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Analysis of short videos on TikTok for learning Portuguese as a foreign language



Análisis de vídeos cortos en TikTok para el aprendizaje del portugués como lengua extranjera

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ABSTRACT

In recent years, short videos have proliferated on various social media platforms, serving as a visual resource with a long history of use for various educational purposes, including foreign language learning (FLL). Despite the growing interest in the use of such platforms for short video learning, little is currently known about the use of these platforms for FLL, highlighting the need to validate these learning resources within a theoretical framework. In this context, this article analyses 34 short videos for Portuguese language learning on TikTok using an adaptation of the principles of multimedia learning proposed by Mayer. It then analyses the relation between the number of principles and each cognitive processing dimension, and the number of views and likes. Results show the adapted principles are suitable for the analysis of short videos for FLL and reveal the most prevalent one is the principle of signalling. Furthermore, the article demonstrates that the more principles a video addresses, the more likes it receives, and that the fostering generative processing dimension plays an important role in this mediation. Overall, the article illustrates the practical application of online short videos in the context of online FLL.

RESUMEN

En los últimos años, los vídeos cortos han proliferado en diversas plataformas de medios sociales, sirviendo como un recurso visual con una larga historia de uso para diversos fines educativos, incluyendo el aprendizaje de lenguas extranjeras (FLL). A pesar del creciente interés en el uso de estas plataformas para el aprendizaje de vídeos cortos, poco se sabe actualmente sobre el uso de estas plataformas para FLL, destacando la necesidad de validar estos recursos de aprendizaje dentro de un marco teórico. En este contexto, este artículo analiza 34 vídeos cortos para el aprendizaje de la lengua portuguesa en TikTok utilizando una adaptación de los principios del aprendizaje multimedia propuestos por Mayer. Analiza la relación que existe entre el número de principios y cada dimensión de procesamiento cognitivo, así como el número de visualizaciones y «likes». Los resultados muestran que los principios adaptados son adecuados para el análisis de vídeos cortos para FLL y revelan que el más prevalente es el principio de señalización. El artículo demuestra que cuantos más principios aborda un vídeo, más «likes» recibe, y que la dimensión de fomento del procesamiento generativo desempeña un papel importante en esta mediación. En general, el artículo ilustra la aplicación práctica de vídeos cortos como un recurso específico para facilitar el FLL y agiliza el desarrollo de estrategias de diseño instruccional para vídeos cortos en el contexto del FLL en línea.

KEYWORDS | PALABRAS CLAVE

Short videos, instructional videos, multimedia learning, foreign language, Portuguese, TikTok. Vídeos cortos, vídeos instructivos, aprendizaje multimedia, lengua extranjera, portugués, TikTok.

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1. Introduction

Instructional videos, mainly consisting of text and visual content, are a well-known educational resource for teaching and learning foreign languages (Pisarenko, 2017). In instructional videos, the instructor presents words in the form of narration or printed text, while visual content is presented through on-screen slides or animations (Mayer, 2021).

In today's Internet video era, people have access to various forms of online and instructional videos in both formal and informal learning environments (Ou et al., 2019). However, while such access occurred several times during the twentieth century through different technological outlets, it quickly faded for educators, because such resources were not used effectively to support learning (Mayer, 2021). Therefore, the current era may face the same problem as the twentieth century, namely that the easy access to video brought by the Internet may fade in the education field due to a lack of educational impact (Mayer, 2020).

To minimise this risk, instructional videos should follow specific guidelines known to foster and improve learning (Brame, 2016). One example of such guidelines are the principles of multimedia learning (Mayer, 2020), which are grounded in cognitive theory and presume three kinds of instructional design goals or dimensions: 1) reducing extraneous processing, which includes principles for helping learners to avoid distractions and focus on essential material (coherence, signalling, redundancy, spatial contiguity, and temporal contiguity); 2) managing essential processing, which includes principles for helping learners to process complex essential material (segmenting, pretraining, and modality); and 3) fostering generative processing, which includes principles for motivating learners to work towards understanding essential material (multimedia, personalisation, voice, image, embodiment, and generative activity).

Recent research suggests that some of these principles are likely to be more applicable to students with lower levels of knowledge and to shorter courses (Mayer, 2020). For example, the multimedia principle, which assists learners in making connections between graphics and language, may be more appropriate for lower-level learners. The signalling principle is especially suitable for learners with limited skills and knowledge. The segmenting principle aims to break information into smaller pieces and adapt it to the user's learning pace. The modality principle works better with short, fast-paced videos and the personalization principle is most likely to be effective if the learner is a beginner and the lesson is short (Mayer, 2020).

Short videos are not a new concept in the field of FLL, having appeared in previous generations of visual technologies (Zhang et al., 2022a). Regarding social platforms, TikTok pioneered the short video format in recent years, but this format has caused other platforms to transform themselves, making short videos the most prominent content format nowadays in social media. TikTok has faced the challenge of rapidly growing and diversifying the platform's features and content to adapt to an increasingly international audience. This explosive change has led TikTok to be considered as a separate category from its long form ancestor, along with the short form video format (Kaye et al., 2022). However, despite the growing interest in the use of such platforms for learning (Khlaif & Salha, 2021), their use for FLL is still incipient. Therefore, as these platforms have begun to be used for FLL, it is important to analyse this form of learning against a validated theoretical structure. As such, in this study, we propose that Mayer's multimedia learning principles may constitute a quality framework and index for the analysis of short videos on TikTok aimed at fostering FLL. In parallel, given the growing attention to the quality of user experience in online instructional videos (Habibi & Salim, 2021), this article also discusses the ongoing debate about the relationship between the number of views and likes and the quality of videos, using user engagement data provided by TikTok.

In this context, the aim of this study is twofold: 1) to analyse short videos for the teaching and learning of Portuguese as a foreign language using an adaptation of Mayer's multimedia learning principles and 2) to understand the potential relationships among the principles and the number of views and likes of the videos. This will enable the identification of the principles that are more applicable to the design of short videos and those that are more likely to contribute to FLL. By doing so, this study offers a set of guidelines that may inform and be helpful for the design of quality and effective short videos for FLL on social platforms.

1.1. The principles of multimedia learning and FLL

First, the characteristics of FLL should be considered. For native speakers, on-screen text competes with the processing power of the visual channel, which may cause learners to miss some visual information in the video, especially in fast paced situations (Lee & Mayer, 2018). However, for foreign language learners, presenting text and narration together is more effective than presenting narration alone. This is because written material on the screen can provide a means of capturing attention, which is particularly useful when the learner is unable to access auditory information (Gass et al., 2019).

Therefore, the redundancy and modality principles are interpreted differently by native speakers and foreign language learners. For native speakers, the redundancy principle is that people learn better from pictures and narration than from pictures, narration, and printed text. And the modality principle states that people learn more deeply from pictures and spoken words than from pictures and printed words (Mayer, 2020). However, if foreign language learners are unfamiliar with the words, presenting them in a narrated video may be an extra burden, whereas a printed text may provide a more sustained presentation. Therefore, the redundancy and modality principles do not apply to foreign language multimedia learning, as narrated videos with printed text are more effective than narrated videos (Lee & Mayer, 2018).

Then, the characteristics of short online videos should also be considered; they are very short by nature and their pace is usually entirely controlled by the learner. Therefore, based on the suggestion of boundary conditions for the temporal continuity principle, i.e., that this principle may be less applicable when the subsequent lesson alternates between short segments or when the learner controls the lesson (Mayer, 2020), the conditions for applying the temporal continuity principle are considered incompatible with the characteristics of the short videos in this article. So, the temporal continuity principle does not apply to the context of this study.

In parallel, we considered the generative activity principle based on these characteristics of short videos. The principle of generative activity states that people learn better when they are guided in carrying out generative learning activities, such as summarising, mapping, drawing, imagining, self-testing, self-explaining, teaching, or enacting (Fiorella & Mayer, 2016). More specifically for video lectures, the generative activity principle aims to ask learners to type in a brief explanation of the foregoing segment at pauses in the video (Mayer, 2021), or to imitate the teacher's actions during a video presentation (Mayer, 2020).

The effectiveness of generative learning strategies, on the other hand, depends on the extent to which students construct coherent mental representations of the material during the learning process. This means that students need to understand which strategies to use, when to use them, and how to use them effectively (Fiorella & Mayer, 2016). However, in tens of seconds of the short video duration, it is not possible to effectively get learners to actively pause the video and use appropriate strategies to explain what they are learning. As such, the generative activity principle is not applicable to the short videos referred to in this article.

The last principle to be adapted is the segmenting principle. This principle states that people learn better when multimedia information is presented in segments at the user's pace, rather than as a continuous unit. For example, learners are allowed to press a button to see the next part of a slide and hear the corresponding narration (Mayer, 2021). The TikTok player fully supports these user behaviours. According to some studies, breaking audiovisual material into multiple sequences can lead to more comprehensible input (Campoy-Cubillo, 2019), and learners are more likely to comprehend if the videos are short and focused on the learning objectives (Brame, 2016).

Similarly, the main purpose of applying the segmenting principle is to break down complex materials into more manageable parts (Mayer, 2020). Given TikTok's ability to deliver small learning units in a very short time and based on the fact that TikTok initially limited videos to no more than 60 seconds (Fiallos et al., 2021; Khlaif & Salha, 2021), we adapted the description of the segmenting principle by keeping the video duration under one minute.

A detailed summary of the multimedia learning principles adapted for the design of short videos for FLL can be found in Table 1, along with a description and examples (or evaluation criteria) for each principle. A detailed summary of the principles excluded is also included, as well as the reasons for the exclusion.

Table 1. Principles included and excluded						
Principles	Processing dimensions	Principles	Description (Mayer, 2021)	Example (Mayer, 2020, 2021)		
included	Reducing extraneous processing	Coherence	Avoiding extraneous material in slides and script	Removing seductive details such as huge logos or colourful backgrounds. Removing additional details such as unnecessary words and symbols. Remove background music.		
		Signalling	Highlight key material	Verbal and visual cues are added with classic signalling, spatial outline, highlighting.		
		Spatial contiguity	Placing printed text next to corresponding part of graphic	Slides contain graphics with words placed next to corresponding parts.		
	Managing essential processing	Segmenting	Breaking a complex lesson into progressive parts under the control of the learner. *Keeping the video under one minute	Allowing the learner to press a button to see the next segment of a slide and hear the accompanying narration. *The duration of the video is no more than one minute.		
		Pretraining	Providing pretraining in the names and characteristics	The video contains an introduction involving the names and characteristics of key concepts.		
	Fostering generative processing	Multimedia	Presentig words and graphics rather than words alone	The video contains both narration and graphics.		
		Personalization	Using conversational language	The lecturer speaks in first and second person. The lecturer occasionally inserts relevant self-revealing statements. The lecturer uses polite wording.		
		Voice	Using appealing human voice	The lecturer speaks with a friendly human voice that displays positive emotion.		
		Image	Not displaying static image of the instructor's face	The video does not have a window with a photo of the instructor's face.		
		Embodiment	Displaying gesturing instructor	The lecturer writes and draws on the board. The lecturer maintains eye contact. The lecturer displays dynamic gestures. The demonstration is filmed from a first- person perspective.		
Principles excluded	Processing dimensions	Principles	Description (Mayer, 2021)	Reasons for exclusion		
	Reducing extraneous processing	Redundancy	Not adding captions that repeat the narration	"Narrated video with printed text can be more effective than narrated video in multimedia instruction in one's second language" (Lee & Mayer, 2018: 653).		
		Temporal contiguity	Presenting visual material at same time as corresponding narration	"The temporal contiguity principle may be less applicable when the successive lesson involves alternations between short segments or when the lesson is under learner control" (Mayer, 2020: 227).		
	Managing essential processing	Modality	Presenting words as spoken text	"Narrated video with printed text can be more effective than narrated video in multimedia instruction in one's second language" (Lee & Mayer, 2018: 653).		
	Fostering generative processing	Generative activity	Inserting generative learning activities	"Students need to know which strategies to use, when to use them, and how to use them effectively" (Fiorella & Mayer, 2016: 733).		

Note. The descriptions and examples marked with an asterisk are our adaptations

1.2. User engagement and video quality

Multimedia learning principles as an indicator of video design quality have been discussed above, but there is another indicator that should also be measured, namely user engagement. In this case, user engagement represents the quality of user experience. This topic has been receiving increasing attention in educational research (Habibi & Salim, 2021), but there is more than one way to measure it and note should be given to the fact that user engagement metrics are influenced by different factors and can assume different meanings.

For example, in TikTok, views are generated through recommendations by its algorithm (Klug et al., 2021). Videos are ranked by metrics such as views, likes, and shares, and can become popular videos with different levels of views if the combined ranking reaches different specified values (Zhao, 2021). And in addition to these video engagement metrics, views can also be associated with specific release times and popular video sections (Klug et al., 2021). However, in comparison, likes are a more direct form of user voting to express the popularity of video content (Khan, 2017), and can also be interpreted as the acceptability of the content by the viewers (Throuvala et al., 2019). Therefore, these comparisons have led to the development of educational research on the relationship between user engagement and video quality.

Rittberg et al. (2016) rated instructional videos on YouTube according to reliability, comprehensiveness, and global quality scale, concluding that video quality does not correlate with video views. Bae and Baxter (2018) analysed instructional videos on YouTube with 14 key criteria, also concluding that there was no significant difference in the number of views between the most useful and other videos. However, Shoufan (2019) used learning analytics to look into the extent to which YouTube's educational videos supported the cognitive features articulated in cognitive theories of multimedia learning.

The findings of this study show a strong or moderate correlation between the number of likes or dislikes and the educational video's cognitive value, so that the quality of educational videos is expressed as a function of the number of likes, referred to as the video cognitive value. In parallel, De-Angelis et al. (2019) evaluated the overall video quality and usefulness of surgical videos on YouTube and found a significant relationship between the number of likes and moderate/good video quality.

Therefore, considering this debate, and taking into account that the object of analysis in this article is online short videos and that TikTok supports the collection of video views and likes, this article analyses short videos according to two quality indicators: the principles of multimedia learning, considered as a quality indicator of video design, and user engagement, considered as an indicator of user experience, in terms of the number of views and likes.

2. Methodology

2.1. Video selection

We conducted a search on TikTok on November 1, 2022, using the keyword "Aprender português" [Learning Portuguese]. The search returned a total of 445 short videos, but as TikTok shows all short videos related to "Learning" and/or "Portuguese", the results were further refined by applying exclusion criteria: 1) short videos with generalist content (e.g., humor, advertising) (n=174); 2) short videos for learning other languages (n=29) and 3) short videos for learning Portuguese using other languages (n=208). Our main objective was to only include short videos using Portuguese that had the explicit goal of teaching Portuguese. After applying the exclusion criteria our sample totalled 34 short videos posted between September 2021 and October 2022¹.

2.2. Video analysis

The analysis of the short videos was conducted using the adapted multimedia learning principles presented in Table 1. Coder A coded the total sample of videos (N=34) and Coder B coded around 30% of the total sample (N=10). As the coding process may be permeable to subjective interpretation (Lombard et al., 2002), an intercoder reliability check was performed, using the Intraclass Correlation Coefficient (ICC) in the statistical software R (Falissard, 2012), checking absolute agreement in a confidence interval of 95%. The ICC was of 0.845.

2.3. Data analysis

In the first step, we characterised the sample of short videos in terms of their quality using the multimedia learning principles. The total variable used was the sum of the principles identified in each video. The frequencies of each individual principle according to the three different processing dimensions (cf. Table 1) are also presented. To better understand the relationship between the three dimensions, and since the number of principles in each dimension differs, we performed a partial polychoric correlation (Revelle, 2019). To assess the relationship between the number of principles (total and per dimension) in the videos and the views and likes obtained, Spearman bivariate correlations were performed.

As the number of days between the publication date of the videos and the recording of the number of likes and views per video varies, Spearman correlations between the number of principles and dimensions, and the publication date of the videos were performed. For significant Spearman correlations, Bayesian correlations were performed to assess the robustness of the effects obtained. Bayes factors were interpreted according to the classification of Lee and Wagenmakers (2013).

To check whether it was the fostering generative processing dimension that mediated the significant relationship between the total number of principles of multimedia learning present in the videos and the

number of likes, we performed a mediation analysis with 1000 bootstrapped samples. Analyses were conducted using R (Team, 2022) to generate the linear models and JASP (Team, 2023) for Bayesian analyses.

3. Results

3.1. Application of the multimedia learning principles in the short videos

The average number of the principles found in the 34 short videos can be seen in the violin graph on the left in Figure 1, where the black square is the mean, and the black line is the median. The distribution of short videos according to the number of principles can be seen in the graph on the right in Figure 1.



A visual analysis of the graphs in Figure 1 shows an average of 7.9 principles per short video (SD=1.675) and a registered variation of 5 to 10 principles. Interestingly, no short video adopted less than 5 of the 10 principles included in the analysis framework, indicating that the minimum quality according to the principles of multimedia learning was 50%. Looking at the distribution, it is possible to see that 64.7% (n=22) of the 34 short videos included 8 or more principles (Md=8) and that 50% of the videos complied with between 6 and 9 principles (see box plot).



Considering that the above results refer to a total analysis, the frequencies of the multimedia learning principles are now presented individually. Figure 2 shows the number of short videos that include each of the principles. The least observed principle in the analysed videos is coherence, which is present in only 29.4% (n=10) of the videos, and the most observed principle is signalling, which is present in all the analysed videos. It should be noted that coherence is the only principle that emerges in less than 50% of the videos and is most responsible for reducing the overall value of compliance with the principles of multimedia learning. Additionally, the personalisation principle is also noteworthy, appearing in only

58.8% (n=20) of the videos. Regarding the dimensions of the multimedia learning principles, the short videos compliance with these dimensions can be found in Table 2. Before analysing it, it is noteworthy to highlight the dimension does not include the same number of principles. There are 3, 2 and 5 principles respectively for reducing extraneous processing, managing essential processing, and fostering generative processing. The analysis of Table 2 reveals that the reducing extraneous processing dimension has the fewest videos containing all principles (only 29% of the videos) and the managing essential processing dimension has the most (82.4% of the videos). This result is not surprising, since the least considered principle is the coherence principle, which pertains to the reducing extraneous processing dimension.

Table 2. Frequencies of short videos' compliance with the three dimensions						
Principles		Counts	% of Total	Cumulative %		
Reducing Extraneous Processing	1/3	3	8.8 %	8.8 %		
	2/3	21	61.8 %	70.6 %		
	3/3	10	29.4 %	100 %		
Managing Essential Processing	1/2	6	17.6 %	17.6 %		
	2/2	28	82.4 %	100 %		
Fostering Generative Processing	1/5	1	2.9 %	2.9 %		
	2/5	5	14.7 %	17.6 %		
	3/5	6	17.6 %	35.3 %		
	4/5	7	20.6 %	55.9 %		
	5/5	15	44.1 %	100 %		

3.2. Principles of multimedia learning and engagement metrics

To assess the relationship between the number of principles of multimedia learning (total and per dimension) in the short videos and the number of views and likes obtained, Spearman correlations were carried out. The correlation matrix resulting from this analysis is shown in Figure 3.



As we can see in Figure 3, significant correlations were only registered between the total number of principles found in the short videos and the presence of likes they received (r=.345, p=.046), and between the number of principles for the fostering generative processing dimension and the presence of likes they received (r=.360, p=.037). These two significant correlations, which are positive, indicate that the more principles of multimedia learning a video contains, the more likes it receives. This result is strengthened by the fact that there is no relationship between the total number of principles or the fostering generative processing with the publication date of the videos (all p>.220). It should also be noted that no significant correlations with the presence of views were found. Given the p values close to 0.05 in the two significant correlations, Bayesian correlations were performed to assess the robustness of the observed effect (Figure 3).

The Bayes factor obtained for the fostering generative processing dimension (FGP)*Likes correlation is 3.141, while the Bayes factor obtained for the total number of principles (NMP)*Likes correlation is 1.839. According to Lee and Wagenmakers (2013) classification, the Bayes factor for the correlation between the fostering generative processing dimension and the presence of likes has moderate evidence, while the Bayes factor for the correlation between the total number of principles presented in the short videos and the presence of likes has anecdotal evidence.

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Given that fostering generative processing dimension is included in total principles, and the impact of its correlation with likes is larger than the correlation of total principles with likes, and none of the other dimensions show a significant correlation with likes, we would expect the significant correlation of total principles with likes to be driven by the impact of the fostering generative processing dimension.

To test whether it was the fostering generative processing dimension that mediated the significant relationship between the total number of principles presented in the short videos and the presence of likes, we performed a mediation analysis with 1000 bootstrapped samples. Table 3 presents the results of this mediation. The results show that although there is no significant mediation effect ($a \times b = 1.315$, p=.189), the direct relationship between the total number of principles presented in the short videos and the presence of likes is not significant (c=.0.248, p=.804), and only becomes significant when the fostering generative processing dimension. The results of the total relationship is explained by the fostering generative processing dimension. The results of this analysis show that the principles for fostering generative processing explain the relationship between the total number of principles and the presence of likes.

Table 3. Mediation estimates								
Effect Lal	Label	Estimate	e E	95% Confide	7	n	% Madiation	
	Laber	Estimate	SE	Lower	Upper	2	Р	% weulation
Indirect	a×b	2,850.353	2,168.008	-565.351	7,926.173	1.315	0.189	82.927
Direct	С	-586.821	2,363.177	-5,897.183	3,655.182	-0.248	0.804	17.073
Total	c+a×b	2,263.532	1,052.741	493.871	4,542.108	2.150	0.032	100

4. Discussion and conclusion

The aim of this study was to 1) to analyse short videos for the teaching and learning of Portuguese as a foreign language using an adaptation of Mayer's multimedia learning principles and 2) to understand the potential relationships among the principles and the number of views and likes of the videos.

Results show that the principles of multimedia learning are implemented well in the short videos. Based on the analysis of the three dimensions, we found that the highest application of the managing essential processing dimension is due to the high implementation of the segmenting and pre-training principle, as most of the videos are kept to less than one minute and with key content introductions. The lower application of the fostering generative processing dimension is influenced by the fact that the personalisation principle is not well implemented, as the instructors in some videos do not narrate in the first and second person.

The reducing extraneous processing dimension is the one that covers the least number of short videos, as the principle of coherence is applied minimally. This is because many videos have background music and coloured backgrounds, which is in line with what was previously found on short videos for English learning in TikTok (Zhang et al., 2022b). In these short videos, background music is used to evoke emotion and sound effects are used to add an element of humour. Only a small percentage of the short videos exhibited a plain background.

It should be noted that the criteria for evaluating the application of principles of multimedia learning to short videos were set in line with Mayer's investigation, where background music is present in a way that affects learning outcomes. However, for FLL, there are positive findings that support further research into real-world-based musical materials to facilitate daily cognitive tasks (Kang & Williamson, 2014). This is because FLL outcomes are better when music is integrated, whether in the background, through songs, or during musical and rhythmic activities, than when no music or other artistic interventions are used (Degrave, 2019). In general, however, the role of background music in learning is not clearly established (De-la-Mora-Velasco & Hirumi, 2020). The same is true for FLL, as for some skills there is published data or conflicting evidence between studies (Degrave, 2019).

Thus, since the effects of using background music in FLL are not fully known, we can understand that this may be the reason why the coherence principle is not well applied in the short videos analysed. In parallel, TikTok is initially a music-based platform, therefore, the sound and background music are likely to influence whether the video is popular or not (Klug et al., 2021). This may also be another reason why the creators decided to add background music to their videos.

Results regarding the relationship between the number of principles of multimedia learning (total and per dimension) in the short videos and the number of views and likes obtained, showed the correlation of the number of principles is only apparent with likes. This result is not very surprising, as mentioned before, views can be associated with likes, shares, specific release times and popular video sections (Klug et al., 2021). However, likes can be interpreted in relationship with the perceived value of the video (Shoufan, 2019). This means that views were shown to be independent of the effectiveness of the video, and given that they can be influenced by various factors, whereas likes can directly represent the viewer's perception of the video content, this could explain why the number of principles applied to the video did not correlate with views but did correlate with likes. This also means that our results provide preliminary evidence that, even for videos of very short duration, the number of likes is more related to the quality of the video than the number of views.

Results also show that the principles for fostering generative processing dimension explain the relationship between the total number of principles and the presence of likes. Mayer's research on instructional design principles initially focused on techniques to reduce extraneous processing and gradually expanded to include techniques to manage essential processing and foster generative processing (Mayer, 2020). A major challenge that has surrounded this design process is the limited cognitive capacity of learners (Mayer, 2020). Therefore, when focusing on instructional techniques to foster generative processing, researchers are challenged to consider more fully the role of motivation in multimedia learning (Fiorella & Mayer, 2016). This occurs because motivation is key to engaging learners in selecting, organising, and integrating knowledge, and it is the learners' motivation that leads to their generative cognitive processing (Mayer, 2020).

Thus, in this context of learner motivation as a driver of cognitive processing, the descriptions of the principles of multimedia learning have been gradually adapted. For example, in a second edition of the principles, Mayer emphasised that "we found no evidence that animation was more effective than static diagrams in multimedia lessons" (Mayer, 2009: 230). Additionally, regarding the image principle, he emphasises that "people do not necessarily learn better when the speaker's image is added to the screen" (Mayer, 2009: 242). Later, in a third edition, the image principle was updated to state that "people do not learn better from multimedia presentations when a static image of the instructor is added to the screen" (Mayer, 2020: 331). Also, the embodiment principle was added to highlight the importance of high embodiment of the instructor on the screen, because high embodiment can serve as a positive social cue that motivates learners to work harder to understand the instructional information. In this context, based on the importance of fostering generative processing dimension, synthesising the details of the embodiment principle, such as dynamic mapping, gaze guidance, and perspective into five ways specifically improves the effectiveness of instructional videos by combining the generative activity principle and subtitle principle in FLL videos.

In summary, we can understand that the fostering generative processing dimension is considered more correlated with the effectiveness of video than the other dimensions, because it is generated by the learner's motivation. Similarly, the number of likes is also generated based on the viewer's perception of the video content, which represents the value, acceptance, and popularity of the video by the viewer and is fully associated with the learner's motivation to watch it. Thus, at the level of learning motivation, it can be explained that the fostering generative processing dimension is more correlated with the presence of likes than other dimensions. This also means that our results provide preliminary evidence that, in the multimedia learning principle, the fostering generative processing dimension reflects the quality of the user experience of the short video.

Finally, considering that the object of analysis in this article was generated based on our search on TikTok, we cannot deny that these 34 videos may not constitute all the videos related to learning Portuguese on TikTok made by native speakers, and that the number of videos may have an impact on the results of applying the principles of multimedia learning to short videos. The corpus could be expanded in several possible ways, such as by extending the analysis to other languages or by comparing videos from different platforms (e.g., Instagram and YouTube). It is also worth noting that the analysis in this study focused on video design quality and user experience quality but not on video content quality. This will be one of the

directions for future research. Another aspect to be taken into consideration in future studies is the use of cross-sectional or longitudinal methods for established time periods analysis. However, what we can determine based on our data analysis is that short videos for learning Portuguese on TikTok conform to the construction of principles of multimedia learning and have full potential to become a specific learning resource for this era. The design quality of these videos, i.e., the application of multimedia learning principles, correlates with the number of likes. In addition, the fostering generative processing dimension reflects the quality of the user experience of the short video. It has a prominent role in facilitating the dissemination and effectiveness of short videos, which stimulates consideration about the design of online short videos for learning foreign languages, as much as having the potential to inform the design of educational materials and video-based language-learning programmes.

Notes

¹Available at: https://doi.org/10.6084/m9.figshare.23622714.v1.

Authors' Contribution

Idea, Y.Z.; Literature review (state of the art), Y.Z.; Methodology, P.B., Y.Z.; Data analysis, P.B., Y.Z, ML; Results, P.B.; Discussion and conclusions, Y.Z.; Writing (original draft), Y.Z., M.L.; Final revisions, M.L., P.B, L.P.; Project design and funding agency, Y.Z.

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Didactic audiovisual translation in language teaching: Results from TRADILEX



Traducción audiovisual didáctica en enseñanza de lenguas: Resultados del proyecto TRADILEX

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ABSTRACT

The current paper reports on the results of a national research project investigating the use of didactic audiovisual translation (DAT) in foreign language teaching. Although previous research in this field concludes that there are positive outcomes in students' learning, most studies rely on small samples and analyse one language skill only. The TRADILEX project aims at examining the effect of several modes of audiovisual translation (AVT) *i.e.*, subtitling, dubbing, subtitling for the deaf and hard of hearing, audio description and voiceover- in oral and written skills of university students learning English as a foreign language. This article assesses the effectiveness of a didactic proposal that includes 30 lesson plans through an intervention carried out with 566 participants from eight universities in Spain. The study relies on a quantitative design, and statistical tests (descriptive statistics and Wilcoxon Test) were carried out to estimate the effect of DAT on oral and written reception and oral and written production of the students. Our results underline that there are statistically significant differences that confirm students improved in the four communicative skills in the foreign language. Besides, there is a positive evolution in students' achievement during the study, and participants report a favourable perception of the didactic intervention.

RESUMEN

Este trabajo presenta los resultados de un proyecto nacional sobre el uso de la traducción audiovisual didáctica (TAD) en el aprendizaje de lenguas extranjeras. Si bien los resultados de investigaciones previas en este campo son favorables con respecto al desempeño académico del alumnado, la mayoría de los estudios analizan una única destreza lingüística y cuentan con muestras reducidas. El proyecto TRADILEX tiene como objetivo analizar el efecto del uso de diferentes modalidades de traducción audiovisual (TAV) (subtitulado, doblaje, subtitulado para sordos, audiodescripción y voces superpuestas) en las competencias orales y escritas del alumnado universitario que estudia inglés como lengua extranjera. El presente artículo analiza la efectividad de una propuesta didáctica que incluye 30 planes de estudio y que se analizó a través de una intervención con 566 participantes de ocho universidades españolas. La investigación toma un diseño cuantitativo en el que se realizaron pruebas estadísticas (estadísticos descriptivos y Test de Wilcoxon) para valorar el efecto de la TAD sobre las destrezas lingüísticas de recepción oral y escrita, producción oral y escrita del alumnado. Los resultados subrayan que hay diferencias estadísticamente significativas que demuestran que los participantes del estudio mejoran en las cuatro destrezas comunicativas analizadas. Además, los datos también confirman la evaluación positiva del rendimiento del alumnado en el transcurso del estudio, así como una percepción favorable de la intervención didáctica por parte de los participantes.

KEYWORDS | PALABRAS CLAVE

Didactic translation, audiovisual translation, language teaching, language didactics, foreign language, digital literacy. Traducción didáctica, traducción audiovisual, enseñanza de lenguas, didáctica de la lengua, lengua extranjera, alfabetización digital.

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1. Introduction and state of the art

Since the 1980s, audiovisual media has been widely used as a language teaching resource (Geddes & Sturtridge, 1982; Sherman, 2003; Stemplesky & Aracario, 1990; Tomalin, 1986). Its use in the language classroom has garnered learning benefits for students who can work with authentic language in class and interact in communicative situations (Buck, 2010; Ghia & Pavesi, 2016; Izquierdo et al., 2017; Navarro-Pablo et al., 2019; Pavesi, 2015). Technical progress has informed evolution in the way in which we currently use technology in the classroom, where student-centred approaches require students to play active roles in the use of Information and Communication Technology (ICT) (Motternan, 2013). Against this background and dating back a number of decades, audiovisual translation (AVT) began to be used as a resource in foreign language classes specifically by using subtiling as a support element (Duff, 1989; Holobow et al., 1984; Maley & Duff, 1983; Price, 1983; Vanderplank, 1988). The proactive role of students in the subtiling and dubbing of videos has more recently demonstrated that a beneficial effect on language learning can be appreciated and has generated increasing interest in didactic audiovisual translation (DAT) (Wang & Díaz-Cintas, 2022; Zabalbeascoa et al., 2012).

DAT specifically refers to the use of modes of translation like subtitling, dubbing, subtitling for the deaf and hard of hearing (SDHH), audio description (AD) or voiceover as pedagogical resources in language didactics (Talaván, 2020). In other words, DAT is focused on the design, development and application of didactic tasks where students are required to subtitle or dub a video clip using distinctive strategies and make use of the available technology (which includes different applications and software, such as Aegisub). The research regarding DAT possibilities in language learning is an interdisciplinary area in which applied linguistics, language and literature didactics, translation studies and educational science all converge (Lertola, 2021). In addition to offering promising results related to the development of the communicative skills of primary, secondary and university education students (Ávila-Cabrera & Rodríguez-Arancón, 2021; Bausells-Espín, 2022; Beltramello & Nicora, 2021; Bolaños-García-Escribano & Navarrete, 2022; Incalcaterra-McLoughlin, 2019; Marzà et al., 2022; Pintado-Gutiérrez & Torralba, 2022; Soler-Pardo, 2020), DAT likewise has obvious implications in terms of digital literacy, given that subtitling or active dubbing of videos by students facilitates working on their digital skills, multimodal working or mediation, amongst others (Martínez-Sierra, 2021). Furthermore, it is of importance to recognise that DAT can be used in face-to-face or digital educational environments, which is of special interest given the prominence that non face-to-face and hybrid modes of language learning have been afforded as a result of the COVID-19 pandemic.

For two decades, research in this field has provided empirical evidence that shows that the use of DAT facilitates the acquisition of vocabulary (Lertola, 2019), the promotion of intercultural skills (Borghetti & Lertola, 2014), the improvement of oral comprehension (Avila-Cabrera, 2022; Navarrete, 2020; Sánchez-Reguena, 2018) and also the advancement of written skills (Ibáñez-Moreno & Escobar, 2021). Linguistic advantages aside, it has been observed that the use of the DAT leads to an improvement in other fundamental elements in education, such as creativity (Ávila-Cabrera, 2022), the fostering of interaction in the classroom and motivation (Alonso-Pérez, 2019), the activation of previously-acquired knowledge, working with higher and lower order cognitive abilities, or translanguaging -the use of both the mother tongue and the foreign language in the classroom- (Baños-Piñero et al. ., 2021). Recently, research results have underlined the benefits of working with integrated skills (Sánchez-Requena et al., 2022) and confirm the pedagogical possibilities of DAT in new environments, such as in speech therapy (Fernández-Costales et al., 2023). Until now, most research has focused on analysing the results of case studies with small samples carried out in a single institution and research with inferential statistics or analysis using large samples collated in different contexts is infrequent. In addition, previous studies predominantly look into a single aspect: the improvement in students' written skills (Ibáñez-Moreno & Escobar, 2021), the impact on vocabulary acquisition (Elsherbiny, 2021) and the effect of DAT on motivation (Beseghi, 2021). However, the effect on different dimensions in language learning has not been comprehensively investigated. Against this background, the TRADILEX project (https://tradit.uned.es/proyecto-tradilex/) worked on the principle that it was necessary to research the application of DAT from a broader perspective and by using a robust research design, with a considerable sample size made up of participants from diverse national locations. The sample consists of 566 participants from eight Spanish universities enrolled in the 2021-2022 academic year. The general objective of the project was twofold: on the one hand, to evaluate the impact of DAT on the four linguistic skills of the participants and, on the other, to assess the learning progress from the first to final lesson plans (LP) carried out. In order to estimate the effect of DAT on the L2 learning process, 30 LPs were designed for the B1 and B2 levels from the Common European Framework of Reference for Languages -or CEFR- (Council of Europe, 2018) in which the participants worked with the five AVT modes: subtilling, SDHH, dubbing, AD and voiceover. With that in mind, the specific objectives of this article are formulated as follows:

1) Analyse the impact of DAT on oral production.

- 2) Analyse the impact of DAT on written production.
- 3) Analyse the impact of DAT on oral reception.
- 4) Analyse the impact of DAT on written reception.
- 5) Evaluate the progress of L2 skills and knowledge of AVT throughout the didactic intervention.
- 6) Evaluate the participants' perception during the didactic intervention.

There are several reasons why we believe that this piece of research can contribute to educational improvement in language learning. Firstly, empirical evidence confirms the effectiveness of DAT as a pedagogical resource in the teaching of languages in different linguistic settings. Secondly, the academic progress of students who integrate this didactic resource into their learning itinerary has been verified. Thirdly, timely educational implications of a didactic proposal that goes beyond improving linguistic competence are established, given that it promotes digital literacy, multimodal learning and the use of new technologies in the classroom. Finally, the results presented here are the result of an interdisciplinary research project in which researchers from philology, language didactics, and pedagogy have participated, all of whom can contribute to new interdisciplinary perspectives to the language teaching process.

2. Methods and materials

The study has a pre-experimental mixed research design and is placed within a national R+D+I project developed between 2020 and 2023. It is essential to have a general understanding of the project in order to become "au fait" with the methodology used in this study. Figure 1 shows the timing of the project which revolves around 9 phases:

- Launch (O1). This first phase took place in the first term and consisted of the creation of the research group, the building of the website and the carrying out of a bibliographical review.
- Proposal design (O2). During the second term, the methodological proposal and the general research framework were designed. The modern language centres where the investigation would be implemented were also selected.
- Task design and centre network (O3). In the third term of the first year, 30 LPs were designed for B1 and B2 levels and a collaborative network was established with the language centres involved in the project.
- Pre-experimental study (O4) and its continuation (O5). In the first term of the second year, specific training was given to the participating teachers so they could rigorously carry out the project implementation. Additionally, studies began within the different language centres and the pilot data were collected. This phase continued during the second term of the second year through the investigation presented here, with constant monitoring by the research team.
- Study closure (O6). In the third term of the second year, the study in language centres was closed and data analysis began.
- Platform design and other languages (O7). In this seventh phase, the virtual platform was developed to host the 30 LPs for use by both students and teachers.
- Implementation (O8). The digitalisation of the LPs in the new platform format was the eighth phase. In addition, a manual of good practices in DAT was finalised.
- Piloting, transfer and dissemination (O9). In this final phase, platform pilot tests were carried out with some institutions, transfer possibilities to other contexts were analysed and an international conference on DAT was held.

The main objective of this research is to analyse the data obtained in the phases associated with the preexperimental study (O4 and O5). Temporarily, these phases took place in the final term of 2021 and the first term of 2022. This is of particular interest as the terms coincided with the SARS-CoV-2 pandemic. This situation resulted in the intervention being carried out completely online in a Moodle, where virtual courses were created for each level and centre.



The process which was followed was identical for each institution where each institution was provided with a file containing the instructions the students would need to complete their course registration in the virtual learning space. Each corresponding centre boasted not only teaching staff but also the supervision of an individual belonging to the research group, whose main function was to supervise and ensure the correct development of the intervention. There were weekly follow-up sessions and the course forums and email were used as the main means of communication. The courses had the following structure:

- Course presentation and initial tasks. This section provided a general guide in PDF and interactive support with the main steps to follow, alongside access to the pre-test and the initial questionnaire.
- Lesson plans. Subsequently, five blocks with the different DAT modes were offered, each with an introductory guide and interactive support with the initial steps to follow and guidelines for the corresponding DAT mode, software tutorials, etc. The first block contained 3 subtitled LPs, the second had 3 voiceover LPs, the third included 3 dubbing LPs, the fourth consisted of 3 audio description (AD) LPs, and in the fifth block there were 3 SDHH LPs. Within each modality, the level of difficulty was incremental, as is the case in the full set of DAT modes. With this strategy, sequential learning is anticipated which favours the learning process and reduces the dropout rate.
- Final tasks. At the end of the intervention, the students had to complete a final questionnaire and do an integrated skills test to verify their progress.

The instruments used for data collection were the following:

• Initial questionnaire. An 11-item questionnaire (largely closed-ended questions) that collated data of interest on the sample. The questionnaire contained a block for sociodemographic data, self-perception of communicative competence levels in L2 and previous DAT experience. The questionnaire also explored the sample's expectations regarding the course.

- Initial Test of Integrated Skills (ITIS). This test evaluated the four basic macro-skills and measured the students' performance before starting the intervention (Couto-Cantero et al., 2021).
- Intervention. The intervention was evaluated through rubrics designed for each modality. On a weekly basis, the students received information about their delivered tasks, therefore allowing for reflection on their strengths and areas for improvement.

Regarding the intervention, Figure 2 (https://doi.org/10.6084/m9.figshare.23123426) shows a combination of the LPs that were designed and those that were used for each didactic sequence: the sequences of 6 LPs for a single modality and the sequences of 15 LPs for 5 combined modes. Although not all the LPs were used in the intervention analysed here, specific courses were indeed implemented in which short sequences of a single modality were worked on. This occurred specifically during the piloting carried out in the O4 phase (González-Vera, 2022). After piloting, necessary corrections and improvements were implemented in the design of the intervention, in the virtual platform and in some LPs.

The LPs were built around an excerpt from a short film which had previously been selected in order to achieve specific educational objectives. The estimated time that each participant had to dedicate to undertaking each LP was 60 minutes, in which the tasks were divided into four blocks: warm-up tasks, video watching, DAT tasks and consolidation tasks (post-DAT tasks).

- Final Test of Integrated Skills (FITIS). This post-test was identical to that of the pre-test and its main objective was to quantitatively measure the degree of development of each macro-skill after the intervention, in order to be able to compare this information with that of the pre-test. This allows one to have a quantitative vision of student progress and, at the same time, is a core element for the research project.
- Final questionnaire. A 21-item questionnaire (largely closed-ended questions) aimed at assessing students' perception of the experience. The questionnaire was built around four blocks: process perceptions, perceptions of the results obtained, perceptions of the impact of the intervention on motivation and the development of interculturality and levels of general satisfaction with the project.

The sample is made up of N=566 participants from different Spanish universities: The National University of Distance Education, the European University of Madrid, the University of Castilla-La Mancha, the University of Almería, the University of Córdoba, the University of A Coruña, Jaume I University and the University of Lleida. Figure 3 (https://doi.org/10.6084/m9.figshare.22259278) illustrates the gender distribution according to each centre. The majority are women (60.78%), with men representing 38.64% of the sample and non-binary 0.88%.

Regarding the age of the participants, the data have been grouped into four ranges. From 18 to 30 years old (A), from 31 to 40 years old (B), from 41 to 50 years old (C) and 51 or more years old (D). Figure 4 (https://doi.org/10.6084/m9.figshare.23139083) illustrates the distribution of the sample by age and gender, and from it, one can appreciate that most of the participants belonged to group A (N=300, 53.01%), while range B accommodated 18.37% (N=104), and range C 16.6% (N=94). The least represented range is D with 12.02% (N=68).

The sample includes participants from both state and private universities, and from face-to-face and distance education institutions. There is also a balance in both the age and gender of the participants. To address the code of ethics under which the project operated, on July 5^{th} 2021, a certificate of suitability was obtained. This certificate allows for the involvement of human beings as part of a research project. In order to guarantee anonymity when working with collated data, each participant was issued a code concealing their identification.

3. Results and analysis

In this section, a quantitative and inferential analysis is explored. Firstly, a study of the normality of the oral and written production variables and of the oral and written reception is carried out, the results of which have been obtained through the pre-test (ITIS) and post-test (FITIS). Additionally, each variable is studied separately through different statistics. Participant performance is also analysed via the grades obtained in each DAT task.

3.1. Descriptive statistics analysis and sample normality study

Table 1 (https://doi.org/10.6084/m9.figshare.23138678) summarises the basic descriptive statistics. Valid indicators for each of the variables are collected and missing indicators are shown. With regards to the post-test, the increase in lost data can be attributed to the dropout rate. It is important to appreciate that the course was implemented electronically during a complex and unprecedented socio-health situation. The oral reception success rate stood at 41.62%; written reception at 43.18%; oral production at 49.45%; and written production at 47.48%. Considering that universities such as the National University of Distance Education usually achieve a follow-up success rate of less than 40%, course engagement can be deemed to be high. Within the realms of Distance Learning (DL) (García-Aretio, 2017), the success rate is calculated by the number of students who complete all available course tasks, including the evaluation tasks.

Concerning the normality study, the H_0 states that each variable is normal. However, a normality analysis (Shapiro-Wilk) of the sample of each of the variables listed in Table 1 reveals that the p-indicator is <.001. This indicates that the previously presented hypothesis must be rejected and the alternative hypothesis must be accepted, which shows that the variables in Table 1 do not meet the normality conditions.

3.2. Inferential analysis

To execute the inferential analysis, it is essential to consider both the sample size and the normality analysis. When dealing with variables that do not meet the normality conditions, non-parametric tests must be used. In this case, the analysis of the impact of the intervention was conducted through average comparisons, using the Wilcoxon test for paired samples. The analysis is divided into four sections, each of which corresponds to each of the basic language skills.

3.2.1. Oral reception

To study the difference in averages in this variable, an alternative hypothesis is proposed. This hypothesis puts forward that the oral reception value in the pre-test is lower than the value of oral reception in the post-test. To arrive at this hypothesis, the Wilcoxon paired sign test was implemented, obtaining the values detailed in Table 2 (https://doi.org/10.6084/m9.figshare.23139518).

The p-value of the Wilcoxon test is statistically significant, entailing the rejection of the null hypothesis and the acceptance of the alternative hypothesis. Therefore, one can assert that the difference in the averages is statistically significant, and the value of the FITIS oral reception is significantly higher than that of the ITIS oral reception, where there is a percentage increase of 16.43%.



The raincloud diagram in Figure 5 corresponds to the variable in question. In this figure, oral reception is shown with green illustrating the distribution of measure 1 (ITIS) and orange the distribution of measure 2 (FITIS). Latest trends in Statistics and Data Science informed the use of this type of diagram as the raincloud diagram is most advantageous in that it is a representation system that is both precise and transparent, reflects the raw data, the probability density and key elements such as the mean and median in a visual and clear way (Allen et al., 2021).

Perhaps one of the most interesting aspects to highlight is the homogenizing and beneficial effect of the intervention with regards to this variable, given that the mean score increases at the same time as the standard deviation decreases, as shown in Table 3 (https://doi.org/10.6084/m9.figshare.23139707). Delving into the standard deviation, it is important to clarify that this homogenizing effect is reflected in a percentage reduction, since the standard deviation of the FITIS (oral reception) falls by 21.08%.

3.2.2. Written reception

The analysis of this variable proceeds in a similar vein to that of the oral reception variable. Firstly, the non-parametric test is applied, enabling the study of the alternative hypothesis that asserts that the written reception score in the post-test (FITIS) is higher than that of the pre-test (ITIS), obtaining the results shown in Table 4 (https://doi.org/10.6084/m9.figshare.23139893). Based on the results obtained, the null hypothesis must be rejected and the alternative hypothesis accepted since the p-value is less than .05. As previously mentioned, the representation of the written reception data has been chosen using raincloud diagrams (Figure 6) in order to offer a more complete vision of the data set.



The raincloud diagram depicting the written reception results shows an effect not dissimilar to that of the oral reception variable, albeit in this case the difference is less pronounced. Inspection of Table 5 (https://doi.org/10.6084/m9.figshare.23145800) reveals that this is because the difference between the average and the standard deviation is smoother and, furthermore, the distribution is different. However, the homogenizing effect of the intervention continues to be appreciated, meaning that students improve in a harmonious manner. In percentage terms, the reduction in the standard deviation is 33.39%.

3.2.3. Oral production

In the case of oral production, a non-parametric test is also applied. On this occasion, the alternative variable is that the ratings of the variable are higher after the intervention. The Wilcoxon non-parametric test is applied and the results shown in Table 6 (https://doi.org/10.6084/m9.figshare.23145905) are obtained. Regarding the effect of the intervention on the distributions of the sample, the raincloud diagram (Figure 7) is very illustrative since the distribution of the values of measure 2 (FITIS oral production) around higher values (close to 9) is clearly appreciated.



The descriptive statistics of oral production (Table 7, https://doi.org/10.6084/m9.figshare.23145986) follow the trend of the previous variables whereby the difference in the standard deviation is very pronounced. This is directly related to the shape of the raincloud diagram, since the values after the intervention tend to be more homogeneous and higher, as is the post-test distribution (orange colour). The aspect of the percentage reduction is noteworthy, since there is a drop of 62.91% in the standard deviation from the pre-test to the post-test. This is a very positive statistical indicator given that if the percentage increase in the average qualification of this variable (48.05%) is taken into account, the trend is clearer than in the previous variables towards the improvement of this skill and the homogeneity of performance.

3.2.4. Written production

Written production is studied in a similar way. As previously seen, the alternative hypothesis is considered to be that the scores obtained by the participants in the post-test are higher than those obtained in the pre-test. The Wilcoxon test is applied and the results obtained are shown in Table 8 (https://doi.org/10.6084/m9.figshare.23146079).



The raincloud graph (Figure 8) confirms the trend of the other studied variables (oral production, oral reception and written reception). In the post-test case, the sample distribution

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generates greater values and the dispersion is lower. The descriptive statistics analysis (Table 9, https://doi.org/10.6084/m9.figshare.23146160) confirms what can be appreciated in Figure 8. Although in this case the decrease in the standard deviation is not excessively pronounced, this does transpire to be the case in the average difference. With regards to this variable, the percentage reduction of the standard deviation is statistically significant since the pre-test is 42.68% greater than the post-test. This results in the differences becoming less pronounced and the hypothesis that this type of intervention has a considerable homogenizing potential can be readdressed.

3.3. Performance analysis

Another aspect of interest is the performance during the course, which was evaluated through a series of rubrics designed on an ad hoc basis for each DAT modality. It should be pointed out that the difficulty levels of the LPs for each modality increased progressively and that the modality changed for every three LPs. Figure 9 (https://doi.org/10.6084/m9.figshare.23146250) shows the participants' progress from the first to the final LP and Table 10 (https://doi.org/10.6084/m9.figshare.23146346) lists the scores for each LP. In it, the following sections can be distinguished:

- Section I [LPS1-LPS3]. In this section, the qualification trend decreases as a result of the incremental difficulty of each LP and due to the students having to learn to subtitle.
- Section II [LPS3-LPD2]. This section shows increases and corresponds with the beginning of the revoicing modes. Although the difficulty is incremental, the students have become familiar with DAT and in these modes the software is the same for both voiceover and dubbing.
- Section III [LPD2-LPAD1]. In this section the trend decreases. LPD3 requires students to use creative dubbing, which is a challenge as there is a specific request to reformulate a text in a humorous manner. The scores decline until LPAD1, and this can be attributed to the fact that AD is an AVT modality that is based on intersemiotic translation, itself an added challenge.
- Section IV [LPAD1-LPSDH1]. In this section students have become familiar with didactic AD and their scores have increased. In LPSDH1 there are no sudden changes, but this can be attributed to the fact that in this first session students already have a good working knowledge of the subtitling tools.
- Section V [LPSDH1-LPSDH3]. Finally, the scores decrease as a result of didactic SDHH probably being the most complex modality. Additionally, in the final LP, creative SDHH is also requested.

3.4. General perception analysis

This section addresses certain aspects which are considered to be of interest when conducting a holistic analysis of the intervention. Perceptions of the time dedicated to tasks and the modes preferred by the students will be examined.

In order to study the relationship between the time dedicated to each LP and the perception of the total duration of the intervention, a contingency analysis was carried out (Table 11, https://doi.org/10.6084/m9.figshare.23154239). This table is complemented by a Chi-Squared test (Table 12, https://doi.org/10.6084/m9.figshare.23154320). This analysis concludes that there is a relationship between both variables and that the participants who tend to consider the intervention to be adequate are those who have dedicated an average time of between 60 and 90 minutes for each LP. The approximate duration was an important element of the methodological proposal, given that the intention is that the DAT tasks can occupy the time of a single class or self-study session.

Another interesting aspect is to study which modality is favoured by the participants and these data are collected in Figure 10 (https://doi.org/10.6084/m9.figshare.23154392). Of the 201 participants who answered the final questionnaire, the majority (N=52, 25.9%) opted for dubbing, while for 25.4% (N=51), standard subtitling was the preferred modality. Both modes are positioned as the favourites, followed by SDHH with 18.4% (N=37), AD with 16.9% (N=34) and voiceover (N=15, 7.5%).

Of equal interest is the participants' general perception of the project. Figure 11 (https://doi.org/10.6084/m9.figshare.23146496) reflects how a large majority (N=157) showed a high

degree of agreement with the statement that their participation had met their learning expectations. It is of special interest to focus on the perception (Figure 12, https://doi.org/10.6084/m9.figshare.23154584) that the participants had of the inclusion of DAT in the language curriculum, where a large majority (N=163) expressed their degree of agreement with the convenience of including DAT tasks in the planning of language courses. Finally, Figure 13 (https://doi.org/10.6084/m9.figshare.23154860) highlights the favourable perception of the participants regarding the use of DAT in the classroom, especially when considering its potential to promote autonomous learning amongst students.

4. Discussion and conclusions

This piece of research is pioneering on an international level by presenting results boasting a large sample collated from numerous universities on the use of DAT as a didactic teaching resource and tool for learning a foreign language.

The main result to highlight, and which encompasses the first four proposed objectives, is that there are statistically significant differences that allow us to attest that DAT contributes to improvement in the English learning process as participating students improve in the four linguistics skills: written and oral reception and production. Integrated skills enhancement had been previously advocated for but never explored until now in this field of study. Additionally, there is notable progress in the students' skills in DAT and in a foreign language since the beginning of the didactic intervention, concurring with similar results from previous research (Talaván, 2020). Furthermore, students express a favourable perception of the didactic intervention and the use of DAT as a didactic resource in the classroom, declaring clear preferences for the modes which are more familiar to them: dubbing and standard subtiling.

This research opens new doors in the field of language didactics by providing empirical data on the didactic possibilities of DAT. The objective of the research is not to propose a specific language teaching method, but to contribute to the teaching and learning process by providing teachers with new tools and pedagogical resources that they can integrate into their teaching. To address weaknesses, it is worth mentioning the dropout rate (which, although expected, could always be lower) and the time to complete the LP, which, although it was adjusted to what was expected in many cases, in others it exceeded more than was expected. Both of these points will be studied more closely in future related research. It is also necessary to mention that the value of the results must be underplayed, taking into account the frenetic rate of technological transformation, which clearly impacts time and research processes, as well as paradigm changes in university education and in education in general.

DAT is a versatile tool that can be used at different educational levels (primary, secondary and university) and can be included both in traditional learning and in hybrid or virtual modes. The field of DAT is a fertile line of research and based on the present piece of research, more studies can be carried out on it. Future studies could focus on understanding teacher perceptions of the use of DAT as a teaching tool, analysing the cumulative effect of DAT as a resource pedagogy in longitudinal projects, or its inclusion in bilingual education programs that work with two languages. To the same degree, analysis of the use of DAT in multilingual environments (with co-official and/or minority languages), as well as the possibilities it offers to improve accessibility for students in the language classroom would also be of interest.

Authors' Contribution

Idea, A.F.C & N.T; State of the art, A.F.C; Methodology, N.T.; Data analysis, A.J.T.R; Results, A.J.T.R; Discussion and conclusions, A.F.C; Written composition (first draft), A.F.C; Final revisions, A.F.C; Project design and sponsorship, N.T.

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English learners' intentions to adopt online learning post-pandemic: Ease precedes usefulness



El aprendizaje en línea de inglés después de la pandemia: La facilidad precede a la utilidad

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ABSTRACT

Adopting online learning as a mandated means of instruction amid the pandemic guaranteed students the opportunity to integrate digital technologies for English language learning. This experience was pivotal in investigating the continuous use of these platforms to facilitate online language learning post-pandemic. However, few studies have focused on this context, especially considering the psychological aspects of language learning through these gained learning experiences. Therefore, this study explores this narrative based on the technology acceptance model and external factors such as confidence in English (CONF), online learning anxiety (ANX), and familiarity with education technology (EdTech). Using the partial least square approach, data from the 530 Malaysian undergraduates analysed revealed that perceived ease of use (PEOU) precedes perceived usefulness (PU) as the most crucial factor influencing attitude and intention to use online learning. Likewise, CONF and ANX had stronger associations with PEOU than PU, but EdTech was found to be inconsequential towards attitude and PU. The results of this study underline the importance of PEOU that heralds PU in determining the continuous use of online tools for English language learning in higher educational institutions.

RESUMEN

La adopción del aprendizaje en línea como un medio de instrucción obligatorio durante la pandemia posibilitó a los estudiantes integrar tecnologías digitales para el aprendizaje del idioma inglés. Esta experiencia fue fundamental para investigar el uso continuo de estas plataformas para facilitar el aprendizaje de idiomas en línea después de la pandemia. Sin embargo, pocos estudios se han centrado en este contexto, específicamente considerando los aspectos psicológicos del aprendizaje de idiomas a través de estas experiencias de aprendizaje adquiridas. Por lo tanto, este estudio explora esta narrativa basada en el modelo de aceptación de tecnología y factores externos como la confianza en inglés (CONF), la ansiedad de aprendizaje en línea (ANX) y la familiaridad con la tecnología educativa (EdTech). Usando el enfoque de mínimos cuadrados parciales, los datos analizados de 530 estudiantes universitarios de Malasia revelaron que la facilidad de uso percibida (PEOU) precede a la utilidad percibida (PU) como el factor más crucial que influye en la actitud y la intención de usar el aprendizaje en línea. Del mismo modo, CONF y ANX tenían asociaciones más fuertes con PEOU que con PU, pero se descubrió que EdTech no tenía consecuencias para la actitud y el PU. Los resultados de este estudio subrayan la importancia de PEOU que anuncia PU para determinar el uso continuo de herramientas en línea para el aprendizaje del idioma inglés en instituciones de educación superior.

KEYWORDS | PALABRAS CLAVE

English as a second language, online learning, confidence in English, online learning anxiety, familiarity with education technology, post-pandemic.

Inglés como segunda lengua, aprendizaje en línea, confianza en inglés, ansiedad de aprendizaje en línea, familiaridad con las tecnologías educativas, postpandemia.

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1. Introduction

English language education in developing countries such as Malaysia has frequently been highlighted as an important qualification to transform the country into a high-income nation (Renganathan, 2023). Hence, English is a compulsory subject taught in primary and secondary schools for 11 years as a second language (Nik-Fauzi et al., 2022) and used as a medium of instruction at the tertiary level in most higher learning institutions. Likewise, due to the exponential growth of technology, Elaish et al. (2023) describe that using technologically assisted language-learning tools has become essential to teaching English as a second language (ESL) as learning behaviour has shifted from passive to active in recent years. Furthermore, technology adoption to support language learning is imperative to cater to the millennials' learning needs (Shadiev & Yang, 2020). Even though this has simultaneously created new opportunities to blend digital technologies for language learning (Buragohain et al., 2023), the pandemic entrusted educators and students to digitalise learning at a whole new level by adopting a distance learning approach. Hence, online learning was no longer merely an option but a necessity to enhance learning with possible merits (Chung et al., 2020) as it gained prominence in education, envisaging higher use intention post-pandemic (Al-Hamad et al., 2021). In Malaysia, pre-pandemic online learning has been regarded as transformative for ESL by integrating tools such as YouTube, Google Classroom, and WhatsApp to complement face-toface teaching (Haleman & Yamat, 2021; Rahman, 2020). However, post-pandemic, ESL learners have now experienced a higher degree of using online tools for videoconferencing and collaboration, such as Zoom, Skype, and WebEx, as well as tools to manage and communicate online to facilitate learning (Nik-Fauzi et al., 2022). According to Chew and Ng (2021) and Krishan et al. (2020). ESL learners benefited from synchronously using online resources such as Google Translate and dictionaries during virtual classes where the instant access to these tools improved their language skills and confidence in communicating in English. Simultaneously, it also aided constructive and self-directed learning abilities in improving basic language skills, especially for reading, writing, and vocabulary acquisition through tools such as Typely and Grammarly (Buragohain et al., 2023). Consequently, the purpose of these tools shifted from merely an option to complement classroom learning dictated by teaching needs to a critical access point for learning and communicating independently.

In retrospect, modicum studies have addressed ESL students' acceptance and efficacy in independently using these technologies (Zaidan et al., 2021). Likewise, the unexpected switch to online education during the pandemic also prompted similar concerns about how it relates to digital literacy (Alfadda & Mahdi, 2021) and the psychological challenges involved in language learning (Karuppannan & Mohammed, 2020). Uztosun (2020) highlighted the importance of considering these characteristics as a considerable amount of language learning skills, while discrete, highly influences ESL learners' performances. Furthermore, in Malaysia, research on ESL online learning strategies often focuses on the technical angle while neglecting students' opinions, which is vital in improving technology assimilation (Nik-Fauzi et al., 2022). Undoubtedly, students' perception, attitude, and needs towards online learning has also shifted post-pandemic (Alfadda & Mahdi, 2021) which warrants exploration to provide critical insights to maximise learning outcomes (Zapata-Cuervo et al., 2022), especially for teaching and learning ESL (Buragohain et al., 2023). Therefore, Mohtar and Yunus (2022) asserted that the transition makes examining ESL students' perceptions, acceptance, and intention of online learning necessary.

Therefore, Haleman and Yamat (2021) suggested expanding the technology acceptance model (TAM) (Davis, 1985) by considering language-learning factors as external factors. TAM is frequently utilised in investigating users' technology acceptance by shedding light on how technology interaction influences attitude (ATT) and behavioural intention (BI), mainly based on the perceived ease of use (PEOU) and perceived usefulness (PU) of the said technology. TAM theoretically focuses on the effects of technology use (Kumar et al., 2020). Next, regarding external factors, we first considered experience with online learning in higher education post pandemic, as Lazar et al. (2020) and Wei (2022) suggested. As online learning experience rendered familiarity with education technology and online learning anxieties, these two constructs were deemed necessary to predict future intention. According to Hanafiah and Aziz (2022), in Malaysia, very few studies emphasise the psychological attributes of online language learning caused by

the pandemic. Hence, we firstly considered online learning anxiety, as suggested by Wang and Zhang (2021), and secondly, ESL learning confidence, as suggested by Côté and Gaffney (2021). ESL learners' confidence in learning is a primary concern for Malaysian undergraduates (Mohamad, 2020) and exploring this perspective is vital in understanding ESL learners' motivation to adapt to online learning postpandemic

(Siok et al., 2023). Therefore, this study explores the acceptance and intention to use online learning to

- learn English by answering the following research questions:
 RQ1: Which factors significantly influence attitude and behavioural intention to use online learning to learn English based on TAM?
 - RQ2: How do external factors, namely confidence in English, online learning anxiety, and familiarity with education technology, influence attitude and behavioural intention to use online learning to learn English?

The following section discusses how the conceptual model was hypothesised by incorporating these factors.

2. Hypotheses development

The hypotheses developed in this study are described in terms of the endogenous and exogenous variables used to predict utilisation attitude and behavioural intention per the general extended technology acceptance model for e-learning (GETAMEL) (Abdullah & Ward, 2016). GETAMEL considers the TAM variables as internal constructs of the model and external constructs as antecedents of the primary internal constructs (PU and PEOU) (Jiang et al., 2021).

2.1. Internal constructs

Davis (1985) introduced TAM founded on the theories of reasoned action and planned behaviour, and it has supported a plethora of studies connected to technology acceptance. TAM has been used to explore BI and ATT for online learning in numerous studies (Annamalai et al., 2021; Chung et al., 2020; Kumar & Silva, 2020; Kumar et al., 2022; Mailizar et al., 2021) where BI is defined as the likelihood of engaging in a behaviour (Han & Yi, 2019) and has a strong relationship with ATT (Mailizar et al., 2021) and PU when learning with technology (Kumar et al., 2020). In this study, BI is defined as the inclination to persist in using online platforms post-pandemic for learning English. Conversely, ATT is defined as the degree of appraisal of an intended behaviour (Ajzen, 1991). However, when considering technology utilisation, it can be defined as an emotional reaction attributed to system utilisation (Venkatesh et al., 2003). Next, PU indicates users' conviction in a specific information system to deliver the expected results and has a causal effect with PEOU, which is the degree to which the utilisation is perceived to require minimum physical or mental effort (Davis, 1985). According to Mohtar and Yunus (2022), the acceptance of a learning platform for language learning is often attributed to accessibility, intention, and appreciation of the learning process. Hence, when language learners recognise the benefit of learning technology, they are more likely to use it, which equally influences their ATT (Hashim et al., 2016). Therefore, we hypothesise the following based on the internal constructs:

- H1: PU will significantly influence BI.
- H2: PU will significantly influence ATT.
- H3: PEOU will significantly influence PU.
- H4: PEOU will significantly influence ATT.
- H5: ATT will significantly influence BI.

2.2. External constructs

2.2.1. Confidence in English (CONF)

Confidence is one of the main factors influencing language acquisition (Krashen, 1981). ESL learners tend to be passive when learning online, which can be attributed to low confidence in language proficiency (Putri, 2023) when communicating with their instructor or when singled out in a classroom environment to provide feedback. Nevertheless, integrating technology in the language classroom during the pandemic has been deemed transformative in learning experiences and levels of confidence (Burk, 2021). Therefore,

we theorised CONF as an external variable that may influence usefulness and ease of use in the context of online language learning, as also suggested by Haleman and Yamat (2021):

- H6: CONF will significantly influence PU.
- H7: CONF will significantly influence PEOU.

2.2.2. Online Learning Anxiety (ANX)

One of the most critical emotional aspects influencing university students' English language acquisition due to the pandemic is online learning anxiety: environmental anxiety attributed to information overload, technical factors, and learning difficulties (Wang & Zhang, 2021). According to Zapata-Cuervo et al. (2022), online learning during the pandemic has increased anxiety due to learning challenges, which Abdelwahed et al. (2022) reflect as difficulties in access, technical support, and a lack of technical skills required for learning a language. Hence, anxiety is influenced by ease of use as also suggested by Abdullah and Ward (2016). Additionally, as anxiety is frequently associated with usefulness, the experience of utilising technologies may significantly impact adoption (Binyamin, 2019). Tapsuri and Polyiem (2022) explained that ANX could also be attributed to individual characteristics reflecting learning tool preferences due to their recognised usefulness. Therefore, we hypothesised the following relationships:

- H8: ANX will significantly influence PU.
- H9: ANX will significantly influence PEOU.

2.2.3. Familiarity with Education Technology (EdTech)

Students' technological competency in learning is determined by the extent and quality of their digital learning experience, which indirectly influences their online learning attitude (Lazar et al., 2020). Buragohain et al. (2023) stated that limited learning technology exposure might influence language pedagogical practises and online learning attitudes, which Alfadda and Mahdi (2021) claim are associated with TAM factors. Likewise, although they had exposure to online learning due to the pandemic, Malaysian ESL undergraduates are not extensively exposed to these technologies to signify strong familiarity with education technologies (Hasnan & Mohin, 2021). Jiang et al. (2021) claimed that familiarity did not influence PU or PEOU in language learning; however, we hypothesise, based on differing views, the following relationships:

- H10: EdTech will significantly influence PU.
- H11: EdTech will significantly influence PEOU.
- H12: EdTech will significantly influence ATT.

Accordingly, based on the hypothesised relationships, we proposed the conceptual model as represented in Figure 1.


3. Materials and methods

3.1. Instruments

The guestionnaire combines items adapted from Davis (1985) by Haleman and Yamat (2021), focusing on PU, PEOU, ATT, and BI to reflect the perception of learning English using online learning strategies post-pandemic. PU was measured using four items with an example item, such as "Online learning increases my competency in English language learning"; PEOU with five items, for instance, "I find it easy to complete my English homework via online learning"; ATT with three items such as "I think learning the English language via online learning is interesting" and lastly BI with three items, for example, "I feel comfortable using online learning to improve my English". Next, CONF was adapted from Yim and Yu (2011), while ANX and EdTech from Lazar et al. (2020). CONF was evaluated based on five items focusing on student confidence in English class (e.g., "I feel confident when I speak English in class"). As for ANX, online learning anxiety was measured without language motives with three items, for instance. "Working with online learning tools does not make me feel nervous". Lastly, EdTech also has three items and the questions focused on online applications used during the pandemic, such as learning management systems, videoconferencing tools, and synchronous digital tools generally used for learning English, such as "After the pandemic, I am most familiar with videoconferencing applications such as Google Meet, WebEx, Microsoft Meet". All 28 items were measured using a five-point Likert scale ranging from 1=strongly disagree to 5=strongly agree.

3.2. Respondents and sampling

The respondents of this study were polytechnic undergraduates from various semesters and disciplines taking communicative English courses in Malaysia. The ESL language courses are similar for all disciplines and all polytechnics, as the core purpose of language instruction is to create proficient English communication abilities (Mohamad, 2020) that complement technical courses (Radzi & Embi, 2018). Due to the homogenous nature of these courses, this study employed convenience sampling where the respondents were from seven polytechnics from the northern, east, and middle region. One lecturer from each polytechnic was invited to voluntarily aid the research process by electronically distributing the survey link through social media applications or learning management systems. The survey included a consent statement and permission to conduct the study from the Ministry of Higher Education. As the participation was voluntary, the researchers targeted a few institutions to ensure a high response rate that would fulfill the minimum sample size of 146 respondents determined using GPower 3.1 (Faul et al., 2007), based on typical values of α =0.05, effect size f² of 0.15, power=0.95, for six predictor variables.

3.3. Research design

This study employed a cross-sectional survey design using a self-administered questionnaire distributed electronically using Google Forms. Two reminders were broadcasted to encourage a higher response rate, based on three-week intervals. Next, the data collected was assessed to determine univariate normality using IBM Statistical Package for the Social Sciences (SPSS), version 27, by running the Kolmogorov-Smirnov test by which all factors were non-normally distributed and therefore suitable for partial least squares - structural equation modelling (PLS-SEM) analysis. PLS-SEM is used when the study focuses on prediction and theory development (Reinartz et al., 2009) and weights causal-predictive analysis. Next, the data was exported to SmartPLS ver. 3.2.8 (Ringle et al., 2015) for further analysis to answer the research question.

4. Analysis and findings

4.1. Demographic and multivariate analysis

A total of 530 respondents participated in this study, where 229 respondents (43.21%) were male students, and 301 were female (56.79%). Most respondents (n=283, 53.40%) were from a technical background, such as engineering, and 46.60% (n=247) were from non-technical backgrounds, such as commerce and tourism. The number of respondents for the first year (n=217, 40.94%) and final year respondents (n=212, 40.00%) were comparable, whereas only 19.06% (n=101) respondents were from

the second year. The average age of the respondents was between 18 to 25 years old.

Next, to determine correlations between the variables, multivariate normality was measured based on Mardia's test of multivariate normality, accessible at https://webpower.psychstat.org/wiki/tools/index (Zhang & Yuan, 2018). The results indicated the non-normal distribution of data as represented by the skewness (β =507.644, p<0.01) and kurtosis (β =2451.872, p<0.01) results, which was ideal for the

4.2. Measurement model

measurement and structural model analysis.

Measurement model analysis determines the model's reliability and validity to observe the relationship between the data and variables. The findings (Table 1) revealed that all reliability values represented by the indicator reliability, composite reliability, and internal consistency were below the threshold value suggested by Hair et al. (2019), signifying that the data had internal consistency.

			Table 1. Reliabili	ty and validity ana	alysis		
Variable	Indicator	Loading	Indicator Reliability	Composite Reliability	Cronbach's Alpha	rho_A	AVE
ANX	ANX1	0.909	0.953	0.946	0.915	0.916	0.855
	ANX2	0.929	0.964	-			
	ANX3	0.937	0.968	-			
ATT	ATT1	0.910	0.954	0.958	0.941	0.942	0.850
	ATT2	0.942	0.971	-			
	ATT3	0.920	0.959				
	ATT4	0.917	0.958				
BI	BI1	0.917	0.958	0.950	0.929	0.930	0.825
	BI2	0.911	0.954				
	BI3	0.901	0.949				
	BI4	0.904	0.951				
CONF	CONF1	0.855	0.925	0.908	0.868	0.878	0.670
	CONF2	0.873	0.934	-			
	CONF3	0.905	0.951	-			
	CONF4	0.846	0.920	-			
	CONF5	0.565	0.752	-			
PEOU	PEOU1	0.844	0.919	0.940	0.920	0.921	0.758
	PEOU2	0.879	0.938				
	PEOU3	0.889	0.943				
	PEOU4	0.871	0.933				
	PEOU5	0.870	0.933				
EdTech	POST1	0.877	0.936	0.936	0.897	0.903	0.829
	POST2	0.925	0.962				
	POST3	0.929	0.964				
PU	PU1	0.849	0.921	0.939	0.914	0.915	0.795
	PU2	0.915	0.957				
	PU3	0.920	0.959				
	PU4	0.880	0.938	1			

Note. Perceived ease of use (PEOU); Perceived usefulness (PU); Attitude (ATT); Behavioral intention (BI), Online learning anxiety (ANX); Familiarity with Edtech tools (EdTech); Confidence in English (CONF).

Next, the convergent validity determined, based on the average variance extracted (AVE), signifies that each construct can account for the variation in its elements. Likewise, all Heterotrait-Monotrait (HTMT) values were below the threshold value of 1.00 (Henseler et al., 2015) (Table 2), revealing that respondents could easily differentiate between the constructs. Hence, the measurement model was also acceptable.

	Table 2. HTMT ratio											
	ANX	ATT	BI	CONF	EdTech	PEOU	PU					
ANX	-											
ATT	0.806	-										
BI	0.805	0.960	-									
CONF	0.748	0.705	0.712	-								
EdTech	0.551	0.625	0.563	0.576	-							
PEOU	0.786	0.884	0.835	0.757	0.701	-						
PU	0.755	0.863	0.848	0.767	0.646	0.9	-					

4.3. Structural model

The relationships between the variables and the hypothesised relationships were measured using a structural model. First, the model fit was determined by the standard root mean square residual (SRMR) value, indicating a value of 0.057 which was below the cut-off value of 0.08 (Henseler et al., 2016). Next, the variance inflation factor (VIF) analysis (Table 3) which determines items' correlation with each other, indicated that all values were below the threshold value of 5.0 (Henseler et al., 2016). As both these values were established, the analysis of path coefficients (β) used to determine the correlation and strengths between variables was performed (Wong, 2019), followed by bootstrapping resampling of 5,000 that indicated significant relationships when t-values were above 1.96 (Hair et al., 2019). Hence, the results of all hypothesised relationships based on β , t-value, confidence intervals, and effect size (f2) are presented in Table 3, where non-significant relationships are highlighted in red, as shown in Figure 2.



The analysis showed that all hypotheses failed to be rejected except for H_{10} (β =0.067, t=1.834, =0.067, f²=0.009) and H_{12} (β =0.048, t=1.228, =0.220, f²=0.005) (Table 3).

		l able	e 3. Resi	lits for β ,	t-value,	VIF, CI, <i>f</i> ²	and VIF			
Н	Relationship	β	Stdev	t- value	p-value	CI 2.5%	CI 95%	f ²	VIF	Decision
H₁	PU → BI	0.173	0.034	5.033	0.000	0.104	0.244	0.059	2.791	S
H ₂	PU → ATT	0.366	0.055	6.698	0.000	0.259	0.474	0.152	3.236	S
H ₃	PEOU → PU	0.577	0.041	13.972	0.000	0.497	0.664	0.409	2.929	S
H4	PEOU → ATT	0.491	0.067	7.366	0.000	0.363	0.613	0.246	3.584	S
H₅	ATT → BI	0.761	0.031	24.191	0.000	0.693	0.823	1.148	2.791	S
H ₆	CONF → PU	0.173	0.041	4.214	0.000	0.089	0.258	0.051	2.121	S
H ₇	CONF → PEOU	0.259	0.055	4.699	0.000	0.158	0.367	0.102	1.925	S
Hs	ANX → PU	0.126	0.049	2.590	0.010	0.027	0.215	0.024	2.37	S
H9	ANX → PEOU	0.397	0.056	7.083	0.000	0.292	0.503	0.242	1.909	S
H ₁₀	EdTech→ PU	0.067	0.036	1.834	0.067	-0.008	0.137	0.009	1.715	NS
H ₁₁	EdTech → PEOU	0.308	0.042	7.374	0.000	0.228	0.39	0.194	1.437	S
H ₁₂	EdTech → ATT	0.048	0.039	1.228	0.220	-0.03	0.124	0.005	1.714	NS
Note. Pe	erceived ease of use (PE	OU); Perce	eived usefu	Iness (PU);	Attitude (AT	T); Behavior	al intention	BI), Onlin	e learning	anxiety (ANX);

Familiarity with Ed-tech tools (EdTech); Confidence in English (CONF); Hypothesis (H); Supported (S); Not-Supported (NS).

Therefore, familiarity with education technology post-pandemic for learning English did not influence attitude and perceived usefulness, but the ease of use of such platforms (H₁₁: β =0.308, t=7.374, =0.000, f²=0.194). According to Cohen (2013), f² values between 0.020 - 0.150 are weak, 0.150 to 0.350 are

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medium, and values equal to or larger than 0.350 are large effect size. H_5 (β =0.761, t=24.191, =0.000, f²=1.148) had the highest effect size, followed by H_3 (β =0.577, t=13.972, =0.000, f²=0.409) where both were considered as having large effect size. Likewise, H_2 (β =0.366, t=6.698, =0.000, f²=0.152), H4 (β =0.491, t=7.366, p=0.000, f²=0.246) and H_9 (β =0.397, t=7.083, =0.000, f²=0.242) had medium effect size.

Next, the coefficient determination (R^2) indicated that the model could explain 81.9% of BI, 72.6% of ATT, 72.2% of PU, and 65.9% of PEOU. Hair et al. (2019) described R^2 values of 0.75, categorised as strong, 0.50 as moderate, and 0.25 as weak. Based on the findings, it could be determined that the in-sample predictive power is considered strong for BI (0.819) and ATT (0.726). According to Benitez et al. (2020), a high value can be expected when the phenomenon is already well understood.

However, to determine the predecessors with a strong overall effect (i.e., those with reasonably high importance for the target construct) and importance, the importance-performance map analysis (IPMA) was conducted (Ringle & Sarstedt, 2016).

Table 4. Importance and Performance Index Values for BI							
Factor	Importance	Performances					
ANX	0.308	67.870					
ATT	0.773	68.323					
CONF	0.253	64.653					
EdTech	0.264	72.318					
PEOU	0.691	67.966					
PU	0.493	65.012					

Based on the findings as reflected in Table 4 and Figure 3, the importance (total effects) for BI is mainly determined by ATT (0.773) and PEOU (0.691) and less so by CONF (0.253) and EdTech (0.264). IPMA helps to identify areas of improvement in predicting BI, and the performance value of EdTech (72.318), ATT (68.323), and PEOU (67.966) and the area of improvement in future studies.



Figure 3. Importance-performance map on BI

5. Discussion

The findings indicated that the hypothesised model could predict 81.9% of behavioural intention and 72.6% of attitude, which reflects strong in-sample predictive power. Referring to RQ1 for internal constructs, attitude was the strongest predictor of intention in using online learning with a strong impact. These results align with those obtained by Mailizar et al. (2021). Likewise, ease of use was pivotal in determining usefulness and attitude with a high effect corresponding to Annamalai et al. (2021) findings, yet the association between attitude and usefulness differed as a significant but weak effect was observed. Therefore, this reflects a movement away from the relevance of perceived usefulness towards a more significant influence of ease of use. Although language learners' intention to use online learning could be heavily influenced by their ability to access information, internet connection, and technical facilities (Baxter, 2020); Rubaai and Khatib (2020) added that the association between simplicity and usefulness could only be confirmed if they perceive easy access to and means of interaction with learning resources, online collaboration, and authentic instructor feedback. Hence, simplicity in accessing and using online tools is vital in determining utilisation, and we theorised that this could be a behaviour inherited due to the convenience of using online resources for vocabulary, phrases, sentences, spelling, and grammar for virtual classes during the pandemic.

Next, to answer the second research question (RQ2), focusing on external constructs, the findings indicated that all external factors were positively associated with ease of use but only reflected a medium effect. Confidence in English and online learning anxiety were found to have a weak relationship with usefulness, while familiarity with education technology did not influence usefulness, as observed by Jiang et al. (2021). Additionally, familiarity also did not influence attitude, which contradicted the findings of Abdullah and Ward (2016). Interestingly, even for external constructs, PEOU still precedes PU. According to Kumar et al. (2020), usefulness is more influential than ease in initial platform adoption and not for continuous use. Moreover, due to the pandemic, the online learning experience may have transformed language learners' attitude that focuses on ease of use as online learning has become a substantial norm. Furthermore, the pandemic orchestrated a pivotal movement in using learning technologies by acting as a catalyst for digital transformation in higher education (Cazan & Maican, 2023), where online language learning, which previously focused on distributing informative content and conducting online activities that supplement face-to-face instruction (Azlan et al., 2020), is no longer a norm. Conversely, while Malaysian students were marginally prepared for online learning due to a lack of individual learning experiences and technical difficulties pre-pandemic (Chung et al., 2020), mandatory online learning has positively benefited them (Bervell et al., 2022) during the pandemic, where they are motivated to participate and accept the possibilities of language learning online (Mohtar & Yunus, 2022).

One interesting aspect that emerged from the analysis is the stronger association between confidence in English and online learning anxiety towards ease of use compared to usefulness. Confidence in English mirrors the level of learning participation (Ramsa & Mohd-Rawian, 2019), which reduces learning anxiety (Abdous, 2019). Abdullah and Ward (2016) and Burk (2021) explained that higher levels of language learning confidence could be due to exposure to learning tools. While we did not explore this hypothesised relationship, we rationalise this association based on the precedence of ease of use after the initial introduction of a tool for achieving learning goals which we relate to usefulness. Hence, unsurprisingly, the continuous use of online learning tools has rendered familiarity inconsequential towards usefulness, as also highlighted by Binyamin (2019). Our findings also draw similar conclusions to Abdullah and Ward (2016) and Wang and Zhang (2021), suggesting marginal online learning anxiety associations with factors and challenges related to ease of accessing and using online tools in English language acquisition, contradicting the findings by Tapsuri and Polyiem (2022) emphasising usefulness. Nevertheless, our findings also support Putri's (2023) claims that ESL confidence in learning English online is still a passive experience, and based on the IPMA results, improvement is necessary with online learning experience and anxiety if the goal is to improve intention. Moreover, the results also highlighted the importance of attitude and ease of use towards intention which supports Buragohain et al. (2023) notion that language learning online will continue to acclimate and advance collectively.

6. Conclusions

Therefore, we conclude that the main factor influencing attitude and intention to use online learning for ESL learners is perceived ease of use. Ease of use was vital not only in arbitrating perceived usefulness but also confidence in English, online learning anxiety, and familiarity with education technology towards the endogenous variables. Likewise, external variables had a stronger association with ease of use than usefulness, where familiarity or experience during the pandemic has rendered inconsequential influence on online learning attitude and usefulness. The findings are vital in transforming ESL language learning online, as understanding motivational factors could maximise future intention (Siok et al., 2023) by aiding educators and stakeholders in identifying ideal instructional interventions to support online language learning. Likewise, the findings highlighted the need to explore how technical factors such as complexity, availability, and accessibility of language tools that reflect ease may influence attitude and intention to use online learning post pandemic.

Some limitations should be considered. First, the findings did not represent different levels of education or specific language learning skills, which warrants further exploration. We also highlight the need to

explore factors such as facilitating conditions, behavioural expectations, usability, task-technology fit, habit, and hedonic motivation as the pandemic experience has altered learning experiences and how these variables are associated with ease of use and intention. Next, future studies on the emotional aspect of learning are also recommended, especially considering playfulness and enjoyment in online learning, as we theorised that they may have possible associations with usefulness. Lastly, although the results of this study underline the importance of ease of use, we believe future studies could also consider a mixedmethod approach to rationalise the associations between these variables and consider untested language learning variables as mediating or moderating variables.

Authors' Contribution

Idea, I.S, J.A.K.; Literature review (state of the art), I.S, J.A.K.; Methodology, I.S, J.A.K.; Data analysis, I.S, J.A.K, S.O; Results, I.S, J.A.K.; Discussion and conclusions, I.S, J.A.K.; Writing (original draft), I.S.; Final revisions, I.S, J.A.K, S.O.

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ABSTRACT

The main objective of the research is to study the creative potential of Artificial Intelligence (AI) for writing skills in an educational context. The research aims to provide evidence on the use of AI and contribute to its integration in the classroom as a support for the teaching-learning process. Two types of research designs were established: a descriptive and comparative non-experimental quantitative research, and a quasi-experimental pretest-posttest study. The sample consisted of 20 AI systems and 193 university students who were given Games 2 and 3 of the Spanish PIC-A test ("Creative Imagination Test for Adults"). The students repeated the games, assisted by ChatGPT, to compare the possible improvement of their productions. The findings reveal statistically significant differences between the AIs and the students in the indicators of fluency, flexibility, and narrative originality in Game 2. Furthermore, significant differences are found between students' pre-test and post-test scores in fluency, flexibility, and narrative originality in Game 2 and in fluency in Game 3. Finally, the assistance provided by AI in writing tasks and verbal creativity is highlighted, and this should be considered in language teaching; in any case, AI cannot replace human intelligence and creativity.

RESUMEN

La investigación persigue estudiar las posibilidades creativas de los sistemas de Inteligencia Artificial (IA) para el desarrollo de la escritura en el contexto educativo. Se persigue aportar evidencias en el uso de la IA y contribuir al conocimiento de su integración en las aulas como apoyo al proceso de enseñanza-aprendizaje. Se establecen dos tipos de diseño: una investigación de corte cuantitativo no experimental de tipo descriptivo y comparativo, y un estudio cuasi-experimental de tipo pretest-postest. La muestra estuvo compuesta por 20 sistemas de IA y 193 estudiantes universitarios, a los cuales se les aplicaron los juegos 2 y 3 del test español PIC-A («Prueba de Imaginación Creativa para Adultos»). El alumnado repitió los juegos con ayuda de ChatGPT, con el fin de comparar la posible mejora de sus producciones. Los resultados destacan la existencia de diferencias estadísticamente significativas entre las IA y el alumnado en los indicadores de fluidez, flexibilidad y originalidad narrativa del juego 2. Además, se encuentran diferencias significativas entre las puntuaciones del pretest y postest del alumnado en fluidez, flexibilidad y originalidad narrativa del juego 2, así como en fluidez del juego 3. Finalmente, se pone de manifiesto la ayuda que la IA proporciona en tareas de escritura y creatividad verbal, lo que debería ser tenido en cuenta en la enseñanza de lenguas; en cualquier caso, la IA no puede reemplazar a la inteligencia y la creatividad humana.

KEYWORDS | PALABRAS CLAVE

Artificial intelligence, writing, language teaching, verbal creativity, ChatGPT, Large Language Models. Inteligencia artificial, escritura, enseñanza de lenguas, creatividad verbal, ChatGPT, modelos de lenguaje extensivos.



1. Introduction

The rapid development of Artificial Intelligence (AI) is a reality that involves multiple opportunities, risks, and challenges in the field of education, which have so far outpaced policies and legislative frameworks. In this regard, UNESCO (2019) committed to harnessing the potential of AI technologies in order to advance towards Sustainable Development Goal 4 (ensure inclusive and equitable quality education and promote lifelong learning opportunities for all) and achieve the Education 2030 Agenda. AI originally emerged as a tool to simulate and mechanise human thought processes (Turing, 1950). Today, it has become the basic grammar of our century that aims to develop citizens' AI literacy and competencies (UNESCO, 2021). Moreover, UNESCO aims to achieve a human-centred approach, based on principles of inclusion and knowledge. In this sense, one of the most important challenges is to ensure that AI is designed and used in an ethical and responsible way, in order to avoid misuse of technology or the increase of existing inequalities in society (UNESCO, 2022a).

Recently, the OECD (2021) considers the ways in which smart technologies are changing classroom education and the management of educational organisations and systems. Nowadays, there are already various ways in which AI can be involved in teaching, from OER (Open Educational Resources) content recommendation, student emotion detection, intelligent tutoring systems, AI-powered teaching assistants, to automatic exam marking and automatic forum monitoring (Flores-Vivar & García-Peñalvo, 2023).

There are several AI systems that are used to generate text automatically ("Large Language Model" or LLM). Their origin dates back to 2017, when the architecture of Transformer Models (Vaswani et al., 2017), neural networks that can learn through attention mechanisms, was presented. Experiments on two machine translation tasks showed that these models are highly efficient in terms of output quality and lower training. This model can learn context through sequential data, which is considered by experts to be the beginning of LLMs. Subsequently, in 2018, Google launched a research project based on Natural Language Processing (NLP), whose technology sought the interaction between human and computer dialects, bringing together the disciplines of Applied Linguistics, Computer Science, and AI. Google presented BERT ("Bidirectional Encoder Representations from Transformers"); a state-of-the-art NLP system that would help search work through its well-known search engine. Thus, LLMs are deep learningalgorithmsm that can recognise, summarise, translate, predict, and generate text or other content based on knowledge acquired from massive data sets. This learning is unsupervised, as it feeds a given amount of data to an AI without explicit instructions on what to do with it. Among the various applications of this large language model (Lee, 2023) are ChatGPT and other systems, which have been trained to answer questions or follow specific writing instructions.

These AI systems can write in a particular tone (humorous, familiar, professional, witty, friendly), rewrite or paraphrase sections of a given text, write after a title, or write in Shakespearean style. They represent an important challenge for language teaching and, in particular, for work on written expression and the development of creative writing. Creativity is a capacity of the human mind (Csikszentmihalyi,1998; Guilford, 1950; Sternberg, 1999), but, as Boden (2004) pointed out, computers and creativity can be interesting partners in two ways: for understanding human creativity and for producing computational creativity. This author explains creativity from a scientific approach that uses computational concepts from the field of AI, concepts that allow us to create and test hypotheses about the structures and processes that may be involved in human thought.

With respect to computational creativity, it should be noted that humans play a fundamental role in programming, choosing models, and fine-tuning AI systems. However, if we consider Boden's (2004) three types of creativity (combinatorial, exploratory, and transformational), computers can generate ideas that at least appear to be creative. Moreover, he argues that computers can produce new ideas and help people to do so; both their failures and their successes make it possible to think more clearly about the creative power of human beings. Miller (2019) also questions whether AI can be creative, based on a review of various applications in the fields of visual arts, music, text, and musical theatre. He identifies the essential factors for the creative process, from the need for introspection to the ability to discover the key problem, and concludes that computers can be as creative as humans. On the other

hand, Ward (2020) suggests that computational creativity is not (and does not need to be) equivalent to human creativity but could be different and even contribute to new processes and outcomes that could be considered creative; machines do not need to be more like humans, but humans could recognise the creative capabilities inherent in the machine. This is therefore the interesting direction that the new era of AI could take for the development of teaching and learning processes.

In this sense, language teaching should not avoid AI systems, considering the growing expansion of digital environments for writing and the significant presence of such environments in educational contexts. Writing, AI, and creativity become fundamental aims for new models of language teaching. Moreover, creativity cannot be separated from culture and the use or learning of a language (Argondizzo, 2012). Along these lines, creative thinking has taken on an important educational dimension as it has been included as a new assessable competence in PISA (OECD, 2019); this programme assesses the area of creative expression (where the domain of both written and visual expression is located), in addition to the area of knowledge creation and creative problem-solving finding creativity in artistic and inventive practices, this is an effeproblem-solvingproblem solving in all types of challenging situations (Rodrigo-Martín et al., 2022), which is why it is advisable to develop it in the educational environment. Moreover, creative thinking is identified as one of the prerequisite competencies which should be promoted by Member States for AI education, according to UNESCO (2022a).

Considering all the above, chatbots and the communicative interaction enabled by AI systems pose a challenge to the teaching practice of language teachers. Several studies have shown that the integration of AI improves the quality and effectiveness of foreign language teaching, as it favours an individualised and cooperative learning style (Sun et al., 2021; Yanhua, 2020). In this sense, given the variety of tools, programmes, and resources available to learners, it is crucial to study their possibilities, limitations, and ways of use, both for the benefit of adequate acquisition of the necessary competencies and for ethical use. Moreover, in the educational environment, AI systems must be subject to strict requirements for monitoring, assessing learners' skill,s or predicting their behaviour. AI must support the learning process without reducing cognitive abilities. Furthermore, the information collected by the learner in their interactions with AI systems shall not be subject to illicit use, misappropriation, or criminal exploitation (UNESCO, 2022a).

Several initiatives have been addressing its potential educational use. For example, UNESCO (n.d.) is developing the portal "Teaching AI for K-12" (students aged 5-18), which includes resources to be used by teachers. In addition, in order to ensure that AI writing support tools use correct Spanish, the Royal Spanish Academy (RAE, n.d.) has led the project "Lengua Española e Inteligencia Artificial" (LEIA in Spanish) [Spanish Language and Artificial Intelligence]. It has also developed the MarlA project (Gutiérrez-Fandiño et al., 2022), a family of large language models in Spanish, made available to industry and research, which uses the RoBERTa-base, RoBERTa-large, GPT2 and GPT2-large models for their construction. MarIA has been created to solve the existing conflict with languages in GPT, as most LLM developers have been built in English. In addition, AI is already being used as a co-worker in some companies, according to Montero (2023), who recently pointed out that OpenAI chat has been included in a design project he is working on. In education, AI is also beginning to be experimented with, as Hendrickson, a lecturer in Digital Media at the University of Leeds, has her students use both ChatGPT and other AI language models in their writing assignments to improve their academic writing, while also testing how the technology works, enabling students to critically reflect on and question this text-generating resource (Renbarger, 2023). Similarly, the present research aims to approach the use of Al in teaching classrooms, as a companion and support, in order to integrate its use and check what kind of support this can provide. In the absence of solid and proven evidence on the effectiveness and impact of AI on students' academic achievement, research is needed in this area. Research needs to be carried out in a future that is yet to be defined, as Al is a very powerful technology and the challenge is to "discover ways to use it with meaningfulness and awareness" (Selwyn et al., 2022: 143).

Therefore, the general objective of the present research is aimed at studying the creative possibilities of AI systems for the development of writing in the educational context. This general objective is articulated in the following specific objectives:

- To find out the level of creativity indicators (fluency, flexibility, and narrative originality) of Al systems and students, based on the sample of the Creative Imagination Test for Adults (PIC-A) by Artola et al. (2012).
- To compare the creativity of the AI systems with that of the students, based on the indicators of fluency, flexibility, and narrative originality.
- To compare the scores of the creativity indicators obtained by the students in the two phases of application of the tests, the first without any type of aid and the second using an AI system (ChatGPT).

2. Materials and methods

2.1. Design

Aiming at addressing the objectives formulated, two types of research design were established. Firstly, a descriptive and comparative non-experimental or ex post-facto quantitative research study was carried out, in which the level of creativity achieved by both the AI systems and the students was analysed, and the extent of the relationship between the creativity of the AIs and the students was studied.

Secondly, a quasi-experimental pretest-posttest study was carried out, where the creativity indicators obtained by the students, both before and after a learning intervention with the help of ChatGPT, were evaluated and compared.

2.2. Sample and participants

The sample consisted of 20 Large Language Model (LLM) systems with OpenAl/GPT-3 technology (except Dupla.ai, a Chrome extension), which have the function of automatically generating text from a given instruction (Table 1). In the selection of Al systems, the following inclusion criteria were taken into account: open access (free of charge or "Freemium") and online execution without prior download. These criteria are explained by the intended use of Al in an educational context.

Similarly, 193 students (153 women and 40 men) aged 18 to 50 years old, enrolled in the Degree in Primary Education and the Master's Degree in Research and Innovation in Early Childhood Education and Primary Education at the University of Murcia, the Degree in Fine Arts at the University of Salamanca and the double Degree in Audio-visual Communication and Journalism at the Miguel Hernández University of Elche participated in the study. A non-probabilistic, purposive, convenience sampling procedure was used.

	Table 1. Characterist	tics of AI systems	
Name	Website	Organisation	Access
ChatGPT	https://chat.openai.com	OpenAl	Free
Copy.ai	https://www.copy.ai	CopyAI, Inc	Freemium
Rytr	https://rytr.me	Rytr LLC	Freemium
Peppertype	https://www.peppertype.ai	Pepper Content Pvt. Ltd	Paid/Freemium
Copysmith	https://copysmith.ai	Copysmith Artificial IntelligenceInc	Paid/Freemium
Jasper	https://www.jasper.ai	Jasper AI, Inc.	Paid/Freemium
Writesonic	https://writesonic.com	Writesonic, Inc.	Freemium
Youchat	https://youchat.com	YouChat Inc	Free
Anyword	https://anyword.com	Keywee Inc. (d.b.a. Anyword)	Freemium
ASKtoAl	https://asktoai.com/es/	MakeYourCloud LTD	Paid/Freemium
Contentbot	https://contentbot.ai	ContentBot.ai	Paid/Freemium
Copymatic	https://copymatic.ai/app/	Copymatic Inc	Paid/Freemium
Dupla	https://app.dupla.ai	duplaAi, Inc	Chrome extension
Magic Write (Canva)	https://www.canva.com	Canva Pty Ltd	Freemium
Neuro-Flash	https://app.neuro-flash.com	Neuroflash GmbH	Paid/Freemium
Nichesss	https://nichesss.com	Malcolmtyson	Freemium
ReAl	https://ai.devvinay.in/?ref=producthunt	Regem Enterprises	Paid/Freemium
Simplified	https://app.simplified.com/ai-writer	TLDR Technologies, Inc.	Freemium
Unbounce	https://unbounce.com	Unbounce Marketing Solutions Inc.	Paid/Freemium
Wordtune	https://www.wordtune.com	Al21 Labs	Freemium

2.3. Tools

The instrument used was the Test of Creative Imagination for Adults (PIC-A) by Artola et al. (2012). Of the four games that make up the test, the second and third were used, as these are the ones that focus exclusively on verbal text. The instructions for the games are as follows:

- Game 2. Make a list of all the things a rubber tube could be used for. Think of interesting and original things. Write down all the uses you could have for it, even if they are imagined. You can use any number and size of tubes you want. Example: "As a water pipe".
- Game 3. Imagine and answer what you think would happen if this sentence were true: What would happen if people never stopped growing? Example: "Stretchy clothes would sell much more".

The indicators of creativity, assessed in both the second and third games, are as follows:

- Fluency: the ability to produce a large number of ideas. A high fluency score corresponds to being able to make a large number of associations with a stimulus.
- Flexibility: the ability to produce a wide variety of responses, related to different domains. A high flexibility score relates to the ability to search for solutions using a variety of alternatives and the ability to change perspective.
- Narrative originality: the ability to produce ideas that are far from the obvious or established. A response is considered original when its frequency of occurrence is very low.

Finally, reliability was calculated using Cronbach's alpha, which indicated that both game 2 (α =.803) and game 3 (α =.853) showed high internal consistency.

2.4. Procedure

Firstly, each of the AI systems was asked to perform the two sets of the PIC-A. The instruction for each test was typed into the chats and text boxes of the systems and the response provided was collected. Given the speed with which the systems generate text, instead of using the time set by the instrument, the information was requested on three continuous occasions, sending the same instruction each time. Subsequently, the automatic text generated was corrected, based on the indicators of fluency, flexibility, and narrative originality, according to the correction notebook established in the instrument (Artola et al., 2012). It should be noted that bearing in mind that the AI learns from previous interactions, the two PIC-A games were performed as the first action once the system was accessed, to ensure that no circumstance could have influenced its response.

As far as the research with the students is concerned, one-hour sessions were used in each of the groups. Firstly, in the pre-test phase, the students played the two creativity games, following the instructions and duration provided in the manual (10 minutes each). Secondly, the students registered in ChatGPT (the Al selected for its significant diffusion compared to others designed previously, its media impact, and the current debate on its use in the educational field), its functioning was explained, and they carried out test queries. Thirdly, the students performed the games again (post-test phase), this time with the help of the answers provided by ChatGPT; it was explained to them that they had to improve the content they had written when they took the test for the first time, so it was not a question of taking the tests again without taking into account what they had done previously. The learners could ask the chat what they considered in order to improve their text, either by asking for the test instruction literall or by asking other questions that could be aimed at improving their written productions.

Participants were informed about the confidentiality of the data and research objectives, following the ethical standards indicated in The Code of Good Practice on Research of the University of Murcia (2022), and any doubts that arose at the time of application were addressed.

2.5. Data analysis

The indicator scores for creativity were calculated according to the correction instructions and category system of Artola et al. (2012). The direct scores are calculated from the following indications: a) Fluency is obtained by counting the total number of different answers given; b) Flexibility refers to the number of different categories (according to the established scale) in which at least one answer is classified; c) Narrative originality is the result of multiplying the number of answers in each category by the coefficient given to that category and their total sum. The determination of high or low creativity is made on the basis of the table of averages of the indicators in the different games, provided by the instrument manual (Artola et al., 2012: 86).

Once the correction had been made, the descriptive statistics of the different variables were analysed in order to find out the level of creativity of the AI systems and of the students, according to the first specific objective. The Kolmogorov-Smirnov normality test was then applied to determine the relevance of the use of parametric tests. This test showed that fluency (p < .05), flexibility (p < .05), and narrative originality (p < .05) did not follow a normal distribution. Thus, in order to compare the creativity of the AI systems and the students, as pursued by the second specific objective, the Mann-Whitney U test was performed. Finally, to answer the third specific objective, the Wilcoxon test was performed.

3. Results

The results are presented below according to the specific objectives formulated. The first specific objective focused on finding out the level of the creativity indicators of the AI systems and the students. A descriptive statistical analysis was carried out of the scores obtained after correcting the games played by the AI systems and the students in terms of fluency, flexibility, and narrative originality. Firstly, with respect to the AI systems (Table 2), it was observed that the means obtained in game 2 are higher than the means indicated in the instrument manual for the indicators of fluency (M=15.54), flexibility (M=9.75) and narrative originality (M=11.15). However, in game 3, the means are lower than those given in the manual for fluency (M=13.78), flexibility (M=8.75) and narrative originality (M=8.12) (Artola et al., 2012: 86).

In game 2, none of the Als falls below the averages for fluency and narrative originality indicated in the manual. In fluency, ASKtoAI (DS-direct score: 81), Youchat (DS: 65), Writesonic (PD: 41) and Dupla (PD: 40) stand out. In narrative originality, ASKtoAI (DS: 87), ChatGPT (DS: 85), Copy.AI (DS: 60), Unbounce (DS: 49) and Anyword (DS: 47) stand out. In flexibility, not all Als exceed the manual average, although Dupla (DS: 29), Canva's Magic Write (DS: 19) and Anyword (DS: 18) should be mentioned.

In game 3, the Als with high scores in fluency are Neuroflash (DS: 30), ASKtoAI (DS: 20) and Jasper (DS: 20). In flexibility, Neuroflash (DS: 20), Writesonic (DS: 11), ChatGPT (DS: 10), ASKtoAI (DS: 10) and Nichesss (DS: 10) stand out. In narrative originality, ChatGPT (DS: 25), ASKtoAI (DS: 22) and Neuroflash (DS: 18) scored highest.

Table 2. Descriptive statistics for indicators of creativity in AI systems									
	G2 Fluency	G2 Flexibility	G2 Narrative Originality	G3 Fluency	G3 Flexibility	G3 Narrative Originality			
M	29,3	12,35	37,4	10,65	6,90	7,80			
SD	16,9	5,33	20,5	7,44	4,34	7,82			
Minimum	14	5	12	1	1	0			
Maximum	81	29	87	30	20	25			

Secondly, after performing the descriptive statistical analysis of the students' scores (Table 3), it was discovered that the sample of the present study presented values below the means of fluency and flexibility of the two games, as well as below the means of narrative originality of game 2, as indicated in the manual of the Creative Imagination Test for Adults (Artola et al., 2012: 86).

Table 3. Descriptive statistics of the indicators of creativity in students												
G2 Fluenc		uency	G2 Fle	xibility	G Narrative	2 Originality	G3 Fl	uency	G3 Fle	xibility	G Narrative (3 Originality
	М	w	м	w	М	w	М	w	М	w	М	W
N/	10,8	9,05	7,61	7,38	11,2	10,2	9,87	8,20	6,95	6,53	9,84	7,47
IVI		10,47		7,56		11,02		9,52		6,87		9,35
SD	5,76	5,59	3,60	3,81	8,25	8,71	5,66	5,09	3,33	3,97	8,89	6,61
Minimum	2	1	2	1	0	0	1	1	1	1	0	0
Maximum	31	27	18	17	43	39	34	22	22	16	52	22

However, the mean of narrative originality of game 3 was above the mean indicated by the instrument referred to. If we look at the scores according to gender, women obtained a better mean in the narrative originality of both games, compared to that presented in the instrument's manual. In general, women showed better mean scores than men in all the creativity indicators in the sample of the present study.

For the second specific objective, in order to compare the creativity of the AI systems and the students, the Mann-Whitney U test was performed, which shows that there are statistically significant differences in the indicators of fluency, flexibility and originality in game 2 (Table 4).

Table 4. Creativity of AI systems and learners											
Creativity indicators	Human In	telligence	Artif Intelli	icial gence	U	z	a	Effect			
	м	SD	М	SD			·	Size			
G2 Fluency	10,47	5,756	29,30	16,927	228,000	-6,499	<,001	.445			
G2 Flexibility	7,56	3,637	12,35	5,334	790,000	-4,363	<,001	.299			
G2 Narrative Originality	11,02	8,337	37,40	20,451	246,500	-6,422	<,001	.440			
G3 Fluency	9,52	5,576	10,65	7,443	1798,000	-,504	,614	.034			
G3 Flexibility	6,87	3,467	6,90	4,340	1913,000	-,065	,948	.004			
G3 Narrative Originality	9,35	8,509	7,80	7,818	1644,500	-1,090	,276	.075			

Moreover, no statistically significant differences were found in the indicators of game 3, indicating similar levels between the students (human intelligence) and the AI. However, it should be noted that students show a higher mean on the narrative originality indicator in game 3. Also, fluency and narrative originality in game 2 have moderate effect sizes, while the other indicators in game 2 and game 3 have low effect sizes.

Following this, to address the third specific objective, aimed at comparing the scores of the creativity indicators obtained by the students in the two phases of application of the tests, the Wilcoxon test was performed, which revealed the existence of statistically significant differences between the pre-test and post-test scores in fluency, flexibility, and originality in game 2, as well as in fluency in game 3 (Table 5). On the other hand, fluency, and narrative originality in game 2 show a moderate effect size, while both the flexibility indicator in game 2 and the three indicators in game 3 show a low effect size.

Table 5. Students' pretest and posttest										
Creativity indicators	Pre	test	Pos	ttest	7	n	Effect			
	M	SD	M	SD	2	Р	size			
G2 Fluency	10,47	5,756	13,08	7,554	-5,666 ^b	<,001	.408			
G2 Flexibility	7,56	3,637	8,33	3,958	-3,036 ^b	,002	.219			
G2 Narrative	11,02	8,337	14,45	10,816	-5,583 ^b	<,001	.402			
originality										
G3 Fluency	9,52	5,576	10,05	5,774	-2,236⁵	,025	.161			
G3 Flexibility	6,87	3,467	7,15	3,782	-1,738 ^b	,082	.125			
G3 Narrative originality	9,35	8,509	9,31	8,590	-1,596 ^b	,110	.115			

4. Discussion and conclusions

The present research aimed to approach the study of the creative possibilities of AI systems for the development of writing in the educational context. We have managed to provide didactic evidence on the use of AI and to contribute to the knowledge of its integration in classrooms as educational support. The role that AI systems can assume in the new technological framework, where the writing-creativity-AI trinomial can begin to be contemplated in the new models of language teaching, has been verified.

Firstly, it is noticeable that the means obtained by the Als in the three indicators of game 2 are higher than the means indicated in the instrument manual, while, on the contrary, the means achieved in the indicators of game 3 are lower. This situation is related to the type of instruction requested in each of the games and highlights the difference between AI systems and humans. While game 2 explores the possible uses of a real object, the statement in game 3 starts from an implausible situation and aims to assess a fanciful aspect of imagination, a form of thinking that is fundamental to creative behaviour. Uncreative subjects are unable to conceive of such possibilities in this context and may clash when playing this game (Artola et al., 2012), as has happened to Al systems. Moreover, play involves insight into the experience, and while certain consequences are easy to discover, others require deepening of the subject matter and problems (Guilford, 1950). Csikszentmihalyi (1998) already argued that creativity does not happen in an isolated mind, but in the interaction of the person with a socio-cultural context, with established symbolic rules and a field of experts who recognise innovation. Also, taking into account that fantasy (compared to the invention, creativity, and imagination) is the activity that is presented as the freest, creativity being the sum of fantasy and invention (Munari, 2018), it is observed that AI responds more effectively to the invention, seeking practical solutions. In relation to these results, it is striking that there is an AI (pymetrics.ai), as described by Sadin (2018), dedicated to selecting personnel for companies, based on their creativity, adaptability, and flexibility. In this vein, Miller (2019) argues that to be truly creative, machines will need

to enter the world. In relation to the students, as has been noted in other studies (Donolo & Elisondo, 2007), females have a higher level than males in the sample in all creativity indicators, as well as a higher level of narrative originality in both games in relation to the scale of averages in the instrument manual. In general, it can be stated that gender differences in creativity depend on social and cultural factors (Aleksi et al., 2016; Hora et al., 2022). In addition, after comparing the creativity of the Al systems with that of the students, the Al scores on the indicators in game 2 significantly outperformed the students' scores, while in game 3 the creativity indicators showed similar levels in both groups. This result is consistent with the above, as Al scores were higher in game 2. Als have a large amount of information, more than a person can handle and, as Goleman et al. (2016) stated, having accurate and abundant data is essential in the creative process, since the greater the knowledge of the details of a problem, the greater the probability of finding a solution. With respect to game 3, the students outperform, although not significantly, the Al in narrative originality. Humans do not possess the rigidity that Al systems have exhibited, not being able to distance themselves from the statement in game 3 and find answers that could be pigeonholed into surprising, new, non-obvious, and valuable categories (Boden, 2004; 2018).

Furthermore, the significant improvement in the student's written productions after the use of ChatGPT has been highlighted, specifically in all the indicators of game 2 and the fluency of game 3. The potential of human-AI collaboration in the writing process is highlighted, as "AI is a means, not an end" (Breton, 2021) and it has been a tool that has worked as an assistant to the students in game 2, which is aligned with the productive possibilities of AI technology, whereas the flexibility and originality of game 3 has not, as it has already been shown that the AIs have not been able to imagine the effects of a fantasy situation. In addition to the explanations already offered, this result may also be due to what is called the "framing problem", which refers to the fact that systems programmed for a specific purpose perform better, although they are not able to successfully perform another activity for which they are not programmed (Bonami et al., 2020).

In light of these findings, writing with computational assistance suggests a rethinking of how writing and creativity are conceived. There are questions and concerns with academic honesty and plagiarism, as reflected in recent scientific (Else, 2023; O'Connor and ChatGPT, 2023) and mainstream (Sánchez, 2023; Vázquez, 2023) publications; and indeed, in parallel to the growth of Als, methods are being developed to detect texts written by them, such as "Classifier" (OpenAI, 2023). In any case, banning Al systems in education (Peirón, 2023) would be a losing battle, so instead of pretending that Al does not exist, it is time to train students to work with it; in the same way that tools such as ChatGPT are being used in science and several researchers confirm their use (Hutson, 2022). Teachers should therefore reflect on the skills they teach and how Al could help students in generating ideas and developing their creativity when dealing with writing tasks.

On the other hand, having proven the Al's assistance in terms of verbal creativity, it must be pointed out that Al cannot replace human intelligence and creativity. Montero (2023) pointed out that Al lacks judgment and stated that creativity is not having ideas but knowing when not to have more. The machine lacks context and does not know what is good to be valued. Therefore, the active participation of students in their learning process should be encouraged and they should be encouraged to act decisively, judiciously, and responsibly. Collaborative human-machine intelligence is required, as highlighted by the Instituto Nacional de Tecnologías Educativas y de Formación del Profesorado [National Institute of Educational Technologies and Teacher Training] (INTEF, 2022), noting the complex relationship between people and Al, as there are specific functions that can only be performed by humans and for which they must be trained (Holmes et al., 2019). Along these lines, Fyfe's study (2022), like the present research, asked university students to conduct an essay using Al. Initially, applying Al to writing may have seemed like a shortcut, but the artificially generated text was difficult to control, deviated from the topic and had to be revised in its different samples, which did not allow for the automatic integration of information in an extensive genre such as the essay.

On the basis of this study, further research in the field of writing is of interest, by extending the study of creativity with the help of AI by means of narrative composition tasks; along these lines, books on the use of ChatGPT to write and structure long texts are beginning to appear on the market (Gade, 2023). In

addition, it is useful to broaden the human sample of participants to include other degrees or professional areas. Similarly, it is possible to envisage future research that delves deeper into the different domains of creativity, in line with the rapid advancement of Al in the creation of a wide variety of products. Thus, the present research can be completed with other studies focused on the creation of images or musical sequences using AI. In short, there is a need for more in-depth studies on the use and exploitation of AI and, specifically, ChatGPT in an educational context, as textbook publishers themselves are beginning to incorporate these resources into their content platforms, as is the case of Edelvives' intelligent assistant that integrates ChatGPT (Edelvives, 2023). Lastly, the use of AI should be aimed at empowering teachers and not replacing or displacing them (UNESCO, 2022b). An AI Literacy Plan is required to train teachers in both technical skills and ethical-philosophical debates (Flores-Vivar & García-Peñalvo, 2023; UNESCO, 2022a). Similarly, changes in educational practice in the coming years will be determined by Al developments and will need to rely on research in full collaboration with teachers, educational leaders, and learners to ensure that appropriate educational policies are put in place (OECD, 2021).

Authors' Contribution

Idea, M.I.V.Y.J., O.L.M, V.N.N., F.C.S.; Literature review (state of the art), M.I.V.Y.J., F.C.S.; Methodology, M.I.V.Y.J., O.L.M.; Data Analysis, M.I.V.Y.J., O.L.M., V.N.N.; Results, M.I.V.Y.J.; Discussion and conclusions, M.I.V.Y.J., O.L.M, V.N.N.; Drafting (original draft), M.I.V.Y.J.; Final revisions, M.I.V.Y.J., O.L.M, V.N.N., F.C.S.; Project design and funding, O.L.M., M.I.V.Y.J.

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Youth digital writing on WhatsApp and the teaching of spelling

Escritura digital juvenil en WhatsApp y enseñanza de la ortografía



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ABSTRACT

Instant messaging applications integrated in smartphones have favored the emergence of new digital writing systems, which are characterized by the use of specific spellings called textisms. This study analyses the relationship between the use of textisms and spelling mistakes in academic texts. The methodology applied was descriptive, based on a directed content analysis. The sample consisted of 270 students in the third and fourth years of compulsory secondary education enrolled in twelve public high schools in the autonomous community of Andalusia. Data were obtained from real texts provided by the students participating in the study, extracted, on the one hand, from WhatsApp messages from their smartphones, and, on the other, from academic texts produced as an activity in the secondary school classroom. The results obtained from the descriptive analyses and the bivariate correlation analyses (Pearson coefficient) allow us to affirm that the average number of textisms are intentional discrepancies with the academic norm in the digital context. Consequently, they cannot be considered as misspellings that occur due to a lack of knowledge of the Spanish language, but rather as new forms of language generated by the use of digital technologies.

RESUMEN

Las aplicaciones de mensajería instantánea integradas en los teléfonos inteligentes han favorecido el surgimiento de nuevos sistemas de escritura digital, que se caracterizan por emplear grafías específicas denominadas textismos. Este estudio analiza la relación entre el uso de textismos y las faltas de ortografía en textos académicos. La metodología aplicada ha sido de carácter descriptivo, basado en el análisis de contenido dirigido. La muestra la integran 270 estudiantes de tercero y cuarto de Educación Secundaria Obligatoria matriculados en doce institutos públicos de la Comunidad Autónoma Andaluza. Los datos se obtuvieron a partir de textos reales aportados por el alumnado participante en el estudio, extraídos por un lado de mensajes de WhatsApp de sus teléfonos inteligentes y por otro de textos académicos elaborados como actividad del aula de Secundaria. Los resultados obtenidos a partir de los análisis descriptivos y los análisis de correlación bivariada (coeficiente de Pearson) permiten afirmar que el promedio de textismos en WhatsApp de la muestra es muy superior al de faltas de ortografía en los textos escolares; lo que confirma que los textismos son discrepancias intencionadas con la norma académica en el contexto digital. En consecuencia, no pueden ser considerados como faltas de ortografía que se producen por desconocimiento de la lengua española, sino nuevas formas de lenguaje generadas por el uso de las tecnologías digitales.

KEYWORDS | PALABRAS CLAVE

Young people, social networks, digital writing, WhatsApp, textisms, spelling competence. Jóvenes, redes sociales, escritura digital, WhatsApp, textismos, competencia ortográfica.



1. Introduction

Comprehensive language training is a universal demand that involves the mastery of different languages, including those linked to technologies, digitalization, and social networks. Language teaching includes addressing aspects such as new digital languages, also in the context of the Spanish language (Cremades et al., 2021). In this context, the study by Pérez-Rodríguez et al. (2019) on media competence of Spanish adolescents in Secondary Education concludes that further research is needed on "students' ways of reading and writing, including their strategies for producing texts, and a deeper understanding of the types of texts they use to communicate in today's liquid society" (Pérez-Rodríguez et al., 2019: 45).

Linguistic diversity on the Internet is a global and multilingual phenomenon (Danet & Herring, 2007) that has been enhanced by the generalization of instant messaging applications on smartphones (Yus, 2022). Interactive digital communication has favored the creation of a new written norm that has received different denominations, including "textese", "CMC language", "chatspeak", or "digital" (Turner, 2010; Johnson, 2015). These new forms of writing are conditioned by the influence of technology, social networks, and digitization, are characterized by the oralization of written code (Turner, 2010) and "continue to evolve and converge and, to some extent, approximate face-to-face communication with all its immediacy, complexity, and variety" (Thurlow, 2018: 7-8). Previous research has analyzed, in detail, the new digital writing systems of languages around us, such as English (Grace & Kemp, 2014; Wood et al., 2014; Kemp et al., 2021), Spanish (Vázquez-Cano et al., 2015; Gómez-Camacho et al., 2018), French (Bernicot et al., 2014; Cougnon et al., 2017), and German (van-Dijk et al., 2016; Verheijen et al., 2020), among others. Some studies on minority languages identify global features shared by many languages, also in the use of pragmatic and emotional resources; for example, Cenoz and Bereziartua (2016) for Basque, or Finkelstein and Netz (2023) for Modern Hebrew.

The features that characterize the digital writing norm that employs nonstandard spelling (among other elements) have been named textisms from the studies of De-Jonge and Kemp (2012), whose use is favored by technological advances (Kemp & Grace, 2017; Yus, 2022). Undoubtedly, emoticons are the maximum exponent of the new global language in terms of expression of feelings (Li et al., 2022), although with marked nuances in their meanings and uses in different languages (Kejriwal et al., 2021). Even if the use of contractions and abbreviations to "reduce the length of words in order to be able to send text messages in a quick and cheap manner" is a global textism for all languages (De-Jonge & Kemp, 2012: 49-50), Grace and Kemp (2014) oppose contractive textisms (shortening the original words) and expressive textisms (adding more text in order to provide additional information). In Yus' opinion, "expressive textisms occur due to the user's communicative or expressive needs (e.g., to convey intonation, feelings, emotions, etc.) and thus communicate an additional layer of information that is relevant in itself" (Yus, 2022: 60). Gómez-Camacho et al. (2018) classify textisms in the context of the Spanish language into three levels: graphophonemic, lexical-semantic, and multimodal (Table 1), although these textisms may appear simultaneously in the same element.

Table 1. Categorization of textisms (Gómez-Camacho et al., 2018)						
Textisms of the graphophonemic level						
 Emphatic repetitions (repetition of closing marks, one or more letters, interjections, or onomatopoeias). Deletions and omissions (merging of words, capitalization, deletion of letters or syllables, punctuation marks, accents). 						
- Nonstandard graphemes (textisms of k, x, s, z, sh, tx, w, y, numbers, and symbols with their phonetic value).						
Textisms of the lexical-semantic level						
- Dialectalisms.						
- Transcription of diatopic, diastratic, and diaphasic varieties.						
- Creation of new words, onomatopoeias or nonstandard interjections, amalgams, or conglomerates.						
- Foreign words.						
- Nonstandard initials, abbreviations, and acronyms.						
Textisms of multimodal level						
- Emoticons, images, audio, videos, stickers.						

The graphophonemic level includes textisms based on the discrepancy between phoneme and grapheme, such as the phenomena of shortening or reducing the number of words, the use of non-normative graphemes or the repetition and omission of graphemes, punctuation marks, or capital letters. Textisms at the lexical-semantic level include the use of dialectalisms, the creation of new words, and the

use of foreign words. Finally, the multimodal level contains the use of emoticons, images, videos, audio, or stickers, among other elements.

These new languages pose a conflict between what Androutsopoulos calls popular and academic conceptions of language, although this phenomenon should be understood as "a process of change facilitated and enabled by digital media, but materialized and carried out by networked writers in late-modern and post-standardized societies" (Androutsopoulos 2011: 147). From an educational point of view, Gleason already drew attention to the hybrid nature of current adolescent literacy practices "while young people are concerned with traditional dimensions of literacy, such as grammatical correctness and proficient spelling and punctuation, they are also concerned with emergent practices, such as engaging in relevant youth practices that are multimodal, spatial, and social" (Gleason, 2016: 33).

Interaction between learning the cultured linguistic norm and the use of the interactive digital norm raises a new perspective on the existing relationship between interactive digital writing in literacy and linguistic skills when typing on the virtual keyboard of smartphones. The latest studies by Finkelstein and Netz (2023), Androutsopoulos and Busch (2021), Verheijen and Spooren (2021), Kemp et al. (2021) or Núñez-Román et al. (2021) on different languages respond to the same concern as the classic studies by Wood et al. (2014), De-Jonge and Kemp (2012) or Bernicot et al. (2014) on English and French: the possibility that the use of textisms by adolescents in instant messaging apps negatively affects the formal registers of language.

WhatsApp is the most widely used instant messaging application both globally and in the context of the Spanish language (Statista, 2022), and it very significantly favors young people to broaden their intercultural and interlinguistic awareness from a local perspective (Takkac, 2019). Pérez-Rodríguez et al. (2022) describe the impact of networks such as Twitter on communication and explore the communicative and multimodal skills of creators (Youtubers and Instagrammers) as new spaces are opening up for citizen representation and participation.

The analysis of adolescent and youth chats on WhatsApp to determine the interaction between the use of textisms and linguistic competence in a broad sense has been the starting point for the latest studies of different languages published on the subject (Gómez-Camacho et al., 2018; Rosenberg & Asterhan, 2018; Escobar-Mamani & Gómez-Arteta, 2020; Verheijen & Spooren, 2021; Pérez-Sabater, 2022; Tragant et al., 2022; Finkelstein & Netz, 2023). In general, scientific literature has not identified a negative relationship between the use of textisms in instant messaging applications and the orthographic competence of adolescent speakers.

Zebroff's exhaustive review on the impact of texting on adolescent literacy concludes that it is still "largely unknown whether texting has a positive, negative, or neutral effect on adolescent literacy" (Zebroff, 2018: 353) so more studies are needed in this field. In the context of education in Spain, the analysis of lbarra-Rius et al. (2018) finds that communicative situations in a formal education setting occur outside the daily lives of students and calls for the incorporation of interactions with smartphones into the educational environment. This study responds to this demand in the context of the Spanish language.

The present study explores whether the use of textisms in WhatsApp messages of adolescents in the last two years of compulsory education in Spain is related to the appearance of spelling mistakes in their academic texts. Consequently, the objectives of this research are as follows:

- To describe the writing norm used by Andalusian adolescents on WhatsApp.
- To establish a relationship between the use of textisms in WhatsApp and spelling mistakes in academic texts.

We start from the hypothesis that the use of textisms in the sample does not negatively influence spelling competence, but rather favors the acquisition of linguistic competence in adolescent students, as suggested by the studies of Lanchantin et al. (2015), van-Dijk et al. (2016), Verheijen et al. (2020) and Verheijen and Spooren (2021). In line with the findings of Bernicot et al. (2014) and Plester et al. (2009), among others, we expect that some textisms of the graphophonemic level, especially those referring to auxiliary signs in Spanish writing, present a differentiated behavior in their relationship with misspellings of the same nature. If we find that there is a relationship between the interactive digital norm and the academic norm, it will be necessary to reformulate the concept of spelling competence in the context of compulsory education,

assuming that digital competence (INTEF, 2022) involves the production of texts in a digital environment "through strategies such as multimodality, hypertextuality, and interaction" (Rodrigo-Segura & Ibarra-Rius, 2022: 42).

2. Materials and methods

This research uses a descriptive method, since its main objective is to describe the characteristics of communication through the WhatsApp social network in a population of adolescents, in an objective and verifiable way (Colás, 1998). Specifically, it is an analytical study, based on directed content analysis (Hsieh & Shannon, 2005), which aims to discover the textisms used in written communication through WhatsApp.

2.1. Sample

The sample consisted of 270 students enrolled in the 3^{rd} and 4^{th} years of Compulsory Secondary Education (ESO) from twelve public secondary schools in all provinces of the Andalusian Autonomous Community, with the exception of Almería. Of the sample, 54.4% were enrolled in the 3^{rd} year of ESO and 45.6% in the 4^{th} year of ESO. The ages of these students ranged between 14 and 16. Of those surveyed, 41.3% were male and 58.7% were female. This sample represents the population under study (students from the Autonomous Community of Andalusia) at a confidence level of 95% and a sampling error of +/-6. The sampling system used was non-probabilistic and, specifically, convenience sampling.

2.2. Instrument

For data collection, a recording sheet was used in which the textisms were grouped into five categories following the taxonomy proposed by Gómez-Camacho et al. (2018) to facilitate statistical analysis: textisms by repetition, textisms by deletion, textisms of tildes, non-normative graphemes, and textisms of the lexical-semantic and multimodal level (Table 2).

Table 2. Categories of textisms analysis with examples						
Textisms due to repetition	n					
Repetition of closing marks ?!	kiya!!!!!					
Repetition of one or more letters	QUEEE?					
Emphatic repetition of interjection or onomatopoeia	jajajaja					
Textisms due to shortening or suppression						
Intentional linking of words	Holaquehases					
Word shortening by removing letters or syllables	ta bn					
Omission of punctuation marks	Ke pasa? no te visto					
Textisms of intentional omission of h-	ke a pasao???					
Loss of intervocalic d	e comío					
Textisms due to omission of accents						
Omission of accents	ke paso					
Textisms of non-normative graphemes						
Textisms of k	te kiero					
Textisms of x	ola a todxs					
Textisms of s	ké ases					
Textisms of z	pazaaa					
Textisms of sh	shica					
Textisms of tx	txica					
Textisms of w	weno					
Textisms of y	kiya					
Lexical-semantic and multimoda	l textisms					
Textisms of numbers, letters and symbols with their	cansa2 no vngo +					
phonemic value	Gansaz, no viigo +					
Multimodal elements, emoticons, stickers, etc.	$\circ \circ \circ \circ \circ$					
English, other languages or made up words	srry, brother					

For the analysis of the textisms of the graphophonemic level, three categories of textisms analysis have been created: by repetition, by deletion, and by use of non-normative graphemes. Textisms by omission of tildes have been processed as a separate category from textisms by deletion given the high presence of textisms by intentional omission of tildes and misspellings of tildes in academic texts.

Also, textisms of the lexical-semantic level (dialectalisms, transcription of diatopic, diastratic, and diaphasic varieties, creation of new words, onomatopoeias or non-normative interjections, amalgams or conglomerates, foreign words, acronyms, abbreviations and non-normative acronyms) have been grouped in a single category (abbreviations and non-normative acronyms) with the textisms of the multimodal level

(emoticons, images, audio, videos, stickers) in order to facilitate the analysis of their relationship with the spelling mistakes that belong entirely to the correspondence between phonemes and graphemes, and to the use of auxiliary signs in the Spanish language.

2.3. Data collection

Data have been extracted from a corpus of real texts written by the students participating in the study both in instant messaging applications (in this case WhatsApp), and in activities from different areas of the secondary school curriculum that generated handwritten academic texts. Specifically, participating students selected uncorrected and unmodified WhatsApp messages, which they considered representative of their way of writing, and which had been sent in the context of digital communication with other adolescents, previously eliminating any personal reference or any data of a private nature. In addition, participating students also provided an uncorrected handwritten text that they considered representative of their way of writing in class (notes, essays, etc.). Data collection was authorized by the School Board of the Center and the Educational Administration, in compliance with the ethical standards for educational research of the Andalusian Ministry of Education and the University of Seville.

Subsequently, a deductive content analysis was performed, using the aforementioned categorization to record the information. Two researchers independently coded all the texts in the sample. An acceptable interobserver agreement index was obtained (>0.80). With the few disagreements identified, a consensual concordance was applied. These researchers were previously trained before proceeding to the corresponding analysis. The same procedure was carried out for the analysis of spelling errors appearing in academic texts.

2.4. Data analysis

In order to respond to research objectives, descriptive statistical analyses were performed, applying statistics of central tendency (mean) and dispersion (standard deviation, hereafter SD; and minimum and maximum). Bivariate correlation analyses were also carried out, applying Pearson's coefficient to check the degree of relationship between the variables analyzed. IBM SPSS v.26 software was used for statistical analysis.

3. Analysis and results

First, it is worth highlighting the characteristics of the writings hosted on social networks and academic texts to serve as a reference for the study. On the one hand, regarding the characteristics of the texts written on WhatsApp, the results reveal that the mean number of words per text is 79.79 words (SD=43.82), ranging from a minimum of 3 to 246. The mean number of interventions of the WhatsApp text, i.e., each time the subject has sent a message in their app, is 17.05 times (SD=5.94), ranging from a minimum of 2 to a maximum of 36. The total number of textisms of WhatsApp writings is 27.73 (SD=18.55), ranging from 0 textisms to 117.

On the other hand, among the characteristics of academic written texts, it stands out that they are productions integrated by an average of 171.94 words (SD=82.30), the minimum number of words in these texts is 35 and the maximum 647. The average number of spelling mistakes is 4.76 (SD= 5.86), ranging from texts with no mistakes to some with a maximum of 44. The most common type of mistake is the error of diacritical marks, whose average is 4.07 of missing accents per text, ranging from texts with no mistakes to some with a maximum of error that stands out with an average of more than 1. The presence of errors in phonemes /b/, /g/, /j/, /y/, /z/, /s/, /k/, /rr/ in all academic texts has been analyzed, and they concluded that all these errors are below an average frequency of occurrence of less than 1.

3.1. Characteristics of digital writing in WhatsApp

Figure 1 shows the proportion of each type of textism analyzed in this study. Thus, we can see that, of the total number of textisms that appear in the students' writings on the WhatsApp social network, 59.96% are textisms due to deletion. To this, we should add another 15.81% related to textisms due to the omission of accents. Therefore, around 75% of the analyzed textisms fall into this category. Next, around

13.21% of the textisms are repetition textisms. Around 10% of textisms correspond to those derived from the lexical/semantic and multimodal levels. Only 1.34% of textisms correspond to those deriving from the use of non-normative graphemes.



Figure 2 details the frequency of occurrence of the textisms that characterize students' written digital norm in WhatsApp communication.



We can observe that the presence of textisms by shortening or deletion are the ones that appear the most, with an average value for frequency of appearance of 15.57 and SD=13.43. Textisms of non-normative graphemes are the ones that appear the least, with an average value of less than 1, specifically 0.35 (SD=0.91), ranging from 0 to 6. Textisms due to omission of accents, repetition or lexical/semantic level, reach average values of 4.10 (SD=3.33), 3.43 (SD=3.68) and 2.51 (SD=3.50), respectively. In the case of textisms due to omission of accents and lexical/semantic level, the minimum is 0 and the maximum are 28 and 26.

These results offer us a global vision of the characteristics that make up digital writing, with shortening being the most notable peculiarity in this type of communication. It is worth mentioning the low weight of textisms of non-normative graphemes, which confirms their intentional nature and that in no case can be considered as misspellings. These data provide information on the features that make up this new digital

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writing, where efficiency and speed seem to be at the heart of this communication. The presence of other types of textisms outlines and qualifies this digital writing.

3.2. Relationship between digital and academic writing

One of the concerns formulated by the faculty is whether this type of communication can have negative effects on academic writing, or conversely, whether academic writing is reflected in writing on WhatsApp. To test these hypotheses, we proceeded to analyze possible correlations between the total number of textisms appearing in WhatsApp writing and the total number of spelling mistakes students have in their academic writing. Following the results expressed in Table 3, we can observe a low but significant correlation, at a level of 0.01, between the number of faults in the academic writings and textisms by omission of accents. In this case the correlation is directly proportional, r=.143.

Likewise, there is a low and significant correlation, at a level of 0.05, between the number of spelling mistakes and the textisms of the lexical/semantic and multimodal level, although in this case it is inversely proportional r=.150. Between the total number of textisms and the total number of mistakes, no significant correlation was detected, however, the value of r=.019 points to an inversely proportional tendency.

Table 3. Correlation between textisms and spelling errors										
Types of Textisms	Deletion	Repetition	Omission of accents	Nonstandard graphemes	Lexical/semantic and multimodal level	Total number of textisms	Total number of errors			
Deletion	1	.304**	.241**	.391**	.079	.902**	.002			
Repetition		1	.178**	.092	.224**	.540**	055			
Omission of accents			1	.140*	.023	.442**	.143*			
Nonstandard graphemes				1	.054	.411**	002			
Lexical/semantic and multimodal level					1	.313**	150*			
Total number of textisms						1	019			
Total number of errors							1			

**. The correlation is significant at the 0.01 level (bilateral) *. Correlation is significant at the 0.05 level (bilateral).

Finally, the relationship between misspellings and textisms was tested. The results show a correlation between textisms due to the omission of accents and misspellings, at a significance level of 0.05, although the intensity of the correlation is quite low (r=.145). A significant correlation is also detected, at a significance level of 0.05, although with low intensity and inversely proportional (r=.150) between the number of spelling mistakes and textisms or lexical/semantic and multimodal level.

As for the correlation between the total number of textisms and their different types (Table 3), we detected that there is a high and significant correlation, at 0.01, with the number of textisms by deletion or shortening, obtaining a value of r=.902. With a direct correlation are the textisms due to repetition, omission of accents, and non-normative graphemes, with r values of 0.540; 0.442 and 0.411 respectively, at a significance level of 0.01. The correlation between the total number of textisms and those of a lexical/semantic and multimodal nature, with an r value of 0.313 and also significant at 0.01, is of a medium-low value, although direct.

Table 3 also provides information on the relationship between different types of textisms. Textisms by shortening correlate in a low, direct, and significant way with all types of textisms, except with those of the lexical/semantic and multimodal levels.

Finally, analyzing the results derived from the analysis of the correlation between textisms due to omission of accents and misspellings derived from diacritical errors, it is revealed that there is a directly proportional and significant correlation at the 0.01 level between both variables. However, correlation value r=0.172 is quite low.

4. Discussion and conclusions

The results of this research provide evidence on the use of the digital norm in WhatsApp chats of Andalusian adolescents in the third and fourth years of Compulsory Secondary Education and its relationship with the standard orthography of Spanish. More than a third of the words that make up the WhatsApp corpus analyzed in the study presented some textisms, so we can affirm that the use of textisms is the main feature of the digital writing of the adolescent students participating in the study, and 61

that they used a different writing norm, adapting to the demands of interactive digital communication with respect to formal academic texts (van-Dijk et al. 2016; Verheijen & Spooren, 2021). The average number of textisms in WhatsApp in the sample is much higher than the number of misspellings in school texts, so the same speakers who follow the academic norm in their formal texts prefer the digital norm in text messages on their smartphones. In our opinion, this confirms that textisms are intentional discrepancies with the academic norm in the digital context that cannot be considered as misspellings caused by ignorance of the Spanish language (Cremades et al., 2021; Gómez-Camacho & Gómez-del-Castillo, 2017).

The interactive digital norm in WhatsApp in the corpus analyzed preferentially uses textisms involving the shortening of words, the omission of accents and the omission of punctuation marks and spaces between words. Our analyses reveal that, in the sample, textisms by shortening are the most notable feature of the interactive digital norm (Plester et al., 2009; Vázquez-Cano et al., 2015; Yus, 2022). However, textisms by repetition and the use of non-normative lexical units confirm that the interactive digital norm is not a form of economy in language, but an alternative form of expression that integrates different language varieties and different languages in the digital environment (De-Jonge & Kemp, 2012; van-Dijk et al. 2016). Participants show written language varieties in WhatsApp, as well as in their orthographic competence, so our results agree with those of Pérez-Rodríguez et al. (2019) in the sense that Spanish adolescents in Compulsory Secondary Education cannot be considered as a homogeneous group of digital natives.

The use of non-normative graphemes has turned out to be insignificant in the results of this study. This finding is relevant because these textisms of the graphophonemic level are mostly related to oral features of the diatopic varieties in the Andalusian speech of the participants in the study. We refer singularly to textisms related to nonstandard graphemes x, s, z, e and y that could be related to phenomena typical of Spanish varieties such as *seseo* (pronunciation of the Spanish letter "c" and "z" as the letter "s"), lisping and *yeismo* (pronunciation of the Spanish letter "ll" as "y") (Narbona et al., 2022). Our study does not confirm that the reproduction of diatopic varieties of the Spanish language is one of the characteristics of the interactive digital norm used by adolescent learners on WhatsApp (Mancera, 2016; Martín, 2016; Flores-Salgado & Castineira-Benitez, 2018). The limitation of the sample to speakers from Andalusia does not allow us to extrapolate this conclusion to Spanish as a whole, which highlights the interest in extending this study in a pan-Hispanic context.

In our opinion, the academic texts analyzed were characterized by correct spelling in the context of compulsory education in Spain, with the exception of errors in the use of the tilde. The descriptive and correlational analysis of errors and textisms confirms that the use of textisms in the sample does not impair the linguistic competence of the participating students in terms of written expression. These results are consistent with previous research findings in other languages (Plester et al., 2009; Wood et al., 2014; Verheijen & Spooren, 2021; Verheijen et al., 2020) and in the Spanish language (Gómez-Camacho & Gómez-del-Castillo, 2017). Even Textisms of lexical-semantic level and multimodal level considered as a whole could be related to the development of writing competence and spelling, although this is not a conclusion of our study (Martínez-Parejo, 2016).

Considered independently, the omission of the tilde as textism or its omission in academic texts offers very interesting results in the relationship between the digital norm and the academic norm in Spanish writing. There is a significant correlation between textism and misspelling in the case of the written accent, which can be interpreted in the sense that this textism is detrimental to the students' spelling competence, although our data do not allow us to affirm this categorically. This relationship does not appear in previous literature, although it is consistent with the findings of previous studies of French and English (Bernicot et al., 2014; Zebroff, 2018). A limitation of this study is the impossibility to discern in WhatsApp interventions when a written accent was intentionally omitted (textisms) versus those that were not written due to inattention or ignorance (misspellings), based on the hypothesis that misspellings can also be committed in interactive digital communication.

In our opinion, it is necessary to reformulate the concept of spelling competence in the context of compulsory education of adolescents, exclusively linked to the relationship between phonemes and graphemes in the Spanish language (Rodríguez-Ortega, 2015) and in other languages (Pinto et al., 2015). Orthographic competence is conceived as a set of alphabetic, orthographic, and morphological writing skills

(Von-Suchodoletz et al., 2017) that does not include textisms of the interactive digital writing standard. The Framework of Reference for Teaching Digital Competence (INTEF, 2022) links the very object of learning literacy and digital competence as part of the basic literacy of all citizens in the compulsory educational stages. In the same sense, Rodrigo-Segura & Ibarra-Rius (2022) insist on the need for the development of digital competences of teachers and students to improve teaching in the area of Language and Literature Didactics. The use of the digital standard as a resource for the teaching of spelling in Compulsory Secondary Education (ESO) is one of the most suggestive possibilities to which this study

We agree with Pérez-Rodríguez et al. (2019) on the need to establish synergies between school texts and instant messaging, integrating learning that takes place outside the school context through the same applications or devices. It is paradoxical that the digital standard used in WhatsApp is identified as an opportunity for the acquisition of adolescents' orthographic competence in various languages (Gómez-Camacho & Gómez-del-Castillo; 2017; Escobar-Mamani & Gómez-Arteta, 2020; Verheijen et al., 2020; Kemp et al 2021; Finkelstein & Netz, 2023), but it has not been integrated into it.

points towards, and opens the way for, further research.

A new conception of orthographic competence must recognize the iconic and interactive nature of digital writing (Pérez-Rodríguez et al., 2022), as well as the influence of the interface on the code (Yus, 2022). From an educational point of view, we agree with the proposals made by Grace and Kemp (2014) for English, and Bernicot et al. (2014) for French, in the sense that it is also necessary to discriminate some types of textisms in the Spanish language. Our results confirm that contractive and expressive textisms (Grace & Kemp, 2014), and some textisms that alter the relationship between phonemes and graphemes because they interact differently with traditional orthography, should be considered in a differentiated way. In our opinion, textisms due to written accent suppression are the most relevant example that the relationship between digital norm and spelling competence depends on the nature of textisms and misspellings, at least in adolescent students.

The results of Androutsopoulos and Busch's (2021) research offer a very interesting perspective on the role of punctuation marks in digital communication of German adolescents in WhatsApp, which could be applied to the Spanish language in further studies. In summary, we agree with the conclusion of Verheijen et al. (2020: 21) that "young people should not be discouraged from using digital writing but taught to alternate effectively between formal and informal registers", integrating textisms into the acquisition of communicative and orthographic competence of students in compulsory education.

Authors' Contribution

Idea, A.G., J.P., P.C., J.C.; Literature review (state of the art), A.G., J.P.; Methodology, P.C., J.C.; Data analysis, P.C., J.C.; Results, P.C., J.C.; Discussion and conclusions, A.G., J.P., P.C., J.C.; Writing (original draft), A.G., J.C; Final review, J.P., A.G., P.C., J.C.; Project design and sponsorship, J.P., A.G.

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Using YouTube to seek answers and make decisions: Implications for Australian adult media and information literacy



Uso de YouTube para buscar respuestas y tomar decisiones: Implicaciones de la alfabetización mediática e informacional en adultos australianos

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ABSTRACT

This article argues that it is necessary to develop new approaches to media and information literacy (MIL) education to respond to information seeking on YouTube. The article draws on data from a survey of adult Australians (N=3,510), focusing on their media literacy attitudes, experiences, and needs. A subset of this data focuses on respondents who use YouTube to seek information for a purpose. The article interrogates the data to ask who uses YouTube to access information when they need to make a decision; how these adults' critical dispositions compare to people who do not use YouTube to seek information; and what level of media ability they have compared to other groups. A total of 45% of adult Australians had used YouTube to seek information and make a decision in the month prior to completing the survey. While this group shared a critical disposition towards media and information, they lacked confidence in their own media abilities. We argue that it is necessary to develop new MIL approaches to assist this group. In addition, we argue that this group is more likely to respond to MIL initiatives that are available on YouTube itself and are unlikely to seek MIL learning in community institutions like libraries or community centres.

RESUMEN

Este artículo sostiene la necesidad de desarrollar nuevos enfoques en la educación en alfabetización mediática e informacional (AMI) para responder a la búsqueda de información en YouTube. El estudio se basa en los datos de una encuesta realizada a adultos australianos (N=3.510), centrada en sus actitudes, experiencias y necesidades en materia de alfabetización mediática. Un subconjunto de estos datos se centra en los encuestados que utilizan YouTube para buscar información con algún fin. El texto indaga sobre quiénes utilizan YouTube para acceder a la información cuando necesitan tomar una decisión; cómo se comparan las disposiciones críticas de estos adultos con las de las personas que no utilizan YouTube para buscar información; y qué nivel de competencia mediática tienen en comparación con otros grupos. El 45% de los australianos adultos acudió a YouTube en busca de información o para tomar una decisión durante el mes anterior a la realización de la encuesta. Aunque este grupo compartía una disposición crítica hacia los medios de comunicación y la información, carecía de confianza en sus propias habilidades mediáticas. Se argumenta que es preciso desarrollar un nuevo planteamiento de la AMI para ayudar a este colectivo. Además, se considera que este grupo es más propenso a responder a las iniciativas de alfabetización mediática e informacional que están disponibles en el propio YouTube y que es improbable que busque la alfabetización mediática e informacional en instituciones comunitarias como bibliotecas o centros cívicos.

KEYWORDS | PALABRAS CLAVE

YouTube, media and information literacy, information literacy, information seeking, social media, adult education. YouTube, alfabetización mediática e informacional, alfabetización informacional, búsqueda de información, redes sociales, educación adulta.

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1. Introduction

The ability to access, use, create and share information via a range of media formats online is increasingly a prerequisite for full participation in society. The persistent development of digital technologies, and the way we use them, demands ongoing learning throughout our digital "learning lives" (Sefton-Green & Erstad, 2016). The concept of media and information literacy (MIL) has received considerable attention in recent years as governments, policymakers, public institutions, and educators have sought to consider the skills, knowledge, and abilities citizens need to thrive online while avoiding the pitfalls of mis- and disinformation (Gagliardone et al., 2015; European Union, 2021; Rasi et al., 2019). Media literacy is defined as the knowledge, skills, and competencies that are required to access, use, analyse, create, and act upon media and to think critically about how media work, how they represent the world, and how they are produced and used (Buckingham, 2019). MIL builds on media literacy to include information literacy and is holistically described as "an interrelated set of competencies that help people to maximize advantages and minimize harm in the new information, digital, and communication landscapes" (UNESCO, 2023).

MIL education is constituted in a range of ways: as formal classroom experiences, as part of afterschool programs, as community-based programs (for instance, in libraries and community centres), and as self-directed learning in online contexts. While academic research examines the role and impact of media literacy interventions, this research mostly focuses on formal education in school classrooms or more broadly focuses on young people, rather than adults (Rasi et al., 2019). This means that far less is known about how adult MIL can be effective for different groups or categories of adults, including through both formal and informal learning.

To better understand adult media practices, skills, attitudes, and abilities in the Australian context, we designed and implemented a national survey (Notley et al., 2021). In this article we focus on a significant finding from the survey which highlights the widespread use of YouTube to access information. A total of 45% of adults said they had used YouTube in the month prior to the survey when they needed to seek information to make a decision. Our choice to focus on decision making was motivated by our desire to understand intentional information seeking. That is, we were not interested in information seeking for its own sake, but rather, information seeking for a specific purpose. The specificity of how people access information online requires that educators and policymakers, and the digital platforms themselves, respond with relevant and appropriate MIL strategies, advocacy, and initiatives. In the case of YouTube, educators need to consider not just the kind of information people access on the platform, but how the information is presented in video by contributors and how YouTube as a platform mediates the availability and visibility of information.

This paper examines existing literature about online search and information retrieval, with a focus on the use of social media, especially YouTube, and how MIL necessarily evolves in response to digital media technologies. It then goes on to provide a brief overview of our research questions and methods before presenting key findings from our survey that highlight the difference between three groups: (a) adults who reported they used YouTube to seek information when they needed to make a decision; (b) adults who did not use YouTube in the past month; and (c) adults who reported using the platform, but not for information seeking. The purpose of this analysis is to consider the need for specific MIL initiatives for those who use YouTube to seek information to help them make a decision. Finally, we discuss our findings and use these to inform possibilities for approaches to platform-informed MIL initiatives.

2. Online information seeking and media and information literacy

Academic research in the field of information science has long argued that everyday informationseeking practices are deeply embedded in people's everyday lives and their social networks (Marchionini, 1997; Sundin et al., 2017; Noble, 2018). In addition, research about online information-seeking practices shows that users ascribe reliability and credibility to information based on a range of factors. This includes an assessment about who produced and published the information (Hargattai, 2010; Pires et al., 2022), who directed them to the information (Hargattai, 2010), the number of followers a social media content producer has (Pires et al., 2022), or how highly ranked information is by search engine results (Kammerer & Gerjets, 2012; Pan et al., 2007). Other research shows that both political ideology and pre-existing beliefs (Brewer & Ley, 2012; Halpern et al., 2019) can influence people's judgements about the quality and veracity of information.

Information seeking also occurs in specific socio-technical environments. Since information-seeking has become embedded within other activities online—such as watching videos for entertainment or interacting with friends-people are now more likely than before to encounter it incidentally, while they are doing other things. The concept of "peer pedagogies" (Dezuanni, 2020) refers to instances where knowledge and skills are shared by online celebrities or "micro influencers" (Abidin, 2018) as an aspect of the content they produce for their fans (Lozano-Blasco et al., 2023). This kind of informal and incidental learning can be perceived as positive and serendipitous (Lange, 2019; Pires et al., 2022). It can also be problematic. This is particularly the case when it is influenced by the algorithmic design of digital platforms which may be informed by an individual's prior search attempts; their level of engagement with media; their geographic location; personal information about them that has been provided to or obtained by a platform (Dolcemascolo, 2016; Wardle & Derakshan, 2017; Noble, 2018); as well as by what content is being prioritised (or deprioritised) by the host platform (Crawford & Gillespie, 2016; Mohan, 2021). While algorithmically influenced information seeking can be beneficial by providing targeted and relevant information, it can also perpetuate prejudice and reinforce racism (Bishop, 2018; Noble, 2018; O'Neil, 2016), reinforce stereotypes, increase the visibility of poor-quality health information (Szmuda et al., 2020), and promote the spread of false, misleading, and malicious news about unfolding events (Vosoughi et al., 2018).

Another area of investigation that considers the links between MIL and information seeking has focused on how literacies across various modes – written and spoken, visual, moving images, audio-based media and interactive media – require an expanded understanding of the concept of literacy (Merchant, 2009; Koltay, 2011; Lankshear & Knobel, 2011). "New literacy" approaches recognise that websites and digital media platforms such as Facebook, YouTube, Instagram and TikTok require literacy practices across multiple-modes and in a multiplicity of socio-technical and cultural contexts (Witek & Grettano, 2012; Simsek & Simsek, 2013; Newman 2015; Lange, 2016; Dezuanni, 2020). Lankshear and Knobel (2011: 28-29) argue that new literacies in digital contexts – which they refer to as being "post-typographic"– are ontologically different to alphabetic and print-based communication and information contexts. Drawing this research together suggests that information seeking on a digital platform like YouTube requires a range of complex MIL-related abilities. Information is not just "sought" and used. Rather, information is constructed, deployed, and iterated and requires not just one "ability" but many abilities brought together in sophisticated ways. As Burgess and Green note:

Being "literate" in the context of YouTube, then, means not only being able to create and consume video content, but also being able to comprehend the way YouTube works as a platform, within an architecture that has affordances and constraints, and with a culture that has competing social and ethical norms and cultural conventions (Burgess & Green, 2018: 86).

The kinds of literacy outlined by Burgess and Green are not readily available as MIL knowledge and skills (Dezuanni, 2021). As they currently exist in schools, universities and libraries, MIL knowledge and skills were largely conceived of in a pre-internet context. In this pre-digital era, information gatekeepers such as publishers, journalists, and editors were generally subject to national laws and regulations and their reputation was at risk if they published false information (Bruns, 2019). Today's information gatekeepers on platforms like YouTube – often taking the form of Influencers or microcelebrities – are very different. People now need to make more frequent judgments about who and what to trust. Additionally, entertainment-focused media and information-focused media are now far more intertwined and are arguably far more collapsed on platforms like YouTube than was the case with traditional media (Hurcombe, 2022), making it more difficult for MIL educators to provide generalised instruction about how to decide who and what systems and actors to trust online.

In a more general sense, many international studies show that MIL necessarily evolves as a field of scholarship and practice as media forms and technologies change. For the past decade, scholarship has argued that media literacy is closely tied to emerging digital competences; and that new media and 72

technologies necessarily require the development of new MIL skills (García-Ruiz et al., 2014). Valverde-Berrocoso et al. (2022) demonstrate through a systematic review of literature that MIL is central to responses to misinformation in digital contexts in a range of ways.

Other scholarship shows how conceptualisations of MIL have continued to evolve in response to misinformation and fake news (Samy-Tayie, et al., 2023). It is in this tradition of recognising how MIL must evolve as technologies evolve, that the emergence of information seeking on YouTube represents an important new area for scholarly consideration. MIL must be theorised in new ways that incorporate knowledge emerging in internet studies and studies of digital media culture.

Over the past decade, YouTube has emerged as a dominant platform used for a range of media including news and information, and it is increasingly used for self-education (Barry, 2016; Burgess & Green, 2018; Pires et al., 2019). Researchers have explored how YouTube is used for information seeking in everyday life and in relation to individuals' interests, passions, and entertainment pursuits (Burgess & Green 2018; Cunningham & Craig, 2017). YouTube has also received significant academic attention as an information resource used by school or university students to supplement their education or to support them with their study or homework (Asselin et al., 2011; Bembenutty, 2011; Bhatia, 2018; Moghavvemi et al., 2018). Other research has examined students' use of YouTube to learn about issues and topics of interest outside of school or university (Lange, 2019; Cunningham et al., 2016; Pires et al., 2022). However, far less research examines how YouTube users apply critical thinking and analysis to determine the quality and veracity of informational videos and how they construct and negotiate the meaning of video content (Lange, 2019), particularly when it comes to adults. This paper contributes to this emerging body of research about how YouTube is used to seek information and it considers how platform specific research can inform the design and implementation of appropriately responsive MIL initiatives.

3. Methodology

The departure point for this paper is the finding in our survey (Notley et al., 2021) that YouTube is a 'go to' source for information for a significant number of adult Australians. We developed the following three research questions to guide our further interrogation of the data:

- RQ1: Who uses YouTube to access information when they need to make a decision?
- RQ2: Are adults who use YouTube to help them make a decision different in their critical disposition toward media engagement from people who don't use YouTube for this purpose?
- RQ3: For those adults who use YouTube to seek information, what level of media ability do they have when compared with other groups?

These research questions firstly support understanding the characteristics of those people who use YouTube in the context of decision making (RQ1) to inform the demographic focus of MIL initiatives. By interrogating this group's critical disposition toward media (RQ2) and their media abilities (RQ3), we complement previous investigations of "how" YouTube is used in the context of information seeking (Burgess & Green, 2018) to move toward understanding their level of media literacy and how best to design MIL initiatives.

Table 1. Summary respondents			
Variables		N	%
Age	18-29	771	22
	30-44	941	27
	45-59	867	25
	60+	931	27
Gender	Female	1,784	51
	Male	1,709	49
	Gender diverse	18	0.5
Education	Non-tertiary	2,632	75
	Tertiary	878	25
Total		3,510	100

The data is taken from a national online survey of Australian adults (N=3,510) conducted in November and December 2020 as part of a broader project examining MIL (Notley et al., 2021). The aim of the survey was to address a knowledge gap about adult Australian media practices, attitudes, dispositions, abilities, and needs. The survey was conducted online and administered by a large Australian panel-
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based survey provider, with the sample selected to be representative of the Australian population by using demographic quotas set according to the Australian Bureau of Statistics 2016 Census data for age, gender, State and Territories, and education level. The final dataset of responses was weighted to ensure the sample was representative across these four demographic characteristics. A summary of the final weighted respondents is provided in Table 1. The survey received ethics approval from Western Sydney University.

3.1. YouTube use

A categorical measure of YouTube use was obtained by classifying participants into a) non-users, b) general users and c) those who also used YouTube in the context of decision making. This latter group was identified by presenting participants with a list of nine online sources and asking which, if any, they had used in the past month to look up information when they needed to make a decision. The list included six generic types of sources ("government websites"; "news media websites"; "online forums"; "search engines"; "social media"; and "user reviews"), two specific platforms ("Wikipedia"; and "YouTube") and the option for participants to indicate their use of 'Other' platforms not covered by our list. Wikipedia and YouTube were provided as separate options as they consistently rank among the top 10 websites used by Australians (Tran, 2017; Alexa, 2022), yet their content is not readily accounted for by the six generic types of sources which were also provided as options. Using this measure, 45% of participants were classified as using YouTube in the context of decision making.

The remaining 55% of participants who reported that they did *not* use YouTube for decision making were classified into the two remaining categories – non-users and general users (who used the platform but not to inform their decision making) – by asking "How often did you use the following social media platforms in the past week?" YouTube was an option among these platforms, with 32% indicating they did not use YouTube and 22% indicating they had used the platform in the past week.

3.2. Critical disposition to media

To measure "how critical" the respondents were in their use of media as part of our second research question, we asked four questions about the importance they gave to related critical MIL outcomes in their lives. Whereas other media literacy studies (Orhan, 2023) have used generic scales to measure critical thinking dispositions, our interest was to develop a measure which specifically related to people's use of media. A five-point scale of importance (1=not important at all; 5=extremely important) was used to measure how important it was for respondents to: 'think about and reflect on your own media use'; 'understand how media impacts and influences society'; 'know how to recognise and prevent the flow of misinformation'; and 'know how to think critically about the media you consume'. The sum of importance scores across all four questions was used as the variable. Aggregate scores ranged from 4 to 20, with a mean of 14.8, a standard deviation of 3.2, and a Cronbach's alpha value of α =0.82.

3.3. Media ability

To investigate the media abilities of participants as part of our third research question, we used a proxy measure which asked respondents about the confidence they had in their media ability. We asked the question "Imagine a friend needs your help. How confident are you to help them with these tasks?" for 12 media activities (Notley et al., 2021). The use of an indirect question sought to reduce social desirability bias (Fisher, 1993) and it corresponds to the Norwegian Media Authority's approach to measuring abilities (Medietilsynet, 2019).

Three of the 12 items were selected as relevant to our current study's interest in the people's ability to make decisions in the context of online media usage: "Check if a website can be trusted"; "Check if information they found online is true"; and "Find information they need online". Responses were recorded using a five-point scale of reported confidence (1=Not confident at all; 5=Extremely confident). The sum confidence score across the three selected questions was used as the variable. Aggregate scores ranged from 3 to 15, with a mean of 9.6, a standard deviation of 2.9 and Cronbach's alpha value of α =0.85.

3.4. Online activity

To obtain a measure of how active participants were online, we presented people with a list of nine activities and asked which, if any, they had done in the past month. The list of activities were: "Posted something on social media"; "Liked/rated/commented on something on social media"; "Shared other people's content online"; "Created a group on social media"; "Made a video and shared online"; "Made a meme or gif and shared online"; "Made/built/modified a website, blog, vlog (video blog)"; "Shared my own music online or my edit of other people's music (e.g. by mixing tracks)"; and "Live streamed video (e.g. on Facebook Live, YouTube Live, "Live" on Instagram Stories)". The number of different activities undertaken in the past month was used as the variable. This ranged from 0 to 9, with a mean score of 2.0 and a standard deviation of 1.7.

3.5. Control variables

Age was included as a continuous control variable, while gender ("female" as reference level) and education level ("Non-Tertiary" as reference level) were both included as categorical control variables in Bayesian regression models. Table 2 provides a summary of all independent variables included in the model.

Table 2. Summary independent variables							
Variable Type Distribution							
Age	Continuous	Mean=47.0 ; SD=17.0					
Gender	Categorical	Female=55.7% (unweighted)					
Education Level	Categorical	Low/Medium=60.1% (unweighted)					
Online Activity	Continuous	Mean=0; SD=1 (scaled)					
Critical Disposition to Media	Continuous	Mean=0 ; SD=1 (scaled)					
Media Ability	Continuous	Mean=0 ; SD=1 (scaled)					

4. Analysis and findings

To assess the factors that were significant in determining who is more likely to use YouTube in decision making we applied a multinomial logistic Bayesian regression model using the brms package (Bürkner, 2017) in R. Parker et al. (2015) point to a range of advantages which Bayesian models offer over frequentist approaches – such as the straightforward nature of interpretation – with such models becoming more frequently used in social science research. The participant's category of YouTube use was treated as the dependent variable. The independent variables of online activity, critical disposition to media and media ability discussed above were standardised by conversion to Z-scores. The model was specified using diffuse priors and is detailed in Table 3. MCMC diagnostic plots on this fitted model indicated no evidence of non-convergence or autocorrelation.

Evidence ratio scores were calculated for each main effect by computing the posterior probability that the effect size is greater than zero (a one-sided hypothesis in the direction suggested by the fitted estimate) against its alternative. Model performance, measured using Area Under the Curve (AUC), achieved a score of 0.73, which indicates moderately good predictive capacity of the model to classify people's usage of YouTube according to our three categories of general user, decision-making user, and non-user of YouTube. In addition to the model being detailed in Table 4, the conditional effect size for each independent variable can also be observed in the plots in Figure 1 (see Appendix 1 at https://doi.org/10.6084/m9.figshare.22811030).

To compare people who used YouTube to seek information when they needed to make a decision with other groups, we examined this group's demographic characteristics. Among all respondents, 45% said they used YouTube to make decisions, 22% used YouTube for general purposes only, and 32% of respondents did not use YouTube (Table 3). There were differences across demographic variables such as gender, age and education. Men were far more likely to use YouTube to make decisions compared to women (53% vs 38%, X^2 (2, N=3,492)<.001). While 60% of those under the age of 35 were using YouTube to make decisions, this number dropped to 39% among those aged 35 and above (X^2 (2, N=3,510)<.001). Those with high education (tertiary and above) were more likely to use YouTube for decision making (56%) compared to those with low or medium education levels (56% vs 42%, (2, N=3,510)<.001).

Table 3. YouTube usage type by demographics, % (person residual)								
	All reconcidente	Ger	nder	Age		Educa	Education	
	All respondents	м	F	U35	35+	Low/medium	High	
For decision making	45	53 (4.74)	38 (-4.64)	60 (7.24)	39 (-4.77)	42 (-2.76)	56 (4.77)	
General use	22	21 (-0.72)	23 (0.70)	28 (3.95)	20 (-2.61)	22 (-0.58)	24 (1.01)	
Non-users	32	26 (-5.01)	39 (4.90)	12 (-11.87)	41 (7.83)	36 (3.75)	20 (-6.50)	

The multinomial logistic regression showed that each of the independent variables (Table 4) used in the model were statistically significant in predicting people's category of YouTube usage. As each variable increases, people are more likely to move from being non-users, to general users, to those who had used YouTube in the context of decision making. The strongest predictor is 'online activity', which reflects the number of different types of online activities an individual had participated in over the previous month. People who engaged in fewer types of online activities were, unsurprisingly, much more likely to be nonusers of YouTube.

The model also shows that the level of importance people give to their critical engagement with media has a smaller but significant association with the likelihood of people's YouTube usage type. Those who place greater importance on having a critical engagement with media were more likely to have used YouTube in the context of decision making. Conversely, those who place the least importance on being critical media consumers were more than twice as likely to be non-users of YouTube. Having a higher level of confidence in one's own media ability is also associated with different usages of YouTube, however, the effect size for this variable is considerably lower and is only statistically significant in distinguishing the use of YouTube for decision making from non-use of YouTube. This suggests that while people who use YouTube for decision making may be more likely to have an appreciation for and awareness of issues relevant to media and information literacy, they do not necessarily have a correspondingly higher degree of confidence in their MIL abilities.

All three control variables included in the model – age, gender, and education level – also had a significant effect on the categorisation of people's usage of YouTube. Tertiary educated people, men and younger populations all show increased likelihood of using YouTube in the context of decision making. This trend is particularly pronounced in the case of men, who are nearly three times more likely (log-odds 1.03; odds-ratio of 2.8) than women to use YouTube for decision making.

Table 4. Predicting YouTube usage type, Bayesian Multinominal Logistical Regression									
Independent Variable	Dependent Variable	Est.	Error	CI Lower	CI Upper	E/R	P/P		
Amo	General User vs Non-User	-0.04	0.00	-0.05	-0.04	Inf	1.00 *		
Age	Decision-making vs Non-User	-0.04	0.00	-0.05	-0.04	Inf	1.00 *		
Condex (Mole)	General User vs Non-User	0.67	0.11	0.49	0.85	Inf	0.67		
Gender (Male)	Decision-making vs Non-User	1.03	0.10	0.87	1.19	Inf	1.00 *		
Education Level (Tertiary)	General User vs Non-User	0.67	0.11	0.49	0.85	Inf	0.67		
	Decision-making vs Non-User	0.45	0.10	0.27	0.60	Inf	1.00 *		
Online Activity	General User vs Non-User	0.67	0.11	0.49	0.85	Inf	0.67		
	Decision-making vs Non-User	0.76	0.06	0.66	0.85	Inf	1.00 *		
Critical Disposition	General User vs Non-User	0.30	0.06	0.21	0.40	Inf	1.00 *		
to Media	Decision-making vs Non-User	0.43	0.05	0.35	0.52	Inf	1.00 *		
Media Ability	General User vs Non-User	0.05	0.06	-0.04	0.15	5	0.83		
	Decision-making vs Non-User	0.13	0.04	0.04	0.22	147	0.99 *		
Note Est=Estimate: CLL	ower/Upper=90% credible interval range:	F/R=Evidence	ce ratio: P	P=Posterio	r probability	* Indicat	es that the		

Note. Est=Estimate; CI Lower/Upper=90% credible interval range; E/R=Evidence ratio; P/P=Posterior probability. * Indicates that i posterior probability exceeds 95% for a one-sided hypothesis of an effect size greater than zero in the direction of the estimate.

5. Discussion

Our finding that 45% of Australian adults turn to YouTube to access information when they need to make a decision is significant and represents a change in how information is accessed compared to during the pre-digital media era. It suggests that we need to strive to understand the implications for MIL and that MIL must continue to evolve as individuals' media and information practices evolve. Encouragingly, our finding that those who place greater importance on being critically engaged with media are more likely to have used YouTube for decision making suggests that this group of people is likely to be positively disposed to MIL if they are provided with relevant learning opportunities. Finally, our finding that these

same information seekers do not necessarily have a high degree of confidence in their own MIL abilities suggests that efforts to improve MIL continues to be important in digital contexts like YouTube use.

It is somewhat surprising that adults who frequently use You Tube for information seeking have a higher critical disposition towards online environments, whilst simultaneously they lack confidence in their own media abilities. Drawing on media education theory suggests that this lack of confidence may be due to the distance between these users' "spontaneous" (everyday) knowledge and "scientific" (conceptual) knowledge (Buckingham & Sefton-Green, 1994). That is, these users may have confidence in their use of the online environment due to regular online participation, but they have not learnt specific concepts and ideas to allow them to confidently explain their knowledge to others, or to deeply reflect on their own participation. Drawing on Vygotsky's (1987) theorisation of learning to theorise media education and learning, Buckingham and Sefton-Green (1994) suggest scientific concepts "are characterised by a degree of distance from immediate experience: they involve an ability to generalise in systematic ways" (Buckingham & Sefton-Green, 1994: 148). This suggests MIL efforts may need to assist individuals to systematise and distance themselves from their existing media experiences. The kinds of YouTubespecific "scientific" knowledge that needs to be developed by frequent YouTube users would include knowledge about how algorithms work, knowledge about media languages, particularly visual literacies (since YouTube is a visual medium), and platform-specific knowledge, such as how communities and relationships form and are sustained on the platform and how the platform collects and uses people's data. They would also need to learn about specific issues that arise on the platform resulting from the platform's design, including issues relating to misinformation, accuracy, and fairness in processes when representing people, places, and ideas.

A consideration of how MIL knowledge must evolve to address YouTube is a clear instance of how MIL continues to change in response to new digital media and technologies, as outlined in the literature review above. To be responsive, MIL approaches must include new approaches to media and communications analysis if it is to remain relevant to contemporary media users and information seekers. An evolved form of MIL in the context of YouTube requires specific knowledge and understanding of this platform as a socio-technological system (Striphas, 2015). This means knowing about visual communication and design systems, including the visual languages associated with video-based storytelling such as how camera shots, angles, lighting, editing, animation, and sound impact meaning (Buckingham, 2013). It requires understanding of the intent and implications of online trends, memes, and micro-genres of entertainment (Abidin, 2018). It includes knowing how particular online communities circulate and socialise content and use it in relational, social, cultural, and political ways (Dezuanni, 2020); alongside an understanding of the implications of representing ideas, people, places, events, and practices in particular ways, in written and visual form (Thomson, 2019). It also includes understanding how specific platforms function to make certain kinds of experiences available (or not) to users (Nichols & LeBlanc, 2020).

In addition to the need to develop new forms of MIL knowledge and skills to respond to YouTube, it is also necessary to develop new forms of pedagogy and new sites of learning. Given that YouTube information seekers are more likely to be tertiary educated and younger, certain kinds of MIL interventions will more be appealing and effective than others. People in this user-profile are unlikely to attend formal community-based MIL education opportunities. Indeed, our survey shows that only a very small percentage of adult Australians seek assistance for MIL in spaces such as libraries and community centres, while they are far more likely to engage and learn new media skills and abilities online (Notley et al., 2021). Given this, one of the best opportunities for MIL education for these users is likely to be on the social media platforms themselves.

There are already existing examples of MIL being made available in engaging and platform-relevant ways on YouTube. For instance, Minecraft Let's Player Stampylonghead is a highly popular 'family friendly' YouTuber (with over 10 million subscribers as of Jan 2023) who complements his Minecraft and gaming videos with a series of videos about the internet, YouTube as a platform, Minecraft as a gaming company, and issues related to online safety and misinformation (Dezuanni, 2020). In essence, Stampylonghead's videos are a form of media education that targets children and young teenagers who are Minecraft fans, though these videos are not labelled this way. Another example is from YouTube pioneer John Green,

who has produced a popular Crash Couse YouTube series (with over 14 million subscribers as of Jan 2023) including "Introduction to Crash Course Navigating Digital Information #1" (Green, 2019), which addresses misinformation. This course, which is framed as an MIL initiative, was developed in partnership with Mediawise, which is part of the Poynter Institute, a non-profit journalism school, as well as with researchers from the Stanford History Education Group. The initial video in the series has over 525,000 views suggesting the series has been relatively popular. There are many other examples available that may serve as templates for how 'in-platform' MIL interventions can be made engaging for frequent YouTube users.

6. Conclusions

We recognise that the quantitative survey findings outlined in this article provide just one way to inform the design and delivery of MIL interventions for adults who use YouTube to inform their decision making. Nonetheless, the data reveal significant and important insights about the needs and practices of adults who use YouTube to inform their decision making, being highly significant given that they result from a robust and large sample of the Australian adult population. Future research should examine MIL initiatives more systematically on YouTube. This research should consider the pitfalls, challenges, and benefits of implementing MIL initiatives on commercial social media platforms in partnership with influencers and other actors who already have a large following of engaged users. In addition, qualitative research can extend the findings by understanding how adults use YouTube to make decisions including how they critically analyse information that is embedded within video and how they combine this with other data and knowledge sources.

The survey findings presented in this paper show that YouTube is used widely by adult Australians to seek information and to inform decision making, especially among younger, well-educated, and male adults. While the survey suggests that these YouTube users are more likely to have a stronger disposition toward critical thinking and be more active online, they are not more likely to be confident in their own media abilities than people who used YouTube but not to inform their decision making. To be relevant, effective, and meaningful, MIL education efforts need to be informed by people's actual information seeking and media use. Regardless of where information comes from, or what form it takes, people need to be able to carry out critical analysis and to make timely and reasoned judgements about whether the information is reliable and trustworthy.

We suggest that MIL efforts need to be both context and technology specific. This is essential because the shift from "spontaneous" to "scientific" knowledge necessary for MIL to be developed (Buckingham & Sefton-Green, 1994), requires specificity and contextual nuance. In addition, the places and spaces where MIL learning takes place are highly relevant and important. Formal and informal MIL Initiatives available on YouTube suggest that efforts are more likely to be successful when they address specific audiences in ways that are familiar and accessible and which are embedded in community cultural norms and practices. This requires careful and well-designed interventions that ring-true to different groups or categories of users.

Authors' Contribution

Idea, T.N., M.D., S.C., S.P. Literature review (state of the art), T.N., M.D., S.P. Methodology, S.C., S.P. Data analysis, S.C., S.P. Results, T.N., S.C., S.P. Discussion and conclusions, T.N., M.D. Writing (original draft), T.N., M.D., S.C., S.P. Final revisions, T.N., M.D., S.C. Project design and sponsorship, T.N., M.D., S.P.

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Social web and photojournalism: User-generated content of the Russo-Ukrainian war



Web social y fotoperiodismo: Contenido generado por el usuario en la guerra ruso-ucraniana

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ABSTRACT

The research is focused on the emerging practices of digital photojournalism in war contexts, in relation to the use of usergenerated content from social networks. The focal point is the coverage of the Russo-Ukrainian conflict by the two main online newspapers of the belligerent countries: Ukrayinska Pravda and Rossiyskaya Gazeta. From the analysis of an initial sample of 7,194 articles (6,646 Ukrainian and 548 Russian), published during the first semester of the war, the preferred type of graphic content and the degree of presence of images from the different social platforms will be determined. Likewise, the article offers a theoretical innovation on the current state of the routine of war digital photojournalism, introducing the definition of the concept of "false collective source" due to the appropriation of mechanisms of collective intelligence for potential propaganda purposes. The informative use of the social web has generated a transition from "gatekeeping" to "gatewatching" that makes it necessary to review the state of the art to avoid a possible instrumentalization of the role of users. Finally, a decalogue is proposed to combat digital illiteracy and identify new appropriation practices, by distinguishing the use of the social web as an information source versus its use as a mere distribution channel.

RESUMEN

La investigación enfoca su interés en las prácticas emergentes del fotoperiodismo digital en contextos bélicos en relación con el uso de contenidos generados por usuarios desde las redes sociales. El estudio se centra en la cobertura del conflicto rusoucraniano por parte de los dos principales diarios digitales de los países beligerantes: Ukrayinska Pravda y Rossiyskaya Gazeta. A partir del análisis de una muestra inicial de 7.194 artículos (6.646 ucranianos y 548 rusos), publicados durante el primer semestre de la guerra, se determinó el tipo de contenido gráfico preferente y el grado de presencia de imágenes procedentes de las distintas plataformas sociales. Asimismo, el artículo ofrece una aportación de innovación teórica sobre el estado actual de la rutina del fotoperiodismo digital bélico, introduciendo la definición del concepto de «falsa fuente colectiva» como resultado de la apropiación de mecanismos propios de la inteligencia colectiva con fines potencialmente propagandísticos. El uso informativo de la web social ha generado una transición del «gatekeeping» al «gatewatching» que requiere una revisión del estado de la cuestión con el fin de evitar una posible instrumentalización del papel del usuario. Por último, se plantea un decálogo para combatir la desalfabetización digital e identificar las nuevas prácticas de corte apropiacionista, mediante la distinción del uso de la web social como fuente informativa frente a su utilización como mero canal de distribución.

KEYWORDS | PALABRAS CLAVE

User-generated content, digital illiteracy, war photojournalism, collaborative journalism, post-truth, and social networks.

Contenido generado por el usuario, desalfabetización digital, fotoperiodismo bélico, periodismo colaborativo, posverdad, redes sociales.



1. Introduction and state of the art

In an era marked by the global fight against disinformation, this study examines the status of photojournalism in relation to the incorporation of User-Generated Content (UGC). The growing concern about the dissemination of false images through the Internet is a consequence of the influx of Web 2.0 in the dynamics of production, access, and distribution of visual information through the media in the last two decades (Kümpel & Springer, 2016; López-García et al., 2017). Infoxication and media overload in the face of the overexposure of images on the web calls for a profound revision of the role of informative photography in the post-digital era, especially in the case of war conflicts (Zelizer, 2005; Griffin, 2010; Khaldarova & Pantti, 2016). Recent studies on the risks and opportunities of collaborative journalism have focused on the need to refine data verification practices and techniques in the face of the growth of Web 3.0 (Carson & Farhall, 2018; Ballesteros-Aguayo et al., 2022). However, as Benaissa Pedriza points out, "no quantitative research has been found that specifically analyzes the use, presence, and relevance of content published in social networks as a source of journalistic information" (2018: 17).

Within 2.0 sources, Canavilhas and Ivars-Nicolás distinguish contributions from blogs and microblogs, forums or mailing lists, chats, wikis, multimedia repositories, and social networks. According to their research, Web 2.0 sources are based on the "contribution of collective intelligence and, in this sense, are predominantly unofficial" (2012: 65). In the present research, we will examine whether this premise is fulfilled in the case of the presence of social networks in the photojournalistic coverage of the Russo-Ukrainian war by the two leading digital media in the belligerent countries: Ukrayinska Pravda and Rossiyskaya Gazeta (Similarweb, 2023a; 2023b).

As Pavlik (2001) points out, the use of the Internet has introduced new ways of searching for information, contacting unofficial sources, and finding expert sources. The incorporation of social networks into journalistic practices entails the introduction of new models of information production (Hedman & Djerf-Pierre, 2013; García-Avilés, 2014) and the need to distinguish between their role as sources of journalistic information (Gans, 2004) or as distribution channels (Janssen Observer-FAPE-ANIS, 2017). Within the so-called "reciprocal journalism" (Lewis et al., 2013), based on the development of a horizontal relationship between journalists and users in the exchange of information and opinions (Paulussen & Harder, 2014), it is necessary to distinguish valuable information from rumors and disinformation.

The current trend in the use of UGCs is to resort to these sources of information when it is impossible to contact official sources (De-Keyser & Raeymaeckers, 2012). This situation is increasingly common in photojournalistic coverage of crisis situations. However, informative monitoring through the screen entails a lower diversity of sources and the risk of spreading "fast news" (Sacco & Bossio, 2015). Likewise, this research raises the risks involved in the appropriationism of the collective intelligence dynamics by the official sources.

1.1. From "gatekeeper" to "gatewatcher". Towards collaborative journalism?

Nowadays, the power of images lies in their appropriation and distribution by Internet users. The user, who has become a "produser" (Bruns, 2008), not only consumes information but also assumes a more active role, interacting and contributing to the production and viralization of hypermedia information (Parra, 2017; Sabés & Parra, 2014; Marchionni, 2013). New ways have opened the production (Hermida & Thurman, 2008), consumption (Casero-Ripollés, 2012), and distribution of content (Fernández-Castrillo, 2014), which have contributed to blurring the distinction between reporting and covering events (Kermani, 2018). According to Sánchez and Martos, "we are currently witnessing a continuous, personalized and participatory journalism with multimedia capabilities, which acquires its identity on the Web". In this open and interactive sphere, the former differentiated roles between sources, producers, and consumers of news and information are eroding, and the continuous flows of content can no longer be owned or controlled (Heinrich 2012; Hermida 2013). The shift from a "one-to-many" to a "many-to-many" communication model (Jahng & Littau, 2016; Newman, 2009) has made social networks the primary means of accessing information for most users (Tranche, 2019; Sánchez, 2016). In some cases, the media simply reproduce what is viralized on the World Wide Web, without providing information about

the difference between who creates, edits, and distributes the images. This confusion of roles carries a high risk of engaging in disinformation practices when primary sources are not contrasted or the difference between authorship and distribution of content is not identified. According to data from the 2022 Edelman Trust Barometer, the issue of disinformation and fake news ranks among the top concerns of the world's population, being a cause for concern for 76% of respondents. In addition, 46% of participants view the media as agents of societal disintegration and place journalists among the least trustworthy groups. In the ranking of the country's main problems, the Spanish population places the role of the media and social networks (disinformation, manipulation, and the spread of hoaxes) ahead of housing and the environment (CIS, 2022).

According to Bruns (2003), in the online environment, the overabundance of content has led to an evolution of the role of the journalist from "gatekeeper" to "gatewatcher". That is, a function based not so much on filtering or blocking data or images, but on "content curation" (Stanoevska-Slabeva et al., 2012; Loo et al., 2015), through the selection and dissemination of mostly foreign information. While in the first modality, the information may come from any type of source, the second typology includes only the contents available through the Internet.

On the other hand, the blurring of the role of the user as a source of information –due to the proximity and immediacy in the absence of the journalist and in favor of a pluralistic view of reality– can lead to a single discourse camouflaged behind an apparent collective creation of knowledge. In other words, the growing presence of institutional sources in social networks can overshadow UGCs, representing a setback in the progress achieved by collective journalism. Another of the great challenges of photojournalism today is that of authorship, "(...) from the illegal copying and distribution of an author's images to the lack of attribution, that is, the absence of citation of the author of the image" (Robles, 2020: 419). The editing and viralization of images made by others belong to the field of distribution and never to that of authorship, two categories that tend to be confused due to the tyranny of immediacy in the dissemination of news, especially in the context of war.

1.2. The social web in the coverage of the Russo-Ukrainian war

Previous research highlights the dominant role of Russia in the use of propaganda and disinformation (Helmus et al., 2018; Tarín et al., 2018; Van-Herpen, 2016). On the other hand, Olivares-García et al. (2022) argue that in the first thirty days of the Russo-Ukrainian war of 2022, Ukraine controlled the narrative of the conflict from social platforms, largely thanks to the contribution of the Ukrainian president himself from his Instagram and Telegram profiles. According to this research group, "Zelensky uses social networks as a means of information to disseminate images of the destruction of his country and to connect with his people in a direct way, beyond the information that traditional media can provide through the press, radio, or television" (Olivares-García et al., 2022: 5). In their study, they highlight the scope and effectiveness of this strategy based on the use of social networks from two main factors: first, the fact that during a conflict, the means of journalistic production may be limited –or even unavailable at certain times–; and also because the reporting of events through the social networks makes it possible to completely control the narrative without having to rely on the cooperation of journalists and –more specifically– media editors.

A survey on perceptions of media coverage of the Russo-Ukrainian war at the beginning of the conflict –conducted by the British research agency YouGov for the Reuters Institute's Digital News Report 2022–gathered important data on the presence of social media as a source of information. Between 29th March and 7th April 2022, a total of 1,000 people from five different countries –based on their proximity to the conflict – were interviewed. The main findings include a low level of trust in the media's perspective on the conflict –especially among the younger generations– and the fact that, although television is still the main medium through which citizens learn about the war, most information is consumed online –whether from media websites, non-mainstream websites, or social platforms– (Newman et al., 2022).

In the YouGov study, geographic proximity was one of the factors that determined the results obtained. Fahmy and Kim (2008) also suggest that patriotism predominates in media coverage of war conflicts when the journalists' country of origin is involved in the conflict. Similarly, in their research on the Iraq War, they pointed out that "news coverage of international events tends to favor government voices"¹ (Fahmy & Kim, 2008: 447), although the media do not always systematically support their governments' foreign policies. According to Mast and Hanegreefs (2015), "amateur" images gain presence and "discursive authority" in times of crisis, especially when they are repurposed by the media. In "the contemporary digital, image-saturated media ecology, the range of visual content generated and disseminated by media-savvy bystanders and participants has expanded significantly, invigorating the 'mediatization' of war conflict and human suffering in the process" (Mast & Hanegreefs 2015: 594). In the analysis of the photojournalistic content coming from the social networks that are the object of this study, we will see if the "hierarchy of credibility" (Becker, 1967) is replicated in the selection of sources by journalists, with the consequent prevalence of official sources –politicians and senior public figures– over unofficial sources –in this case, users, or anonymous citizens– and professional sources –war reporters, agencies, and media–.

2. Objectives and hypothesis

This research focuses on the use of graphic resources from social networks in the digital newspapers Rossiyskaya Gazeta $(RG)^2$ –an official organ of the Russian government founded in 1990 by a decree of the Supreme Soviet of the Russian Soviet Federative Socialist Republic– and Ukrayinska Pravda $(UP)^3$ –founded in 2000 by Georgiy R. Gongadze– during the first half of the conflict. We analyzed the uses and functions that content generated and distributed by non-professional sources through social networks have in the published news through four phases: quantitative analysis of the use of social networks as a source of graphic content for news production; determination of the preferred type of graphic content; study of the importance of content generated by unofficial social networks –influencers, ordinary citizens and anonymous profiles– and official social networks –state leaders and officials, public administrations, police, civil protection, etc.– compared to content generated by journalists; and study of the differences in the use of the social web as a source of information versus its use as a mere distribution channel. The initial hypotheses are:

- H1. The photojournalistic coverage of the Russo-Ukrainian war by the studied newspapers with content from social networks gives priority to graphic content distributed and created by non-professional profiles (institutional, political-military and UGC).
- H2. There are significant difficulties in determining the authorship of much of the graphic content since the real author of the content is confused with the distributor.
- H3. Despite the changes in information consumption and the proliferation of different hypermedia resources, most of the graphic content coming from social platforms for news production is photography.

Finally, we propose a decalogue for the development of photographic fact-checking tools to avoid visual infoxication in connective environments.

3. Material and methods

3.1. Sample and design

The sample corpus consists of 7,194 news articles about the Russo-Ukrainian war with content from social media platforms (6,646 Ukrainian and 548 Russian) published during the first semester of the conflict in UP and RG. Web scraping technique was used to select the sample, and "R" was used as the programming environment to acquire and process massive data sources. Following previous studies which focused on the interaction between social media and information published in the digital press (Broersma & Graham, 2013; Paulussen & Harder, 2014; Mast & Hanegreefs, 2015; Benaissa Pedriza, 2018), the research methodology employed was based on content analysis with a mixed approach, combining qualitative and quantitative analysis of the data obtained, as we believe that the triangulation of these perspectives allows a better understanding of the journalistic messages.

3.2. Data acquisition and procedure

We began by tracking all news articles published between February 24 and August 24, 2022, that explicitly referred to the conflict and contained the terms "Facebook", "Instagram", "Rutube", "Telegram",

"TikTok", "Twitter", "VK", or "YouTube" either in the headline, caption, or body of the article. The selection criteria of these social platforms correspond to the data of DataReportal (2023a; 2023b)⁴ and Statcounter (2023)⁵, which rank them as the most popular in Russia and Ukraine. Thus, 7,194 articles with content from at least one of the mentioned social networks were detected. The second part of the study consisted of a quantitative analysis of those articles with graphic resources (videos, photos, maps, illustrations, collages, and infographics) from the social networks. Based on the results obtained, the typology of this content was categorized to identify the majority type of graphic content and the most-used social networks. The categories for classifying each article are exclusive; only one category was assigned to each article, based on the type of prevalent social web content. When the number of multimedia elements was equal, the article was classified based on the arrangement of the content within the news body, prioritizing the one closest to the headline, which has greater visual prominence.

Finally, we conducted a qualitative analysis of the non-professional social media photos (2,532 articles from UP and 135 from RG) from the predominant social platforms in each medium (Telegram and Facebook in UP and Telegram and VK in RG), as these were the predominant sources used to illustrate the news. Based on research using probability sampling methods for media content analysis (Kim et al., 2018; Lacy et al., 2015), a manageable representative sample of 334 UP and 101 RG articles was calculated. The articles to be analyzed were selected by applying simple random sampling through Random.org to avoid any bias in the selection. The Google Lens and InVID tools were used to investigate the authorship of the images in these articles.Below, we present the coding scheme with the most significant variables applied in this study:

- Medium: UP; RG.
- Type of content: photography; video; video capture; full video and screenshot; text; others (infographics, maps, collages, and illustrations).
- Social network: Facebook; Instagram; Rutube; Telegram; Twitter; VK; YouTube; unspecified.
- Distribution source: journalist; unofficial social network or UGC; official social network (institutional and political-military); unspecified.
- Authorship: journalist; unofficial social network or UGC; official social network (institutional and political-military); unspecified.
- Theme: political actors; combat actions; weapons; destruction; armed forces; victims; civil society; resource images.
- Photo caption: contains; does not contain.

4. Analysis and results

According to the analysis of the sample (N=7,194), the results are consistent with previous research and indicate that Telegram is the social network preferred by both newspapers as a source of graphic and textual information about the war (Fernández-Castrillo & Ramos, 2023). News articles containing Telegram content make up 48.15% of articles in UP and 62.22% in RG. In UP, Facebook content also stands out (42.86%), while in RG, YouTube (19.16%) and VK (15.14%) content prevail. Regarding the type of content, in 57.58% of cases in UP and 92.33% in RG, journalists turn to social media in search of graphic resources for news coverage (Tables 1 and 2).

Table 1. Ukrayinska Pravda's typology of social network content										
Social network	Photo	Text	Video	Full video and screenshot	Video screenshot	Others	Total			
Facebook	1,473	1,003	171	102	30	70	2,849			
Instagram	22	5	6	0	3	0	36			
Telegram	1,161	1,572	172	65	111	119	3,200			
Twitter	94	165	32	22	2	19	334			
YouTube	2	72	81	37	26	0	218			
N/S	7	2	0	0	0	0	9			
Total general	2,759	2,819	462	226	172	208	6,646			

In UP, photography is the main graphic content, accounting for 72.09% of articles that include visual resources from social networks (n=3,827 articles with graphic material). In addition, when journalists of the Ukrainian newspaper reproduce textual information –quotes and literal statements– from social platforms (n=2,819), they turn to official social networks (institutional and political-military) in 86.37% of

cases (Table 3), thus reproducing the direct discourse of the administration. Video predominates in RG (49.27%), followed by photography (29.74%). It is significant that more than half of the recorded YouTube videos have restricted access and can be viewed only from Russia.

Table 2. Rossiyskaya Gazeta's typology of social network content										
Social network	Photo	Text	Video	Full video and screenshot	Video screenshot	Others	Not available	Total		
Instagram	2	0	1	0	0	0	0	3		
Rutube	0	0	9	0	0	0	0	9		
Telegram	144	41	144	0	2	3	7	341		
Twitter	3	0	0	0	0	0	0	3		
VK	10	1	72	0	0	0	0	83		
YouTube	0	0	44	1	9	0	51	105		
N/S	4	0	0	0	0	0	0	4		
Total	163	42	270	1	11	3	58	548		

The results show that journalists give priority to non-journalistic profiles when extracting content from the social web (89.18% in UP and 56.93% in RG). Within the non-journalistic sources, we found differences between the two media (Table 3). In UP, national official social networks predominate (institutional, 47.66%; and political-military, 38.77%), with profiles such as that of the General Staff of the Armed Forces, cited 761 times; the Governor of Lugansk, Sergei Gaidai (333); the State Emergency Service (206); or the Governor of Donetsk, Pavlo Kyrylenko (183). Thus, the "hierarchy of credibility" of sources is respected, with journalists giving more weight to the content of official sources' social platforms than to that of UGCs. In RG, unofficial social networks or UGCs stand out (36.67%), with generally impersonal and pro-nationalist profiles such as the Telegram channel @ogilvi (30); @milinfolive (19) or @RVvoenkor (17). In both cases, national sources are privileged, which warns of the undirectionality of the journalistic coverage of both digital newspapers, reinforcing the discourse of their governments in times of war.

Table 3. Social networks source classification									
	Institutional	Political-military	UGC	Professional	N/A	Total			
Rossiyskaya Gazeta									
Photo	14	10	111	22	6	163			
Video	36	10	84	140	0	270			
Full video and screenshot	1	0	0	0	0	1			
Video screenshot	0	0	1	3	7	11			
Text	20	17	1	4	0	42			
Others	3	0	0	0	0	3			
Not available	0	0	4	3	51	58			
Total	74	37	201	172	64	548			
Ukrayinska Pravda									
Photo	1,402	1,054	76	131	96	2,759			
Video	225	140	32	65	0	462			
Full video and screenshot	110	63	11	41	1	226			
Video screenshot	55	58	10	44	5	172			
Text	1,264	1,171	52	332	0	2,819			
Others	112	91	1	4	0	208			
Total	3,168	2,577	182	617	102	6,646			

For the thematic analysis and the study of differences between distributor and author, we focused on the analysis of photographs from non-professional social networks (2,532 articles from UP and 135 from RG), as these are the predominant visual sources in both media.



Note. From left to right: photo associated with Zelensky by UP, while its real author is Ronaldo Schemidt the General Staff of the Armed Forces of Ukraine, its real author Ivor Prickett (The New York Times).

It was observed that photographs of "weapons" predominate in RG (52.47%), distinguishing between Ukrainian weapons and armored vehicles captured as "trophies" by the Russian army (49.05%) and those

of Russian weaponry (50.95%). This is followed by photographs of "destruction" (20.80%), focused on the damage caused by Russia to enemy military equipment; "armed forces" (16.83%); "political actors" (3.96%); "resource images" (3.96%); and "victims" (1.98%). In UP there is an opposite representation centered on images of "destruction" (43.41%) caused by the Russian army. As for the protagonists, "armed forces" (13.47%) and "political actors" (13.47%) stand out, whose representation is focused on the Ukrainian side. Other categories in descending order are "resource images" (8.08%), "weapons" (6%), "civil society" (6%), and "combat actions" (5.38%). As with RG, the minority representation of "victims" (4.19%) –Ukrainian dead and wounded– is significant.

Some 91.05% of RG photos have no caption because they are embedded content directly from the social web. The remaining images (8.95%) are accompanied by a non-explanatory caption that only identifies the distributing source. In UP, 45.50% of the articles have captions that refer only to the source and 8.47% refer to the "illustrative" function of the images. In this regard, it is noteworthy that 72.45% of UP articles with a preponderance of photographs include a single image, which points to the illustrative rather than the narrative function of photography in the Ukrainian newspaper, which brings photography closer to decorative rather than informative purposes.



Note. Photograph from the General Staff of the Ukrainian Armed Forces, which does not reveal the photographer's identity.

On the other hand, the source of distribution can be identified in 98.6% of the articles in UP and 88.32% in RG (Table 3), but it was not possible to identify the authorship of 56.43% of the images in RG and 41.31% in UP. In addition, the identification of the authorship of the photographs is partial, generally attributed to the corresponding organizations or media (Figure 2) and, to a lesser extent, to the individual author of the photographs (2% RG and 5.08% UP).



Note. Photo from the Ministry of Defense of Ukraine, published in 2018 and used by UP as current by extracting it from the Facebook page of "KB LUCH".

5. Discussion and conclusions

Based on the results obtained, we confirm that, in the hierarchy of news content, images generated by users still rank above audience comments (Mast & Hanegreefs, 2015), but in no case do they reach the visibility of institutional sources. The initial hypothesis about the predominance of unofficial 2.0 sources is only fulfilled for RG, since official ones are prioritized in UP. In the case of the Russian media, the UGCs belong to nationalist profiles –generally anonymous accounts–, and it should be borne in mind that this is an official body. Therefore, what we have before us is the reproduction of the old informational selection system camouflaged under a co-creative appearance.

Regarding H2, the results reflect a lack of journalistic discipline in both media regarding the authorship of the images, in terms of copying, unauthorized distribution, and lack of attribution. The indeterminacy between the figures of producer and distributor gives rise to appropriation practices in which authorship is associated by default with the person who edits and distributes the photographs instead of being attributed to the original creator of the content. As for H3, despite the proliferation of a wide range of hypermedia resources, the fixed image continues to lead the graphic content. Also, the use of social networks in the photojournalism coverage of the Russo-Ukrainian war is part of the professional routine of the newspapers analyzed and focuses on the clipping of graphic resources for creating news about the war (57.58% of the articles in UP and 92.33% in RG).

One of the main findings of this research lies in the lack of transparency on the part of UP and RG in relation to visual content authorship. This alerts us to the unverifiable nature of a large part of the photographs taken from the social web. It is probable that those images in which the authorship is not specified (56.43% of the images of RG and 41.31% of UP) are non-professional photographs taken mainly by military personnel, emergency and State security services, and local residents –that is, we presuppose, due to the quality of the images, the vertical format (presumably taken from mobile devices) and the difficulty of accessing some of the locations–.

This reality requires the accomplishment of a series of measures to fight against digital illiteracy both on the part of professionals and users to promote the use of social networks as a source of information instead of merely a distribution channel:

- Insert an explanatory caption including the author, distributor, place, date, circumstances in which the photograph was taken, alterations or cuts.
- Distinguish between authorship and distribution.
- Incorporate original content that includes EXIF ("Exchangeable Image File Format") data in order to prevent the images from losing relevant information about the capture (geolocation, time, camera properties, etc.).
- Include hyperlinks to the original post of the image.
- Verify the origin of the images by using visual content fact-checking tools (for example, Google Lens and InVID).
- Support documentary photography of a narrative type to face the rise of "photo-news" or "photoillustration".
- Require ethical responsibility from those people and entities that participate in the selection, search, and dissemination of photographs.
- Take care of the relationship with users by promoting co-creative dynamics based on transmedia communication. It requires an update of the information verification processes.
- Retrieve the graphic editor instead of reinforcing the role of the "multitask" reporter.
- Develop media-digital literacy initiatives that provide a basic knowledge of the elements of visual language both to the public and to professionals.

This new media ecology requires a more active role from the user, who is implicitly displaced by the duty to evaluate and corroborate the quality of a wide – even unfathomable – range of information on offer. In future research, it is intended to delve into the proposal of edu-communicative guidelines for the prevention of this modus operandi based on the presumption of a high level of digital literacy of citizens in hypertextual skills that generates a "media hyper-responsibility". It also relegates the function of the journalist to that of a mere intermediary between primary sources and users. Based on the data collected, we verified that the

presence of the social networks in the photojournalistic coverage of the Russo-Ukrainian war corresponds to the category of a feigned collaborative journalism. The UGC is still a minority, overshadowed by what we call «false collaborative sources», consisting of the appropriation of the Social Web by part of institutional sources to reinforce their messages through the colonization of the fifth estate.

Notes

¹The paper has been translated from the original version by Harvey Holtom, official translator at the Department of Communication and Media Studies (UC3M).

²Visits Rossiyskaya Gazeta last quarter 2022/23: November 35.6 million; December 36.1 million and January 40.6 million. (https://bit.ly/3kgmpwh).

³Visits Ukrayinska Pravda last quarter 2022/23: November 70 million; December 66.5 million and January 65.9 million (https://bit.ly/3xJ4IOA).

⁴Social networks most used in Russia by January 2023: VK (75.3%); WhatsApp (71.5%); Telegram (64.4%); Odnoklassniki (43.5%); TikTok (42.6%); Instagram (24%); Skype (11.7%); Facebook (7%) and Twitter (5.7%), among others (http://bit.ly/3xL9JRg).

⁵Social networks most used in Ukraine by January 2023: Facebook (42.67%); Twitter (13.39%); Instagram (13.29%); YouTube (8.54%) (http://bit.ly/3SmERjx).

Authors' Contribution

Idea, C.F.C., C.R.; Literature review (state of the art), C.F.C.; Methodology, C.F.C., C.R.; Data analysis, C.R.; Results, C.F.C., C.R.; Discussion and conclusions, C.F.C., C.R.; Writing (original draft), C.F.C., C.R.; Final revisions, C.F.C., C.R.; Project design and funding agency, C.F.C.

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Incidences of artificial intelligence in contemporary education

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Incidencias de la inteligencia artificial en la educación contemporánea

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ABSTRACT

The term "Artificial Intelligence" was coined in 1956 at a conference at Dartmouth College and since then it has undergone constant development and has evolved radically. Prominent pioneers of the term include John McCarthy, Marvin Minsky, Allen Newell, and Herbert A. Simon. The application of Al in education worldwide has increased dramatically with its importance growing at an increasing rate. The objective of this research is to bibliometrically analyze applications of Al in contemporary education. The methodology includes a Prisma of the articles of three fundamental databases: Scopus (n=390), Mendeley (n=113), and Science Direct (n=3,594). A total of n=4,097 articles in English and Spanish were analyzed. The systematic literature review of recent works employed a mixed approach using quantitative and qualitative methods. It was inferred by the authors that Al is revolutionizing education by offering personalized and efficient solutions to improve students' learning. One of the main conclusions of this research is that in contemporary education, students are one of the groups that are most affected by Al. Furthermore, the human intelligence of teachers plays a fundamental role since they adapt their methodologies to leverage new technologies. Finally, it is worth noting that decisions made in schools and universities support new educational models based on technology.

RESUMEN

El término «Inteligencia Artificial» fue acuñado en 1956 en una conferencia en Dartmouth College, y desde entonces, este ha experimentado un desarrollo constante y ha evolucionado de manera significativa. Algunos de los pioneros más destacados incluyen a John McCarthy, Marvin Minsky, Allen Newell y Herbert A. Simon. La aplicación de la inteligencia artificial en la educación ha aumentado considerablemente a nivel mundial en la dinámica era digital. El objetivo de la investigación es analizar bibliométricamente las incidencias de la IA en la educación contemporánea. La metodología contiene un Prisma de tres bases de datos fundamentales Scopus (n=390), Mendeley (n=113) y Science Direct (n=3.594), para un total de n=4.097 artículos en idioma inglés y español. La revisión sistematizada de la literatura reciente tiene un enfoque mixto, cuantitativos y cualitativos empleando varios paradigmas de la investigación en función del objetivo, se obtiene que la IA ha revolucionado la educación, ofreciendo soluciones personalizadas y eficientes para mejorar el aprendizaje de los estudiantes. En las principales conclusiones se plantea que en los términos teóricos de mayor impacto están los estudiantes como elemento principal de la IA de la educación contemporánea. Por otra parte, los profesores juegan un papel fundamental en este proceso a través de sus metodologías y el uso de estas tecnologías. Así mismo están los currículos educacionales mediante la toma de decisiones en los colegios y universidades que están apostando por nuevos modelos tecnológicos educativos.

KEYWORDS | PALABRAS CLAVE

Artificial intelligence, education, contemporary, e-learning, online teaching, deep learning. Inteligencia artificial, educación, contemporáneo, aprendizaje electrónico, enseñanza en línea, aprendizaje profundo.

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1. Introduction and state of the art

Artificial intelligence (AI) has a profound impact on everyday life. AI is used in different high-stake applications, for example, healthcare, business, government, education, and justice, leading toward a more algorithmic society (Kaur et al., 2022). The influence of algorithms is increasing through its growing presence in most domains, without being noticed and sometimes usurping the identity of other social actors (Garcia-Orosa et al., 2023). The use of AI systems in educational contexts is showing potential opportunities for its use by teachers and students (Flores-Vivar & García-Peñalvo, 2023), enhancing new didactic models.

The use of digital games in learning and early identification of dropout risk in higher education by incorporating AI are critical research topics (Bañeres et al., 2023). In addition, the adoption of AI in educational applications can enhance students' learning competencies and is significant in knowledge-sharing processes across different sectors (Alhumaid et al., 2023) and for epistemic network analysis (Wang et al., 2023). To improve student engagement and motivation, scholars suggested using an AI-based educational data mining approach that enables early recognition and development of personalized recommendations in the flipped classroom (Sayed et al., 2023; Huang et al., 2023).

1.1. Artificial intelligence in education

Al performance prediction modeling is widely used to identify at-risk students and consequently establish student-centered learning pathways, and optimize instructional design and development (Ouyang et al., 2023). Alternatively, it is necessary to reflect on AI, chatbots, and plagiarism in higher education (King & chatGPT, 2023). The above tools, if misapplied, will not develop knowledge, professional competencies, or critical thinking skills, which are vital in diverse professions.

The personalized intelligent manufacturing paradigm with cognitive automation capabilities (Li et al., 2023) has attracted increasing attention by offering an adaptable and flexible solution. The paradigm leverages the advantages of both deep neural networks and reinforcement learning by adopting the power of representation learning, to make accurate and fast decisions when faced with dynamic and complex situations.

This intelligence system develops foresight science with a systematic approach to generate future predictions in planning and management using analytical and predictive tools to understand the past and present (Ednie et al., 2023), while providing information on the future of education. The adoption of appropriate practices using Al-enabled techniques facilitates teaching and learning performance in higher education (Hua-Hu, 2023).

The analysis of learning tactics and strategies in an online environment (Lahza et al., 2023) is a form of pedagogical support for collaborating with students in the development of academic-related content. Analysis of learning tactics is emerging as a viable approach to engage students in higher-order learning. In all the above instances, ethical considerations of Al must be considered (Sun & Ye, 2023). One of the ultimate challenges in philosophy is therefore, determining what deserves moral regard.

Digital explosion and entrepreneurship education is having an impact on promoting entrepreneurial intent for business students (Dabbous & Boustani, 2023) and thus, empowering AI as a form of entrepreneurship. Adoption of AI-based teaching robots (T-bots) for learning using the technology adoption model and context-specific variables (Hussain, 2023) aligns with education efforts in fostering intelligent decisions.

It has become essential for today's learners to gain basic literacy and Al competencies, yet educators do not care about these era-defining trends in contemporary pedagogy (Chai et al., 2023). According to Zhen et al. (2023), virtual technology is widely employed in various sectors such as personal assistance, intelligent customer service, online in various educational modalities and for assessing physical activity in high school children (Ahmed et al., 2023), data visualization, augmented reality, and virtual reality (Cerqueira et al., 2023).

An informed perspective of learning through AI raises concerns on how to train users in handling changes brought about by the introduction of the technology (Arbelaez-Ossa et al., 2023; Ursani & Ursani, 2023). The future of standardized assessment, validity, and confidence in assessment and

scoring algorithms (Aloisi, 2023), therefore considers challenges of using AI to aid standardized high-risk assessment.

1.2. Artificial intelligence software applied in education

Among the Al tools applied in online education are special types of software. English teaching and learning in this information age should be carried out with the help of intelligent system software to counter the disadvantages of the traditional system of teaching and learning (Dong, 2022). According to the current circumstances of teaching in addition to learning, semantic Web technology and Al technology are combined to build an advanced system of teaching and learning.

In the context of AI, scientific research practice has been simplified in terms of technological form and content, that limits students' ability to comprehensively apply technology. The above-mentioned scenario, therefore, becomes an obstacle in the development of superior technological features in the context of AI (Hu et al., 2023). Online and adaptive learning has already advanced within academia. However, the most significant changes are yet to come. These evolving technologies have the potential to change traditional roles in colleges and universities to the point where many educators will reconsider their roles as teachers, researchers, and administrators (Picciano, 2019).

The future of higher education and education through online technology, specifically adaptive learning and analytics infused by AI software, is increasingly developing as part of teaching methodology. Transformation of educational concepts, reform of teaching courses, and reorganization of teaching materials are critical ways to strengthen the quality of contemporary education through AI (Zhou, 2023). This is related to the development of teaching materials suitable for various regions and schools to deepen students' understanding and enhance their interest in courses.

It also serves to make decisions in application domains such as justice, health care, and education (Hort et al., 2023) and as deep learning systems trained to read, classify, and respond to human emotions (Ho et al., 2023). Computer-assisted instruction also has some degree of lock-in. The use of Al causes students to learn passively, without goals, education, and guidance (Shen & Tan, 2023). Based on the above scenarios, there are models for evaluating the effectiveness of Al-based computer-assisted physical education teaching and training, which help to focus goals and determine guidance.

Real object understanding using 3D haptic virtual reality for online education is another tool (Allaoua-Chelloug et al., 2023). This computer vision technology incorporates tasks that implement basic filtering for image classification. The main areas of research in this field include object detection and recognition, and interesting aspects of education at different levels.

Detailed exploration of AI and digital education provides a sustainable impact on youth and society (Tongkachok et al., 2023). Therefore, using AI launches some digital applications for digital education, an element that increased during the COVID-19 pandemic. For all the above instances, it is necessary to define the research question: What are the incidences of AI in contemporary education through a bibliometric analysis? Establishing as a general objective: To analyze bibliometrically the incidences of AI in contemporary education.

2. Material and methods

In this work, a descriptive and retrospective bibliometric analysis was conducted on the impact of AI in online education, using, as a guide, an adaptation of the proposal of Matthew et al. (2021). The PRISMA methodology was applied, thus endorsing the systematic review.

This review has a mixed approach as a contribution to the application of several types of research paradigms adapted from the post-positivist paradigm since it is evident that AI is a phenomenon that exists but is not yet fully explored. The qualitative and quantitative approach is combined with critical theory. The constructivist paradigm is also mixed since the articles taken as references are based on research that was built on socially proven realities, according to different contexts and times, where the countries, as well as their situations and analysis, are different.

For the research, conceptual categories are established considering the incidence of AI in education, from which the dimensions (D) and indicators (I) that lead the research are defined and are based on the analysis of the previously established information:

- D.1: Authors. I: Total citations, citations per year, publication timeliness, affiliation, country, H index.
- D.2: Journals. I: Main publications, journal quartiles, indexation, impact factor, and countries.
- D.3: Contributions I: Subject matter, methodologies used, analysis techniques, and samples used.

2.2. Population and sample

The steps carried out for the visual design of the PRISMA diagram (Figure 1) are described below.



Note. Adapted from Matthew et al. (2021).

1) Identification of the key steps of the systematic review: the systematic review generally includes sub-steps such as:

- Search for studies: The following search equation was used: title ("artificial and intelligence and + and education") and limit-to (language, "English") or limit-to (language, "Spanish"). As can be seen in the equation, English and Spanish were the inclusion criteria.
- Selection of studies: To obtain the best results in the exploration carried out, search strategies were applied to all the literature indexed in Scopus, Mendeley, and Science Direct related to this topic up to 2023.
- Data extraction: The tools of the bibliometric package of the R statistical program (Aria & Cuccurullo, 2017) were used to extract the information of the variables to be analyzed according to the dimensions explained above.
- Evaluation of the quality of the evidence: After the previous steps, the results were analyzed descriptively, and based on this information, the tables and graphs presented in the results section were prepared.

3. Analysis and results

As established in the methodology, the study starts by identifying incidences represented by the conceptual categories related to the object of study, extracted from the keywords of the research included in the sample. The students are the main element of the AI, since their performance with AI varies depending on their human condition. On the other hand, teachers play a fundamental role in this process through their methodologies and the use of these technologies, where the basis of everything is in the technological

education of all the actors in the educational system. Alternatively, Al is a contemporary experiment that is directly influencing educational curricula, and the decision making of students and teachers, where schools and universities are putting their faith in new technological models.

All subjects of the curriculum, including physical education, are being empowered by these Al spaces in education, which makes this topic systemic. Systemic factors include a trainer of information networks, a generator of large databases, a developer of deep learning, electronic learning, new professional skills, a generator of new methodologies such as virtual learning environments and virtual learning objects. In summary, the most relevant incidences in terms of conceptual categories found are (Figure 2): Students, Technology-based learning (e learning), Teaching methods and systems, Prognostic-based learning, Virtual teaching, Computer-assisted instruction, Quality control, Information management, Complex learning, and Curriculum.



Note. Bibliometrix. Based on Scopus 2023 database.

3.1. D.1: Authors

One of the indicators of Al in education is the authors who publish most on the subject, as they depict a direct relationship with contemporary topics on the subject. The authors' dimension highlights the people who research and write about the subject under research. Their objective is to share their findings and discoveries with the scientific community and the public and to contribute to the advancement of knowledge in their field of study. With this statement in mind, we will analyze some indicators of Al in contemporary education that directly impact the authors (Table 1). The table shows the main authors publishing in journals focused on Al topics globally. Only 10 authors were selected using Bibliometrix. Also present are the total number of citations per year, the most current Al-related articles in education, the H index that provides the citation level, affiliation, and countries. In order to achieve the greatest possible effectiveness, these variables were reviewed individually by each author in their own scientific network platforms such as Google Scholar, Scopus index, among others,

However, the analysis here shows that developed countries are still at the forefront of technologies and therefore of AI in education. Likewise, the authors are in the best universities in their countries that provide them with a high possibility of research and time to carry it out. It is an extraordinarily topical subject considering the years in question. Citation rates are high, which shows the interest in the subject, and this has allowed the growth of the researchers mentioned in Table 1.

North America, Europe, and Oceania lead, followed by the Asian continent. The total absence of South America and Africa continues to demonstrate that the generation of AI for education is a matter of investment, resources, and budgetary availability. It is noteworthy that these authors established their publications until the year 2020 and although they are still among the first, there is no evidence of publications between 2021 and 2023. In general, there are 10 authors; eight of them belong to developed countries and two to underdeveloped countries. The number of publications within the last five years is seven and three within the last 10 years. Likewise, the mean overall average citation index is 113, the mean citation index per year is 20 and the mean H-index is 19. The leading country in AI in contemporary education according to its authors is Australia (2), considering the top 10 authors.

Table 1. Authors' dimension									
Names and surnames	Citations	Citations by year	Present	Index H	Affiliation	Country			
Popenici. S	240	34	2017	3	Charles Darwin University	Australia			
Roll. I	200	25	2016	23	Technion - Israel Institute of Technology	Israel			
Chen. L	138	35	2020	1	Yango University, Fuzhou	China			
Timms. M.J.	136	17	2016	12	Australian Council for Educational Research	Australia			
Wartman. S.A.	86	14	2018	20	Academic Health Centers	United States of America			
Chatterjee. S.	70	18	2020	29	Indian Institute of Technology Kharagpur	India			
Winkler-Schwartz. A.	70	14	2019	15	Institut-Hôpital Neurologique de Montréal	Canada			
Guan. C.	68	17	2020	57	Nanyang Technological University	Singapore			
Hinojo-Lucena. F.	68	14	2019	16	Universidad de Granada	Spain			
Knox. J.	56	14	2020	13	Centre for Research in Digital Education, The University of Edinburgh	United Kingdom			

Note. Developed by the authors. Based on Bibliometrix results from Scopus, Mendeley, and Science Direct 2023 databases.

3.2. D.2: Journals

A scientific journal is a periodical that contains original, peer-reviewed articles in a specific field of science. Scientific journals are a means of disseminating recent research and discoveries to a community of researchers and specialists in a subject and are an important part of the review and validation process in science. For all the above reasons, it is necessary to establish the essential elements of the main journals that publish topics related to Al in contemporary education as a dimension of research (Table 2).

Table 2. Dimension of scientific journals								
Scientific journals	Quartiles of the journals	Journal Indexing	Journal impact factor	Country				
Research and Practice in Technology-Enhanced Learning	Q-1	JCR, SJR	18	Singapore				
International Journal of Artificial Intelligence in Education	Q-1	JCR, SJR	53	USA				
IEEE Access	Q-1	JCR, SJR	158	USA				
International Journal of Artificial Intelligence in Education	Q-1	JCR, SJR	53	USA				
Academic Medicine	Q-1	JCR, SJR	162	USA				
Education and Information Technologies	Q-1	JCR, SJR	48	USA				
Journal of Surgical Education	Q-1	JCR, SJR	59	USA				
International Journal of Innovation Studies	Q-2	SJR	12	China				
Education Sciences	Q-2	JCR, SJR	30	Switzerland				
Learning, Media, and Technology	Q-1	JCR, SJR	49	UK				

Note. Developed by the authors. Based on Scopus, Mendeley, and Science Direct 2023 databases.

Considering Table 2, it can be stated that within the 10 scientific journals that publish the most on the topic of AI in education, 80% are in the first quartile of publication (Q-1) and 20% in the second quartile (Q-2). Ninety percent belong to the Journal Citation Reports (JCR) and 10% to the Scimago Journal & Country Rank (SJR). The above defines a position that all publications related to the research are high impact and evaluated by double-blind peer review systems, Open Access, and are collected in world-class journals compiled by the Scopus database. The average impact factor of the journals is 64.2.

Countries publishing related reputable journals include the United States of America that is in first place with six journals, while Singapore, China, Switzerland, and the United Kingdom all have one journal. All the publications that promote the topic of AI in contemporary education are from developed countries centered on three continents: North America, Europe, and Asia. South America and Africa are absent in journals of this type. This last indicator coincides with the same indicator of the authors' countries, which solidifies that AI in education is a topic that is promoted by developed countries.

3.3. D.3: Contributions

Scientific contributions are original and significant contributions that scientists make in their areas of research to expand knowledge and solve problems. These contributions may include discoveries, theories, methods, innovative techniques, experiments, and studies that confirm or refute hypotheses. The scientific contributions of AI in contemporary education are critical for the progress of science and the improvement of the quality of life, so we analyze in this research (Table 3) the main impacts of these methodologies and techniques.

Table 3. Scientific contributions								
Subject	Methodology	Analysis techniques	Sample					
Impact of AI on teaching and learning in higher education.	Systematic review	Bibliometrics	Not applicable (N/A)					
Evolution and revolution of Al in education.	Systematic review	Modeling approach, literature review, system description, system evaluation, or learning theories.	47 items					
Dynamic modeling of spatial and satellite coalition robots.	LAGRANGE function, Newton-Euler function	Integral effort learning control scheme based on the Barrier-Lyapunov function.	N/A					
Educational cobots and intelligent classrooms.	Sociocriticism	Problem formulation	N/A					
Al in medical education.	Systematic curricular attention	Statistical domain expertise, machine learning, and robotics	N/A					
Al in secondary and higher education.	Quantitative analysis	Structural equations	329 subjects					
Al in medical education.	Benchmarking	Virtual reality simulation. Machine learning to evaluate the surgical experience	12 items					
AI and innovation in education.	Systematic review	Bibliometrics	400 items					
Al in higher education.	Systematic review	Bibliometrics	132 items					
Al in Chinese education.	Quantitative analysis	Documentary review	3 companies					
Note Prenared by the authors Based on the Sconus, Mendeley, and Science Direct 2023 databases								

lote. Prepared by the authors. Based on the Scopus, Mendeley, and Science Direct 2023 databases.

All contributions revolve around Al in online education. However, similarities and differences among them are enhanced. For example, employing Al in teaching and learning, in the evolution and revolution of education, and the insertion of robots in different educational areas through dynamic modeling. Contemporary trends are developing such as educational robots (T-bots) and intelligent classrooms, and the inclusion of Al in medical education, at educational levels, as an innovative element of different environments, settings, and learning objectives.

Al in education is a new cycle of technological innovation that, with the development of science and technology, is here to stay. Al is of vital importance in understanding, management, and teacher training for the teaching of new generations for the immediate future that is not long in coming.



Note. Scopus 2023 database.

Within the methodologies shown in these articles on AI in contemporary education, it is evident that 80% are theoretical reviews and 20% are quantitative analyses. Systematic reviews, socio-critical elements, curricular attention, benchmarking and LAGRANGE function, and Newton-Euler function are derived from the above.

Among the techniques that can be identified are the following: Bibliometrics 30% of publications, documentary review 10%, modeling approach, literature review, system description, system evaluation or learning theories 10%, integral effort learning control scheme based on the Barrier-Lyapunov function 10%, problem formulation 10%, statistical expertise domain, machine learning, and robotics 10%, structural equations, virtual reality simulation and machine learning to evaluate surgical experience 10%.

Concerning the selected samples, it can be said that 40% defined it as only empowering reflection articles, another 40% used a sample of articles, 10% worked on a review of documents in companies, and only 10% did it with subjects. This shows an incipient lack of concrete practice in the different social realities. Once the previous results have been determined, it is necessary to define the evolution of AI in education to arrive at the present. For this purpose, the trajectory of scientific articles in the Scopus database was consulted (Figure 3).

Al in education has experienced constant advance since its conception in 1956, establishing its first theoretical antecedents in 1976. Some important milestones refer to the fact that it was in 1956 when the term Al was first discussed at a conference at Dartmouth. In the 1960s-70s, the first Al systems were developed, including pattern recognition and natural language understanding. In the 1980s-90s, advances in information processing and data storage were developed that enabled Al systems to improve on tasks such as machine learning and planning. In the 2000s-2010s, significant advances in deep learning and massive data analysis occurred, allowing Al to improve in tasks such as image recognition and text generation.

From 2015 to the present, AI has continued to evolve at a rapid pace, with advances in technologies such as reinforcement learning, natural language processing, and robotics. AI has also been integrated into a wide variety of practical applications, including facial recognition, virtual assistant, and enterprise data analytics. AI is beginning to be used to personalize education, adjusting the pace and content according to the needs of individual students.

In 2017, AI tools were developed that allowed teachers to evaluate and improve their teaching, as well as allowing students to get real-time feedback on their performance. In 2019, virtual reality and augmented reality began to be used to enhance the learning experience, allowing students to interact with content in a more immersive way.

The COVID-19 pandemic empowered distance education and Al-developing solutions to support online learning becoming a necessity. In 2021, Al was increasingly used to create chatbots and virtual assistants to help students resolve queries and enhance their learning experience and its elements that are still being developed to this day.

4. Discussion and conclusions

The results provide evidence that AI research may be on the rise, agreeing with Hinojo-Lucena et al. (2019). After 2000, recognition is made on the era of cognitive intelligence, mimicking human intelligence and cognitive abilities as planned by Garcia-Orosa et al. (2023). In the last decade, from 2010, the term general intelligence is discussed, with the creation of general AI systems, which can perform a wide range of tasks, including learning new knowledge and skills.

However, discriminatory characteristics are not evident given that AI does not inherently establish gender or race patterns. All this relates to possible algorithmic biases that could negatively affect certain social groups if any historical discriminatory elements are included in the algorithms. Technologies most in demand are those based on AI, such as intelligent tutoring systems, adaptive learning management systems, and video games (Vila & Penín, 2007).

Al is impacting human relationships, through communication, relationships, and ways of interacting with the surrounding world. On the one hand, it improves communication and collaboration through online platforms and instant messaging applications. On the other hand, self-service for example employs machines with a more natural and fluid interaction. However, there are also challenges such as the increasing dependence on technology and its negative impact on people's social skills and ability to communicate. In addition, there are concerns about the privacy and security of personal information, as well as the possibility of excessive automation of human jobs. While humans sometimes find it difficult to be impartial, an ethical challenge of AI systems (Flores-Vivar & García-Peñalvo, 2023) is to make them fair and impartial rather than to perpetuate discrimination or injustice.

In partial fulfillment of the research objective, it was concluded that AI has revolutionized education, offering personalized and efficient solutions to improve student learning. There are also concerns about its long-term impact and its potential to replace teachers. One of the main conclusions obtained is that AI focuses on developing algorithms and techniques that allow machines to perform tasks that normally require human intelligence. Among the various functions it performs are decision-making, learning, and problem solving.

The way of working has changed, for instance in medicine where medical diagnostic systems help healthcare professionals diagnose illnesses, personalize treatments, and improve efficiency in providing health care. Robots are also being developed to perform specific tasks, such as cleaning houses and patient care in hospitals. Al is used in voice and face recognition applications, such as Apple's Face ID and Google's camera assistant, to verify the identity of users. It is applied to automate repetitive jobs, such as inventory management and data classification.

Another important conclusion is the possible resistance of several scientific and academic communities in the indiscriminate application of AI, given that it could be transforming human relationships when not used responsibly. One of the most obvious applications, which requires efficiency and responsibility, is the automation of processes, generating higher levels of productivity, as well as the analysis of substantial amounts of data and the discovery of patterns and trends. In addition, it is being used to develop new products and services, as well as to improve customer experience.

Industrial security does not escape the influence of AI, for example, through the development of surveillance and threat detection systems. However, it is essential to analyze the ethical and social challenges involved. As technology advances, AI is expected to have an increasing impact on human life. The world is transforming, and dissimilar opportunities are offered to improve people's lives. As future lines of research, a more in-depth study of the contributions of AI research in education will be conducted to determine its impact on student learning. An analysis of the use of virtual assistants in learning will also be applied.

Authors' Contribution

Idea, J.R.S.N., Y.S.P.; Literature Review (State of the art), J.R.S.N.; Methodology, J.R.S.N., Y.S.P., D.D.P.B., M.J.C.; Data analysis, J.R.S.N., Y.S.P.; Results, J.R.S.N., Y.S.P., M.J.C., D.D.P.B.; Discussion and conclusions, J.R.S.N., Y.S.P., M.J.C., D.D.P.B.; Writing (original draft), J.R.S.N., Y.S.P.; Final draft, J.R.S.N., Y.S.P., M.J.C., D.D.P.B.; Project design and sponsorship, J.R.S.N., Y.S.P., M.J.C., D.D.P.B.; M.J.C., D.D.P.B.; Project design and sponsorship, J.R.S.N., Y.S.P., M.J.C., D.D.P.B.; M.J.C., D.D.P.B.; M.J.C., D.D.P.B.; Project design and sponsorship, J.R.S.N., Y.S.P., M.J.C., D.D.P.B.; M.J.C.; M.J.C., D.D.P.B.; M.J.C.; M.J.

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Lockdown, cyberhate, and protective factor of social-emotional and moral competencies in Primary Education



Confinamiento, ciberodio y factor protector de las competencias socioemocionales y morales en Educación Primaria

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ABSTRACT

The COVID-19 pandemic caused a major crisis in numerous social spheres, especially among children, due to the closure of schools in hundreds of countries. The lockdown resulted in classes being given exclusively online, which could have led to increased participation in antisocial online behaviour such as cyberhate. This research aims to find out the impact of lockdown on cyberhate in children in Primary Education and to analyse the role of social, emotional and moral competencies as a protective factor. The study was conducted with 792 primary school pupils (Mage=10.81, SD=0.85) from Cuenca (Ecuador). A questionnaire focusing on cyberhate, social and emotional competencies, empathy, and moral emotions scales was used. A quantitative study was carried out with a longitudinal design with two data rounds of collection separated by an interval of five months. The results showed that total cyberhate and its dimensions, perpetration and propagation, increased longitudinally. Cyberhate among these participants could be predicted, after five months of lockdown, for being male, being in the highest school year, attending a state school, and obtaining low scores in moral emotions. The effects of the lockdown have highlighted the importance of face-to-face social relationships, which has exciting implications on the importance of school in developing social, emotional, and moral competencies which foster coexistence and respect for diversity.

RESUMEN

La pandemia por COVID-19 provocó una gran crisis en numerosos ámbitos sociales, especialmente en los niños, por el cierre de las escuelas en cientos de países. El confinamiento implicó un contexto educativo puramente virtual, lo cual pudo aumentar la participación en ciberconductas antisociales como el ciberodio. El objetivo de la presente investigación es conocer el impacto del confinamiento en el ciberodio de los niños de Educación Primaria, y analizar el papel de las competencias socioemocionales y morales como factor protector. El estudio se realizó con 792 alumnos de Educación Primaria (Medad=10,81, DT=0,85) de Cuenca (Ecuador). Se utilizó un cuestionario compuesto por las escalas de ciberodio, competencias socioemocionales, empatía y emociones morales. Se realizó un estudio cuantitativo con un diseño longitudinal con dos recogidas de datos en un intervalo de cinco meses. Los resultados mostraron que tanto el ciberodio total y sus dimensiones, agresión y promoción, aumentaron longitudinalmente. El ciberodio entre estos participantes se podría predecir tras cinco meses de confinamiento por ser varón, por pertenecer al curso superior, por asistir a un centro público y por tener bajas puntuaciones en emociones morales. Los efectos del confinamiento han destacado la importancia de las relaciones sociales cara a cara, lo cual tiene interesantes implicaciones sobre la importancia de la escuela en el desarrollo de las competencias socioemocionales y morales para la convivencia y el respeto a la diversidad.

KEYWORDS | PALABRAS CLAVE

Cyberhate, socio, emotional and moral competencies, empathy, lockdown, primary education, COVID-19. Ciberodio, competencias socioemocionales y morales, empatía, confinamiento, educación primaria, COVID-19.

Received: 2023-01-12 | Reviewed: 2023-02-06 | Accepted: 2023-05-02 | OnlineFirst: 2023-06-30 | Published: 2023-10-01 DOI https://doi.org/10.3916/C77-2023-09 | Pages: 105-114 The COVID-19 pandemic led to a major crisis in many social spheres, especially amongst children (Stassart et al., 2021). As regards education, the state of health emergency led to the complete shut-down of face-to-face classes in over 200 countries in order to prevent the spread of the virus and alleviate its impact. Lockdown resulted in classes being given exclusively online, in which Information and Communication Technologies (ICT) and the Internet became vital tools and were, in fact, the only means of maintaining contact with school (UNESCO, 2020). The increased use of the Internet led to the greater vulnerability of individuals and exposed young people in particular to a greater degree of disinformation and manipulation on social networks, with its accompanying antisocial online behaviours, such as cyberhate (Ferrera et al., 2020).

Cyberhate consists of intentional aggression on the Internet, with the purpose of harming other people via online content, and it is motivated by issues such as sexual orientation, skin colour, nationality, religion, and political ideology, amongst others. Cyberhate has certain special characteristics such as the possibility of carrying out aggressive acts at any time, reaching a much wider audience and causing more long-lasting harm (Bedrosova et al., 2022; Hawdon et al., 2017). Added to these characteristics are the aggressor's perception of anonymity as well as the victims' lack of control over the situation in which they find themselves and the difficulties they face in defending themselves online (Wachs & Wright, 2018).

Over recent years, there has been a significant rise in cyberhate, with a high percentage of children and adolescents being exposed to personal attacks online (Blaya et al., 2020; Kansok-Dusche et al., 2022). The lockdown, with its massive increase in online communication, also boosted cyberhate. The consequences of cyberhate can be extremely harmful, and can affect individuals in different ways, such as losing trust in other people (Näsi et al., 2015), lowering individual well-being (Keipi et al., 2018) and a lack of academic motivation (Isik et al., 2018). Cyberhate is also a complement, in some cases, or an antecedent, in others, of hate crimes in real life, such as shootings, stabbings, and bomb attacks (Johnson et al., 2019).

However, further research is required into antisocial online behaviour in order to identify predictors of cyberhate among adolescents. Some interventions have been made in education, but these are still rare, as evidenced by a recent meta-analysis which discussed two guantitative interventions (Windisch et al... 2022). In this context, the Global Cybersecurity Report 2020 (ITU, 2021) made a clear reference to the field of education, proposing different measures to protect children on the Internet, such as innovations in the curriculum and specific teacher training in the compulsory stages of the school systems. The vital importance of the school's stance towards cyberhate highlights the need to carry out studies to identify the most effective factors to ensure the success of educational interventions. Numerous educational interventions have already been carried out to reduce and eradicate antisocial online behaviour such as cyberbullying (Gaffney et al., 2019), all of which stress the importance of the pupils developing their social and emotional competencies. These competencies have also played a key role, directly and indirectly, in intervention programs against cyberbullying, according to one meta-analysis which included 50 studies with 320 effect sizes (Polanin et al., 2022). According to current scientific knowledge, social and emotional competencies are negatively related to antisocial online behaviour such as cyberbullying (Rodríguez-Álvarez et al., 2022), so we would expect there to be a similar relationship with cyberhate (Bedrosova et al., 2022; Wachs et al., 2022). Although, to date, no studies have verified this approach, it is certainly a high priority given the relevance of the topic. Different studies have found that high levels of social, emotional, and moral competencies are related to low levels of aggressive and antisocial behaviour, and that a high level of social, emotional, and moral competencies protects children and young people against different antisocial behaviour such as bullying (Gaffney et al., 2019; Yang et al., 2020) and cyberbullying (Rodríguez-Álvarez et al., 2022).

The social and emotional competencies are composed of the set of knowledge, skills and attitudes related to self-awareness, self-motivation, self-management, social awareness, pro-social behaviour, and responsible decision making whose role is to manage emotions and interpersonal relationships in various social contexts (Zych et al., 2018), including online interactions. Therefore, it may be possible to use social and emotional competencies as a protective factor to help improve measures designed to prevent and reduce cyberhate. These skills play an essential role in establishing a peaceful coexistence, are essential

for learning and knowing how to relate properly with others and enable us to resolve conflicts peacefully through mutual respect (CASEL, 2012).

One of the key social and emotional competencies—which are, in turn—related to moral aspects (Allemand et al., 2015), is empathy. Empathy facilitates social relationships and can be defined as the ability to understand and share another person's emotional state. It consists of two dimensions: cognitive empathy and affective empathy. Low levels of empathy are associated with antisocial behaviour and are a predictor of aggressive behaviour (Campos et al., 2022; Jolliffe & Farrington, 2004). Moral growth, on the other hand, involves effectively managing the emotions learned through the experiences or relationships gained from moral events, and is what prompts us to do good and avoid evil (Kroll & Egan, 2004), and to defend people's general interests and well-being (Haidt, 2003). Moral development is an essential complement to the social and emotional field and helps promote coexistence and respect for diversity (Caurín et al., 2019).

According to the review of the scientific literature, high levels of social, emotional, and moral competencies could safeguard against cyberhate among adolescents. However, to date, few studies have been conducted in this area and, therefore, further research is needed to look at the relationship between cyberhate and social and emotional competencies in greater depth, given the potential these competencies have for prevention of and intervention in different antisocial behaviours.

The objective of this research is therefore twofold: firstly, to find out what impact the lockdown had on cyberhate and, secondly, to analyse the usefulness of social, emotional, and moral competencies as a protective factor for children in Primary Education. The break from face-to-face schooling and the increased use of ICT during lockdown support the formulation of the following hypotheses:

H1: Five months into lockdown, cyber-hate among pupils will have increased. Social, emotional, and moral competencies are vital for the respectful and peaceful promotion of interpersonal relationships and help to improve inclusion; therefore, they are expected to be negatively related to cyberhate, which leads us to hypothesis H2: Social, emotional, and moral competencies are protective factors against cyberhate.

2. Method

2.1. Participants

The study was carried out with 792 participants between the ages of 9 and 14, with a mean age of around 11 (M=10.81, SD=0.85), and consisted of: 9-year-olds: n=24; 10-year-olds: n=279; 11-year-olds: n=337; 12-year-olds: n=133; 13-year-olds: n=16; and 14-year-olds: n=3. Of the pupils, 49.4% (n=394) were male and 50.6% (n=398) were female, all attending 15 primary schools in the city of Cuenca (Ecuador); of these, eight were state schools, representing 61.2% (n=485) and seven were private, representing 38.8% (n=307) of the sample. The sample was distributed evenly over all the classes in the last two years of Primary Education, with 49.6% (n=393) in the sixth year and 50.4% (n=399) in the seventh year. Absent pupils (n=37) were not included in the analyses. A total of 93.5% (n=740) of the participants were of Ecuadorian nationality, and 6.5% (n=51) of the children were foreign. Most of the parents were Ecuadorian, with 6.3% (n=50) of the mothers and 7.2% (n=57) of the fathers being foreign. The ethnic-cultural diversity was organised into two large groups, with the majority group containing Ecuadorians and Ecuadorian parents (n=678) and the minority group (n=114) consisting of those children whose hometown or nationality, or that of their parents, was not Ecuadorian.

2.2. Instruments

The data were collected from a questionnaire consisting of items related to socio-educational characteristics (gender, grade, nationality, nationality of parents, belonging to native groups and school), and the following four specific scales were used to obtain the study variables:

The Cyberhate Questionnaire (Zych, in press) was used to assess cyberhate among the participants. It consists of 15 questions with responses on a five-point Likert scale from 1 ("Strongly disagree") to 5 ("Strongly agree"). The items refer to behaviour exhibited over the past three months such as expressing hate towards others online, sharing hurtful photos or videos online, or encouraging people to insult certain minorities online. The instrument (Ω_{T1} =.95; Ω_{T2} =.88) has a two-dimensional structure: Perpetration of

cyberhate (Ω_{T1} =.96; Ω_{T2} =.83), made up of 10 items (for instance, "I have posted messages on forums or networks that express hate towards minorities"); and Propagation of cyberhate (Ω_{T1} =.96; Ω_{T2} =.71), made up of five items (e.g., "I have tried to convince people, on the Internet, that certain minorities should have no say in affairs").

The Social and Emotional Competences Questionnaire (Zych et al., 2018), which consists of 16 questions, with responses on a five-point Likert scale from 1 ("Strongly disagree") to 5 ("Strongly agree"). The items refer to behaviour exhibited over the past three months, such as being aware of the thoughts that influence our emotions or knowing how to help people in need. The instrument has excellent reliability (Ω_{T1} =.84; Ω_{T2} =.72), although this is lower in its four factors: Self-awareness (Ω_{T1} =.68; Ω_{T2} =.62), with four items (e.g., "I know how my emotions influence what I do"); Self-management and motivation (Ω_{T1} =.65; Ω_{T2} =.58), with three items (e.g., "I know how to motivate myself"); Social awareness and prosocial behaviour (Ω_{T1} =.68, Ω_{T2} =.61), with six items (e.g., "I pay attention to the needs of others"); and Responsible decision making (Ω_{T1} =.54; Ω_{T2} =.44), with three items (e.g., "I make decisions carefully analysing possible consequences").

The Empathy Scale (Jolliffe & Farrington, 2004), validated in Spanish by Villadangos et al. (2016), can be taken as part of the social and emotional dimension (Allemand et al., 2015) and has adequate reliability (Ω_{T1} =.84; Ω_{T2} =.65). The items refer to behaviour such as "I can usually realise quickly when a friend is angry" or "I am not usually aware of my friends' feelings", exhibited over the last three months. It consists of 20 questions to be answered using a five-point Likert scale from 1 ("Strongly disagree") to 5 ("Strongly agree"). This scale is divided into two factors: Affective (Ω_{T1} =.58; Ω_{T2} =.48), with 11 items (e.g., "I often get swept up in my friends' feelings"); and Cognitive (Ω_{T1} =.74; Ω_{T2} =.56), with nine items (e.g., "I usually realise how people are feeling even before they tell me").

The Moral Emotions Scale (Ålamo et al., 2020) is made up of five items answered on a Likert scale, with five categories from 1 ("Strongly disagree") to 5 ("Strongly agree"), which has a reliability index of Ω_{T1} =.78 and Ω_{T2} =.50. The items focus on a range of moral emotions, such as guilt, regret, pride, or shame, which appear when faced with moral transgressions (e.g., "I feel guilty if I have hurt a schoolmate").

2.3. Design and procedure

This is a quantitative and longitudinal study. The sample was selected for convenience and accessibility, using non-probabilistic sampling, thanks to the permission granted by the educational institutions. First, the researchers contacted the heads of the selected schools in Cuenca (Ecuador) to ask for their collaboration in the study. Next, we obtained the parents' informed consent. Data collection was performed in two rounds: first, in January and February 2020 (T1) just before lockdown, and second, in July 2020 (T2), at the end of the school year, after five months of lockdown. The surveys were administered collectively to class groups during school hours and took approximately 20 minutes to complete. Participation was voluntary and only anonymous individual codes were used for the longitudinal matching of the subjects. At T1, the participants were supervised by the researchers, who delivered and collected the questionnaires, without any intervention from the teaching staff. At T2, since the face-to-face classes had been suspended due to the COVID-19 pandemic and the pupils were still in lockdown, the questionnaires were collected by the researchers online and by the teachers admitting the pupils to an online class in which the researchers provided the questionnaires. In this study, the same participants answered both questionnaires (T1 and T2).

2.4. Data analysis

The reliability of the scales and their dimensions were calculated using McDonald's Omega, with the Factor 10.5.02 computer program. We performed descriptive analyses of frequencies, standard deviations, and percentages, as well as comparative analyses between the pre-lockdown variables and after five months of lockdown using Student's t test. Cohen's d was also calculated to find the size of the effect. Pearson correlations were performed to analyse the univariate relationships between gender, grade, type of school, ethnic-cultural group, social, emotional and moral competencies, and cyber-hate. The multivariable study to predict the unique relationship of cyberhate with the rest of the study variables was
carried out using cross-sectional and longitudinal linear regression analyses. Gender and school year were included in different analyses as control variables because of their close relation to cyberhate (Obermaier & Schumuck, 2022).

The ethnic-cultural group and type of school were also taken into account, as they mark significant educational differences between the pupils in the study context (Delprato & Antequera, 2021; Garaigordobil et al., 2015; Isik et al., 2018). The data analyses were carried out using the SPSS 25 statistical package, except in the case of Cohen's d, where the Campbell Collaboration calculator was used.

3. Results

Comparative analyses of cyberhate before lockdown and after five months of lockdown showed significant changes. Cyberhate and its two factors increased significantly during lockdown, with considerable effect sizes (Table 1).

Table 1. Comparison of cyberhate before lockdown and after five months of lockdown							
	Before lockdown M (SD)	After five months of lockdown M (SD)	t	р	d (95%Cl)		
Perpetration of cyberhate	1.40 (0.55)	1.80 (0.56)	-33.77	<.001	-0.72 (-0.820.62)		
Propagation of cyberhate	1.38 (0.59)	1.82 (0.60)	-29.99	<.001	-0.74 (-0.840.64)		
Total Cyberhate	1.39 (0.54)	1.81 (0.52)	-41.12	<.001	-0.79 (-0.890.69)		

Gender, school year, and type of school showed a significant relationship with cyberhate in all cases, particularly with Perpetration of aggression and total Cyberhate. In the case of the ethnic-cultural group, the only correlation which appeared was with the Propagation of cyberhate after five months of lockdown (T2).

The correlations of the different social, emotional, and moral variables showed a significant, negative relationship with cyberhate, both cross-sectional and longitudinal, except for the absence of any correlation between affective empathy and cyberhate and its dimensions (Table 2).

Table 2. Correlations of gender, school year, type of school, and different social,								
emotional and moral variables with cyberhate								
	Aggression of cyberhate (T1)	Promotion of cyberhate (T1)	Total Cyberhate (T1)	Aggression of cyberhate (T2)	Promotion of cyberhate (T2)	Total Cyberhate (T2)		
Gender(Female=0; male =1)	.086*	.069	.083*	.112**	.063	.105**		
School Year (T1)	.176**	.125**	.164**	.254**	.035	.196**		
Type of school (T1)	112**	118**	118**	144**	124**	151**		
Ethnic-cultural (T1)	.024	.051	.035	.020	.097**	.052		
Self-awareness (T1)	136**	091*	125**	091*	076*	095**		
Self-manag. and motiv. (T1)	121**	079*	110**	123**	050	108**		
Soc. awar. and pros beh. (T1)	135**	137**	141**	092**	127**	116**		
Respons. decis. making (T1)	109**	092**	107**	080*	077*	087*		
Soc. emot. comp. total (T1)	168**	136**	162**	127**	114**	135**		
Cognitive empathy (T1)	091*	065	085*	078*	077*	086*		
Affective empathy (T1)	038	036	038	054	058	062		
Empathy total (T1)	072 [*]	057	069	075*	077*	084*		
Moral emotions (T1)	145**	142**	149**	153**	148**	167**		
Perpetration of cyberhate (T1)	1	.858**	.983**	.817**	.638**	.835**		
Propagation of cyberhate (T1)	.858**	1	.938**	.729**	.755**	.818**		
Cyberhate total (T1)	.983**	.938**	1	.813**	.701**	.857**		
Perpetration of cyberhate (T2)	.817**	.729**	.813**	1	.595**	.950**		
Propagation of cyberhate (T2)	.638**	.755**	.701**	.595**	1	.817**		
Cyberhate total (T2)	.835**	.818**	.857**	.950**	.817**	1		
Note Significance level *n< 05 **n< 01 ***n< 001								

Linear regression analyses, in which socio-educational characteristics gender, school year, type of school, and ethnic-cultural group) were included as control variables, take into account social, emotional, and moral competencies (using the scales of social and emotional competencies, empathy, and moral emotions) at T1 to predict cyberhate and its factors.

Table 3. Predictive variables (T1) in cross-sectional and longitudinal relation with the Perpetration of cyberhate							
	Cross-sectional relations with the Perpetration of cyberhate		Longitudinal relations with the Perpetration of cyberhate				
	β	р	β	р			
Gender(Female=0; male =1)	0.08	.03	0.10	.01			
School Year	0.17	<.001	0.18	<.001			
Type of school	-0.07	.06	-0.13	<.01			
Ethnic-cultural	0.02	.61	0.05	.16			
Self-awareness	-0.08	.10	-0.02	.67			
Self-management and motivation	-0.01	.74	-0.02	.64			
Social. awareness and pros beh	0.01	.85	0.03	.49			
Responsible decision making	-0.02	.63	-0.01	.73			
Cognitive empathy	-0.07	.09	-0.06	.18			
Affective empathy	0.05	.22	0.02	.66			
Moral emotions	-0.10	.02	-0.13	<.01			

The predictive role of social and emotional competencies in Perpetration of cyberhate (Table 3), Propagation of Cyberhate (Table 4) and the total of Cyberhate (Table 5) were analysed cross-sectionally (before lockdown) and longitudinally (after five months of lockdown).

Table 4. Predictive variables (T1) in cross-sectional and longitudinal relation							
with the Propagation of cyberhate							
	Cross-sectional relations with the Propagation of cyberhate		Longitudinal relations with the Propagation of cyberhate				
	β	р	β	р			
Gender(Female=0; male =1)	0.06	.12	0.12	<.01			
School Year	0.11	<.01	0.25	<.001			
Type of school	-0.09	.01	-0.12	<.01			
Ethnic-cultural	0.05	.18	0.02	.62			
Self-awareness	-0.01	.77	-0.02	.70			
Self-management and motivation	0.01	.79	-0.05	.23			
Social awaren. and pros. behav.	-0.04	.40	0.06	.16			
Responsible decision making	-0.02	.60	-0.01	.73			
Cognitive empathy	-0.03	.54	-0.07	.12			
Affective empathy	0.02	.67	0.03	.44			
Moral emotions	-0.10	.02	-0.12	<.01			

From the analysis of cross-sectional relationships with cyberhate (T1), where the independent variables belong to T1, all the models proposed are significant. A higher level of Perpetration of cyberhate before lockdown can be predicted (R^2 =.08, F=5.76, p<.001) for being male, being in the highest school year (seventh year), and having a low score in Moral emotions. Also, a greater Propagation of cyberhate before lockdown can be predicted (R^2 =.05, F=3.91, p<.001) for being in the highest school year (seventh year), attending a state school and having a low score in Moral emotions. Finally, a higher score in the total of Cyberhate before lockdown can be predicted (R^2 =.07, F=5.24, p<.001) for being male, being in the highest school year (seventh year), attending a state school and having a state school, and having a low score in Moral emotions.

Table 5. Predictive variables (T1) in cross-sectional and longitudinal relation with Cyberhate total							
	Cross-sectional relations with Cyberhate total		Longitudinal relations with Cyberhate total				
	β	р	β	р			
Gender _(Female=0; male =1) (W1)	0.07	.04	0.05	.21			
School Year (W1)	0.15	<.001	0.02	.60			
Type of school (W1)	-0.08	.03	-0.11	<.01			
Ethnic-cultural (W1)	0.03	.40	0.10	<.01			
Self-awareness (W1)	-0.06	.23	-0.02	.68			
Self-management and motivation (W1)	-0.01	.90	0.04	.35			
Social. awareness and pros beh (W1)	-0.01	.86	-0.04	.44			
Responsible decision making (W1)	-0.02	.60	-0.01	.79			
Cognitive empathy (W1)	-0.06	.17	-0.03	.56			
Affective empathy (W1)	0.04	.33	-0.01	.80			
Moral emotions (W1)	-0.10	.01	-0.11	<.01			

The longitudinal analysis of the independent variables (T1) with cyberhate and its dimensions (T2) reveals that all the linear regression models are significant. A higher level of cyberhate aggression after five months of lockdown can be predicted ($R^2=.12$, F=9.16, p<.001) for being male, being in the highest school year (seventh year), attending a state school, and obtaining a low score in Moral emotions. Also, a higher level of Promotion of cyberhate after five months of lockdown can be predicted ($R^2=.05$,

F=3.67, p<.001) for being male, being in the highest school year (seventh year), attending a state school and obtaining a low score for Moral Emotions. Finally, a higher total of Cyberhate after five months of lockdown can be predicted ($R^2=.10$, F=7.27, p<.001) for attending a state school, belonging to the ethnic-cultural minority, and obtaining a low score for Moral Emotions.

4. Discussion and conclusions

The lockdown which was imposed during the COVID-19 pandemic led to a significant upheaval in people's lives, especially for children (Stassart et al., 2021). The educational process took place at home, online classes replaced face-to-face education and, as a result, all face-to-face contact between teachers and pupils came to an end, which was a cause for concern worldwide (UNESCO, 2022).

However, the lockdown also provided a unique opportunity to study how communicating almost exclusively through ICT affected social relationships among children. Therefore, the objective of the current study was to find out the impact of lockdown on cyberhate and to analyse the protective factor of the social, emotional and moral competencies among children in Primary Education. Fortunately, the basis of this study also involved discovering the relationship between social and emotional competencies and antisocial online behaviour, of which cyberhate is one of the most recent, worrying forms (Hawdon et al., 2017; Keipi et al., 2018).

The longitudinal results of the study show an increase in cyberhate after five months of lockdown among Primary Education pupils, thus validating Hypothesis 1. This research therefore supports the assumption that the Internet and, in particular, social networks are a setting in which the general population usually encounters hate speech. During lockdown, the Internet use skyrocketed to hitherto unknown levels (UNESCO, 2020). In line with previous research (Wright et al., 2021), the longitudinal nature of this research has been able to verify that during lockdown, cyberhate also increased, both in its level of perpetration and the extent of its propagation.

In order to facilitate the design of new strategies to prevent cyberhate, it is vital to detect risk and protection factors which can help to protect children and adolescents and contribute positive effects to this population. In this study we have sought to discover, in addition to the impact of the COVID-19 lockdown on cyberhate in children in Primary Education in Ecuador, the role of social, emotional, and moral competencies as a protective factor against cyberhate. As can be seen in the results of this research, cyberhate, together with its dimensions of perpetration and propagation, could be predicted after five months of lockdown for being male, being in the highest school year, attending a state school, and for obtaining low scores in social, emotional, and moral competencies, in particular in moral emotions. The effects of lockdown have highlighted the importance of face-to-face social relationships and, possibly, the importance of school in the development of social, emotional, and moral competencies.

Male pupils seem to be more likely to engage in cyberhate than their female counterparts, as has already been found in the case of other types of antisocial behaviour and online behaviour (Bachman et al., 2008; Jaggers et al., 2016; Jolliffe & Farrington, 2006; Shollenberger, 2015). These results show the need for training at school to address these differences by gender and to facilitate prevention and educational intervention.

The pupils in the highest school year, of the two groups that participated in this research, generated more cyberhate than the lower year. To an extent, this is logical, if we consider that older pupils have more access to devices and better-developed ICT skills and so can engage in cyberhate more effectively. In turn, this finding is in line with studies on the development of antisocial behaviour, which show that they increase from childhood to adolescence (Farrington, 2020).

State schools are also a setting in which cyberhate is more prevalent than in private schools. This may be due to the more limited socio-educational and economic resources available to state schools in Ecuador, and in Latin America in general, compared to private schools, which can constitute a serious obstacle to academic progress. Thus, a state school population made up of educational communities with a lower average income than their counterparts in private schools, together with the greater socioeconomic and ethnic-cultural diversity, may account for the more serious educational obstacles encountered in state schools. In addition, the idea of working in state schools appears to be less attractive to teachers (Delprato

& Antequera, 2021). All of these factors in state schools must be taken into account when preparing to design different educational initiatives to promote equality, coexistence, and positive, non-violent social relations, and to prevent cyberhate and other forms of antisocial behaviour.

Moral emotions are also a recurring factor in the cross-sectional and longitudinal prediction of cyberhate, which partly validates Hypothesis 2. These results are in line with previous studies on the predictive role of social, emotional and moral competencies in other types of antisocial behaviour (Gaffney et al., 2019; Mazzone et al., 2018). These findings also encourage perseverance in the goal of developing social, emotional, and moral competencies in the general public, and promote their better development in the curriculum from Primary Education onwards.

This study has several limitations. Firstly, the sample, although large, is not representative. Another limitation is the use of self-reports, which, in future research, should be complemented with other types of instruments. A further limitation is the difference in procedures used for the two rounds of data collection (one face-to-face and the second, due to lockdown, online): here, several reliability indices for certain dimensions indicate that we should be cautious in drawing conclusions. The second round of data collection was carried out during lockdown, firstly, because we aimed to learn how cyberhate had evolved over the same school year and secondly, to collect the data, where possible, in full lockdown conditions, without extraneous variables such as the end of year holidays, especially since nobody could tell exactly how long lockdown would last.

Despite these considerations, the study gives us a genuine insight into the impact of the COVID-19 lockdown on cyberhate in primary school children from a longitudinal perspective. This research has also highlighted the role played by social, emotional, and moral competencies in preventing cyberhate. In the light of these results, we would recommend that all interventions to prevent and reduce cyberhate prioritise the promotion of social, emotional, and moral competencies, with special emphasis on the moral elements, and with particular attention to male pupils, while at the same time assessing the socio-cultural factors mentioned above. Education, specifically in schools, plays a key role in fostering gender equality, since any sociocultural differences in family, social, and non-formal education between male and female pupils could be reduced through training promoting social, emotional, and moral competencies, which in turn, help to check antisocial behaviour such as cyberhate. It is therefore essential to continue striving to achieve a comprehensive education among the general public, starting at the initial stages of formal education, to nurture the social, emotional, and moral sphere of each individual and thus help society to progress towards greater equality, coexistence, and respect for diversity.

Authors' Contribution

Idea: V.J.LL.; Literature review (state of the art): V.J.LL., C.S.M., X.V.C.; Methodology: V.J.LL., C.S.M; Data collection: C.S.M.; Data analysis: V.J.LL., C.S.M., X.V.C.; Results: V.J.LL., C.S.M., X.V.C.; Discussion and conclusions: V.J.LL., C.S.M.; Writing (original draft): V.J.LL., C.S.M.; Final revisions: V.J.LL., C.S.M., X.V.C.; Project design and sponsorships: V.J.LL., C.S.M., X.V.C.

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Análisis de medios y audiencias en redes sociales ante informaciones sobre suicidio

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ABSTRACT

Suicide had traditionally been silenced in the media until the beginning of the 21st century, when the World Health Organization (WHO) changed its recommendation not to report on it in order to disseminate this serious social problem and contribute to its prevention. Work has been done to define how and with what limits the media should report, but there are no codes dealing with social networks, which require specific treatment given their great capacity for influence. This research analyses the information on suicide published on social networks by the Spanish media with the greatest interaction on Twitter and the feedback from audiences, during the first six months of 2022, applying the different ethical codes and consulting the seven state organizations specialized in suicide. This work aims to examine the connection and interaction between the selected media and their audience in social networks, participation, the type of content created by the media and the exchange produced with their audiences. In the results, it is observed that the interaction of the audience regarding the different approaches of the media on Twitter on suicide is associated with the idea of sharing, commenting or bookmarking those messages related to prevention.

RESUMEN

El suicidio ha sido tradicionalmente silenciado en los medios de comunicación hasta inicios del siglo XXI, cuando la Organización Mundial de la Salud (OMS) cambió su recomendación de no informar por la de difundir este grave problema social para contribuir a su prevención. Se ha trabajado en definir cómo y con qué límites deben informar los medios, pero no hay códigos que traten las redes sociales, que exigen un tratamiento específico dada su gran capacidad de influencia. En esta investigación se analizan las informaciones sobre suicidio publicadas en redes sociales por los medios españoles con mayor interacción en Twitter y la retroalimentación de las audiencias, durante los primeros seis meses de 2022, aplicando los diferentes códigos éticos y consultando a las siete organizaciones especializadas en suicidio de ámbito estatal. Con este trabajo se pretende examinar la conexión y la interacción entre los medios y el intercambio producido con sus públicos. En los resultados, se observa que la interacción de la audiencia respecto a los diferentes enfoques de los medios en Twitter sobre el suicido se asocia a la idea de compartir, comentar o marcar como favoritos aquellos mensajes vinculados con la prevención.

KEYWORDS | PALABRAS CLAVE

Social media, suicide, risks, online audiences, self-regulation, information quality. Redes sociales, suicidio, riesgos, audiencias online, autorregulación, calidad informativa.



1. Introduction and state of the art

Suicide is, according to the World Health Organization (WHO), a major public health problem. Over 800,000 people commit suicide every year worldwide and it represents the leading external cause of death in Spain, according to the National Institute of Statistics (INE, in Spanish), with a ratio of 8.3 deaths for every 100,000 inhabitants. Suicidal thinking is observed at an increasingly young age, a situation that experts attribute, amongst other reasons, to the pandemics, harassment, and cyberbullying (Garcés-Prettel et al., 2023; Quinatoa-Santo & Larzabal-Fernández, 2021; Wake et al., 2021). Suicide is the fourth cause of death among 15-19-year-olds, according to the WHO (2000). A report issued by the WHO and the UN (2017) points out bullying as an integral part behind 200,000 yearly youth suicides.

All these figures verify that suicide is a highly relevant social problem, whose impact justifies the media spotlight. The presence of press news is ever increasing (Blanco-Castilla & Cano-Galindo, 2019), partly due to changes in recommendations from social and healthcare organizations. The traditional position had been to consciously silence suicide in the media, since experts pointed to a possible call effect (known in the technical literature as the "Werther effect", the name of the suicidal protagonist in Goethe's novel).

In the year 2000, the WHO published a document entitled "Preventing suicide, a resource for media professionals" where it is pointed out that the media may play a key role in preventing suicide (World Health Organization, 2000). The position of experts reaffirms this idea: psychology and psychiatry professionals request to give suicide more social visibility and require the cooperation of the media to contribute to its prevention with their information. This is what the technical literature calls "Papagen effect", in reference to the character in Mozart's "The Magic Flute" who is convinced by three childlike spirits to drop his plan given the alternatives to his death. However, diffusion must be properly focused (Philips et al., 1992; Hawton & Williams, 2002). The key lies, therefore, in how to inform.

Following the WHO's change, varied codes with recommendations for its treatment in the media have appeared, but all of them focus on traditional support media and none includes the diffusion on social networks, despite their growth and great viewing capacity by audiences who are both consumers and producers of information (Ritzer et al., 2012). During the first half of 2022, the number of internet users reached 37 million in Spain, according to the General Media Study (GMS), of which 70% are social network users. As per the Observatory on social media of 2021, 85% of the Spanish internet surfers use social media, which are young people's usual channels, amongst whom the suicide cases and attempts have alarmingly increased. These figures justify the need for specific studies which establish an appropriate approach to the media's social networks.

The scientific literature on the treatment of suicide is scarce and practically inexistent with respect to the mass media publications on social networks. Some references are found on the media's treatment of suicide and the WHO guidelines (Olivar-de-Julián et al., 2021; Durán & Fernández-Beltrán, 2020), on their inclusion in codes of ethics and manuals (Lois-Barcia et al., 2018), and on the coverage of deaths of celebrities by suicide (Niederkrotenthaler et al., 2020; Wake et al., 2021).

In all cases, the change of position by the WHO is assumed to have had a very limited impact on journalistic practice. Despite the publication of the "Guidelines for the treatment of suicide in the media, Support Manual for their professionals" by the Ministry of Health (2020), the "Recommendations to audiovisual media on the reporting of death by suicide" by the Autonomous Government of Catalonia (2016) and the Audiovisual Council of Catalonia, and the "Ethical code on the media treatment of suicide" (APIB, 2018), promoted by the Balearic Association of Journalists, the Balearic College of Psychology and the Helpline of the Balearic Islands, in the vast majority of cases, the mass media do not comply with the WHO guidelines (Rodríguez-Caro et al., 2021; Olivar-de-Julián et al., 2021). Durán and Fernández-Beltrán (2020) specify the principal errors in the lack of a global approach to the problem, the explicitness of the method and place, the use of non-expert sources, the simplification of causes, and the absence of support references (organisations and telephones).

There exists countless research on the influence of the internet and the social networks on present communication, but those focused on their responsibility towards suicide are rare. The Internet represents a new scenario as well as an additional concern for the prevention of suicidal behaviour, triggered by the influence of pro-suicide content (López-Martínez, 2020).

Social isolation has proven to be a risk factor that increases the chances of developing suicidal behaviour (Castillo-Sánchez et al., 2020), and the Internet has become an apparent socialisation space for many people. Adolescence is characterised by young people's vulnerability and by the enormous influence that their cultural and social environments exert, (Monteagudo-Ródenas, 2002) and today, when we speak of our young people's social and cultural contexts, we must inevitably talk about social networks.

Recent studies have shown that social networks may act as a highly significant means of suicide contagion (Yıldız et al., 2018; Carlyle et al., 2018; Abrutyn et al., 2020). Somehow, social networks are reproducing the Werther effect so feared by the mass media in the last century, thus provoking its self-censorship.

Particularly significant are the publications by «influencers» or famous people. The rise of suicide rates after media news concerning the self-deaths of public figures is a well-documented phenomenon, which has even led to the need for specific treatment in the WHO guide. Similarly, there is a strong correlation among the content of the messages from certain personalities in social networks which increase the risk of suicide by the general public (Fahey et al., 2018; Niederkrotenthaler et al., 2020).

The risks of the internet are obvious, but it also provides possible preventive support, above all, to detect suicidal tendencies in their phases of ideation (Castillo-Zúñiga et al., 2022; Lopez-Castroman et al., 2020; Rajesh-Kumar et al., 2020). Castillo-Sánchez et al. (2020) have conducted an analysis of the literature published between 2010 and 2020 on the subject and have developed, as principal techniques, the use of machine learning algorithms such as data mining, linguistic research, and text word count, among many others, which are used in a combined way at times. However, there is a paucity of academic studies on how social network platforms and their users must behave in relation to this issue, so that their online publications do not act as a driving element of suicidal behaviour. Cohen-Almagor (2022) warns about the dangers of hate speech on social networks, although suicide advice is scant. The salient Australian project #chatsafe (Robinson et al., 2018), provides some guidelines designed to support safe peer-peer online communication, especially among young people. It is a transfer to the web 2.0 of the guidelines for mainstream media (La-Sala et al., 2021), even though its model has not been expanded to other countries.

There is hardly any self-regulation regarding the online media treatment of suicide. By default, it can be understood that the limited norms included, both in journalistic codes and in guidelines issued by other organisations, would be extendable to digital information, but the specifics of the Internet, and especially of social networks, lead to the need of an ad hoc regulation and to the growth of specific studies pinpointing the suitable media approach to online social networks.

2. Methodology

The primary objective of this study is to pinpoint Twitter audience behaviour towards the selected media news on suicide, to assess how users respond to different treatments as well as what type of expressions or phrases provoke a reaction among the followers of the accounts studied. We seek to ensure that interaction is associated with the WHO guidelines and the Spanish organisations. Lastly, some action proposals are suggested in order to address the peculiarity of social networks given the absence of conduct guidelines.

Our first objective is to get to know the current status of the issue through the analysis of all the expert organisations' codes and guidelines, as well as the existing research at a scientific or academic level, both nationwide and worldwide. Subsequently, an assessment of the conducted process has been made through a qualitative analysis and quantitative conclusions as well.

Both the qualitative and quantitative studies analyse the corporative profiles on the microblogging (Grahl, 2013) Twitter of the mainstream national media with more followers on this social network, according to the "top 20" media. We have selected two conventional general media or digital migrants ("El País" and "El Mundo"), two TV channels (RTVE and Antena 3), one free of charge ("20 Minutos"), two radio stations (Cadena SER and COPE), as well as two digitally native ("El Confidencial" and "El Español"). This study intends to examine the connection and the interaction between the selected media and their audience on the social networks (Correa et al., 2010), their participation (Otieno & Matoke, 2014; Gruzd et al., 2012), the type of content created by the media and the exchange produced with their

audiences (Kaplan & Haenlein, 2010). To that end, firstly, from January 1 to June 30,2022, an advanced search was made on Twitter exclusively bounded to the above-mentioned media, with the word "suicide" and the synonymous expression "take your own life", in order to verify to what extent they implement the WHO guidelines (2000) as well as all the subsequent codes in the informative treatment of suicide. Overall, 114 tweets were downloaded with the support of the platform «exportcomments.com», which also enables the interaction of each message (comments, likes and shared). However, eleven messages were excluded on using the concept suicide metaphorically, applied to sports and politics.

For the qualitative analysis, we start from an adaptation of the texts by Herrera-Damas and Requejo-Alemán (2015), who propose a classification of strategies for use on Twitter (information dissemination, promotion, engagement, participation, contests, and active learning), to which a new category is added, awareness. We also draw on the proposal by García-Avilés and Arias-Robles (2016) on visual formats and journalistic genres on Twitter. To complete this classification, we have added the tone to analyse the proximity and the creation of links between emitter and receiver.

Our methodology concludes with a Delphi, a hugely effective method to analyse complex topics and gather consensus views (Landeta-Rodríguez, 2002; Reguant-Álvarez & Torrado-Fonseca, 2016; Baladrón-Pazos & Correyero-Ruiz, 2019). During the month of September 2022, a questionnaire was sent to the seven major national organisations which work on suicide prevention, and on family and survivor care. The sample of this panel of experts is integrated by the entities collected in the guide published by the Spanish Government to which we have added two more: The "Teléfono de la Esperanza" (the Phone of Hope), which has been operative in this field for over 50 years, and the ANAR Foundation, focused on childhood and adolescence in light of the rise of cases in that segment of the population. A second online closed response questionnaire was forwarded to complete the Delphi (November 2022), where four questions were included, separated into two different pathways, with a view to unify positions.

The questions focused on whether the media should report a suicide or not, which data should be included on an item of news on the media's social networks, and justifying the reasons for the answer. Among the data being reviewed to decide whether they must be included or not, are the allusion or not to the method, the reference to the exact place, the victim's identification whether anonymous or famous, age, gender, municipality, farewell notes, images or photos of the victim, concepts like epidemics, data to contextualise the problem, expert sources, statements from relatives, neighbours or similar, the trigger when it is a social issue (harassment, etc.), testimonies of survivors, help resources, victim's screenshots on social networks, associating mental health with risk of suicide, or linking with myths.

The organisations that nswerred our questionnaire, in both phases, were the confederation "Salud Mental España" (Mental Health Spain), the "Teléfono de la Esperanza ASITES" (ASITES Phone of Hope), Papageno, AIPIS, Després del Suïcidi Associació de Supervivents DSAS (After Suicide Association of Survivors), the "Fundación Española para la Prevención del Suicidio" (Spanish Foundation for Suicide Prevention), and the "Asociación de Investigación, Prevención e Intervención del Suicidio" (Association of Suicide Research, Prevention and Intervention). In addition to the two rounds of questions, a further open one and another with closed responses, some telephone conversations were carried out with several of the mentioned entities in order to shape some responses and expand information.

3. Analyses and results

3.1. Results in the social profiles of the media

Of all the tweets examined, 28.43% were shared by Cadena SER radio, 17.65% by the newspaper "El Mundo", 16.67% by "20 Minutos", 11.76% by "El País", 10.17% by "El Confidencial", 9.8% by RTVE, 7.84% by Antena 3, and only 1.96% by COPE. The single media that reached most retweets on its publications on suicide in that period was "El Mundo", with 62.28% of the total amount of the messages analysed; followed by "El País", with 15.93%, and, distantly, by Cadena SER, with 9.31% out of the total. Something similar occurs regarding the number of comments and tweets marked as favourites, and in percentages much alike.

Table 1. Distribution of tweets per media			
Medium	N° of tweets		
20 Minutos	17		
A3 Noticias	8		
COPE	2		
El País	12		
El Confidencial	7		
El Español	11		
El Mundo	18		
SER	29		
RTVE	10		
Total	114		

From this data arises the question about what type of messages, with what tones and intention and, above all, what phrases they use to achieve such levels of interaction. As far as the audience is concerned, in this case, it is interesting to assess which messages encouraged the followers' reaction. To that end, we adapted the classification by Herrera-Damas and Requejo-Alemán (2015), and a new category was added, awareness. Most messages intend to spread information of interest and current affairs (32%) or raise awareness (24%). It is noteworthy that 24% of the texts examined could be classified under the category of promotion, since they are, fundamentally, books or radio and TV phone calls, related to the topic.



Note. Advanced search on Twitter.

Concerning the attitude of the audience from the media studied on Twitter, it is significant to highlight that most users opt to interact more in the awareness intention. Over 60% of the retweets, comments, and favourites took place in this area, despite the fact that most of the messages focus more on diffusion, which is the second most commented topic.



Note. Advanced search on Twitter.

On the other hand, according to the methodology of García-Avilés and Arias-Robles (2016), the journalistic genres mostly used by the media on Twitter are the news (73%) and the interpretative (12%). A total of 8% are references to news and information on current affairs, and just 7% are based on the genre of dialogue.

As for the most used format, we highlight photo news, headlines, some live programs, and information with key data and statistics. The media that share most photo news are "20 Minutos", "El Mundo" and "El País"; whilst those publishing most messages while going live are "Cadena SER" and "El Español". In these cases, photo news is only used for sharing images together with the advertisement of the telephone number 024 to prevent suicide or with photos of celebrities who confessed a suicide attempt.



Note. Translation: Cadena SER: #TuitsQueNunca with @jl sastre is back this Tuesday on @TwitterSpaces. What's going on with suicide in our country, especially among young people and adolescents? We'll be expecting you as of 1 pm on our Twitter profile; EL ESPANOL: We are talking to the writer about the deaths that changed his life and turned him into an accidental author. "Accines for mourning" by Javier Jiménez: this is how. To this author overcame the suicide of his daughter, told by @IreNadal. Elespañol.com. "Accines for mourning" by Javier Jiménez: this is how... The writer invites EL ESPANOL into his house to talk about the losses that changed his life and turned him into...,"2001. Distance service activates a phone number to prevent #suicide: 024, avail able every day. 247/ and it is confidential. Talking about suicide is the first step to fight it ver20m.ex/geuex cause of non-natural deaths in Spain. Almost 20% of adolescents wished for their deaths last year and 36% tried to take their own lives. Mental health problems in children and adolescents rocketed to 54%. 024. The healthcare service provides a phone number to prevent suicide.

Our attention is now drawn to the most journalistic part of these messages shared on Twitter, where just a fourth part mentions expert sources, although it must be stressed that just 2% of the shared news use politicians, neighbours, and relatives as sources to address suicide.

The majority of messages in the sample analysed are focused on prevention (52.43%), people's testimonies who tried to take their lives, fundamentally celebrities (18.45%), and description of facts (16.5%). The approach used the least is the victim's identity profile, an issue not additionally recommended, although some media used it at particular times. In few cases, it was decided to share information on support, for instance, psychological (6.8%), or counselling (4.85%).

Table 2. Expressions and level of interaction from the audience						
Expressions	Retweets	Comments	Favourites	N.º of messages		
Commit suicide (associated with crime)	0,08	0,00	0,12	0,97		
Stop the spread/epidemics of suicides	1,77	1,44	1,28	2,91		
Person's age	8,67	12,93	8,36	5,83		
Labels associations	0,08	0,00	0,02	0,97		
Cry for help	1,13	0,54	1,93	7,77		
Identifying exact place	1,28	2,69	1,04	2,91		
Frustrated suicide attempt	54,15	46,68	59,16	11,65		
Number of victims over a period	3,02	2,51	1,21	3,88		
Suicide-driven person	0,23	0,18	0,25	0,97		
Urgent National Prevention Plan	5,58	4,31	8,18	4,85		
Guidelines for the treatment of suicide by the mass media	0,19	0,36	0,25	3,88		
Remember helpline	16,97	10,59	11,94	22,33		
Has committed suicide	0,11	0,00	0,07	0,97		
Mentions method of suicide	0,45	2,87	0,91	2,91		
Mentions the person's name	4,30	8,80	3,38	11,65		
A sentence reinforcing reiteration (another)	1,51	5,92	1,54	7,77		
Suicide victim	0,49	0,18	0,37	3,88		

Note. Advanced search on Twitter.

"La Cadena SER" (22.8%), "El Español" (11.4%) and "20 Minutos" (6.2%) are the media whose tweets focused more on an approach to suicide prevention; whilst other media, like the newspaper "El Mundo", opted for the description of facts in the orientation of the messages published.

The interaction between the mass media's audience and their followers regarding the diverse approaches of the media on Twitter about suicide is crystal clear, and most people opt for sharing, commenting, or marking as favourites those messages related to prevention. Thus, for instance, the tweets with preventive information and content which was retweeted represent 78.72% of the sample, whereas those getting some comments was 62.48%. On 80.64% of the cases they were marked as favourites.

On the contrary, when it comes to analysing the interaction of the audience, the type of messages highlighted are those referring to messages with non-recommendable phrases, such as "frustrated suicide attempt" (11.65%), or "mentions the person's name", when the person is not a recognised face (11.65%). Instead, expressions such as "commit suicide associated with a crime", "suicide-driven person" or "has committed suicide" were hardly used.





3.2. Results in the support organisations

Amongst the support organisations, there exists a wide consensus on the need to count on expert sources in the elaboration of shared information and on the importance of always adding the helpline as well as adding other resources to combat suicide. A majority of them consider that suicide might as well be related to the victim's mental health problems, when applicable, since this may help to pressure the administrations towards the approval of a national plan; or to the use of data to contextualise news items. Most of those associations asked do not oppose to the publication of the gender, though they do oppose to the publication of the victim's age due to the risk it could have between specific groups.

Five of the eight organisations consulted view that the information on online networks must include expert sources and support resources/telephones. Two of them would add data and figures, in addition to linking mental health problems with the risk of suicide. Two believe that it is desirable to provide the victim's gender and identity only in the event of being a celebrity or having public relevance. Two respond positively to other data, such as age and trigger, and just one to testimonies.

4. Discussion and conclusions

The experts' change of guidelines has fostered a rise in journalistic publications on suicide, although still insufficient in light of the large number of cases. This situation is also reproduced by the mass media's publications on their social networks: compared to the roughly 2,000 people who lose their lives to suicide every six months in Spain, we have only detected 141 tweets among the profiles of 9 mass media over the first six months of 2022. In their communication on social networks, the media reproduce the modus operandi of their respective news channels. Thus, the mostly used journalistic genre is the news (73%)

of tweets) and its own prevailing formats being: photo news, headlines, live, key data, and breaking news. It should be emphasised in positive terms that the predominant approaches are prevention (52.43% of the shared messages), and the testimonies of people who tried to commit suicide (18.45%). The predominance of the communicators' responsibility is also observed in the behaviour of audiences, who focus their interaction on the publications concerning prevention (78% of the retweets and 62% of the comments), as well as the testimonies (12% of the retweets and 22% of the comments).

Along these lines, we can highlight the widespread practice of sharing more messages on Twitter with the purpose of raising awareness, and also issuing information and data which reinforce the necessity to tackle this matter on the part of the political and health authorities. In this regard, it is noteworthy that most of the tweets have been to remember the helpline 024 (22.33%), to make an urgent appeal for a National Plan of Prevention (4.85%), or even to specify the recommendations for the treatment of suicide in the media (3.88%).

As for the non-recommended expressions mostly used by the media on Twitter, the ongoing references to the idea of "frustrated suicide attempt" (11.65%), or mention the victim's name (11.65%) play a prominent role. Even though the level of non-compliance of the codes by the media is low, it suffices for it to happen from time to time so that, around social networks, their impact becomes widely amplified by the multiplier effect of the audiences. Thus, the wrong expression like «frustrated suicide attempt» gets the most retweets (54.15%) and comments (46.68%). For that reason, it is especially critical that the media exercise extreme awareness of their responsibility when they publish or share content on social networks.

There is unanimous agreement amongst the associations in viewing the elements that must be specially avoided, such as any allusions to the method, to the exact place or the municipality, or to data that allow the victim to be identified: name or surnames, or screenshots from the victim's social networks. The unanimity is also absolute when regarding it as inappropriate to mention farewell notes, to allude to concepts such as epidemics, or to use statements from relatives and neighbours.

Among the data that must be collected, which have been agreed on by the associations, are the reference to support resources and the helpline, as well as the inclusion of expert sources. This last aspect has much room for improvement.

In other aspects there are differences of opinion between associations, especially about whether the inclusion of specific content related to the victims' age and gender is convenient, which can be relevant to observe their socio-demographic profiles. There are those who understand that their inclusion provides a warning to highly vulnerable target groups, while between the opposing organisations it is argued that both the person's anonymity and intimacy must prevail.

As reflected in this study, that inclusion in the media is higher around social networks than the one they already have in their traditional formats and, therefore, they must accomplish a far more rigorous communicative practice when publishing and sharing suicide-related content. Therefore, we conclude with a series of guidelines for the managers of social profiles in the media, which may also serve as a reference to guide audiences in rating and sharing that content:

- Communication on social networks must act to show the true dimension of the problem of suicide. The current media coverage is undoubtedly insufficient. It is essential to arbitrate communicative formulas that reiterate the seriousness of the problem. An expression such as "the number of victims so far this year is already X", which is generally used for gender-based violence, may be useful to create public awareness of the true scope of the problem.
- We advise social publications to include data related to the victim's age and gender insofar as they may serve to visualize the greater impact between specific groups who require some special attention.
- We also deem it positive for social publications to include references to the trigger cause (whenever it is reliably proven), and its relation to mental health, as society can thus become more aware of the origins of the problem.
- Both the victim's and the family's preservation of privacy must be a fundamental principle when carrying out any publication on social networks about an act of suicide, although a balance must be sought with the diffusion of data that may be significant from a demographic standpoint, or

from the viewpoint of the "news value" or the media interest in news items. We agree with the associations that it is not convenient to publish the place nor the municipality, although the Autonomous Community can be reported.

- The media must avoid publishing or sharing any information from victims' social profiles, as well as personal pictures or those which may lead to their identification.
- Prevention must be the inspiring principle of the communicative practice on social networks and it must be repeatedly promoted. Therefore, information on the helpline 024 must be included in all social publications on suicide.
- It is convenient for the media to widen the number of expert sources consulted to report on suicides and resort to associations and professionals associated with prevention. It is recommendable that the main associations are labelled on social media publications to publicise them.
- There is a strong need that the media, in their work to create opinion and train citizens, take a stand in favour of the approval of a National Plan of Suicide Prevention and contribute to claiming health improvements that help reduce the number of victims.
- The media must routinely check their online publications to eliminate those that do not comply with the guidelines of responsible action and thus hinder their possible negative effect from perpetuating themselves.

4.1. Future lines of research

On understanding that suicide is a worldwide and growing problem, an interesting future line of research would be to analyse the type of messages on suicide that the media from other countries or news agencies worldwide publish on their social networks. In addition, one of the tangential conclusions of this research reveals that the specialised organisations raise differing positions, so it could be possible to open a new line of research into the analysis of their way of communicating on social networks, aimed at carrying out a comparative study between them and against the media. Likewise, and given the relationship between suicidal thinking and mental health, the object of study could also be extended to professional organisations dedicated to the latter.

Eventually, it would be interesting to know journalists' points of view through discussion groups or interviews, and even to supplement this with the perspective of organisations and experts, as well as seeking agreement and even implementing a venue for permanent consultation and dialogue.

Authors' Contribution

Idea, A.D.M, F.F.B.; Revision of literature (current status), A.D.M, F.F.B.; Methodology, A.D.M, F.F.B, F.J.P.R.; Data analysis: F.J.P.R.; Results: A.D.M, F.F.B, F.J.P.R.; Discussion and conclusions: A.D.M, F.F.B, F.J.P.R.; Drafting (original draft): A.D.M, F.F.B, F.J.P.R.; Final reviews: A.D.M, F.F.B, F.J.P.R.; Project Design and sponsors: A.D.M.

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