Youth digital writing on WhatsApp and the teaching of spelling
Escritura digital juvenil en WhatsApp y enseñanza de la ortografía

ID Dr. Alejandro Gómez-Camacho. Professor, Department of Language and Literature Didactics and Integrated Philology, University of Seville (Spain) (agomez21@us.es) (https://orcid.org/0000-0002-6431-6405)

ID Dr. Juan de-Pablos-Pons. Full Professor, Department of Didactics and Educational Organization, University of Seville (Spain) (jpablos@us.es) (https://orcid.org/0000-0001-9147-5965)

ID Dr. Pilar Colás-Bravo. Professor, Department of Research Methods and Diagnosis in Education, University of Seville (Spain) (pcolas@us.es) (https://orcid.org/0000-0003-3000-075X)

ID Dr. Jesús Conde-Jiménez. Associate Professor, Department of Theory and History of Education and Social Pedagogy, University of Seville (Spain) (jconde6@us.es) (https://orcid.org/0000-0002-4471-5089)

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 in WhatsApp of the sample is much higher than the number of misspellings in school texts, which confirms that 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 Ibarra-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 3rd and 4th 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 3rd year of ESO and 45.6% in the 4th 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	
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 multimodal textisms	
Textisms of numbers, letters and symbols with their phonemic value	*cansa2, no vngo +*
Multimodal elements, emoticons, *stickers*, etc.	👏👏👏👏👏
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 38. There is no other type 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.
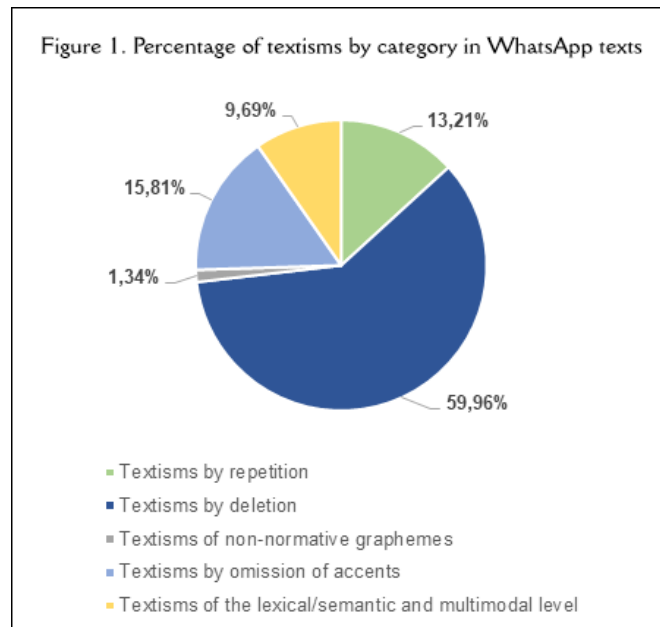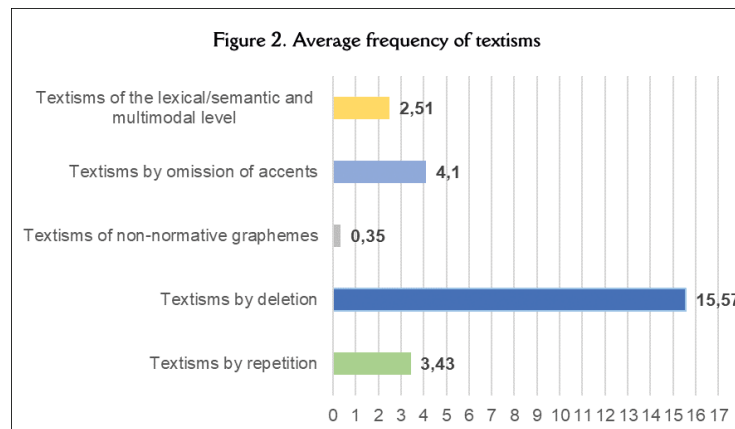
Figure 1. Percentage of textisms by category in WhatsApp texts

- 13,21%
- 9,69%
- 15,81%
- 1,34%
- 59,96%

- Textisms by repetition
- Textisms by deletion
- Textisms of non-normative graphemes
- Textisms by omission of accents
- Textisms of the lexical/semantic and multimodal level

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

Figure 2. Average frequency of textisms

- Textisms of the lexical/semantic and multimodal level: 2,51
- Textisms by omission of accents: 4,1
- Textisms of non-normative graphemes: 0,35
- Textisms by deletion: 15,57
- Textisms by repetition: 3,43

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

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

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 *yeísmo* (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 points towards, and opens the way for, further research.

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.

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

Funding Agency

References

Androutsopoulos, J. (2011). Language change and digital media: A review of conceptions and evidence. In *Standard languages and language standards in a changing Europe* (pp. 145-160). Novus Press. https://bit.ly/451KARH

Androutsopoulos, J., & Busch, F. (2021). Digital punctuation as an interactional resource: the message-final period among German adolescents. *Linguistics and Education*, *62*, 100871-100871. https://doi.org/10.1016/j.linged.2020.100872

Bernicot, J., Goumi, A., Bert-Erboul, A., & Volckaert-Legrier, O. (2014). How do skilled and less-skilled spellers write text messages. *Journal of Computer Assisted Learning*, *30*(6), 559-576. https://doi.org/10.1111/jcal.12064

Cenoz, J., & Bereziartua, G. (2016). Is instant messaging the same in every language? A Basque perspective. *Reading and Writing*, *29*, 1225-1243. https://doi.org/10.1007/s11145-016-9634-z

Colás, P. (1998). Los métodos descriptivos. In P. Colás, & L. Buendía (Eds.), *Investigación educativa* (pp. 177-200). https://bit.ly/456lsJu

Cougnon, L.A., Maskens, L., Roekhaut, S., & Fairon, C. (2017). Social media, spontaneous writing and dictation. Spelling variation. *Journal of French Language Studies*, *27*(3), 309-327. https://doi.org/10.1017/S095926951600020X

Cremades, R., Onieva-López, J.L., Maqueda-Cuenca, E., & Ramírez-Leiton, J.J. (2021). The influence of mobile instant messaging in language education: Perceptions of current and future teachers. *Interactive learning environments*, *29*(5), 733-742. https://doi.org/10.1080/10494820.2019.1612451

Danet, B., & Herring, S.C. (2007). *The multilingual Internet: Language, culture, and communication online*. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780195304794.001.0001

De-Jonge, S., & Kemp, N. (2012). Text-message abbreviations and language skills in high school and university students. *Journal of Research in Reading*, *35*(1), 49-68. https://doi.org/10.1111/j.1467-9817.2010.01466.x

Escobar-Mamani, F., & Gómez-Arteta, I. (2020). WhatsApp for the development of oral and written communication skills in Peruvian adolescents. [WhatsApp para el desarrollo de habilidades comunicativas orales y escritas en adolescentes peruanos]. *Comunicar*, *65*, 111-120. https://doi.org/10.3916/C65-2020-10

Finkelstein, S., & Netz, H. (2023). Challenging folk-linguistics: Grammatical and spelling variation in students' writing in hebrew on WhatsApp and in essays. *Applied Linguistics*, (pp. 1-22). https://doi.org/10.1093/applin/amac072

Flores-Salgado, E., & Castineira-Benitez, T. (2018). The use of politeness in WhatsApp discourse and move 'requests'. *Journal of Pragmatics*, *133*, 79-92. https://doi.org/10.1016/j.pragma.2018.06.009

Gleason, B. (2016). New literacies practices of teenage Twitter users. *Learning, Media and Technology*, *41*(1), 31-54. https://doi.org/10.1080/1743988 4.2015.1064955

Gómez-Camacho, A., & Castillo, M. (2017). La norma escrita en las conversaciones de WhatsApp de estudiantes universitarios de posgrado. *Revista Mexicana de Investigación Educativa*, *22*(75), 1077-1094. https://bit.ly/4590c5N

Gómez-Camacho, A., Hunt-Gomez, C.I., & Valverde-Macías, A. (2018). Textisms, texting, and spelling in Spanish. *Lingua*, *201*, 92-101. https://doi.org/10.1016/j.lingua.2017.09.004

Grace, A., & Kemp, N. (2014). Text messaging language: A comparison of undergraduates' naturalistic textism use in four consecutive cohorts. *Writing Systems Research*, *7*(2), 220-234. https://doi.org/10.1080/17586801.2014.898575

Hsieh, H., & Shannon, S. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, *15*(9), 1277-1288. https://doi.org/10.1177/1049732305276687

Ibarra-Rius, N., Ballester-Roca, J., & Marín-Martí, F. (2018). Encrucijadas de la competencia mediática y la ciudadanía: Uso y consumo de aplicaciones educativas. *Prisma Social*, *20*, 92-113. https://doi.org/10.17561/ae.v20i2.3

INTEF (Ed.) (2022). *Marco de Referencia de la Competencia Digital Docente*. Ministerio de Educación y Formación Profesional. http://bit.ly/3YtHUrM

Johnson, G. (2015). The invention of reading and the evolution of text. *Journal of Literacy and Technology*, *16*(1), 107-128. https://bit.ly/3WdV9x5

Kejriwal, M., Wang, Q., Li, H., & Wang, L. (2021). An empirical study of emoji usage on Twitter in linguistic and national contexts. *Online Social Networks and Media*, *24*, 100149-100149. https://doi.org/10.1016/j.osnem.2021.100149

Kemp, N., & Grace, A. (2017). Txting across time: Undergraduates' use of 'textese' in seven consecutive first-year psychology cohorts. *Writing Systems Research*, *9*(1), 82-98. https://doi.org/10.1080/17586801.2017.1285220

Kemp, N., Graham, J., Grieve, R., & Beyersmann, E. (2021). The influence of textese on adolescents' perceptions of text message writers. *Telematics and Informatics*, *65*, 101720-101720. https://doi.org/10.1016/j.tele.2021.101720

Lanchantin, T., Simoës-Perlant, A., & Largy, P. (2015). The amount of French text messaging related to spelling level: Why some letters are produced and others are not? *PsychNology Journal*, *13*(1), 7-56. https://bit.ly/3Byaq21

Li, X., Zhang, J., Du, Y., Zhu, J., Fan, Y., & Chen, X. (2022). A Novel deep learning-based sentiment analysis method enhanced with emojis in microblog social networks. *Enterprise Information Systems*, *17*(5), 1-22. https://doi.org/10.1080/17517575.2022.2037160

Mancera, A. (2016). Usos lingüísticos alejados del español normativo como seña de identidad en las redes sociales. *Bulletin of Spanish Studies*, *93*(9), 1469-1493. https://doi.org/10.1080/14753820.2016.1181435

Martín, R. (2016). La conversación guasap. *Sociocultural Pragmatics*, *4*, 108-134. https://doi.org/10.1515/soprag-2015-0010

Martínez-Parejo, R. (2016). Desarrollo de la competencia escrita en la enseñanza de lenguas extranjeras a través del uso de dispositivos móviles. *Revista Complutense de Educación*, *27*(2), 779-803. https://doi.org/10.5209/rev_RCED.2016.v27.n2.48317

Narbona, A., Cano, R., & Morillo, R. (2022). *El español hablado en Andalucía*. Editorial Universidad de Sevilla. https://bit.ly/3Oi6vhh

Núñez-Román, F., Gómez-Camacho, A., Errázuriz-Cruz, M.C., & Núñez-Cortés, J.A. (2021). Pre-service Teachers' perceptions on instant messaging and orthographic competence. *Texto Livre*, *14*(3). https://doi.org/10.35699/1983-3652.2021.34141

Pérez-Rodríguez, A., Delgado-Ponce, A., Mateos, P.M., & Romero-Rodríguez, L.M. (2019). Media competence in spanish secondary school students. Assessing instrumental and critical thinking skills in digital contexts. *Educational Sciences: Theory & Practice*, *19*(3), 33-48. https://doi.org/10.12738/estp.2019.3.003

Pérez-Rodríguez, A., Jaramillo-Dent, D., & Alencar, A. (2022). Culturas digitales en las redes sociales: Nuevos modelos de creatividad, (auto)representación y participación. *Icono14*, *14*, 20-20. https://doi.org/10.7195/ri14.v20i2.1928

Pérez-Sabater, C. (2022). Mixing Catalan, English and Spanish on WhatsApp: A case study on language choice and code-switching. *Spanish in Context*, *19*, 289-313. https://doi.org/10.1075/sic.19033.per

Pinto, G., Tarchi, C., & Bigozzi, L. (2015). The relationship between oral and written narratives: A three-year longitudinal study of narrative cohesion, coherence, and structure. *British Journal of Educational Psychology*, *85*(4), 551-569. https://doi.org/10.1111/bjep.12091

Plester, B., Wood, C., & Joshi, P. (2009). Exploring the relationship between children's knowledge of text message abbreviations and school literacy outcomes. *British Journal of Developmental Psychology*, *27*(1), 145-161. https://doi.org/10.1348/026151008X320507

Rodrigo-Segura, F., & Ibarra-Rius, N. (2022). Educación literaria y competencia digital mediante metodologías activas para la formación de los futuros docentes. *Educatio Siglo XXI*, *40*(3), 37-60. https://doi.org/10.6018/educatio.486381

Rodríguez-Ortega, D. (2015). Un bien necesario para la escritura: la competencia ortográfica. *Ocnos*, *13*, 85-98. https://doi.org/10.18239/ocnos_2015.13.05

Rosenberg, H., & Asterhan, C. (2018). WhatsApp, teacher?" Student perspectives on teacher-student WhatsApp interactions in secondary schools. *Journal of Information Technology Education: Research*, *17*, 205-226. https://doi.org/10.28945/4081

Statista (Ed.) (2022). *Panorama mundial de las redes sociales*. Statista. https://bit.ly/3RKyLsA

Takkac, A. (2019). WhatsApp as a tool for sustainable glocal linguistic, social and cultural interaction. *Turkish Online Journal of Distance Education*, *20*(3), 17-28. https://doi.org/10.17718/tojde.598198

Thurlow, C. (2018). Digital discourse: Locating language in new/social media. In J. Burgess, T. Powell, & A. Marwick (Eds.), *The SAGE handbook of social media* (pp. 135-145). Sage. https://doi.org/10.4135/9781473984066.n8

Tragant, E., Pinyana, A., Mackay, J., & Andria, M. (2022). Extending language learning beyond the EFL classroom through WhatsApp. *Computer Assisted Language Learning*, *35*(8), 1946-1974. https://doi.org/10.1080/09588221.2020.1854310

Turner, K. (2010). Digitalk: A new literacy for a digital generation. *Phi Delta Kappan*, *92*(1), 41-46. https://doi.org/10.1177/003172171009200106

Van-Dijk, C., Van Witteloostuijn, M., Vasi , N., Avrutin, S., & Blom, E. (2016). The Influence of texting language on grammar and executive functions in Primary School children. *PLoS ONE*, *11*(3), 1-22. https://doi.org/10.1371/journal.pone.0152409

Vázquez-Cano, E., Mengual-Andrés, S., & Roig-Vila, R. (2015). Análisis lexicométrico de la especificidad de la escritura digital del adolescente en WhatsApp. *RLA. Revista de Lingüística Teórica y Aplicada*, *53*, 83-105. https://doi.org/10.4067/s0718-48832015000100005

Verheijen, L., Spooren, S., & Kemenade, A. (2020). The relationship between Dutch youths' social media use and school writing. *Computers & Composition*, *56*, 1-26. https://doi.org/10.1016/j.compcom.2020.102574

Verheijen, L., & Spooren, W. (2021). The impact of WhatsApp on Dutch youths' school writing and spelling. *Journal of Writing Research*, *13*(1), 155-191. https://doi.org/10.17239/jowr-2021.13.01.05

Von-Suchodoletz, A., Fäsche, A., & Skuballa, I.T. (2017). The role of attention shifting in orthographic competencies: cross-sectional findings from 1st, 3rd, and 8th grade students. *Frontiers in Psychology*, *8*, 1665-1665. https://doi.org/10.3389/fpsyg.2017.01665

Wood, C., Kemp, N., & Waldron, S. (2014). Exploring the longitudinal relationships between the use of grammar in text messaging and performance on grammatical tasks. *British Journal of Developmental Psychology*, *32*(4), 415-429. https://doi.org/10.1111/bjdp.12049

Yus, F. (2022). *Smartphone communication. Interactions in the app ecosystem*. Routledge. https://doi.org/10.4324/9781003200574

Zebroff, D. (2018). Youth texting: Help or hindrance to literacy? . *Education and Information Technologies*, *23*, 341-356. https://doi.org/10.1007/s10639-017-9606-1