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The critical thinking strategies university students use when dealing with Fake News produced by Artificial Intelligence

Universitarios frente a las Fake News generadas por Inteligencia Artificial: estrategias asociadas al pensamiento crítico que adoptan

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ABSTRACT

The arrival of Artificial Intelligence (AI) in the digital arena has increased the amount of fake news (FN) circulating on social networks (SNs), where young people are at particular risk of being deceived and manipulated. The study objectives were: 1) to analyse the critical-thinking strategies that university students (N=543) activate when dealing with FN; 2) to determine how much education and training they have been given for detecting FN; and 3) to describe the educational content that they believe to be most important for identifying FN. The methodology was empirical and non-experimental. The study was descriptive, exploratory, and comparative. A validated questionnaire (α=0.895) with 56 items was used to ascertain how much education they had received for detecting FN and to identify the critical-thinking strategies (cognitive, personal-attitudinal, logical-argumentative, communicative-expressive, and ethical) they activated when dealing with FN. The results indicated that 76.6% reported having little or no education in this regard. The majority understood what FN with the aim of manipulation was, although around 40% reported not being aware of having received any. They did not habitually test the information they received against reliable sources nor check where it came from or who wrote it. Nonetheless, they did detect clickbait. The strategies they used did not always ensure that they determined the truth of the news stories they received, making them more vulnerable. They called for specific education and described the training content they would prioritize to understand how FN is created and to critically analyse its form and content, avoiding being manipulated. Finally, it is important to consider the role of generative AI in altering "evidence", limiting the audience's ability to determine the truth of any information they receive, potentially leading to widespread scepticism.

Palabras clave: fake news, artificial intelligence, critical thinking, social networks, university students

RESUMEN

La irrupción de la Inteligencia Artificial (IA) en la esfera digital está incrementando las Fake News (FN) que circulan en las redes sociales (RRSS), donde especialmente los jóvenes corren el riesgo de ser víctimas de engaños y manipulación. Los objetivos de esta investigación son: 1) analizar las estrategias activadas por universitarios (N=543) frente a las FN, relacionadas con las dimensiones del pensamiento crítico; 2) determinar su nivel de formación recibido para detectar FN; y 3) delimitar los contenidos formativos que consideran prioritarios para discriminarlas. La metodología es empírica, no experimental de tipo descriptivo, con carácter exploratorio y comparativo. Se utilizó un cuestionario de opinión validado (α=0.895), integrado por 56 ítems para conocer el nivel de formación recibido para detectar FN; e identificar qué estrategias del pensamiento crítico (cognitiva, personal-actitudinal, lógico-argumentativa, expresivo-comunicativa y ética) activan frente a ellas. Los resultados evidencian que un 76.7% declara tener poca o ninguna formación al respecto. La mayoría sabe qué son las FN con el fin de manipular, aunque un aproximado 40% declara no ser

consciente de recibirlas. Habitualmente no contrastan la información recibida con fuentes fiables ni comprueban su fuente y autoría. Sin embargo, detectan el abuso del clickbait. Las estrategias que emplean no siempre garantizan discernir la veracidad de las noticias que reciben, incrementando su vulnerabilidad. Reclaman una formación específica y enuncian los contenidos prioritarios para conocer cómo se construyen las FN y analizar críticamente su contenido y forma, evitando el riesgo de manipulación. Finalmente, cabe reflexionar sobre el papel de la IA generativa para modificar "evidencias", limitando la capacidad de la audiencia para discriminar la veracidad de la información recibida, e incluso, abocando a un escepticismo generalizado.

Palabras clave: *fake news*, inteligencia artificial, pensamiento crítico, redes sociales, universitarios

INTRODUCTION

The post-truth era is characterized by an emphasis on the prevalence of subjectivity and the irrelevance of the truth in the face of so-called 'facts' (Villena, 2019). According to Waisbord (2018), we are seeing a new order in communication, with a battle to convince audiences using social networks (SNs): governments orchestrate propaganda campaigns, elites and corporations compete to dominate news coverage without demonstrating facts, only seeking followers. Audiovisual rhetoric is prioritized—techniques for transmitting the most effective, aesthetic, visual, and persuasive messaging possible (Sülflow et al., 2019). Audiovisual messages are created and spread on SNs, trying to convince or move the audience to feel something to achieve a desired effect, making the truth somewhat irrelevant. The young audience, spending so much time on SNs (Lozano-Blasco et al., 2023), often encounter fabricated information dressed up as news-like stories that serve political, economic, or ideological interests (Hernández, 2020).

The object of such Fake News (FN) is to manipulate public opinion, to change its ideas about a given situation, and legitimize a point of view (Aleinikov et al., 2019), which may even harm democratic stability (Chambers et al., 2021). This phenomenon of manipulation contributes to increasing the audience's vulnerability, which is amplified by the reach of SNs and the development of Artificial Intelligence (AI) (Gómez de Ágreda et al., 2021; López et al., 2022). The algorithms behind these SNs examine users' interests to feed them tailored information or advertising (Swart, 2021), adapting to their requirements at the risk of isolating them in bubbles. That may lead to users not seeing other content and becoming radicalized, reinforcing the ideas and arguments they share with similar users (Wolfowicz et al., 2023). The creators of FN do not want their information analysed or their sources checked, but rather seek instant, impulsive, visceral responses, using provocative imagery to trigger emotional responses (Acosta, 2021). In this way, they capture young

people's attention through emotion, affecting their beliefs and seeking their help in spreading false news stories.

Hence, the spread of FN is closely related to deficits in processing conflict and the public's ability to analyse information. Britt et al. (2019) and Batailler et al. (2022) noted four factors that promoted the viral spread of FN: those who receive it not being motivated to analyse the information before they spread it; reduced critical-thinking skills for analysing it; prioritizing the emotional over the cognitive channel; and the information received matching prior beliefs (the more consistent it is, the easier it is to accept). Faced with this situation, it is worth asking whether university students are affected by these factors, and how they deal with the FN they see on the SNs they spend so much time on. More specifically, the objective of the present study is to analyse the strategies related to critical-thinking skills that university students use when dealing with fake news.

CRITICAL THINKING VS. AI-BOOSTED FAKE NEWS

The emergence of generative AI has triggered ethical debates about its use in computing and communication, which is affecting the entire process of news production (Otero, 2022). This technology also has an impact on the strategies people activate to gain knowledge from information they receive, which requires students to be equipped with the cognitive tools that will allow them to be able to respond to the challenges they face (García-Peñalvo et al., 2024). There is no doubt that AI offers great potential for education, although it also brings with it some challenges, which means there is a need for rigorous analysis involving the entire educational community (Sánchez-Mendiola y Carbajal, 2023). One of the risks of the technology is related to its misuse, if it is put into service of malicious interests to create uncertainty in the face of an avalanche of false information, as Martín and Buitrago (2023) and Ballesteros-Aguayo and Ruiz del Olmo (2024) noted.

The challenge nowadays focuses on detecting FN that is created automatically by increasingly sophisticated systems (Meso et al., 2023). These systems replace the authentic actors of news-events, emulating their voices or writing styles, putting them in fictitious scenes, changing what they say, misleading people and causing a permanent state of disbelief and uncertainty. Given this worrying situation, people—especially young people—need to be given tools and strategies to stimulate critical thinking and train them to countereffect the negative impact of AI associated with the creation and spread of FN. That requires determining whether young people are ready to cope in the age of disinformation, in other words, whether they have intrinsic critical-thinking skills.

Ennis (1985) defined critical thinking as a cognitive process that allowed subjects to rationally explain certain facts, identifying their nature and ethical connotations. When it comes to the news this is about peoples' abilities to identify the nature of news stories and evaluate them from an ethical perspective, checking whether they are true and whether they match up with reality. Paul and Elder (2007) suggested five intrinsic dimensions for critical thinking: cognitive, personal-attitudinal, logical-argumentative, expressive-communicative, and ethical. Young people's critical abilities in the face of fake news—created or spread by AI—involves using various abilities that may fall within these dimensions.

The *cognitive dimension* is associated with subjects' capacity to identify and define FN, to be aware of receiving it, and able to classify it in news stories that may be incomplete, biased, contradictory, distorted, misleading, or out-of-context, according to López-Flamarique and Planillo (2021). It also refers to the ability to identify the interests behind FN, highlighting the areas where it are more prevalent.

The *personal-attitudinal* dimension is related to subjects' reactions to FN stories, whether that is stopping reading them in order to analyse them, checking sources and authors, checking or verifying them against other media or with other people (Castells et al., 2022), expanding information, or ignoring them. It is also related to their capacity to rationalize the motives that often lead them to unthinkingly and reflexively spread FN, without considering the potential impact.

The *logical-argumentative dimension* is associated with the ability to discern the formulas FN adopt: a humorous or satirical tone; without context; sensationalist—clickbait—titles or images (Singh et al., 2023); misleadingly cropped, distorted, or AI-created images (Karen et al., 2023) created to capture attention and manipulate. This dimension is also related to the ability to check the veracity of a news story, identifying the elements that contribute to that, such as whether the news comes from an expert or a well-known organization, is supported by believable testimony, is not controversial, and includes real images or video, as demonstrated during the COVID experience (Del Moral et al., 2021).

The *expressive-communicative dimension* is related to subjects' abilities to detect technical or aesthetic aspects that help to disguise FN, in other words, those aspects that cause doubts about its veracity (Kondamudi, 2023). These include a lack of authors, unreliable sources, no publication date, inclusion of attention-grabbing data or headlines that are unrelated to the actual content, use of offensive or discriminatory tone, spelling and grammar errors, AI-produced images, etc. (Figure 1).

Figure 1
Examples of AI-produced fake news

Source. Google Images.

Lastly, the *ethical dimension* is linked to the capacity to think about the motivations behind AI-based FN. In other words, determining whether it is about growing an audience, generating controversy, manipulation or influence, making money, causing social alarm (Aboualola et al., 2023), discrediting people or institutions, obscuring other news items, etc. This dimension also refers to the ability to identify those responsible for spreading FN, such as influencers, pseudo-experts, politicians, journalists, and other citizens.

It is essential to determine whether young people—who are most exposed to the digital arena—are sufficiently ready to respond to the challenges of being inundated with FN produced and spread using AI. Do they possess the levels of critical thinking needed to avoid being manipulated? The current study examines their opinions, perceptions, and reactions to FN, identifying the strategies they use to identify, verify, and check it. This will allow us to explore their abilities and identify limitations in their education that will allow the future design of systematic educational interventions for stimulating their critical thinking in the face of this phenomenon.

METHOD

This study was a result of the inter-university project, *SURFake*, in response to the following questions:

Q1. Do university students feel that they are ready to deal with the avalanche of false information produced by AI that they receive through SNs?

Q2. Can they identify the traits that define FN?
Q3. In what settings do they believe that FN are most prevalent?
Q4. What strategies associated with critical thinking do they deploy when faced with FN?
Q5. What indicators alert them that information is false?
Q6. What do they think are the reasons behind the creation of FN and its spread on SNs?
Q7. Who is responsible for creating and spreading FN?
Q8. Why would they be pushed to spread news without checking it?
Q9. What education or training do they think is most important to deal with this?

More specifically, the *hypotheses* derived from the research questions were as follows:

H1. University students do not feel ready to discriminate the FN they receive via SNs.
H2. Most students think that FN stories are characterized by being biased or incomplete.
H3. They believe that FN proliferates in university, politics and in society news.
H4. They activate various strategies to determine the truth of news they receive on SNs.
H5. A variety of indicators lead them to doubt the truth of news stories they receive depending on age and gender.
H6. Young people believe that the main motivation for creating and spreading FN is manipulation of the public.
H7. The university students believe that influencers are the most responsible for the spread of FN.
H8. The students spread news stories without checking when they are shocking and when they cause social alarm.

This was an empirical, non-experimental study, which was exploratory, comparative, and survey-based, as described by Cohen et al. (2011). The objectives were: 1) to analyse the strategies university students use when faced with FN, related to critical-thinking dimensions; 2) to determine what level of education or training they had received for detecting FN; and 3) to describe the educational content they would prioritize for identifying FN. This will allow future outlining of possible courses of action to incorporate in educational intervention programs that would strengthen strategies associated with critical thinking when faced with any kind of new information.

Sample

Sampling was non-probabilistic and intentional, following application of a questionnaire that university students completed voluntarily. Table 1 shows the distribution of the subjects considering the different classification variables.

Table 1
Sample distribution

		Frequency	Percentage
University	University of Oviedo	274	50.5
	University of Valencia	269	49.5
Gender	Female	420	77.3
	Male	123	22.7
Age (years)	18-19	174	32.1
	20-21	194	35.8
	22-23	100	18.5
	24-25	45	8.3
	Over 25	29	5.4
Degree	Bachelor's in Social Education	86	15.8
	Bachelor's in Teaching Infant Education	131	24.1
	Bachelor's in Teaching Primary Education	113	20.8
	Bachelor's in Education	154	28.4
	Masters' in Education	59	10.9
TOTAL	543	100.0	

Source. authors' own work.

Instrument

The instrument, designed specifically for this study, included 56 items related to the critical-thinking dimensions defined by Paul and Elder (2007). The aim of the instrument was to identify the *Strategies associated with Critical Thinking (ESPECRI)* that university students activated when dealing with FN. It combined items that had been validated and adapted from other similar studies, although the difference here was the systematization of the questions around the critical-thinking dimensions—the present object of study. In other words, the questions were aimed at understanding the strategies university students adopted when dealing with potential FN received via SNs. The cognitive dimension included items adapted from the study by López-Flamarique and Planillo (2021) on awareness of what FN is and awareness of receiving it. The attitude dimension included similar indicators to those used by Castells et al. (2022) to determine subjects' reactions to FN and their contributions to spreading it. The ethical dimension included similar items to those used by Aboualola et al. (2023) to examine beliefs about those responsible for spreading FN and the reasons for creating it.

The items in the logical-argumentative dimension were based on the studies by Del Moral et al. (2021), Karen et al. (2023), and Singh et al. (2023) linked to understanding subjects' abilities to discern the traits of true news stories and to identify the types of FN they often find. The expressive-communicative dimension included items about testing the veracity of news stories, as in the study by Kondamudi (2023). In addition to the critical-thinking dimensions defined by Paul and Elder (2007), an additional dimension was included, education, to assess how important the university students thought various educational content was for being able to deal with disinformation on SNs and AI. This included an item to record the amount of education they had received in this regard, and another to assess their educational needs based on priority topic areas intrinsic to media literacy for combatting disinformation (Sádaba-Chalezquer y Salaverría-Aliaga, 2023).

The instrument was a self-reported questionnaire, with closed questions and mutually exclusive Likert-type response options (four response options: 1=never, 2=occasionally, 3=often, 4=always) (Table 2).

Table 2
ESPECRI-Fake News instrument

Dimension	Variables	Category and coding
1. Cognitive (López-Flamarique y Planillo, 2021)	1.1. Are you aware of the fake news you receive?	(1=never, 2=occasionally, 3=often, 4=always)
	1.2. Indicate to what extent the following adjectives define a fake news story	1.2.1. Incomplete 1.2.2. Biased 1.2.3. Contradictory 1.2.4. Distorted 1.2.5. Misleading 1.2.6. Lacking context
	1.3. What areas do you think fake news proliferates most in?	1.3.1. Culture 1.3.2. Health 1.3.3. Environment 1.3.4. Society 1.3.5. Economy 1.3.6. Politics 1.3.7. Sport
2. Attitudinal (Castells et al., 2022)	2.1. How do you usually react when you think you are looking at a fake news story?	2.1.1. I ignore it/I don't read it (indifference) 2.1.2. I read the whole thing (interest) 2.1.3. I check the source or author (confirmation) 2.1.4. I verify the link (verification) 2.1.5. I check with other people (check) 2.1.6. I look for more information online (documentation) 2.1.7. I check with other media (traditional news, official bulletins, specialist websites…) (compare)
	2.2. Indicate the most common reasons one may have for reflexively contributing to spreading fake news without checking it	2.2.1. It might be useful to others (recipes, offers, advice, medicine, etc.) 2.2.2. It aligns with my interests (leisure, economics, etc.) 2.2.3. It worries me 2.2.4. It shocks me 2.2.5. I enjoy it 2.2.6. It agrees with how I think 2.2.7. It reinforces my ideological convictions

Dimension	Variables	Category and coding
3. Ethics (Aboualola et al., 2023)	3.1. Indicate why you think fake news stories are created	3.1.1. To increase an audience/visits/clicks 3.1.2. To create controversy 3.1.3. To manipulate or influence 3.1.4. For economic interests 3.1.5. To create social alarm 3.1.6. To discredit someone or something 3.1.7. To hide other news
	3.2. Indicate who you think is more responsible for spreading fake news	3.2.1. People in general 3.2.2. Influencers 3.2.3. Pseudo-experts 3.2.4. Politicians 3.2.5. Journalists
4. Logical argumentative (Del Moral et al., 2021; Karen et al., 2023; Singh et al., 2023)	4.1. What kinds of fake news do you commonly find on your social media?	4.1.1. Humorous or satirical information 4.1.2. Information lacking context (time or place) 4.1.3. Headlines, images, or subheadings unrelated to the topic (clickbait) 4.1.4. Misleadingly framed information or images 4.1.5. Unconfirmed information designed to mislead or manipulate
	4.2. How important do you think the following elements are for believing a news item	4.2.1. Supported by recognized experts or organizations 4.2.2. Supported by testimonials 4.2.3. Includes real images or video 4.2.4. Is not controversial
5. Expressive-communicative (Kondamudi, 2023)	5. Indicate how much these indicators make you doubt the truth of a news story	5.1. There is no author 5.2. No date of publication 5.3. An unofficial source (blogs, websites, etc.) 5.4. Data that shock, cause alarm, or controversy 5.5. An attention-grabbing headline unrelated to the content 5.6. Use of a discriminatory or offensive tone 5.7. Poorly written, spelling or grammar mistakes

Dimension	Variables	Category and coding
6. Education	6.1. In your opinion, how much education have you been given for detecting fake news?	(1=None, 2=A little, 3=Some, 4=A lot)
	6.2. In the post-truth era, how important are the following educational content for identifying fake news?	6.2.1. Visual literacy (images, framing, etc.) 6.2.2. The process of creating fake news 6.2.3. Guidelines for testing news stories 6.2.4. Recognizing reliable sources 6.2.5. Keys for detecting hidden interests or intentions 6.2.6. Critical analysis: message and form 6.2.7. Identification of strategies for capturing an audience 6.2.8. Media responsibility and social impact (ethical code) 6.2.9. Steps for defending my rights as a user

Source. authors' own work.

The instrument's reliability was assessed via Cronbach's alpha and McDonald's (1999) Omega, with values shown in Table 3. According to O´Dwyer and Bernauer (2013), all values being greater than (or very close to) 0.7 indicates that the instrument overall, and each of its component dimensions, can be considered reliable.

Table 3

Reliability of the instrument: Cronbach's α and McDonald's Ω

	Cronbach alpha	McDonald's omega
1. Cognitive	.752	.754
2. Attitudinal	.764	.736
3. Ethical	.824	.821
4. Logical-argumentative	.711	.677
5. Expressive-communicative	.776	.778
6. Education	.864	.875

Source. authors' own work

Finally, both Cronbach Alpha and McDonald's omega for the instrument overall gave high values (α=0.895 and Ω=0.917), indicating good reliability.

Data analysis

Data analysis was based on descriptive statistics related to frequencies, percentages, and means. After confirming that the sample did not meet the criteria for normality via the Kolmogorov-Smirnov test, subsequent testing was non-parametric to determine whether there were statistically significant differences in dichotomous variables (Mann-Whitney U) and those with more categories (Kruskal-Wallis).

Only results that were statistically significant are reported. The effect size was assessed using Cohen's d (d) for the dichotomous variable (gender) and Cohen's f (f) for the other variables (age and amount of education received about detecting FN). The statistical power (SP) was calculated specifically for each case, assuming a level of type I error of .1. The data were interpreted with reference to the values suggested by Cohen (1988). The effect size according to d is small at .20, moderate at .50, and large at .80; the effect size according to f is small at .10, moderate at .25, and large at .40; the statistical power is small at .60, moderate at .70, and large at .80. The analyses were done using the software SPSS v26 and G*Power 3.1.9.7.

RESULTS

The distribution of the university students' responses relating to their level of education for detecting FN was as follows: 52.9% indicated having had little education; 23.8% indicated having had none (showing that three-quarters of the students were unhappy with their readiness to tackle disinformation and other issues arising from misuse of AI); only 2.4% felt that they were well educated, and 21% felt somewhat prepared for the task. These data confirm H1, as the students believed that they were not very well trained or educated for this challenge. This is a key variable, as in subsequent tests between groups, the students' perceived levels of readiness may affect their critical abilities for dealing with FN.

Cognitive dimension

The students associated FN with terms such as lies (20.8%), deception/fraud/cheating (15.2%), manipulation/misrepresentation (12.4%), hoax (9.1%), false/not credible (7.9%), invented/unreal (6.9%), disinformation (5.1%), pseudo-journalism

(3.3%), politics/power (3.3%), and others (15.9%). This indicates that they are aware of and understand the concept and its connotations. Over half (51.4%) demonstrated often being aware of the FN they received on SNs, 8.8% said that they were always aware, whereas 38.7% said they were occasionally aware of it, and 1.1% stated never being aware.

Figure 2
Word cloud

Source. authors' own work.

To determine whether there were statistically significant differences in the levels of awareness of receiving FN, the means were compared by gender. This indicated that women were less aware than men of receiving FN through SNs. As might be expected, the students who felt that they had received more education in this regard indicated greater awareness of receiving FN than those who felt they lacked this training (none: $\bar{x}$=2.53, SD=.662; a little: $\bar{x}$=2.64, SD=.602; some: $\bar{x}$=2.89, SD=.657; a lot: $\bar{x}$=3.38, SD=.768; p<.000; f=.253; SP=.999). The effect size for the gender-related difference was small (d<0.2), while the effect for education was moderate (f<0.25). The statistical power was low (SP<0.70) in the first case and high (SP>0.90) in the second (Table 4).

Table 4
Descriptive statistics related to the variable awareness of receiving FN

		X	DT	p	d/f	PE
Gender	Female	2.66	.657	.028	.199	.612
	Male	2.79	.618			
Age	18-19	2.67	.666	.146	.103	.581
	20-21	2.68	.628			
	22-23	2.66	.670			
	24.25	2.71	.626			
	>25	2.97	.680			
Education	None	2.53	.662	.000	.253	.999
	A little	2.64	.602			
	Some	2.89	.657			
	A lot	3.38	.768			

Source. authors' own work.

The traits that the respondents felt defined fake news were deception, followed by distorted and out-of-context information (Table 5).

Table 5
Descriptive statistics about the traits defining a fake news story according to gender

Traits	Total		Women		Men				
	x̄	DT	x̄	DT	x̄	DT	p	d	PE
Incomplete	2.85	.887	2.88	.897	2.70	.833	.034	.207	.644
Biased	2.95	.831	2.97	.837	2.85	.803	.124	.145	.411
Contradictory	3.04	.784	3.05	.793	2.96	.746	.196	.117	.307
Distorted	3.52	.604	3.55	.582	3.42	.668	.064	.203	.624
Deceptive	3.68	.571	3.67	.575	3.68	.566	.941	.017	.105
Out of context	3.29	.730	3.29	.726	3.26	.748	.661	.041	.126

Source. authors' own work.

Comparing the means by gender indicated significant differences in defining FN. Women tended primarily to identify them as incomplete, although the size of the effect of the gender variable was small and the statistical power was low. There was a similar picture for the 22-23 year-old age group (18-19: x̄=2.64, SD=.880; 20-21: x̄=2.84, SD=.821; 22-23: x̄=3.21, SD=.880; 24-25: x̄=2.82, SD=.936; >25: x̄=2.86, SD=.953; p<.000; f=.220; SP=.997). This age difference was also seen with FN being defined as *contradictory* (18-19: x̄=2.94, SD=.719; 20-21: x̄=2.98, SD=.811; 22-23: x̄=3.26, SD=.747; 24-25: x̄=2.91, SD=.874; >25: x̄=3.34, SD=.769; p=.002; f=.179; SP=.964); and out of context (18-19: x̄=3.11, SD=.774; 20-21: x̄=3.34, SD=.702; 22-23: x̄=3.44, SD=.656; 24-25: x̄=3.27, SD=.780; >25: x̄=3.45, SD=.632; p=.004; f=.178; SP=.962).

Over-25s identified FN with bias (18-19: x̄=2.64, SD=.827; 20-21: x̄=2.97, SD=.751; 22-23: x̄=3.28, SD=.792; 24-25: x̄=3.04, SD=.903; >25: x̄=3.31, SD=.761; p<.000; f=.291; SP=.999) and with being distorted (18-19: x̄=3.41, SD=.663; 20-21: x̄=3.54, SD=.568; 22-23: x̄=3.61, SD=.530; 24-25: x̄=3.58, SD=.621; >25: x̄=3.69, SD=.604; p=.029; f=.142; SP=.844), and while the effects were small or moderate, the statistical power was high. This pattern was repeated throughout the study results; the effect size data was occasionally limited, although always above the minimum value, but thanks to the acceptable error levels and the large sample, high statistical power was obtained. This suggests that the likelihood of correctly identifying a real effect was high, as indicated by Cohen (1988).

In terms of the *settings* where respondents felt that FN proliferate, their responses indicated society and the political arena (Table 6).

Table 6

Descriptive statistics related to settings where students felt that FN abound, with differences by gender

Settings	Total		Women		Men				
	x̄	DT	x̄	DT	x̄	DT	p	d	PE
Culture	2.64	.789	2.65	.798	2.58	.761	.258	.090	.225
Health	3.04	.762	3.06	.749	2.96	.810	.224	.128	.345
Environment	2.67	.775	2.66	.793	2.69	.705	.692	.040	.125
Society	**3.48**	.639	3.53	.623	3.31	.671	**.001**	**.344**	**.954**
Economy	3.19	.772	3.21	.779	3.12	.748	.195	.118	.310
Politics	**3.62**	.626	3.61	.637	3.65	.588	.573	.065	.167
Sport	2.49	.771	2.40	.730	2.78	.832	**.000**	**.492**	**.999**

Source. authors' own work.

There were statistically significant differences between means by gender. Women felt that society news was more affected by FN, while men saw it particularly in sport. Over-25s felt that health news was particularly affected by hoaxes and false stories, unlike the other age groups (18-19: $\bar{x}$=2.88, SD=.799; 20-21: $\bar{x}$=3.03, SD=.723; 22-23: $\bar{x}$=3.22, SD=.760; 24-25: $\bar{x}$=3.18, SD=.747; > 25: $\bar{x}$=3.24, SD=.636; p=.003; f=.176; SP=.959). Respondents aged 22-23 identified economic news stories as the least trustworthy (18-19: $\bar{x}$=3.05, SD=.835; 20-21: $\bar{x}$=3.20 y SD=.729; 22-23: $\bar{x}$=3.36, SD=.746; 24-25: $\bar{x}$=3.33, SD=.769; >25: $\bar{x}$=3.21, SD=.620; p=.021; f=.149; SP=.878). Effect sizes in relation to gender and age were small, although the statistical power was high.

Personal-attitudinal dimension

The strategies activated in the face of a supposed FN story may affect a subject's behaviour and lead to them becoming a victim of fraud or manipulation (Lozano-Blasco et al., 2023). This is why it is important to understand their *reactions* and analyse how they deal with this challenge in order to determine and shore up their weaknesses. Over a quarter (26.9%) said that they always ignored FN stories, only 23.2% read them and sought more information online, 17.9% compared them with other media, and 14.2% asked other people about them. It is worth noting that 72.9% confessed to never or only occasionally checking sources or authors of news stories they received (Table 7).

Table 7
Descriptive statistics related to reactions to potential FN and differences by gender

Reactions	Total		Women		Men				
	$\bar{x}$	DT	$\bar{x}$	DT	$\bar{x}$	DT	p	d	PE
Ignore it/don't read it	**2.84**	.904	2.85	.919	2.80	.862	.520	.056	.150
Read it in full	1.88	.829	1.90	.845	1.85	.771	.830	.061	.160
Check source or author	1.93	.961	1.91	.965	1.98	.931	.331	.074	.185
Verify the link	1.64	.939	1.63	.942	1.64	.931	.772	.011	.102
Ask other people	2.50	.923	2.60	.918	2.16	.866	**.000**	**.477**	**.988**
Seek more information online	**2.71**	.961	2.73	.972	2.61	.916	.167	.127	.341
Compare with other media	2.46	.999	2.47	.999	2.45	1.000	.838	.020	.106

Source. authors' own work.

There were significant differences between means based on gender and age. Women were more likely to ask other people about the news they received. Over-25s were more likely to check the source or author (18-19: x̄=1.83, SD=.964; 20-21: x̄=1.89, SD=.948; 22-23: x̄=2.03, SD=.958; 24-25: x̄=1.93, SD=.939; >25: x̄=2.48 y SD=.911; p=.005; f=.154; SP=.896) and to verify links (18-19: x̄=1.46, SD=.871; 20-21: x̄=1.60, SD=.895; 22-23: x̄=1.72, SD=.944; 24-25: x̄=1.91, SD=1.041; >25: x̄=2.17, SD=1.167; p<.000; f=.194; SP=.984). Effects were small in both cases, although statistical power was high.

In addition, respondents who felt that they were well educated about FN were more likely to check sources and authorship, in contrast to those who said that they had not been educated in this regard (none: x̄=1.71, SD=.920; a little: x̄=1.90, SD=.944; some: x̄=2.20, SD=.923; a lot: x̄=2.54, SD=1.030; p<.000; f=.198; SP=.992). They were also more likely to check links (none: x̄=1,45, SD=.857; a little: x̄=1.57, SD=.873; some: x̄=1.90, SD=1.030; a lot: x̄=2.46, SD=1.191; p<.000; f=.217; SP=.998) and compare information with other media (none: x̄=2.22, SD=1.030; a little: x̄=2.46, SD=.992; some: x̄=2.70, SD=.902; a lot: x̄=2.92, SD=1.115; p=.001; f=.176; SP=.971). The effects regarding education were small, although the statistical power was high.

Respondents were also asked for the most common reasons that would lead them to spread a news story without checking it. This question sought to illuminate the types of behaviour they demonstrated: unthinking or deliberate, immediate or intentional, etc., and to identify the risks involved in that behaviour. Table 8 shows the reasons that they reported for sharing unchecked information. Emotion played a large role, almost always associated with shock (73.5%) or worry (67.7%).

Table 8

Descriptive statistics related to the reasons for spreading unchecked news stories and differences by gender

Reasons	Total		Women		Men				
	x̄	DT	x̄	DT	x̄	DT	p	d	PE
Others may find it useful	2.59	.781	2.63	.782	2.48	.776	.073	.192	.587
It relates to my interests	2.71	.793	2.73	.786	2.65	.824	.250	.099	.252
It worries me	**2.82**	.747	2.86	.775	2.67	.624	**.007**	**.254**	**.793**
It shocks me	**2.95**	.800	2.99	.811	2.83	.749	**.030**	**.200**	**.615**
I enjoyed it	2.50	.949	2.44	.951	2.76	.895	**.001**	**.337**	**.947**
It aligns with how I think	2.42	.936	2.41	.947	2.45	.894	.720	.043	.130
It reinforces my ideological convictions	2.40	.989	2.40	.992	2.42	.981	.887	.020	.106

Source. authors' own work.

Comparing the mean scores for the reasons given for sharing news stories without checking them by gender produced significant differences. Women were more likely to spread news stories—without checking them—as a result of the concern they produced and the impact they had. Men were more likely to spread stories they enjoyed and for entertainment. Comparing by the levels of education about FN they had received, those reporting most education indicated that they did it for fun (none: $\bar{x}$=2.33, SD=.971; a little: $\bar{x}$=2.50, SD=.934; some: $\bar{x}$=2.68, SD=.917; a lot: $\bar{x}$=2.77, SD=1.092; p=.035; f=.131; SP=.818). The gender differences in reasons for spreading FN had a small effect and high statistical power, while the differences based on education had a small effect, and high statistical power.

Ethical dimension

Knowing how to discern the *reasons behind the creation of FN* is a skill that involves teasing out what lies underneath a hidden lie and allows subjects to be alert to them. Table 9 shows the respondents' opinions about the reasons behind this type of false information. The vast majority (94.3%) believed that they are mostly created in order to manipulate, and a similar percentage felt that organizations created FN to increase their audience or consumer base.

Table 9

Descriptive statistics related to reasons for creating FN and differences by gender

Reasons	Total		Women		Men				
	$\bar{x}$	DT	$\bar{x}$	DT	$\bar{x}$	DT	p	d	PE
Gain audience/visits/clicks	**3.55**	.666	3.58	.626	3.43	.783	.082	.212	.657
Create controversy	3.20	.744	3.25	.727	3.07	.787	**.033**	**.242**	**.757**
Manipulate or influence	**3.58**	.616	3.64	.580	3.40	.701	**.000**	**.390**	**.983**
Economic interests	3.35	.759	3.39	.754	3.21	.763	**.009**	**.237**	**.742**
Social alarm	3.24	.756	3.32	.747	2.97	.730	**.000**	**.463**	**.998**
Discredit someone/ something	3.27	.739	3.30	.726	3.18	.785	.157	.159	.457
Obscure other news	3.22	.789	3.28	.756	3.02	.861	**.003**	**.330**	**.939**

Source. authors' own work.

On comparing the means, opinions differed significantly by gender and age. Women were more likely to believe that FN was created to cause controversy, manipulate or influence people, make money, cause social panic, or to obscure other news. The effects were small, while the statistical power was moderate or high.

Looking at age, 22-23 and 24-25-year-olds gave higher scores to manipulation (18-19: $\bar{x}$=3.37, SD=.699; 20-21: $\bar{x}$=3.66, SD=.563; 22-23: $\bar{x}$=3.71, SD=.498; 24-25: $\bar{x}$=3.71, SD=.506; >25: $\bar{x}$=3.69, SD=.660; p<.000; f=.238; SP=.999) and economic interests (18-19: $\bar{x}$=3.16, SD=.817; 20-21: $\bar{x}$=3.36, SD=.744; 22-23: $\bar{x}$=3.56, SD=.592; 24-25: $\bar{x}$=3.53, SD=.786; >25: $\bar{x}$=3.45, SD=.736; p<.000; f=.200; SP=.988), while the over-25s gave emphasized causing social panic (18-19: $\bar{x}$=3.02, SD=.768; 20-21: $\bar{x}$=3.31, SD=.718; 22-23: $\bar{x}$=3.40, SD=.728; 24-25: $\bar{x}$=3.29, SD=.787; >25: $\bar{x}$=3.48, SD=.738; p<.000; f=.210; SP=.994) and hiding other news (18-19: $\bar{x}$=3.06, SD=.781; 20-21: $\bar{x}$=3.24, SD=.787; 22-23: $\bar{x}$=3.31, SD=.813; 24-25: $\bar{x}$=3.36, SD=.743; >25: $\bar{x}$=3.52, SD=.688; p<.000; f=.162; SP=.924). The effects of the age-related differences were small, while the statistical power was high.

The respondents identified journalists as principally responsible for the viral spread of FN, followed by influencers and the general public (Table 10).

Table 10

Descriptive statistics related to who is responsible for the spread of FN and differences by gender

Responsible	Total		Women		Men				
	$\bar{x}$	DT	$\bar{x}$	DT	$\bar{x}$	DT	p	d	PE
General public	3.19	.721	3.25	.671	2.98	.846	**.003**	**.374**	**.976**
Influencers	**3.23**	.736	3.24	.711	3.19	.820	.827	.065	.167
Pseudo-experts	2.78	.832	2.78	.821	2.76	.866	.911	.024	.109
Politicians	3.07	.849	3.08	.848	3.01	.851	.374	.082	.206
Journalists	**3.41**	.777	3.39	.775	3.45	.785	.298	.077	.192

Source. elaboración propia.

Comparing the means by age and gender indicated significant differences. Women indicated greater responsibility for the general public in the spread of FN. In terms of age, 24-25-year-olds identified journalists (18-19: $\bar{x}$=3.28, SD=.863; 20-21: $\bar{x}$=3.38, SD=.733; 22-23: $\bar{x}$=3.57, SD=.728; 24-25: $\bar{x}$=3.58, SD=.621; >25: $\bar{x}$=3.52, SD=.785; p=.009; f=.150; SP=.879), followed by politicians (18-19: $\bar{x}$=2.91, SD=.866; 20-21: $\bar{x}$=3.07, SD=.840; 22-23: $\bar{x}$=3.23, SD=.839; 24-25: $\bar{x}$=3.31, SD=.763;

>25: x̄=3.07, SD=.842; p=.011; f=.157; SP=.907) and pseudo-experts (18-19: x̄=2.60, SD=.832; 20-21: x̄=2.78, SD=.806; 22-23: x̄=2.93, SD=.879; 24-25: x̄=3.00, SD=.769; >25: x̄=2.93, SD=.753; p=.006; f=.169; SP=.945). The effects for both variables were small, while the statistical power was high.

Logical-argumentative dimension

The ability to identify the type of FN received via SNs is key for these young people to be able to identify it and not fall victim to disinformation (López-Flamarique y Planillo, 2021). They were asked what kind of FN they received most often. Almost three-quarters (73.3%) indicated that it was mostly unproven information created to deceive or manipulate. A similar proportion (70.9%) received clickbait—stories with headlines, images, or subheadings that had little to do with the story to drive visits or grow an audience (Table 11).

Table 11
Descriptive statistics related to the type of FN received and differences by gender

Most common fake news	Total		Women		Men				
	x̄	DT	x̄	DT	x̄	DT	p	d	PE
Jokes or satire	2.55	.757	2.54	.761	2.60	.737	.297	.080	.200
Out-of-context information	2.68	.750	2.67	.761	2.69	.707	.961	.027	.112
Clickbait (attention grabbing headlines, images or subheadings)	**2.93**	.844	2.94	.863	2.88	.777	.356	.073	.183
Misleadingly framed information or images	2.66	.790	2.69	.812	2.54	.708	**.031**	.190	.578
Unconfirmed evidence created to deceive or manipulate	**3.00**	.798	3.02	.805	2.91	.775	.121	.139	.384

Source. authors' own work.

Comparing the means, there were statistically significant differences by gender, but the effect size and statistical power did not meet the minimum values, meaning they were negligible. In terms of age, over-25s indicated receiving more misleadingly framed images or information (18-19: x̄=2.48, SD=.766; 20-21: x̄=2.77, SD=.775; 22-23: x̄=2.63, SD=.861; 24-25: x̄=2.76, SD=.712; >25: x̄=2.86, SD=.743; p=.004; f=.169; SP=.944), as well as unconfirmed information created to mislead or manipulate

(18-19: x̄=2.83, SD=.815; 20-21: x̄=3.12, SD=.735; 22-23: x̄=3.06, SD=.827; 24-25: x̄=2.89, SD=.885; >25: x̄=3.17, SD=.711; p=.004; f=.166; SP=.937). The effect of this difference was small, although the statistical power was high.

From an educational perspective and given the flood of FN that inundate SNs—amplified by AI—it is important to identify what elements these young people prioritize that give the information they receive credibility, and so be able to detect the areas they are lacking in in order to redirect their strategies. The majority (84.1%) believed information supported by recognized experts or organizations, while 71.1.% were more likely to believe news stories that were accompanied by visual evidence, including real images or videos (Table 12).

Table 12

Descriptive statistics related to elements that students prioritize in giving a news story credibility and differences by gender

Elements of credibility	Total		Women		Men				
	x̄	DT	x̄	DT	x̄	DT	p	d	PE
Supported by a recognized expert or organization	**3.16**	.740	3.20	.711	3.05	.825	.120	.194	.595
Supported by testimonies	2.88	.760	2.94	.733	2.69	.817	**.002**	**.329**	**.938**
Includes real images/video	**2.93**	.800	2.96	.800	2.83	.792	.092	.163	.475
Is not controversial	2.24	.851	2.26	.862	2.17	.813	.335	.107	.276

Source. authors' own work.

Comparing means indicated significant differences by gender and age. Women found news supported by testimonies more believable. Over-25s gave more credibility to news stories backed by recognized experts or organizations (18-19: x̄=3.09, SD=.736; 20-21: x̄=3.19, SD=.680; 22-23: x̄=3.27, SD=.827; 24-25: x̄=2.98, SD=.812; >25: x̄=3.34, SD=.670; p=.031; f=.125; SP=.740). The effects in both cases were small, while the statistical power was high.

Expressive-communicative dimension

Being able to identify the truth of a news story needs people to activate certain strategies in order not to be deceived. Students were asked what *elements* they felt were key to checking information and ensuring that it was true. It was clear that poorly written stories with spelling and grammatical errors made them question a

news story *a priori* (88.2), followed by attention-grabbing headlines that had little to do with the actual content (84.7%) (Table 13).

Table 13

Descriptive statistics related to elements that make respondents question the truth of a story, and differences by gender

Questionable elements	Total		Women		Men				
	x̄	DT	x̄	DT	x̄	DT	p	d	PE
No author	3.06	.823	3.07	.829	3.00	.806	.316	.086	.214
No date of publication	2.72	.862	2.72	.883	2.73	.785	.806	.012	.102
An unofficial source	3.19	.758	3.23	.756	3.07	.761	**.029**	**.211**	**.655**
Shocking/alarming/ controversial data	2.76	.787	2.78	.791	2.69	.775	.181	.115	.300
Attention-grabbing headline unrelated to the content	**3.25**	.768	3.28	.761	3.13	.785	.057	.194	.592
Use of a discriminatory or offensive tone	3.23	.818	3.29	.798	3.01	.851	**.001**	**.342**	**.952**
Poorly written, with spelling and grammatical errors	**3.48**	.758	3.53	.719	3.30	.863	**.006**	**.303**	**.902**

Source. authors' own work.

Comparison of means indicated significant differences by gender and age. Women were more likely to question news stories from unofficial sources, those with a discriminatory tone, and those that were poorly written. In each case, the effect was small. In the first case the statistical power was low, in the other two, it was high. In terms of age, 22-23-year-olds were more suspicious of news stories with a discriminatory or offensive tone (18-19: x̄=3.03, SD=.853; 20-21: x̄=3.27, SD=.841; 22-23: x̄=3.39, SD=.680; 24-25: x̄=3.33, SD=.826; >25: x̄=3.35, SD=.677; p=.004; f=.174; SP=.954). The effect was small, while the statistical power was high.

Education and requirements

The study showed that a concerning 76.7% of the university students had not had any specific education for detecting FN on SNs, most of which are produced by AI. Comparing means by the levels of education they did report and by gender indicated significant differences. Women were more critical about the gaps in their

education than men (women: x̄=1.97, SD=.699; men: x̄=2.19, SD=.840; p=.014; d=.299; SP=.893). The effect was small, while the statistical power was high.

The students, aware of their limited education in this regard, were asked how important certain educational content would be in coping with FN. This showed their concern about having guidelines for recognizing reliable sources, and for critically analysing the form and the messaging of the information they received (Table 14).

Table 14

Descriptive statistics related to how important students rated certain educational content, with differences by gender

Educational content	Total		Women		Men				
	x̄	DT	x̄	DT	x̄	DT	p	d	PE
Visual literacy	2.96	.777	3.00	.763	2.83	.813	**.040**	**.219**	**.682**
How Fake News is created	2.92	.708	2.95	.706	2.83	.711	.118	.169	.498
Guidelines for checking news stories	3.11	.788	3.12	.785	3.07	.803	.524	.063	.162
Recognizing reliable sources	**3.28**	.734	3.33	.703	3.12	.818	**.011**	**.286**	**.870**
Keys to detecting hidden interests and intentions	**3.15**	.748	3.19	.716	2.99	.842	**.024**	**.267**	**.827**
Critical analysis: form and content	**3.17**	.770	3.21	.757	3.02	.796	**.014**	**.247**	**.771**
Identifying audience-capture strategies	2.97	.780	3.03	.766	2.75	.788	**.001**	**.359**	**.966**
Media responsibility and social impact	3.07	.774	3.11	.745	2.92	.833	**.019**	**.245**	**.768**
Ways to defend user rights	2.97	.780	3.03	.773	2.77	.772	**.001**	**.337**	**.947**
TOTAL	3.07	.883	3.00	.763	2.83	.813	**.040**	**.216**	**.671**

Source. authors' own work.

The differences between means were significant considering gender, age, and amount of education received for detecting FN. Women ascribed more importance to education in visual literacy, recognizing reliable sources, keys for identifying hidden interests and intentions, guidelines for critical analysis of form and content, audience-capture strategies, user-rights, and media responsibility and social impact. The effects were small and the statistical power was high.

Respondents aged 24-25 gave higher scores to *visual literacy* (18-19: x̄=2.87, SD=.765; 20-21: x̄=2.91, SD=.770; 22-23: x̄=3.11, SD=.827; 24-25: x̄=3.16, SD=.673; >25: x̄=3.00, SD=.802; p=.042; f=.135; SP=.806), *guidelines for checking news stories* (18-19: x̄=2.99, SD=.812; 20-21: x̄=3.07, SD=.769; 22-23: x̄=3.28, SD=.780; 24-25: x̄=3.33, SD=.707; >25: x̄=3.17, SD=.805; p=.007; f=.154; SP=.897), and *keys for detecting hidden interests and intentions* (18-19: x̄=3.00, SD=.783; 20-21: x̄=3.11, SD=.767; 22-23: x̄=3.30, SD=.628; 24-25: x̄=3.38, SD=.684; >25: x̄=3.31, SD=.712; p=.003; f=.178; SP=.962).

Those aged 22-23 gave higher scores to content that helped *uncover the process of constructing FN* (18-19: x̄=2.80, SD=.660; 20-21: x̄=2.89, SD=.686; 22-23: x̄=3.14, SD=.766; 24-25: x̄=3.04, SD=.706; >25: x̄=2.93, SD=.799; p=.002; f=.173; SP=.954), *recognizing reliable sources* (18-19: x̄=3.18, SD=.738; 20-21: x̄=3.25, SD=.742; 22-23: x̄=3.49, SD=.674; 24-25: x̄=3.44, SD=.659; >25: x̄=3.17, SD=.848; p=.004; f=.163; SP=.929), and examining *media responsibility and social impact* (18-19: x̄=2.90, SD=.798; 20-21: x̄=3.13, SD=.733; 22-23: x̄=3.25, SD=.730; 24-25: x̄=3.00, SD=.853; >25: x̄=3.14, SD=.743; p=.004; f=.170; SP=.946). As previously, the effects were small while the statistical power was high.

Examining respondents opinions based on the education they had received about detecting FN, those who felt more qualified ascribed more importance to recognizing reliable sources (none: x̄=3.08, SD=.815; a little: x̄=3.23, SD=.710; some: x̄=3.28, SD=.682; a lot: x̄=3.37, SD=.862; p=.002; f=.104; SP=.637).

DISCUSSION AND CONCLUSIONS

The first hypotheses was based on the question “Do university students feel that they are ready to deal with the avalanche of false information produced by AI that they receive through SNs?”. It was confirmed, with responses that are cause for concern. Only a quarter of the students indicated having a good level of prior education for dealing with FN, and almost half felt they were unready to do so. The data showed the gaps in their education and their vulnerability, as well as the risk of being at the mercy of manipulation by accepting FN as true and sharing it without thinking. These are valuable findings that open up new educational goals to minimize those gaps and provide students with suitable strategies for the challenges they will face thanks to the emergence of AI and the spread of FN on SNs, as Aboualola et al. (2023) concluded.

A deeper analysis of the data indicated the strategies—linked to the critical-thinking dimensions—that the respondents activated in the face of the FN they received. In the *cognitive dimension*, most of the students gave correct definitions of FN, identifying it with disinformation; manipulation; false information or hoaxes; promoting certain interests, sensationalism and fearmongering; and causing

insecurity and alarm to the general public. The results indicate that they know how to define FN at a theoretical level, but have issues discriminating them based on their educational needs.

After confirming a level of uniformity amongst the respondents in terms of identifying FN as misleading or distorted news stories, the study refuted H2 as the respondents did not identify incomplete or biased news as FN, details that may affect how true information is perceived. This risk is amplified due to the growth of AI tools that make it easy to digitally alter text, images, and videos in order to manipulate the audience, something that makes it harder to tell fact from fiction and predisposes students to systematic doubt, as reported by Ballesteros-Aguayo and Ruiz del Olmo (2024), or to uncritical acceptance.

In contrast, the respondents agreed that FN abound in the social and political spheres—as H3 suggested—in line with the data from Catalina et al. (2019) indicating politics, sport, and the economy as the main areas for FN. In addition, the results indicated that there was a bias related to gender. Women indicated that society news was more affected by FN, perhaps due to their SN consumption, following celebrities and influencers, as reported by Gómez et al. (2020). Men, on the other hand, indicated that there was more FN in sports news, again probably due to the nature of their consumption, as reported by Espinar et al. (2020). Over-25s felt that disinformation and hoaxes were more common in health news, perhaps due to the flood of FN during the COVID-19 pandemic (Román et al., 2020). This indicates that people's experiences of news and their focus of interest may influence their perceptions. No doubt SN algorithms and AI provide people with information based on their profiles, which may confine them to a bubble, as Swart (2021) noted.

Students' abilities for identifying the type of FN the receive and whether they believe a news story are related to the logical-argumentative dimension of critical thinking. Hypothesis H4 was partially confirmed, as the traits that—according to the students—define FN included deception, distortion, and decontextualization. Similarly, they also recognized themselves as victims of clickbait and hoaxes, as Alcalá et al. (2021) and López et al. (2023) reported, leading to uncertainty. Women and over-25s indicated receiving more news stories with false or misleading framing thanks to the involvement of AI.

In addition, the results confirmed the range and variety of criteria that university students used to determine the credibility of a news story based on gender and age, confirming hypothesis H5. Women were more trusting of news supported by testimonials, and older students prioritized information from recognized experts or organizations, followed by news stories containing real images or videos, as Del Moral et al. (2021) noted. However, there are AI applications currently in use that are designed specifically for manipulating photographic "evidence", threatening

this ability to identify authenticity and possibly even leading to widespread scepticism.

One of the strategies within the personal-attitudinal dimension that the women prioritized was to check news stories with their friends, as Valencia et al. (2022) reported. As one might expect, older respondents demonstrated more critical awareness, underscoring their maturity and thoughtful attitudes, they checked sources and verified links. In contrast the younger respondents' strategies did not allow them to determine the truthfulness of the news they received, predisposing them to being manipulated. In addition, the reactions to FN were consistent with the level of education that subjects reported having received for detecting them. The most educated usually checked sources, verified links, and compared against other media. Nazari et al. (2022) reported something similar after analysing young people's consumption and behaviour in the face of FN, indicating the importance of checking information in order not to be fooled (Bronstein et al., 2021), of not spreading hoaxes, and of confirming sources, as Tandoc et al. (2023) emphasized.

The students strategies for verifying information and ensuring it is true are related to the expressive-communicative dimension of critical thinking. Badly spelled news stories with poor grammar followed by attention-grabbing headlines that have little to do with the actual content were the basic indicators that led respondents to question the veracity of the news they received. These are obvious elements that are visible immediately, however the students did not use the date of publication, often a key factor in manipulating information. Women were more likely to doubt news that did not come from official sources, that had a discriminatory tone, or was badly written. This indicates a need, as Valencia et al. (2022) noted, to focus on these aspects and implement educational plans aimed at younger students to give them the strategies for testing and verifying the information they receive, as Alcalá et al. (2021) noted, and so that they can be cautious when dealing with the challenges posed by AI.

Examining the responses related to the ethical dimension of critical thinking, the respondents understood the reasons driving creation of FN, as they were clear that such stories were designed to manipulate, deceive, and influence, whether for economic or ideological reasons, or even to polarize an audience. This confirmed hypothesis H6. Women demonstrated a more critical spirit, indicating that the creators of FN sought to increase their audiences, influence people, make money, cause social alarm, and hide other news stories, as Gómez et al. (2020) reported. Older respondents noted similar motivations, demonstrating more awareness of the dangers of viral news stories for directing the public gaze in order to hide other news.

In contrast to hypothesis H7, the students placed most blame for creating and spreading FN on journalists, followed by influencers and then the general public. In addition, when they were asked why they would share information without checking it, they indicated unthinking behaviours, driven by immediacy, although some were more prudent and considered in their responses. There reactions were affected by the emotional charge of some news stories, and viral spread was related to their intentions to make their friends aware of news stories, particularly when those stories reflected their beliefs and ideas, as Castells et al. (2022) noted. This confirms hypothesis H8. Women shared information without checking it due to concern and impact, whereas men did so when they enjoyed it, without questioning it ethically.

The study indicates that university students' critical-thinking strategies adopted when dealing with FN are insufficient and should be reinforced in the educational arena. They are aware of the risks but they do not know how to react properly. No doubt, in the post-truth era, there needs to be education and training that prepares them for that. More specifically, their priorities indicate a need for them to have guidelines for identifying reliable sources, analyse form and content, and to have guidance so they can detect the hidden interests and intentions behind FN. This should be based on visual literacy, as Dumitru et al. (2022) and Pérez-Escoda et al. (2022) noted.

The importance that the respondents ascribed to certain educational content may help indicate the key aspects for possible educational interventions so that they do not become victims of disinformation. This should involve recognizing reliable sources, detecting media strategies for capturing an audience, identifying the role of the media and its social repercussions, understanding users' rights and responsibilities, and ways to defend against being misled, assuming responsibility for not being complicit in viral spread, etc. These proposals will doubtless contribute to the development of various strategies associated with the critical-thinking dimensions, which will help prepare students for the sophistication of AI tools and raise their awareness of the risk of being manipulated.

The most notable contribution of this study is that it describes and specifies lines of educational intervention for detecting FN, which is becoming increasingly necessary thanks to the explosion of AI in the digital arena. In addition, the study identified the strategies associated with critical-thinking dimensions that are fundamental for educating the public in an environment where uncertainty rules. That said, it is important to note that this was an analysis linked to a specific university context, which means it would be useful to explore other educational levels in order to identify their educational gaps and intervene appropriately to ensure future generations' critical abilities.

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ANEXO

Table 1

Descriptive statistics on the characteristics of a fake news story by gender, age, and education level

		Incomplete	Biased	Contradictory	Distorted	Misleading	Out of context
Women	x̄	2.88	2.97	3.05	3.55	3.67	3.29
	DT	.897	.837	.793	.582	.575	.726
	R	278.23	276.18	275.34	276.82	270.79	272.44
Men	x̄	2.70	2.85	2.96	3.42	3.68	3.26
	DT	.833	.803	.746	.668	.566	.748
	R	245.89	253.01	255.94	250.80	271.72	265.99
Gender	p	.034	.124	.196	.064	.941	.661
18-19 years	x̄	2.64	2.64	2.94	3.41	3.59	3.11
	DT	.880	.827	.719	.663	.636	.774
	R	238.28	216.39	251.25	247.60	254.15	239.13
20-21 years	x̄	2.84	2.97	2.98	3.54	3.71	3.34
	DT	.821	.751	.811	.568	.547	.702
	R	268.67	274.13	263.78	273.55	279.58	281.01
22-23 years	x̄	3.21	3.28	3.26	3.61	3.76	3.44
	DT	.880	.792	.747	.530	.495	.656
	R	334.59	333.23	312.98	288.95	289.80	301.36
24-25 years	x̄	2.82	3.04	2.91	3.58	3.60	3.27
	DT	.936	.903	.874	.621	.580	.780
	R	268.41	292.51	253.07	287.34	250.97	270.00
Over 25 years	x̄	2.86	3.31	3.34	3.69	3.76	3.45
	DT	.953	.761	.769	.604	.511	.632
	R	277.05	339.17	330.24	316.48	290.28	301.50
Age	p	.000	.000	.002	.029	.073	.004
No educational level	x̄	2.90	3.13	3.02	3.53	3.72	3.36
	DT	.975	.860	.820	.587	.484	.737
	R	284.47	307.85	269.11	271.70	277.33	287.99
Low educational level	x̄	2.85	2.91	3.02	3.53	3.64	3.25
	DT	.854	.816	.775	.602	.608	.742
	R	271.17	262.98	268.76	273.52	266.72	264.53

		Incomplete	Biased	Contradictory	Distorted	Misleading	Out of context
Moderate educational level	x̄	2.79	2.82	3.07	3.53	3.70	3.29
	DT	.857	.833	.784	.641	.579	.700
	R	260.78	250.51	277.87	275.78	279.82	270.94
High educational level	x̄	2.77	3.15	3.31	3.31	3.69	3.38
	DT	1.013	.555	.630	.480	.480	.650
	R	264.96	303.88	320.65	208.38	267.00	287.42
Educational level	p	.658	.008	.611	.399	.737	.468

Table 2

Descriptive statistics on the areas where fake news is perceived to be prevalent, by gender, age, and education level

		Culture	Health	Environment	Society	Economy	Politics	Sports
Women	x̄	2.65	3.06	2.66	3.53	3.21	3.61	2.40
	DT	.798	.749	.793	.623	.779	.637	.730
	R	274.79	275.08	269.67	281.73	275.34	269.35	255.35
Men	x̄	2.58	2.96	2.69	3.31	3.12	3.65	2.78
	DT	.761	.810	.705	.671	.748	.588	.832
	R	257.84	256.83	275.61	233.76	255.93	276.74	322.97
Gender	p	.258	.224	.692	.001	.195	.573	.000
18-19 years	x̄	2.57	2.88	2.66	3.43	3.05	3.52	2.54
	DT	.793	.799	.808	.691	.835	.743	.795
	R	259.85	241.93	271.05	262.30	247.82	256.13	279.28
20-21 years	x̄	2.66	3.03	2.60	3.53	3.20	3.68	2.37
	DT	.740	.723	.736	.629	.729	.530	.724
	R	276.72	268.69	257.03	282.19	269.88	280.34	250.70
22-23 years	x̄	2.70	3.22	2.82	3.46	3.36	3.63	2.61
	DT	.870	.760	.730	.626	.746	.597	.777
	R	279.44	305.99	299.58	265.46	304.60	272.50	297.39
24-25 years	x̄	2.64	3.18	2.73	3.58	3.33	3.73	2.51
	DT	.802	.747	.915	.543	.769	.539	.843
	R	273.39	297.36	285.54	288.84	299.33	296.17	271.99
Over 25 years	x̄	2.66	3.24	2.59	3.41	3.21	3.59	2.46
	DT	.769	.636	.682	.568	.620	.628	.744
	R	276.19	308.67	252.38	249.07	267.12	262.88	264.34
Age	p	.791	.003	.161	.462	.021	.257	.094
No educational level	x̄	2.64	3.05	2.64	3.49	3.23	3.58	2.55
	DT	.874	.753	.779	.626	.745	.658	.770
	R	272.19	274.02	264.62	272.87	278.66	265.31	284.31
Low educational level	x̄	2.62	3.03	2.68	3.49	3.15	3.63	2.43
	DT	.771	.784	.781	.658	.795	.618	.739
	R	268.09	270.27	274.34	275.28	264.47	273.29	261.27

		Culture	Health	Environment	Society	Economy	Politics	Sports
Moderate educational level	x̄	2.68	3.05	2.63	3.44	3.26	3.63	2.53
	DT	.744	.702	.744	.625	.717	.613	.825
	R	278.79	272.24	264.62	260.05	282.95	274.07	276.93
High educational level	x̄	2.77	3.08	3.15	3.62	3.15	3.69	2.77
	DT	.725	.954	.801	.506	.987	.630	.927
	R	296.88	288.08	358.19	295.69	276.27	291.69	323.08
Educational level	p	.842	.974	.155	.705	.639	.867	.228

Table 3

Descriptive statistics on reactions to potential fake news, by gender, age, and education level

		I ignore/ do not read it	I read it entirely	I check its source or authorship	I verify the link	I discuss it with others	I search for more information online	I compare it with other media sources
Women	x̄	2.85	1.90	1.91	1.63	2.60	2.73	2.47
	DT	.919	.845	.965	.942	.918	.972	.999
	R	273.21	271.72	267.69	27.09	287.09	275.77	271.71
Men	x̄	2.80	1.85	1.98	1.64	2.16	2.61	2.45
	DT	.862	.771	.931	.931	.866	.916	1.000
	R	263.34	268.50	282.48	274.15	215.15	254.46	268.54
Gender	p	.520	.830	.331	.772	.000	.167	.838
18-19 years	x̄	2.79	1.78	1.83	1.46	2.48	2.66	2.44
	DT	.963	.839	.964	.871	.917	1.017	1.061
	R	265.76	251.29	253.55	241.98	267.71	265.02	266.63
20-21 years	x̄							
	DT	2.88	1.93	1.89	1.60	2.58	2.77	2.51
	R	.902	.808	.948	.895	.897	.895	.951
22-23 years	x̄	277.60	282.69	264.87	268.61	286.28	280.68	279.05
	DT							
	R	2.80	1.99	2.03	1.72	2.51	2.76	2.44
24-25 years	x̄	.910	.870	.958	.944	1.010	.965	1.008
	DT	263.48	289.31	288.71	289.04	272.92	279.14	266.68
	R							
Over 25 years	x̄	2.93	1.78	1.93	1.91	2.33	2.47	2.24
	DT	.751	.765	.939	1.041	.953	.991	1.026
	R	286.32	255.29	273.93	314.17	245.22	231.77	238.61
Age	p							
No educational level	x̄	.789	.842	.911	1.167	.702	.978	.830
	DT	269.79	281.66	360.41	341.26	231.22	284.29	317.86
	R	.857	.153	.005	.000	.236	.320	.226
Low educational level	x̄							
	DT	2.86	1.89	1.71	1.45	2.43	2.64	2.22
	R	.899	.886	.920	.857	.966	1.045	1.030

		I ignore/ do not read it	I read it entirely	I check its source or authorship	I verify the link	I discuss it with others	I search for more information online	I compare it with other media sources
Moderate educational level	x̄	275.52	270.00	235.57	240.15	259.47	261.64	234.12
	DT							
	R	2.80	1.84	1.90	1.57	2.47	2.66	2.46
High educational level	x̄	.923	.777	.944	.873	.904	.943	.992
	DT	265.53	266.78	266.78	265.51	268.01	263.83	271.60
	R							
Educational level	p	2.89	1.93	2.20	1.90	2.65	2.90	2.70

Table 4

Descriptive statistics on the reasons for sharing unverified news, by gender, age, and education level

		It may be useful for others	It relates to my interests	It worries me	It impacts me	It entertains me	It aligns with my way of thinking	It reinforces my ideological convictions
Women	x̄	2.63	2.73	2.86	2.99	2.44	2.41	2.40
	DT	.782	.786	.775	.811	.951	.947	.992
	R	276.99	274.81	279.42	278.25	259.40	269.77	270.51
Men	x̄	2.48	2.65	2.67	2.83	2.76	2.45	2.42
	DT	.776	.824	.624	.749	.895	.894	.981
	R	250.21	257.76	239.62	245.85	311.26	275.28	272.71
Gender	p	.073	.250	.007	.030	.001	.720	.887
18-19 years	x̄	2.59	2.72	2.75	2.94	2.56	2.48	2.39
	DT	.833	.780	.764	.776	.964	.878	.935
	R	270.69	269.90	255.98	267.41	279.11	280.41	268.44
20-21 years	x̄	2.65	2.74	2.87	3.00	2.48	2.37	2.36
	DT	.697	.759	.719	.748	.923	.903	.962
	R	283.28	275.26	281.89	279.80	267.62	263.29	265.61
22-23 years	x̄	2.65	2.77	2.91	2.98	2.45	2.44	2.43
	DT	.833	.897	.753	.876	.999	1.018	1.018
	R	279.37	286.65	287.28	278.88	264.73	275.20	275.85
24-25 years	x̄	2.40	2.62	2.80	2.93	2.64	2.53	2.69
	DT	.837	.747	.786	.809	.933	.991	1.125
	R	235.48	255.96	268.09	268.66	292.68	287.04	312.70
Over 25 years	x̄	2.34	2.48	2.64	2.62	2.31	2.21	2.28
	DT	.670	.785	.731	.942	.891	1.114	1.162
		226.31	227.83	235.41	219.50	242.26	236.12	250.34
Age	p	.127	.346	.195	.313	.594	.497	.354
No educational level	x̄	2.64	2.61	2.77	2.85	2.33	2.32	2.28
	DT	.864	.851	.805	.867	.971	.976	1.038
	R	282.15	254.53	263.12	256.19	246.53	255.64	253.16
Low educational level	x̄	2.59	2.73	2.83	2.98	2.50	2.45	2.43
	DT	.733	.773	.718	.778	.934	.910	.957
	R	270.49	273.16	271.89	277.50	270.63	275.44	275.13

		It may be useful for others	It relates to my interests	It worries me	It impacts me	It entertains me	It aligns with my way of thinking	It reinforces my ideological convictions
Moderate educational level	$\bar{x}$	2.57	2.80	2.90	3.00	2.68	2.45	2.46
	DT	.787	.755	.731	.753	.917	.932	.979
	R	267.12	289.74	286.77	280.18	299.56	277.42	280.98
High educational level	$\bar{x}$	2.46	2.69	2.46	2.69	2.77	2.69	2.69
	DT	.967	.947	.877	.947	1.092	1.109	1.251
	R	247.38	264.15	213.19	235.69	313.38	310.96	310.96
Educational level	p	.762	.297	.277	.377	.035	.437	.332

Table 5

Descriptive statistics on the reasons for the creation of fake news, by gender, age, and education level

		Gain audience/ visitors/ clicks	Generate controversy	Manipulate or influence	Economic interests	Social alarm	Discredit the image of someone/ something	Mask other news
Women	x̄	3.58	3.25	3.64	3.39	3.32	3.30	3.28
	DT	.626	.727	.580	.754	.747	.726	.756
	R	276.33	278.08	282.45	279.59	286.85	275.69	280.87
Men	x̄	3.43	3.07	3.40	3.21	2.97	3.18	3.02
	DT	.783	.787	.701	.763	.730	.785	.861
	R	252.51	246.44	231.25	241.17	215.98	254.71	236.76
Gender	p	.082	.033	.000	.009	.000	.157	.003
18-19 years	x̄	3.45	3.08	3.37	3.16	3.02	3.19	3.06
	DT	.709	.808	.699	.817	.768	.763	.781
	R	251.45	250.24	225.86	236.44	229.29	255.83	239.34
20-21 years	x̄	3.58	3.24	3.66	3.36	3.31	3.32	3.24
	DT	.656	.656	.563	.744	.718	.722	.787
	R	279.20	274.03	288.94	272.21	283.20	281.35	275.77
22-23 years	x̄	3.61	3.33	3.71	3.56	3.40	3.29	3.31
	DT	.634	.779	.498	.592	.725	.743	.813
	R	283.78	300.17	296.63	306.88	302.73	274.88	291.42
24-25 years	x̄	3.62	3.18	3.71	3.53	3.29	3.20	3.36
	DT	.614	.806	.506	.786	.787	.786	.743
	R	284.60	269.22	297.27	313.40	282.18	258.43	296.71
Over 25 years	x̄	3.59	3.31	3.69	3.45	3.48	3.48	3.52
	DT	.628	.604	.660	.736	.738	.574	.688
	R	277.66	286.86	302.03	290.10	322.21	308.26	328.10
Age	p	.202	.086	.000	.000	.000	.260	.003
No educational level	x̄	3.67	3.18	3.67	3.46	3.32	3.33	3.27
	DT	.564	.824	.518	.718	.750	.700	.798
	R	294.14	270.83	288.41	291.75	287.08	282.01	282.47
Low educational level	x̄	3.50	3.19	3.54	3.32	3.21	3.25	3.19
	DT	.709	.716	.657	.768	.761	.748	.777
	R	262.97	267.82	264.31	266.38	265.13	267.52	265.29

		Gain audience/ visitors/ clicks	Generate controversy	Manipulate or influence	Economic interests	Social alarm	Discredit the image of someone/ something	Mask other news
Moderate educational level	$\bar{x}$	3.53	3.26	3.60	3.32	3.26	3.25	3.24
	DT	.655	.717	.606	.768	.753	.771	.813
	R	265.82	282.53	273.89	264.32	276.18	267.96	276.81
High educational level	$\bar{x}$	3.69	3.23	3.54	3.31	3.08	3.46	3.23
	DT	.630	.832	.660	.855	.760	.660	.832
	R	305.96	283.58	262.27	267.46	237.31	307.00	274.00
Educational level	p	.113	.816	.380	.351	.412	.626	.704

Table 6

Descriptive statistics on those responsible for the viralization of fake news, by gender, age, and education level

		Citizens	Influencers	Pseudo-experts	Politicians	Journalists
Women	x̄	3.25	3.24	2.78	3.08	3.39
	DT	.671	.711	.821	.848	.775
	R	280.87	271.72	271.38	274.02	267.66
Men	x̄	2.98	3.19	2.76	3.01	3.45
	DT	.846	.820	.866	.851	.785
	R	236.75	268.49	269.69	260.53	282.60
Gender	p	.003	.827	.911	.374	.298
18-19 years	x̄	3.15	3.15	2.60	2.91	3.28
	DT	.768	.730	.832	.866	.863
	R	265.62	255.13	241.35	245.12	250.71
20-21 years	x̄	3.19	3.26	2.78	3.07	3.38
	DT	.698	.718	.806	.840	.733
	R	269.55	277.59	271.67	270.69	262.12
22-23 years	x̄	3.30	3.27	2.93	3.23	3.57
	DT	.732	.750	.879	.839	.728
	R	293.68	280.60	299.41	300.04	305.65
24-25 years	x̄	3.27	3.38	3.00	3.31	3.58
	DT	.654	.777	.769	.763	.621
	R	283.06	304.59	309.03	313.94	299.27
Over 25 years	x̄	3.00	3.10	2.93	3.07	3.52
	DT	.598	.772	.753	.842	.785
	R	225.43	246.29	296.81	270.93	298.14
Age	p	.196	.181	.006	.011	.009
No educational level	x̄	3.28	3.19	2.67	3.01	3.44
	DT	.673	.737	.792	.888	.706
	R	288.16	262.48	250.75	262.29	273.77
Low educational level	x̄	3.18	3.20	2.77	3.04	3.36
	DT	.766	.749	.868	.844	.823
	R	271.47	267.50	271.00	266.94	264.57

		Citizens	Influencers	Pseudo-experts	Politicians	Journalists
Moderate educational level	$\bar{x}$	3.17	3.35	2.94	3.22	3.50
	DT	.651	.652	.744	.784	.707
	R	263.36	293.51	299.45	297.40	287.75
High educational level	$\bar{x}$	2.85	3.15	2.69	2.92	3.38
	DT	.689	1.068	1.032	1.038	.961
	R	199.08	277.31	264.15	257.38	280.31
Educational level	p	.143	.335	.084	.222	.507

Table 7

Statistics on the types of fake news received, by gender, age, and education level

		Humorous or satirical tone	Information out of context	Headlines, images, or subtitles unrelated to the subject (*clickbait*)	Misleading or distorted information/ images	Unverified information created to deceive or manipulate
Women	$\bar{x}$	2.54	2.67	2.94	2.69	3.02
	DT	.761	.761	.863	.812	.805
	R	267.53	270.84	274.13	278.25	276.24
Men	$\bar{x}$	2.60	2.69	2.88	2.54	2.91
	DT	.737	.707	.777	.708	.775
	R	283.04	271.57	260.14	245.83	252.81
Gender	p	.297	.961	.356	.031	.121
18-19 years	$\bar{x}$	2.51	2.56	2.82	2.48	2.83
	DT	.803	.740	.817	.766	.815
	R	263.29	251.38	252.02	239.38	241.15
20-21 years	$\bar{x}$	2.59	2.73	3.02	2.77	3.12
	DT	.744	.743	.855	.775	.735
	R	278.42	279.72	287.94	294.37	291.97
22-23 years	$\bar{x}$	2.53	2.78	2.94	2.63	3.06
	DT	.703	.746	.897	.861	.827
	R	268.84	292.36	274.90	265.50	283.08
24-25 years	$\bar{x}$	2.60	2.78	3.02	2.76	2.89
	DT	.809	.823	.783	.712	.885
	R	284.77	289.24	285.86	287.42	255.54
Over 25 years	$\bar{x}$	2.48	2.52	2.79	2.86	3.17
	DT	.688	.688	.819	.743	.711
	R	263.05	237.79	244.40	307.22	301.55
Age	p	.823	.079	.139	.004	.009
No educational level	$\bar{x}$	2.60	2.74	2.93	2.68	3.02
	DT	.785	.805	.868	.820	.815
	R	282.47	284.72	272.80	277.51	277.50
Low educational level	$\bar{x}$	2.52	2.64	2.92	2.63	2.94
	DT	.714	.739	.853	.772	.800
	R	267.08	263.13	271.22	267.72	260.54

		Humorous or satirical tone	Information out of context	Headlines, images, or subtitles unrelated to the subject (*clickbait*)	Misleading or distorted information/ images	Unverified information created to deceive or manipulate
Moderate educational level	$\bar{x}$	2.53	2.70	2.90	2.68	3.11
	DT	.789	.703	.798	.793	.750
	R	267.92	278.95	266.29	276.00	292.14
High educational level	$\bar{x}$	2.77	2.77	3.23	2.69	3.08
	DT	1.092	.832	.832	.947	.954
	R	312.38	280.65	331.31	276.81	293.65
Educational level	p	.550	.495	.515	.912	.225

Table 8

Descriptive statistics on the elements prioritized to give credibility to a news story, by gender, age, and education level

		Supported by a recognized specialist or entity	Backed by testimonials	Includes real images/videos	Does not generate controversy
Women	x̄	3.20	2.94	2.96	2.26
	DT	.711	.733	.800	.862
	R	276.11	281.05	276.67	274.27
Men	x̄	3.05	2.69	2.83	2.17
	DT	.825	.817	.792	.813
	R	253.25	236.10	251.32	259.65
Gender	p	.120	.002	.092	.335
18-19 years	x̄	3.09	2.89	2.95	2.16
	DT	.736	.749	.766	.824
	R	255.39	273.55	274.27	258.16
20-21 years	x̄	3.19	2.97	2.98	2.35
	DT	.680	.682	.751	.815
	R	274.03	287.95	279.89	291.62
22-23 years	x̄	3.27	2.77	2.97	2.29
	DT	.827	.863	.881	.935
	R	300.22	254.44	281.61	278.05
24-25 years	x̄	2.98	2.84	2.76	2.04
	DT	.812	.796	.908	.852
	R	236.87	261.99	240.99	240.52
Over 25 years	x̄	3.34	2.62	2.62	2.10
	DT	.670	.820	.775	.900
	R	305.97	222.74	211.26	242.41
Age	p	.031	.107	.089	.079
No educational level	x̄	3.16	2.82	2.89	2.20
	DT	.755	.861	.877	.842
	R	271.38	264.31	268.39	266.48
Low educational level	x̄	3.15	2.89	2.93	2.25
	DT	.738	.741	.761	.844
	R	269.02	272.83	271.38	273.62

		Supported by a recognized specialist or entity	Backed by testimonials	Includes real images/videos	Does not generate controversy
Moderate educational level	x̄	3.20	2.89	2.96	2.25
	DT	.694	.670	.791	.850
	R	278.29	273.45	274.89	274.74
High educational level	x̄	3.15	3.08	3.08	2.23
	DT	1.068	.862	.954	1.166
	R	288.81	317.31	296.15	267.08
Educational level	p	.913	.639	.923	.966

Table 9

Descriptive statistics on the elements that make people question the credibility of a news story, by gender, age, and education level

		Non-existent authorship	Publication date omitted	Unofficial source	Social impact/ political controversy data	Shocking headline	Uses discriminatory or offensive tone	Poor writing and/or spelling and grammar errors
Women	x̄	3.07	2.72	3.23	2.78	3.28	3.29	3.53
	DT	.829	.883	.756	.791	.761	.798	.719
	R	274.37	271.84	278.28	275.48	276.83	282.31	279.61
Men	x̄	3.00	2.73	3.07	2.69	3.13	3.01	3.30
	DT	.806	.785	.761	.775	.785	.851	.863
	R	259.29	268.10	245.74	255.47	248.58	231.73	241.13
Gender	p	.316	.806	.029	.181	.057	.001	.006
18-19 years	x̄	.850	.860	.780	.785	.849	.853	.832
	DT	261.05	273.16	277.33	253.93	254.66	236.80	259.43
	R	3.01	2.63	3.13	2.80	3.29	3.27	3.47
20-21 years	x̄	.798	.874	.757	.777	.749	.841	.721
	DT	260.43	255.91	260.63	279.63	279.80	281.75	266.29
	R	3.21	2.91	3.26	2.79	3.31	3.39	3.57
22-23 years	x̄	.795	.805	.747	.795	.692	.680	.685
	DT	300.25	302.43	285.76	279.96	279.33	296.08	287.80
	R	3.11	2.58	3.16	2.62	3.29	3.33	3.56
24-25 years	x̄	.832	.941	.767	.777	.695	.826	.785
	DT	280.58	245.81	265.00	247.50	275.39	292.84	290.56
	R	3.17	2.86	3.21	3.07	3.29	3.38	3.59
Over 25 years	x̄	.889	.789	.675	.799	.713	.677	.733
	DT	295.03	299.10	270.10	330.60	274.79	293.24	293.00
	R	.147	.063	.653	.050	.498	.004	.313
Age	p	3.04	2.76	3.18	2.78	3.29	3.33	3.57
No educational level	x̄	272.57	280.83	270.04	275.33	279.76	288.84	291.77
	DT	3.02	2.68	3.17	2.72	3.21	3.21	3.40
	R	.830	.862	.778	.775	.785	.863	.782

		Non-existent authorship	Publication date omitted	Unofficial source	Social impact/ political controversy data	Shocking headline	Uses discriminatory or offensive tone	Poor writing and/or spelling and grammar errors
Low educational level	x̄	266.00	263.69	269.80	264.78	265.40	27.11	257.43
	DT	3.11	2.76	3.21	2.81	3.28	3.21	3.56
	R	.713	.779	.710	.751	.738	.746	.704
Moderate educational level	x̄	278.15	277.91	273.85	281.31	277.19	263.61	285.88
	DT	3.46	3.00	3.46	2.92	3.31	3.00	3.54
	R	.660	.816	.660	.954	.630	.707	.660
High educational level	x̄	344.85	316.04	323.88	316.88	274.77	22.15	275.88
		.272	.441	.619	.480	.772	.283	.063

Table 10

Descriptive statistics on the importance assigned to specific educational content, by gender, age, and education level

		Visual literacy	Construction process	Contrast guidelines	Reliable sources	Detecting interests	Critical analysis	Strategies for engagement	Responsibility and social impact	Channels for defense
Women	x̄	3.00	2.95	3.12	3.33	3.19	3.21	3.03	3.11	3.03
	DT	.763	.706	.785	.703	.716	.757	.766	.745	.773
	R	277.83	276.07	273.13	279.35	278.49	279.17	282.50	278.80	282.27
Men	x̄	2.83	2.83	3.07	3.12	2.99	3.02	2.75	2.92	2.77
	DT	.813	.711	.803	.818	.842	.796	.788	.833	.772
	R	247.29	253.39	263.60	242.00	244.99	242.64	231.10	243.91	231.87
Gender	p	.040	.118	.524	.011	.024	.014	.001	.019	.001
18-19 years	x̄	2.87	2.80	2.99	3.18	3.00	3.09	2.86	2.90	2.86
	DT	.765	.660	.812	.738	.783	.804	.795	.798	.793
	R	255.98	246.32	249.10	250.38	244.19	257.31	250.59	239.86	251.49
20-21 years	x̄	2.91	2.89	3.07	3.25	3.11	3.19	2.98	3.13	3.01
	DT	.770	.686	.769	.742	.767	.746	.741	.733	.748
	R	260.87	265.70	262.96	264.07	266.96	274.26	273.47	282.81	278.70
22-23 years	x̄	3.11	3.14	3.28	3.49	3.30	3.23	3.10	3.25	3.08
	DT	.827	.766	.780	.674	.628	.763	.798	.730	.787
	R	301.24	315.82	304.98	313.77	298.29	284.01	299.27	305.89	293.67
24-25 years	x̄	3.16	3.04	3.33	3.44	3.38	3.20	2.93	3.00	2.91
	DT	.673	.706	.707	.659	.684	.842	.780	.853	.821
	R	305.93	293.41	313.62	301.87	316.79	281.29	264.18	261.73	262.33
Over 25 years	x̄	3.00	2.93	3.17	3.17	3.31	3.24	3.10	3.14	3.03
	DT	.802	.799	.805	.848	.712	.636	.817	.743	.778
	R	279.74	274.53	282.22	255.05	303.05	279.86	299.36	282.28	281.17
Age	p	.042	.002	.007	.004	.003	.594	.074	.004	.171
No educational level	x̄	2.95	2.88	3.12	3.23	3.19	3.16	2.91	3.10	2.98
	DT	.779	.844	.810	.815	.820	.795	.771	.828	.834
	R	269.64	267.74	275.88	266.64	286.07	270.97	261.63	280.90	273.90
Low educational level	x̄	2.92	2.90	3.05	3.28	3.11	3.14	2.96	3.03	2.94
	DT	.813	.680	.780	.710	.751	.770	.786	.770	.784
	R	265.79	265.88	260.71	269.99	265.71	265.29	270.62	263.60	266.21

		Visual literacy	Construction process	Contrast guidelines	Reliable sources	Detecting interests	Critical analysis	Strategies for engagement	Responsibility and social impact	Channels for defense
Moderate educational level	x̄	3.07	3.00	3.22	3.37	3.18	3.26	3.04	3.13	3.02
	DT	.675	.610	.761	.682	.627	.729	.769	.710	.691
	R	291.61	285.25	292.39	287.12	272.21	289.51	287.57	282.19	279.61
High educational level	x̄	2.92	3.23	3.23	3.08	3.08	3.15	2.92	3.08	3.15
	DT	.760	.599	.927	.862	.954	.899	.862	.862	.899
Educational level	x̄	260.62	333.23	303.88	237.08	269.31	276.77	268.96	279.65	314.23
		.435	.250	.196	.518	.618	.514	.572	.562	.598