber

YouTuber	Conversation (%)	Applause (%)	Engagement rate (%)
ElRubiusOMG	0.360	7.455	7.815
Vegetta777	0.150	8.453	8.603
AuronPlay	0.4388	9.3120	9.750
Average	0.316	8.406	8.723

Source: compiled by authors.

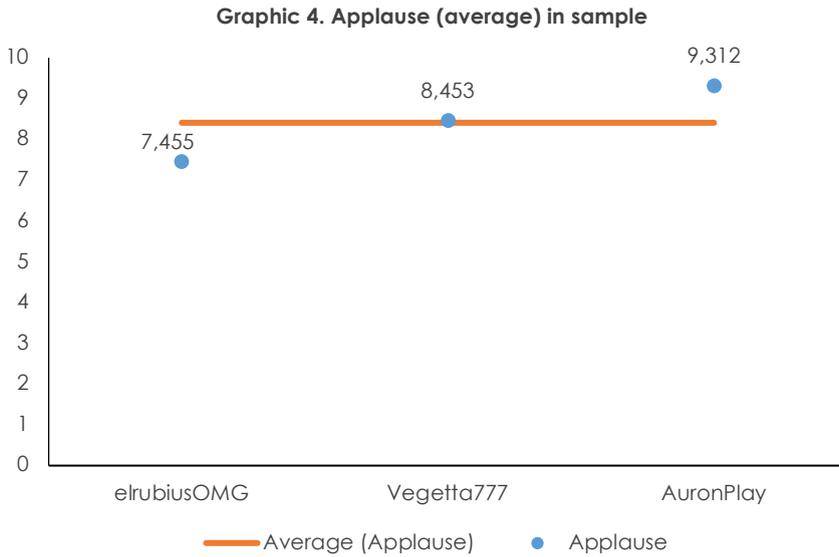Conversation is the interaction with the biggest differences between the subjects analysed (Graphic 3).

Graphic 3. Conversation (average) in sample
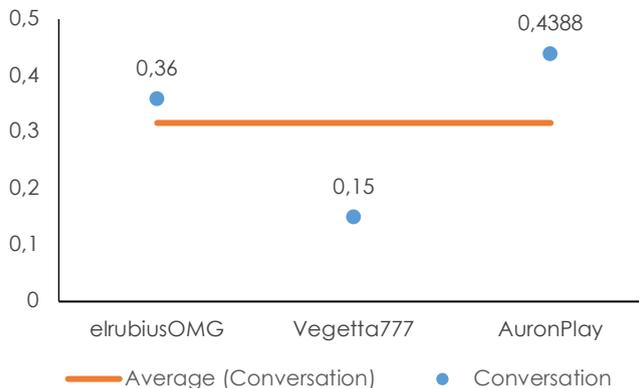
Source: compiled by authors.

There is less variation between the subjects analysed in the percentages for applause (Graphic 4).

Graphic 4. Applause (average) in sample

Source: compiled by authors.

ElRubiusOMG's engagement rate is 7.82%, Vegetta777's is 8.60%, and AuronPlay's is 9.75%. These averages are also relatively close together (Graphic 5), although more marked differences appear when they are broken down by category.

Graphic 5. Engagement rate (average) in sample
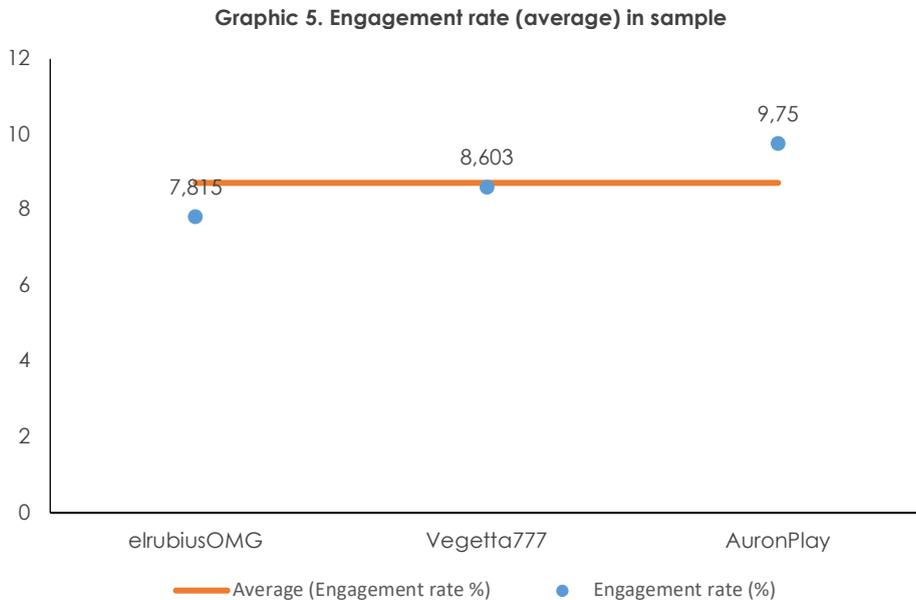
Source: compiled by authors.

For the variables related to interaction, the patterns are similar to those seen in section 3.2 between interaction and impact, although with differences between YouTubers.

Conversation levels are still much lower. AuronPlay, with a conversation rate of 0.44% and applause of 9.31%, stands out once again with the highest level of user interaction in relation to the impact of his videos. In second place is ElRubiusOMG, with a conversation level of 0.36% and applause of 7.46%. Vegetta777 has the lowest conversation level (0.15%), but a higher applause level (8.45%).

The results show that the subject with the lowest engagement rate is ElRubiusOMG, with 7.82%.

In this respect, it is important to consider the information in Table 1 related to the number of videos and views for each YouTuber. In terms of videos uploaded, ElRubiusOMG has the highest average of views per video (9,833,301) while obtaining the lowest engagement.

Vegetta777 has an engagement rate of 8.60%, although his average views per video uploaded to the channel is lower than that of the other two subjects (2,015,982). It is also important to bear in mind that while ElRubiusOMG has 817 videos uploaded and AuronPlay has 393, Vegetta777 has a total of 5,502 videos available on his channel.

AuronPlay enjoys the highest engagement rate (9.75%), offers fewer videos on his channel than the other two subjects analysed (393), and also has a lower number of total views (2,384,182,568) than ElRubiusOMG (8,033,806,952) and *Vegetta777* (11,091,937,688).

As with the findings outlined in section 3.2, the results reveal a pattern whereby a higher engagement rate correlates with a lower level of impact.

4. Conclusions

First of all, there has been a clear increase in interactivity on YouTube over the last 10 years. Following this first empirical study, further research into Spanish interactivity on YouTube is needed to gain a clearer understanding of engagement based on: a) the different thematic categories to which channels may belong; b) channel size (subscribers, total views, views per video, videos uploaded to the channel), and; c) the target audiences of the channels.

This exploratory study reveals a higher engagement rate for videos uploaded in 2019 than for older videos (2009). Future research should seek to determine whether these older videos exhibit the same relationship between impact and conversation, or conversely whether there are differences between 2019 and earlier years.

Although over 10 years there has been a significant increase in active YouTube users (8.5%), passive users continue to dominate the platform's interactive environment.

Secondly, the results display an inverse relationship between impact and interaction, although the findings do not provide sufficient basis to assert conclusively that YouTubers with a lower impact obtain higher engagement rates. Research combining content analysis with data on engagement would help to clarify the correlation between impact and interactivity. To confirm this pattern, we propose a detailed study with a larger sample in order to calculate the ascending line interpolated in this study, thereby reducing noise in the data. It will also be necessary to identify what particular factors break this pattern and whether there is a possibility of structuring them.

Thirdly, the formula proposed offers an opportunity to conduct comparative studies of engagement on YouTube, provided they use the data on interactivity (applause and conversation) and impact levels that the YouTube social media platform allows any user to collect. As these are metrics that are typically included in studies of this type, this formula can also help to calculate the engagement rate for previous research for the purpose of making comparisons.

The formula adopted here measures absolute participation, which does not include the metric of amplification and does not consider the time variable, constituting two limitations that should be borne in mind.

The application of this formula and the collection of the data necessary to apply it make it possible to compare studies of interactivity on YouTube, such as those that monitor the evolution of engagement in both large and niche audiences on YouTube (Gallardo-Camacho, 2013), changes in interactivity over time in order to measure content trends and evolution (Vizcaíno-Verdú & Contreras-Pulido, 2020), and the representation of women on YouTube (Regueira, Alonso-Ferreiro & Da-Vila, 2020).

Of the categories chosen for this study—a) videos with the most views; b) videos with the biggest earnings; c) videos with the most likes; and d) videos most recently uploaded to the channel—the least reliable category appears to be the "biggest earnings" category. Social Blade makes an estimation based on a

range of possible earnings. However, the breadth of that range and the changes YouTube has made to the monetisation of its videos mean that this category is not as accurate as the other categories.

Lastly, this study has revealed an uneven growth in engagement rates, considering the variables of interaction, applause, and conversation. While applause has increased markedly over time, conversation has done so much less aggressively. In the formulas cited in this study (Huertas-Roig, Setó-Pàmies & Míguez-González, 2015; Setup, 2015; Holmbom, 2016; Laeeq, 2016; Pérez-Revilla 2016; Sánchez-Olmos; Hidalgo-Marí, 2016), no differences are observed when assessing the type of interaction. However, the results outlined in section 3.1 suggest that we should treat the interactions of applause and conversation differently, given that conversation requires more time and effort on the part of the user. Yet applause and conversation are treated as the same under the formula. In absolute terms, conversation represents a small proportion of engagement, but it necessarily entails more effort from the user than applause.

It is important to recognise the level of effort required for different types of interaction and to seek a way of correcting their weight in the formula in order to obtain a result that better reflects the reality. The challenge is to work out what value conversation and applause should be given. What weighting should we use to measure the effort made by users in their interaction on social media?

5. Acknowledgement

6. References

[1] IABSᴘᴀɪɴ (2018). Estudio anual de redes sociales 2018. http://bit.ly/2VHCFWd

[2] IABSᴘᴀɪɴ (2019). Estudio anual de redes sociales 2019. https://bit.ly/3b2mZEO

[3] Bauman, Z. (2000). *Liquid Modernity*. Cambridge: Polity Press.

[4] Burges, J. & Green, J. (2018). *YouTube: Digital media and society series*. Polity Press.

[5] Campillo-Alhama, C. & Martínez-Sala, A. (2019). Events 2.0 in the transmedia branding strategy of Word cultural heritage sites. *El profesional de la información*, *28*(5). http://doi.org/dwmt

[6] Cánovas, G. (Dir.) (2014). *Protégeles, Menores de edad y conectividad móvil en España: Tablets y smartphones*. Centro de Seguridad en Internet para los Menores en España. https://bit.ly/2Ygfbeh

[7] Castells-Oliván, M. (2007). Televisión e internet. En M. Campo-Vidal y M. Pascual (Dirs.), *Ponencias sobre el futuro de la televisión*.

[8] Evans, D. (2010). *Social media marketing: the next generation of business engagement*. Indianapolis: Wiley.

[9] Díaz-Arias, R. (2009). El vídeo en el ciberespacio: usos y lenguaje. *Comunicar: Revista científica iberoamericana de comunicación y educación*, *27*(33), 63–71. http://doi.org/ftt5qr

[10] Gallardo-Camacho, J. y Jorge-Alonso, A. (2010). La baja interacción del espectador de vídeos en internet: caso *YouTube* España. *Revista Latina de Comunicación Social*, *65,* 421-435. http://doi.org/c7czw2

[11] Gallardo-Camacho, J. (2013). Descripción cuantitativa y cualitativa del espectador de videos en *YouTube* España. *Revista Communication Papers*, *2*, 11-22. http://doi.org/dwms

[12] Gluck, M. (2012). Interactive Advertising Bureau (IAB), Digital ad engagement: An industry overview and reconceptualization. http://bit.ly/2wLWyDk

[13] Goodman, G. (2012). *Engagement marketing: How small business wins in a socially connected world*. Nueva Jersey: Wiley.

[14] Havas Media (2013). Análisis de factores de participación y *engagement* de *Facebook*. Madrid.

[15] Hoiles, W.; Aprem, A. & Krishnamurthy, V. (2017). Engagement and popularity dynamics of YouTube videos and sensitivity to meta-data. *IEEE Transactions on Knowledge Data Engineering*, *29*(7), 1426-1437. http://doi.org/gbn9mm

[16] Holmbom, M. (2015). The youTuber a qualitative study of popular content. *Institutionen för informatik, Umeå University*. https://bit.ly/2yuXTzw

[17] Hootsuite y We are social (2019). Digital 2019 España. Todos los datos y tendencias que necesitas para entender los comportamientos en internet, redes sociales, móvil y comercio electrónico en 2019. https://bit.ly/2A37Epd

[18] Huertas-Roig, A.; Setó-Pàmies, D. y Míguez-González, M. (2015). Comunicación de destinos turísticos a través de los medios sociales. *El profesional de la información*, *24*(1), 15-21. http://doi.org/dwmr

[19] Kaushik-Aushik, A. (10/10/2011). Best Social Media Metrics: Conversation, Amplification, Applause, Economi Value [Blog]. *Occam's Razor*. http://bit.ly/2OO8jjE

[20] Laeeq, K. (2016). Social media engagement: What motivates user participation and consumption on YouTube? *Computers in Human Behavior*, 66, 236-247. http://doi.org/f9fkd6

[21] López-Gil, M. & Angulo-Rasco, F. (2015). Sonorona o el rizoma de la cultura digital. Um estudio de caso. *Revista Portuguesa de Educação*, *28*(1), 9–33. https://doi.org/fc68

[22] Mingione, D. (2014). Hello Internet! An analysis of *YouTuber* greetings. *Explorations in Linguistics*, *1*(1), 19-35. http://bit.ly/2Pl96aY

[23] Nonnecke, B. & Preece, J. (1999). Shedding light on lurkers in online communities. In K. Buckner (Ed.), *Ethnographic studies in real and virtual environments: Inhabited information spaces and connected communities* (pp. 123 – 128). Edinburgh, United Kingdom: Queen Margaret College.

[24] Origami Logic (2016). The marketer's guide to measuring social engagement. http://bit.ly/33zuTRd

[25] Pérez-Revilla, R. (22/09/2016). Importancia y cálculo del *engagement rate* en *Facebook*. Caso práctico [Blog]. *Social in Media*. http://bit.ly/2w9LdMP

[26] Raso, A. (28/03/2016). Marketing institute, How to measure engagement the right way content [Blog]. *Content Marketing Institute*. http://bit.ly/2VkXUzd

[27] Regueira, U.; Alonso-Ferreiro, A. & Da-Vila, S. (2020). Women on YouTube: Representation and participation through the Web Scraping technique. *Comunicar: Revista científica iberoamericana de comunicación y educación*, *28*(63), 31-40. http://doi.org/dwmq

[28] Robinson, J. & Geoffrey, G. (1997). *Time for life: The surprising ways Americans use their time*. Pennsylvania: Pennsylvania State Press.

[29] Roca-Sales, M. (2009). The future of television: From the boob tube to YouTube. *American Communication Journal*, *11*(1). https://bit.ly/34V1gMa

[30] Sánchez-Olmos, C. y Hidalgo-Marí, T. (2016). Del sofá a *YouTube*: de género sobre la interacción en la red social en torno a las series de TV españolas. *Communication y Society, 29*(2), 117-132. http://doi.org/dwmp

[31] SetUp (24/12/2015). ¿Cómo calcular el *engagement* en diferentes redes sociales? [Blog]. http://bit.ly/2SXfdVa

[32] Shao, G. (2009). Understanding the appeal of user-generated media: A uses and gratification perspective. *Internet Research*, *19*(1), 7-25. http://doi.org/dhvkh

[33] Social Blade (2020). Frequenty asked questions. http://bit.ly/3c6oq5g

[34] Schroer, W. (2008). Defining, managing, and marketing to generations X, Y, and Z. *The Journal of the Household Goods Forwarders Association of America*, *40*(2). https://go.aws/2HUkXc0

[35] Suárez-Ramírez, P. (23/03/2016). Deusto formación, Diferencias entre el *engagement* y el *engagement rate* en RRSS [Blog]. *Deusto Formación*. http://bit.ly/2PlUCHR

[36] Surfshark (2019). Digital quality of life, Global research of 65 countries' digital quality of life. https://bit.ly/2yw7fuZ

[37] Takahashi, M.; Fujimoto, M. & Yamasaki, N. (2003). The active lurker: Influence of an in-house online community on its outside environment. In *Proceedings of the 2003 international ACM SIGGROUP conference on Supporting group work* (pp. 1-10). http://doi.org/bntbpr

[38] Tapscott, D. & Williams, A. (2008). *Wikinomics: how mass collaboration changes everything*. New York: Portfolio, cop.

[39] The Tech Terms Computer Dictionary (2009). YoutTube definition. https://bit.ly/2X4ejsl

[40] Ure, M. (2018). Engagement estratégico y encuentro conversacional en los medios sociales. *Revista de Comunicación*, *17*(1), 181-196. http://doi.org/dwmn

[41] Van-Dijck, J. (2007). Television 2.0: YouTube and the emergence of Homecasting. In *Creativity, Ownership and Collaboration in the Digital Age* (pp. 27-29). Cambridge: Massachusetts Institute of Technology.

[42] Vizcaíno-Verdú, A. y Contreras-Pulido, P. (2020). ¡Soy músico youtuber! Construcción de la identidad artística a través del cover y la ficción. El caso de las violinistas Taylor Davis y Lindsey Stirling. *Revista Mediterránea de Comunicación/Mediterranean Journal of Communication*, *11*(1), 25-36. http://doi.org/d7ks

[43] Wattenhofer, M.; Wattenhofer, R. & Zhu, Z. (2012). The YouTube social network. *Ecoforum*, *8*(1).

[44] Wolton, D. (2000). *Internet, ¿y después?* Barcelona: Gedisa.

Notes

1. *YouTube* was created in 2005.

2. API (Application Programming Interface). This refers to a series of functions and procedures that can be used by other software programs, acting as an interface for communicating with other systems.