Knowing how to share and to protect oneself: key factors on digital cybercritical education for children

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Recommended citation:

Lena-Acebo, Francisco-Javier; **Renés-Arellano, Paula**; **Hernández-Serrano, María-José**; **Caldeiro-Pedreira, María-Carmen** (2022). "Knowing how to share and to protect oneself: key factors on digital cybercritical education for children". *Profesional de la información*, v. 31, n. 6, e310609.

https://doi.org/10.3145/epi.2022.nov.09

Manuscript received on 28th July 2022
Accepted on 03rd October 2022

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Abstract

Children live together consuming, producing, and sharing digital content. These are hypermediated communication actions typical of cyberculture, and require training in critical thinking that, even when minors receive it, is not always perceived as necessary, which can put the privacy of children at risk. This study focuses on analyzing the cyber skills of primary and high school students to act critically, and examines the level of conceptual, attitudinal, and procedural competence that children perceive they have acquired to access, consume, create, and share digital content on social media. The specific objective is to understand some of the components that may be related to young people's perception of the training they have received, as well as whether there are differences in terms of their willingness to acquire training to protect themselves when creating and consuming digital content. To this end, a 25-item questionnaire on the knowledge, attitudes, and actions of young people was designed, validated, and administered to a sample of 417 Spanish students completing primary and high school education. The results obtained indicate that, at the conceptual level, there are no differences between the educational stages, while differences were found at the attitudinal and procedural levels. The two factors identified show that, although high school students have acquired certain critical and protective attitudes, they behave more riskily in their self-presentation and posts than primary school students when accessing, creating, and sharing digital content on social media, and that the training received and the willingness to learn about how to create and share were the differentiating variables for increased protection. We conclude that there is a need for introducing education specific to the critical analysis and self-protection of Internet use at the primary education level, as well as additional training that would help to avoid risky behavior during high school.

Keywords

Internet; Minors; Adolescents; Cyber critical education; Protection; Cyber communication; Digital content; Skills; Protective abilities; Primary education; Secondary education; Training.

Funding

This work is part of the R&D Project "Youtubers and instagrammers: The media competence of emerging prosumers" (RTI2018-093303-b-I00) funded by the *State Research Agency* of the *Spanish Ministry of Science, Innovation, and Universities*, and the *European Regional Development Fund* (*ERDF*).

1. Introduction

Different forms of hypermediated cyber-communication are recreating new cultural behaviors among different social audiences (**Saavedra-Llamas**; **Papí-Gálvez**; **Perlado-Lamo-de-Espinosa**, 2020). In this context, cybercommunication can be understood as a process of mediatized information exchange that takes place mainly through two channels: the Internet in general and social media in particular. Moreover, these exchanges arise within the context of so-called cyberculture that develops through different practices and interactions within mass media and the Internet. This in turn creates a network in which citizens live together and participate by consuming and producing audiovisual content from an increasingly younger age (**Garmendia-Larrañaga** *et al.*, 2016); *OCDE*, 2017; **Rodríguez**; **Ballesteros**, 2019; **Gutiérrez-Lozano**; **Cuartero**, 2022; *Eurostat*, 2022). In Spain, in particular, access to and consumption of digital content occurs increasingly early (**Azurmendi**, 2018), usually before the age of 8 years (**Núñez-Gómez** *et al.*, 2021), becoming intensified among the Spanish population over the age of 16, who are frequent consumers of social media (**Sánchez**; **López**, 2020; *Ontsi*, 2021).

Not only is content massively consumed, but its production is also on the increase owing to the exponential use of social media among other factors. This expected cultural activity implies two basic behaviors: consuming and creating content in different formats, constantly and often fleetingly. These are behaviors that, although they have become normalized and widespread among different generations and different platforms or networks, present users with certain challenges that require training in a set of educational communication skills, training that the European Union is promoting through a sustainable and effective adaptation policy initiative for all countries through the *Digital Education Action Plan* (2021-2027). Among all the skills that should be prioritized, at least concerning consumption, are those that enable users to make critical consumption, whereas, on the behavioral side of creating and sharing, the skills that enable users to know how to produce content based on the values of respect, security, and protection of privacy are the most important (**Pérez-Tornero**, 2017; **Caldeiro-Pedreira** *et al.*, 2021). These two challenges are also the focus of the various digital citizenship plans that are being implemented at both the European and national levels (*DigComp Project*, *European Commission*; the *Krumsvik model*, Norway; the *TPACK model*, USA; the *JISC model*, UK; the *ISTE Standards*, USA; and the *P21 model*, USA).

Progress in the acquisition of these skills is being encouraged through training specific to digital competence, in the context of schools, both for children and for trainee and in-service teachers. (**García-Ruiz**; **Gozálvez**; **Aguaded**, 2014; **Martínez-Sanz** *et al.*, 2016, **Pérez-Escoda**; **García-Ruiz**; **Aguaded**, 2019; **Domingo-Coscollola** *et al.*, 2019; **Torres** *et al.*, 2022). However, this training is not carried out homogeneously across different localities and educational centers, which may have very different digital needs and demands. Also, the assessment of the skills acquired by children is quite dissimilar. Consequently, there is a need for research that addresses the effectiveness of the training received by students to face different challenges and to ascertain, as this study aims to do, whether acquiring digital competence takes place at different educational levels. Additionally, it is necessary to know if competence progresses favorably between the stages of primary and secondary education and whether certain training in critical thinking and self-protection needs to be reinforced.

2. The need for school-based prevention in the face of digital risks

Citizens in general, and specifically younger age groups, are surrounded by technological devices (*Deloitte*, 2021), which does not necessarily imply they know how to coexist with or critically use such tools. Individuals are exposed to a huge amount of information in different formats in which interaction is essential as part of cyberculture. People access, consume and transmit information, but at the same time shape their moral personalities and their individual and social identities. By participating, they identify themselves with a

> "space of interaction that allows them to discuss topics involving content that favors a connection with other subjects" [translation] (**Astorga-Aguilar**; **Smith-Fonseca**, 2019, p. 5).

Far from being conceived as moral techno-panic or an exaggeration of the dangers (**Marwick**, 2008), it is assumed that cyberculture ultimately shapes certain behaviors associated with creating and publishing private information, which can be expropriated and exploited (**Fuchs**, 2011) without being perceived as potentially dangerous by the users of such digital spaces, especially in the case of minors. Much of the literature on the use and participation of minors in online activities has referred to the recreation of user empowerment through actions of freedom and the capacity for decision-making (**Ito**, 2013; **Boyd**,

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2014; **Gillespie**, 2018). These skills are not assumed to be acquired by children, generating a pathologization and an excessive perception of vulnerability, which effectively polarizes the discourse towards risks. This effect is already beginning to be perceived by the children themselves when they are trained in digital skills (**De-Leyn** *et al.*, 2022). In this sense, digital literacy must move away from risk-based reductionisms and solution-based approaches to managing screen time (**Forsler**; **Guyard**, 2020). Therefore, **Biesta** (2017) claims that young people develop their ability to make judgments, but also to be critical, and calls for an education that responds to these parameters so that they can understand, comprehend, and act consciously and responsibly in different contexts in which they live.

In this regard, studies have confirmed that, while creative (**Kupers** *et al.*, 2019), children are also impulsive or compulsive and not particularly reflective about their digital outputs (**Varona-Fernández**; **Hermosa-Peña**, 2020; **Martínez-Sanz**; **Arribas-Urrutia**, 2021; **Varchetta** *et al.*, 2020). At times, they do not know how to access the information they need or access content that is unwanted, illegal, or has an emotional impact because they are still in a stage of development (**Arab**; **Díaz**, 2015; *Informe Unicef*, 2021; **Raposo-Rivas** *et al.*, 2021; **Casillas**; **Cabezas**; **García-Valcárcel**, 2022). In this sense, both minors and young people are aware of some anti-values (also known as counter-values, as they are the opposite of the values shared or agreed upon by a community, **Buxarrais**, 2014) present when they use, share, and disseminate digital content. However, not all young people can perceive these values, and, later on, take more risks than others when consuming this type of content (**Caldeiro-Pedreira** *et al.*, 2021). All of these potential risks put children in a situation of sharing, in an unprotected way, their data with others because they lose their privacy by losing control over the diffusion of their personal life on social media. Therefore, it becomes necessary for children and young people to acquire an active and critical role online and to be able to not only receive information but also create and share it by acquiring the skills that alert them to the risks they are taking when carrying out certain activities associated, for example, with the use of photos, names and real locations on social networks (**Hernández-Serrano** *et al.*, 2021; **Jones** *et al*., 2022). Nonetheless, there is a need for appropriate training in the critical use of the Internet and social media (**Braman**, 2006; **Vargas**, 2018) that calls for transformative literacy and education that makes young people critically aware of the exploitation of cultural behaviors of exhibition and exposure of private data. Young people should be empowered from an early age to be able to interact ethically, detecting misuse or counter-values that may place them in contexts of personal and social risk (**Pérez-Tornero**, 2017; **Díaz-Arce**; **Loyola-Illescas**, 2021).

3. Training in digital competence, from teacher to students

Digital literacy has received much attention and is a concern of various educational bodies and policies. Although it is a general priority, it is a specific one for the teaching staff in charge of training minors in the effective use of technologies and the prevention of digital risks. In Spain, the *Common Framework for Digital Competence in Teaching* (*Intef*, 2017) responds to the objective of achieving an adequate integration of the use of digital technology in teaching, Integrating technology as an end, but also as a means, through which students acquire digital skills. The framework has its origin in the *DigComp Report* (**Ferrari**, 2013) which condenses a set of competencies grouped into five areas, plus a sixth one that is later developed, dedicated to the acquisition of student competencies (*DigCompEdu* [2019]) and which has been recently revised (*European Commission*, 2022) and updated to be more in line with the needs derived from socio-digital developments. The framework divides the development of the competencies into knowledge, skills, and attitudes that favor the relationship with technology in a reliable, critical, and safe way. It follows the guidelines for digital accessibility and the creation of accessible resources and also includes, as a novelty compared to previous versions, examples referring to emerging technologies and systems driven by artificial intelligence.

Among these updates and priorities is the need to develop attitudes, knowledge, and skills for creative and critical reflection. This objective corresponds to the educator, but more specifically to the media and digital training professional, under the umbrella of the discipline that arose through the symbiosis of education and communication for carrying out training in critical, creative, and reflective expression and consumption of media and digital platforms. In this sense, media education (educommunication) refers to the continuous process of teaching and learning, from a perspective that allows

> "identifying barriers to overcome and potentialities to take advantage of for the benefit of a much deeper and more relevant learning" (**Arias-Vallejo**; **Chiappe-Laverde**, 2016, p. 469).

Generating such an outlook and willingness for ethical and responsible use is increasingly necessary given that the recreation of cybercultures based on digital use and trends does not always allow for the development of critical and protective skills. It is important to work along these lines, encouraging young people to make judgments and criticisms about what is appropriate, as opposed to what they want (**Biesta**, 2017). It should be remembered that teacher training in digital competence (**Torres-Barzabal** *et al.*, 2022; **Bravo-Villares**; **Fernández-Sánchez**, 2022) also involves choosing which competencies are most desirable as a means to achieve this goal. In addition, while digital skills frameworks continue to be updated to respond to major future challenges (*OECD*, 2019; **Bianchi** *et al.*, 2022), the existence of insufficient skills or knowledge

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catalogs is being criticized, and it is, therefore, more effective to generate a real protective attitude (**Schaffar**, 2021). Along these lines, **Biesta** (2017) has also shown that definitions of competence belong to the past while what is most needed is to develop a pedagogy of response, which helps learners to make judgments, experience responses, generate critiques, and most importantly understand the complexity of cyberculture.

4. Towards the training of critical skills for internet usage and digital production

Critical cyberconsumption, within cyberculture, is related to training for digital participation that allows the development of critical awareness and the empowerment of the user, so that he or she can avoid the main risks derived from impulsive and irrational digital use. It is based on the idea of the prosumer developed by **Gilmore** (2006), **Bruns** (2014), and prodesigner (**Hernández-Serrano** *et al.*, 2017), where the user not only knows how to consume critically but also contributes to the creation of content through design, reflection, and awareness of their participation, individually and collaboratively, in a safe and respectful manner. Content that will then be able to be disseminated and shared in different digital spheres.

Following **Habermas** (1987), training for critical Internet usage requires a literacy of consciousness, raising awareness of the existence of potential risks that affect not only the user but also the citizens who are involved in the communicative process to which their actions refer. In this context, the main issue is to be aware that the risks arising from inappropriate use of the Internet exist and that they have consequences not only for individuals but also for society. To this end, it is essential in the first instance to develop an attitude that makes it possible to identify inappropriate use of the Internet. Additionally, there is knowledge, which in this case refers to the different ways of dealing with risks, and finally, there are the actions or, in other words, the know-how or putting knowledge into practice. This would encompass the attitudes, knowledge, and procedures that seek an active and participatory development (**Grocott**, 2022) that transcends individuality to focus on the development of social competencies that directly address the changes and future challenges that may arise.

There is a need for critical and reflective learning that is framed within education for responsible citizenship (**Bell**, 2016), whose actions and responsibilities are necessarily interlinked (**Biesta**, 2017). In short, there is a need for training that alludes to cyber-consumption and critical digital production that should address the risks and dangers of the Internet and social media, especially because the most recent studies (*Eurostat*, 2022) show that primary and high school pupils sometimes spend more time surfing the net than working on their academic studies. This situation has been heightened by the confinement resulting from the COVID-19 pandemic and implies the need to develop a form of reflexive and critical expression that goes beyond the mere domain of applications and tabs (**Hargreaves**; **Shirley**, 2021). In this sense, digital competence for learning should enable students to become self-directed and self-determined learners (**Greenhow**; **Robelia**, 2009; **Sánchez-Romero**; **López-Berlanga**, 2020), responding to conceptual, attitudinal, and procedural levels of digital competence (**Cabezas-González** *et al*., 2022).

5. Objective

This study focuses on analyzing the training of primary and high school students for critical Internet usage in terms of their perceived levels of conceptual, attitudinal, and procedural digital competence in accessing, consuming, creating, and sharing content on social media. As a specific objective, we are interested in understanding some of the effects that may be related to the perception that young people have regarding the training they have received, in line with recent studies in this area (**Hernández-Serrano** *et al.*, 2021; **Barredo** *et al*., 2021). This also includes determining whether there are differences in the willingness to acquire training in self-protection for the creation and consumption of digital content.

6. Materials and methods

6.1. Instrument

The instrument used to collect the data was designed based on attitudes, knowledge, and procedures included in the following international competence frameworks: *DigCompEdu* of the *European Commission* and *TEL*; *Findings, Technology and Engineering Literacy* from *National Assessment of Educational Progress*. The subjects chosen are related to the critical consumption and actions for creating and sharing digital content and act as study variables in line with the available literature.

For constructing the instrument, a multistage Delphi validation process was used with the participation of a panel of five experts in methodology and eight teachers with expertise in digital competence, both in primary and high school education. In this process, the items that did not meet the criteria of being sufficiently pertinent and clear were modified or discarded, following the indications established by **García-Ruiz** and **Lena-Acebo** (2018). Finally, 25 items were selected for this study, representative of the set of knowledge (6 items), attitudes (9 items), and procedures (10 items) related to the competencies required for creating and sharing critically and safely, all of which were assessed on a four-point Likert scale.

> "What is most needed is to develop a pedagogy of response, which helps learners to make judgments, experience responses, generate critiques, and most importantly understand the complexity of cyberculture"

The use of the questionnaire was carried out with the prior informed consent of the legal guardians, both in digital format and on paper, and always in the presence of a member of the research team in the classroom when it was filled in. The questionnaire can be found at the following link:
https://doi.org/10.6084/m9.figshare.20383209.v2

6.2. Sample

The study involved pupils in the final years of primary (1st to 6th grade) and compulsory high school (7th to 10th grade) in the Spanish education system. Access to the research sample, in the case of minors, involves a series of difficulties that imply a complex approach to developing the research plan. Given that the sample was exceptionally complex, it was necessary to perform the survey in the presence of a researcher from the group, acting as a reference in its implementation. This in turn implied the selection of an incidental sample of convenience. The sample was taken from primary and high schools, both public and semi-private, in the Spanish cities of Huelva, Lugo, Pamplona, Salamanca, Santander, and Seville. The study considered the responses of 417 students: 224 students in the 6th year of primary education, with a mean age of 11.02 years (SD=0.48), and 193 students in the 4th year of compulsory secondary education or high school (10th grade), with a mean age of 15.28 years (SD=0.92). The sample, corresponding to the 6th year of primary education included the participation of 86 female students and 138 male students, while the sample of pupils in the 4th year of compulsory high school included 104 female pupils and 89 male pupils.

6.3. Analysis

The analysis of the results was carried out in two stages. The first focused on assessing differences in conceptual, attitudinal, and procedural competence. For this purpose, the responses of the participating students corresponding to the two educational stages (primary and high school) were compared by analyzing the possible differences using the Mann-Whitney-Wilcoxon U test. The effect size was also evaluated using the Rank Biserial Correlation (Rr) and Cohen's d in the case of significance in the test. The statistical power for a limiting value of α=0.05 was also calculated for each case.

The second stage of the analysis corresponded to studying the differences in competence between those students who acknowledged having received training (or not) in the creation and dissemination of content on social media, as well as those who showed a positive (or negative) willingness to create and share content on social media. Two items included in the questionnaire administered were used for sample segmentation, with the study sample being distributed according to the characteristics shown in Table 1.

Table 1. Distribution of results according to year

	Willingness: "I care about learning and sharing content on social media"			Training: "My teachers have taught me how to create and disseminate content on the Internet"		
	No	**Yes**	**Total**	**No**	**Yes**	**Total**
Fourth year of compulsory high school (10th graders)	105	88	193	112	81	193
Sixth year of primary school (6th graders)	117	107	224	145	79	224
Total	222	195	417	257	160	417

On the other hand, to reduce the dimensionality of the items studied and identify the underlying factor structure, an exploratory factor analysis (EFA) was carried out using Factor software version 12.01 (**Lorenzo-Seva**; **Ferrando**, 2006). For its development, the 27 proposed items were initially considered, finally discarding those with a normalized MSA value of less than 0.50 (**Lorenzo-Seva**; **Ferrando**, 2006), reducing the number of items considered to 14. As the sample was larger than 400 subjects, the sample was subdivided into two equivalent subsamples for assessing the factor analysis using the Solomon method (**Lorenzo-Seva**, 2021), evaluating the equivalence of the samples based on the Ratio Communality Index. This index yielded a result of 0.9665, close to the maximum value of 1.0.

7. Results

7.1. Level of conceptual, attitudinal and procedural competence of primary and high school students

Concerning the attitudes associated with the level of conceptual competence (see Table 2), statistically significant differences were found between the groups (U=26841.500, p<.001, Rr=0.242, d=0.472, $1\text{-}\beta_{\alpha=0.05}$=0.994). This indicated that students were able to search for information on the Internet to keep up to date, with the mean value for the group corresponding to the 10th graders being higher. ($M_{4HIGHSCH}$=2.927 vs M_{6GRADE}=2.536). Similarly, significant differences were found in the perception of their ability to identify safe and unsafe sites on the Internet (U=24041.500, p<.040, Rr=0.112, d=0.249, $1\text{-}\beta_{\alpha=0.05}$=0.994), with the mean value also being higher for the 10th graders. ($M_{4HIGHSCH}$=2.834) as opposed to the value obtained for the 6th graders (M_{6GRADE}=2.571), although the effect size, and therefore the difference, was small. Regarding the acquisition of knowledge to recognize false news or information on the web, no statistically significant differences were found between the groups studied, with their mean values being reasonably high. Similarly, no significant differences were found between the groups regarding their perception of their awareness of the repercussions and risks of sharing private information on the Internet, with the mean values for their perceptions also being remarkably

high ($M_{4HIGHSCH}$ =3.528 vs M_{6GRADE}=3.290). This indicated that this was the knowledge that the students mostly perceived they had acquired. No differences were found for knowledge regarding privacy protection, such as profile privacy configuration, for which the mean values were related to the response "often or always", or in knowing how to delete their content. In this case, the extremely low mean values indicated, according to the student's self-awareness, they had not acquired this knowledge.

Table 2. Level of conceptual knowledge

	U	P 1-$\beta_{\alpha=0,05}$	Rr d (Δ/σ)	Group	N	Mean	SD	SE
I know how to search for information on the Internet to keep up to date.	26841.500	<0.001	0.242	10th graders	193	2.927	0.746	0.054
		0.994	0.472	6th graders	224	2.536	0.903	0.060
I know how to identify safe and unsafe sites on the Internet.	24041.500	0.040	0.112	10th graders	193	2.834	0.898	0.065
		0.994	0.249	6th graders	224	2.571	1.192	0.080
I recognize when information on the Web is false.	21252.000	0.752		10th graders	193	2.762	0.740	0.053
				6th graders	224	2.768	0.970	0.065
I know the risks of sharing private information on the Internet.	22054.500	0.671		10th graders	193	3.528	0.707	0.051
				6th graders	224	3.290	1.148	0.077
I know how to delete content that I post on the Internet without leaving any traces.	21913.000	0.798		10th graders	193	1.969	0.935	0.067
				6th graders	224	2.009	1.116	0.075
I know how to make my profiles private.	21944.000	0.758		10th graders	193	3.404	0.873	0.063
				6th graders	224	3.286	1.075	0.072

Concerning the indicators for the level of attitudinal competence (see Table 3), statistically significant differences were observed in the use of social media and the Internet for informative purposes to keep up to date (U=29898.500, p<.001, Rr=0.383, d=0.754, 1-β_{α}=$_{0.05}$=0.994), as well as taking care of one's digital content that is shared online (U=26746.500, p<.001, Rr=0.237, d=0.296, 1-$\beta_{\alpha=0.05}$=0.962). For both of these indicators, more high school students perceived they had acquired these skills ($M_{4HIGHSCH}$=3.135 vs M_{6GRADE}=2.478).

Regarding attitudes towards the content that is consumed, there appeared to be differences between the two age groups. Once again, it is the high school students who were more aware of the influence that content had on their way of thinking and acting (U=29602.500, p<.001, Rr=0.369, d=0.686, 1-$\beta_{\alpha=0.05}$=0.999, $M_{4HIGHSCH}$ =2.503 vs M_{6GRADE}=1.933). It is also this group that showed the greatest awareness of the influence their active participation has on who they are and what they like (U=29308.000, p<.001, Rr=0.356, d=0.638, 1-$\beta_{\alpha=0.05}$=0.999, $M_{4HIGHSCH}$ =2.518 vs M_{6GRADE}=1.924), considering that the more personal content that is shared, the more popular a person may become (U=28458.500, p<.001, Rr=0.317, d=0.534, 1-$\beta_{\alpha=0.05}$=0.999; $M_{4HIGHSCH}$ =2.088 vs M_{6GRADE}=1.598).

Differences were also found regarding acquiring attitudes on the impact of participation (U=29616.500, p<.001, Rr=0.242, d=0.472, 1-$\beta_{\alpha=0.05}$=0.994; $M_{4HIGHSCH}$ =2.658 vs M_{6GRADE}=1.960), with the older students being more aware of the risk of being exposed to strangers with access to their data (U=17977.500, p<.001, Rr=0.168, d=0.163, 1-$\beta_{\alpha=0.05}$=0.339; $M_{4HIGHSCH}$=3.218 vs M_{6GRADE}=3.375). However, in the latter case, the differences cannot be considered appreciable. Despite these results, no statistically significant differences were found to exist between the two groups of students concerning the perception of one's respectful attitude in the use of the Internet, being one of the attitudes the majority of the students thought they had acquired.

In addition, the high school students showed a more critical attitude, as they responded "often" to the question referring to cross-checking the information they access (U=26024.500, p<.001, Rr=0.204, d=0.432, 1-$\beta_{\alpha=0.05}$=0.999; $M_{4HIGHSCH}$=3.041 vs M_{6GRADE}=2.670), although the differences found were not highly statistically significant.

Concerning the level of procedural competence (see Table 4), that is, the actions that students take in the use of the Internet and social media to consume, create and share content, statistically significant differences were found in the use of their images to communicate with others (U=32980.500, p<.001, Rr=0.526, d=1.010, 1-$\beta_{\alpha=0.05}$=1.000; $M_{4HIGHSCH}$=2.326 vs M_{6GRADE}=1.487) and the use of photographs of places visited (U=29980.500, p<.001, Rr=0.387, d=0.669, 1-$\beta_{\alpha=0.05}$=0.999; $M_{4HIGHSCH}$=2.285 vs M_{6GRADE}=1.696). These differences are also observed when selfies are taken and shared (U=31442.000, p<.001, Rr=0.455, d=0.819, 1-$\beta_{\alpha=0.05}$=1.00; $M_{4HIGHSCH}$=2.311 vs M_{6EP}=1.567) or videos posted in which the students appear (U=28387.5000, p<.001, Rr=0.313, d=0.550, 1-$\beta_{\alpha=0.05}$=0.999; $M_{4HIGHSCH}$=1.927 vs M_{6GRADE}=1.460). This also includes videos in which others are the protagonists (U=30932.500, p<.001, Rr=0.431, d=0.862, 1-$\beta_{\alpha=0.05}$=1.00; $M_{4HIGHSCH}$=1.876 vs M_{6GRADE}=1.223) sharing their experiences, behaviors that are more common among high school students.

There is also evidence of a greater propensity for risky behavior among older students, such as accepting invitations from strangers (U=31937.500, p<.001, Rr=0.447, d=0.928, 1-$\beta_{\alpha=0.05}$=1.000; $M_{4HIGHSCH}$=1.865 vs M_{6GRADE}=1.201) while, according to the mean values, primary school students more frequently respond "never". The mass diffusion of content received via social media was greater among high school students, although it had a lower effect (U=25772.000, p<.001, Rr=0.192, d=0.295, 1-$\beta_{\alpha=0.05}$=0.999; $M_{4HIGHSCH}$=1.663 vs M_{6GRADE}=1.433) and, therefore, a less significant difference was

Table 3. Level of attitudinal competence

	U	P $1-\beta_{\alpha=0,05}$	Rr d (Δ/σ)	Group	N	Mean	SD	SE
The Internet allows me to keep up to date with the latest news.	29898.500	<0.001	0.383	10th graders	193	3.135	0.765	0.055
		0.994	0.754	6th graders	224	2.478	0.966	0.065
What I see on the Internet influences the way I think and act.	29602.500	<0.001	0.369	10th graders	193	2.503	0.791	0.057
		0.999	0.686	6th graders	224	1.933	0.868	0.058
I think before I post personal photos or videos.	17977.500	<0.001	-0.168	10th graders	193	3.218	0.863	0.062
		0.339	0.163	6th graders	224	3.375	1.047	0.070
Actively participating on social media shows who I am and what I like.	29308.000	<0.001	0.356	10th graders	193	2.518	0.879	0.063
		0.999	0.638	6th graders	224	1.924	0.979	0.065
I am aware that when I participate on social media others may obtain my data.	29616.500	<0.001	0.370	10th graders	193	2.658	0.956	0.069
		0.999	0.671	6th graders	224	1.960	1.118	0.075
One should try to be respectful when participating in social media.	19852.500	0.104		10th graders	193	3.326	0.831	0.060
				6th graders	224	3.357	1.001	0.067
Creating your videos and sharing them helps you become more popular.	28458.500	<0.001	0.317	10th graders	193	2.088	0.923	0.066
		0.999	0.534	6th graders	224	1.598	0.913	0.061
I am careful about the content I share because I know that it influences others.	26746.500	<0.001	0.237	10th graders	193	2.352	0.919	0.066
		0.962	0.296	6th graders	224	1.969	1.013	0.068
Information should be sought from different sources and cross-checked.	26024.500	<0.001	0.204	10th graders	193	3.041	0.728	0.052
		0.983	0.432	6th graders	224	2.670	0.969	0.065

observed between the two age groups. Moreover, no differences were found between primary and high school students regarding the capacity for critically analyzing the intentions of the messages received via social media.

Regarding preventive and protective attitudes, the primary school students were more likely to cover the camera on their devices when not in use (U=19153.000, p<.001, Rr=0.114, d=0.213, $1-\beta_{\alpha=0.05}=0.518$; $M_{4HIGHSCH}=2.596$ vs $M_{6GRADE}=2.835$), although this difference was small. In addition, no differences between the groups were detected concerning the use of secure passwords, which was one of the actions that obtained the highest average score. This result indicates that this is a protective attitude ingrained in students at both stages.

Table 4. Level of procedural competence

	U	P $1-\beta_{\alpha=0,05}$	Rr d (Δ/σ)	Grupo	N	Mean	SD	SE
I share photographs of myself to communicate.	32980.500	<0.001	0.526	10th graders	193	2.326	0.891	0.064
		1.000	1.010	6th graders	224	1.487	0.769	0.051
I accept invites from strangers.	31937.500	<0.001	0.477	10th graders	193	1.865	0.837	0.060
		1.000	0.928	6th graders	224	1.201	0.568	0.038
I use secure passwords to prevent my accounts from being hacked.	20874.000	0.392		10th graders	193	3.679	0.629	0.045
				6th graders	224	3.638	0.852	0.057
I share through social media everything I am sent.	25772.000	<0.001	0.192	10th graders	193	1.663	0.788	0.057
		0.794	0.295	6th graders	224	1.433	0.772	0.052
I take selfies and share them.	31442.000	<0.001	0.455	10th graders	193	2.311	0.934	0.067
		1.000	0.819	6th graders	224	1.567	0.881	0.059
I record videos of what others are doing and share them.	30932.500	<0.001	0.431	10th graders	193	1.876	0.910	0.066
		1.000	0.863	6th graders	224	1.223	0.564	0.038
I create videos in which I appear to share them on social media.	28387.000	<0.001	0.313	10th graders	193	1.927	0.893	0.064
		0.999	0.550	6th graders	224	1.460	0.803	0.054
I share pictures of what I see and where I am.	29980.000	<0.001	0.387	10th graders	193	2.285	0.840	0.060
		0.999	0.669	6th graders	224	1.696	0.917	0.061
I question the intentions of the messages I receive.	21523.000	0.938		10th graders	193	2.539	0.860	0.062
				6th graders	224	2.536	1.124	0.075
If I'm not using the webcam, I cover it up.	19153.000	0.031	-0.114	10th graders	193	2.596	1.288	0.093
		0.518	0.213	6th graders	224	2.875	1.337	0.089

7.3. Differences in competence among students based on the training received and willingness to learn

Dimension reduction was performed by applying a exploratory factor analysis (EFA). Due to the characteristics of the data, the polychoric correlation matrix was computed from the standardization of the item variables, a strategy appropriate for Likert-type items and data with excessive kurtosis, achieving multivariate normality according to Mardia's criterion (**Mardia**, 1970). Similarly, appropriate indicators of adequacy were estimated (Kaiser-Meyer-Olkin: KMO=0.897, 90% Bootstrap Confidence Interval [0.837-0.889]; Barlett χ= 2577.3, df=91, P <.001) for the minimum rank factor analysis and an optimized parallel analysis based on the permutation of 500 random correlation matrices according to the Minimum Rank Factor Analysis (**Timmerman**; **Lorenzo-Seva**, 2011). This made it possible to estimate the number of appropriate factors to be considered at two. The fit achieved in this process was assessed as extremely high with a goodness-of-fit index (GFI) of 1.00 (**Hu**; **Bentler**, 2009). Likewise, the root mean square of residuals (RMSR) value reached was 0.061, which is close to the value of the Kelley criterion proposed for the model (0.059) (**Kelley**, 1935). The factors were extracted using Robust diagonally weighted least squares (RDWLS) and successfully explained 53.64% of the total variance. To simplify the resulting underlying factorial interpretation, a Robust Promin rotation was applied, which is advantageous for the simple explanation of the factors and the construction of the factors in terms of the stability of the solution (**Lorenzo-Seva**; **Ferrando**, 2019b). The factors obtained showed good simplicity indices (Bentler's S= 0.99 P97; LS=0.47, P96) that reinforced the decision to adopt the proposed solution. In addition to the above, all items showed a factor loading above 0.400, as indicated in Table 5.

Table 5. Factor loadings of the items included in the factors identified

	Factor 1. Lack of privacy protection	**Factor 2. Critical and protective attitudes**
I take selfies and share them.	0.942	
I create videos in which I appear to share them on social media.	0.920	
I record videos of what others are doing and share them.	0.888	
I share pictures of what I see and where I am.	0.816	
I share photographs of myself to communicate.	0.795	
I accept invites from strangers.	0.505	
I share through social media everything I am sent.	0.428	
The Internet allows me to keep up to date with the latest news.		0.719
I am careful about the content I share because I know that it influences others.		0.657
Information should be sought from different sources and cross-checked.		0.624
What I see on the Internet influences the way I think and act.		0.577
Actively participating on social media shows who I am and what I like.		0.441
I know how to search for information on the Internet to keep up to date.		0.420
Creating videos and sharing them helps you become more popular.		0.420

Furthermore, Table 6 shows the descriptive statistics corresponding to the scores of the students participating in the study for the two factors identified: the lack of privacy protection and critical and protective attitudes.

Table 6. Descriptive statistics of the scores for the factors identified

	F2. Critical and protective attitudes	**F1. Lack of privacy protection**
Mean (SD)	16.707 (4.018)	12.005 (4.365)
Asymmetry (SD)	-0.049 (0.120)	0.774 (0.120)
Kurtosis	-0.423 (0.238)	-0.032 (0.238)
Minimum	7.000	7.000
Maximum	27.000	25.000

Factor 1, associated with the lack of privacy protection, includes those items related to the risks taken by students according to their level of procedural competence, as it is the actions or behaviors performed by these students that determine the type of risks they take when using social media. These items are as follows: I share photographs on social media to communicate; When I am on social media, I accept invites from strangers; I take selfies and share them; I often record videos of what others are doing and share them; I create videos of myself to share; I share photos of what I see and where I am; and, I share through social media everything that I am sent. The majority of primary school students responded that they "never" did these actions, while the high school students said they did them "often". This suggests high school students are not acquiring procedural competence, which needs to be further reinforced at this level to avoid risky behavior regarding privacy protection when sharing their own and other people's personal information.

Regarding factor 2, on critical and protective attitudes, this includes the items related to the level of conceptual competence (the students know how to search for information to keep up to date) and attitudinal (where the majority of them consider that: the Internet allows them to keep up to date with the latest news; what they see on the Internet influences the way they think and act; you have to take care of the content you share because it influences others; you have to look for information from different sources and cross-check it, but rarely consider that actively participating gives insight into how they really are, or that you gain popularity by creating videos and sharing it), are attitudes that involve reflection, contrasting and responsibility when creating and disseminating content. In parallel, these are all items for which the mean score values of primary school pupils were found to be associated with the response "never/rarely" while for the group of high school students, the responses to these items were often affirmative, according to the higher mean values. This would indicate that it is important to teach such attitudes and knowledge at the primary school stage, in a preventive and protective manner.

> "Cybercultures based on digital use and trends does not always allow for the development of critical and protective skills"

Based on the factors identified, the differences between students who reported having received training in content creation and sharing and those who did not were analyzed (see Table 7). Statistically significant differences were found between the students who responded they had received training in the score of the first factor (U=17262.000, n_{No} =222, n_{YES}=195, p<.001, Rr=-0.202, d=0.389, 1-$\beta_{\alpha=0.05}$=0.956), with a higher score for the students who received training (M_{No}=15.982 vs M_{YES}=17.533). However, both groups, including students who had received training and those who did not, showed similar behavior concerning the actions related to factor 2.

Table 7. Differences in the mean factor scores between students who did and did not receive training

	U	P 1-$\beta_{\alpha=0,05}$	Rr d (Δ/σ)	Group	N	Mean	SD	SE
Factor 2. Critical and protective attitudes	17262.000	<0.001	-0.202	No	222	15.982	4.037	0.271
		0.956	0.389	Yes	195	17.533	3.843	0.275
Factor 1. Lack of privacy protection	19990.000	0.175		No	222	11.748	4.364	0.293
				Yes	195	12.297	4.359	0.312

Similar to the above, differences were analyzed according to the willingness to receive training concerning both factors (see Table 8). In this analysis, statistically significant differences were observed between those students willing to learn how to create and share content on social media and those who did not in the score of factor 2 on protective attitudes, U=12531.000, n_{No} =257, $n_{Sí}$=160, p<.001, Rr=-0.391, d=0.692, 1-$\beta_{\alpha=0.05}$=0.998); it was observed that those students who showed willingness had more protective attitudes. (M_{No}=15.693 vs $M_{Sí}$=18.337). Regarding factor 1, differences were also found between the two groups (U=14449.000, n_{No} =257, n_{YES}=160, p<.001, Rr=-0.297, d=0.524, 1-$\beta_{\alpha=0.05}$=0.952), where a higher mean score was obtained for those students more concerned about learning how to create and share content on social media. (M_{No}=11.140 vs M_{YES}=13.394).

Table 8. Differences in the mean factor scores between students who did and did not show willingness to learn how to create and share content on social media

	U	P 1-$\beta_{\alpha=0,05}$	Rr d (Δ/σ)	Group	N	Mean	SD	SE
Factor 2. Critical and protective attitudes	12531.000	<0.001	-0.391	No	257	15.693	3.785	0.236
		0.998	0.692	Yes	160	18.337	3.852	0.305
Factor 1. Lack of privacy protection	14449.000	<0.001	-0.297	No	257	11.140	4.007	0.250
		0.952	0.524	Yes	160	13.394	4.566	0.361

8. Discussion and conclusions

Our results indicate that there are differences from primary to high school education in the digital competence required for appropriately creating and sharing digital content that is dependent on the knowledge, attitudes, and procedures that students perceive they have acquired.

At the conceptual level, both primary and high school students perceive that they know how to search for, contrast, or recognize false information, actions associated with critical Internet usage. Concerning protection and security, both groups reported they were aware of the risks of sharing personal information, but not all students indicated they were aware of the options for setting up private profiles. In addition, many did not know how to delete posted information, which could indicate possible false-posi-

> "A lack is detected of preventative training for primary school students to develop critical and reflective attitudes"

tive self-awareness, or disproportionate self-awareness, if this is compared with the risky actions they reported taking when creating and sharing digital content found in the procedural analysis, confirming the risk regarding privacy found in other studies on the behavior of minors (**Díaz-Arce**; **Loyola-Illescas**, 2021; **Hernández-Serrano** *et al.*, 2021; **Hernández-Serrano** *et al.*, 2022). The fact that no significant differences were found at this level indicates that this knowledge is acquired early on, progresses positively, and is maintained according to the student's self-perception. Thus, other tests are needed to assess the actual performance and application of this knowledge (**Casillas-Martín**; **Cabezas-González**; **García-Valcárcel**, 2022).

> We are interested in understanding some of the effects that may be related to the perception that young people have regarding the training they have received, in line with recent studies in this area

The greatest variability was found to exist in the acquisition of attitudes related to the production, dissemination, and consumption of digital content. High school students use social media and the Internet more frequently to stay up to date and, above all, to share digital content and their personal information. Both of these behaviors are more typical in the use of social media by this age group as opposed to primary school students (**Núñez-Gómez** *et al.*, 2021; *Ontsi*, 2021). Therefore, the results show that older students are more aware that their actions and what they share on social media can influence the way they think and act, or what others may think of them. This perception of the repercussions is remarkable because it puts the students on the right path for taking responsibility for what they produce and distribute, an attitude that is necessary for transformative competence in digitality (*OECD*, 2019; **Biesta**, 2017). However, they also have other attitudes that are largely in contrast to and associated with a lack of protection such as the fact that they need to actively participate to be known or to gain popularity. In this context, adolescents could be affected by two aspects: the first is the demand for the mass production of content, which is characteristic of cyberculture, and the second is the progressive need to gain recognition from their peers, which is characteristic of adolescence. This would explain why, as other studies have confirmed, social interaction and connecting with other people, as well as self-presentation, are the main reasons that motivate teenagers to use social media (**Brailovskaia**; **Schillack**; **Margraf**, 2020; **Spears**, 2021; **Hernández-Serrano** *et al.*, 2021). The risks that minors are unaware of are associated with the lack of privacy protection, as they tend to prioritize creating and posting their content, as shown by the results associated with the procedural level. Nonetheless, it is striking that the highest mean attitudinal scores were obtained by the group of primary school children with regard to thinking before posting their photos or videos or behaving respectfully when participating on social media. This may indicate that these attitudes are not maintained or that they evolve positively to ensure privacy protection and ethical behavior. Also, these attitudes seem to be lost later on in high school, which supports our argument for the need to reinforce training that would increase the awareness of these students about the repercussions of their actions in the digital world. The proposal by **Pérez-Tornero** (2017) focuses on this form of training and states that the appropriate use of the Internet is guaranteed when there is a good online coexistence with others. This in turn requires a high level of tolerance and respect, which provides the students with the essential attitudes for becoming digital citizens.

At the procedural level, differences were observed in actions related to digital self-representation that were more common in high school students than in primary school students. These actions include taking selfies and sharing them, posting videos of themselves, and even videos of what others do to share experiences, all of which corroborate that their form of communication is marked by the exhibition and constant representation of what they do, who they do it with, and where they are. There is also evidence of a greater propensity for risky behavior among older students, such as accepting invites from strangers or immediately sharing everything they are sent, although the average score obtained revealed that this is an action that does not occur very often. This progression towards risk-taking would make it necessary to continue training minors in the management and production of their personal information, be it photos or videos, to promote a reflective attitude about the repercussions of their digital content (**García-Ruiz**; **Pérez-Escoda**, 2021; **Renés-Arellano**; **Lena-Acebo**; **Hernández-Serrano**, 2021; **Pérez-Escoda**; **Lena-Acebo**; **García-Ruiz**, 2021; **García-Ruiz**; **Gozálvez**; **Aguaded**, 2014; **Martínez-Sanz** *et al.*, 2016; **Redondo-García**, 2016; **Pérez-Escoda**; **García-Ruiz**; **Aguaded**, 2019; **Domingo-Coscollola** *et al*., 2019; **Torres-Barzabal** *et al.*, 2022).

Concerning the factors identified, it could be concluded that the two groups separately highlighted critical attitudes that are protective, as well as other actions that could be risky like self-representation and the sharing of personal information. Both factors would refer to levels of competence that are hardly found in primary school students and more frequently in high school students, which could indicate a negative behavioral trend, as well as a lack of preventative training for primary school students to develop critical and reflective attitudes. It should also be noted that critical training in proper Internet usage focuses on the cultivation of attitudes (**Saavedra-Llamas**; **Papí-Gálvez**; **Perlado-Lamo-de-Espinosa**, 2020), rather than the mere teaching of information or procedures for some applications or devices that may be constantly changing. In fact, when analyzing the differences according to the training received from the students' teachers, it was corroborated that the higher mean scores for the factor referring to

> It is essential to put in place preventive training that will help to ensure children grow up in a safe environment within cyberculture in which values like respect, security, and privacy protection are paramount

the acquisition of critical and protective attitudes were associated with those who had received such training.

However, concerning more risky behaviors, the students who had received training and those who had not presented similar mean scores for factor 2, related to critical and protective attitudes. According to the interpretation we have been making, these results could indicate that as children have greater access to social media, with a higher level of creating and posting their photos and videos, it is this immersion in cybercultural behaviors that would reverse the effect of the protective training received. In contrast, we could consider that students who are exposed to these risks are also aware of the need for training, since, when analyzing the effect of willingness to learn to create and share content on networks, it is significant that, according to the differences found, those who did show this willingness were also those who most frequently showed risky and unprotected behavior.

> "The results obtained highlight the need to promote the teaching of critical thinking for Internet usage among minors, starting from an early age, to avoid the risks associated with consuming, producing, and disseminating digital content"

In conclusion, the results obtained highlight the need to promote the teaching of critical thinking for Internet usage among minors, starting from an early age, to avoid the risks associated with consuming, producing, and disseminating digital content. Even with training, there is the potential for children to compromise their privacy when sharing their photographs with others or welcoming strangers into their digital social spaces, which are the most significant risk-taking behaviors. The identification of these shortcomings is timely because it orients the development of new training and digital literacy actions by understanding which ones need to be reinforced at each stage, regardless of whether or not there is a willingness to learn or whether specific training has been received. This reversal, toward a propensity for taking risks, makes it necessary to continue training students at higher levels in the management and production of their personal information, be it photos or videos, and encourage them to reflect on the repercussions of the digital content they produce (**Pérez-Escoda**; **García-Ruiz**; **Aguaded**, 2019; **Domingo-Coscollola** *et al.*, 2019; **Torres-Barzabal** *et al*., 2022). And, above all, it is essential to put in place preventive training that will help to ensure children grow up in a safe environment within cyberculture in which values like respect, security, and privacy protection are paramount (**Pérez-Tornero**, 2017; **Caldeiro-Pedreira** *et al.*, 2021). In terms of the study's limitations and areas for improvement, further research on new aspects linked to risk-taking when young people consume and use the Internet and social media, as well as topics related to, for example, business, games, fake phenomena, or the limitations of artificial intelligence, among others is still needed.

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