MDPI

Kids Surfing the Web: A Comparative Study in Portugal

Angélica Monteiro [1,*] ![ORCID], **Cláudia Sousa** [2,3] ![ORCID] and **Rita Barros** [1,3] ![ORCID]

1. Centre for Research and Intervention in Education (CIIE), Faculty of Psychology and Education Sciences, Porto University, 4200-135 Porto, Portugal; rita.barros@ipiaget.pt
2. Faculty of Psychology, Education and Sports, Lusófona University, 4000-098 Porto, Portugal; p5315@ulusofona.pt
3. Research in Education and Community Intervention (RECI), Instituto Piaget, 1950-157 Lisboa, Portugal
* Correspondence: armonteiro@fpce.up.pt; Tel.: +(351)-22-607-97-00

Abstract: The conditions for safe Internet access and the development of skills enabling full participation in online environments are recognized in the Council of Europe's strategy for child rights, from 2022. The guarantee of this right has implications for experiences inside and outside the school context. Therefore, this study aims to compare the perceptions of students from different educational levels, who participated in a digital storytelling workshop, regarding online safety, searching habits, and digital competences. Data were collected through a questionnaire survey completed by 84 Portuguese students from elementary and secondary schools. A non-parametric multivariate analysis of variance was used to identify differences as children advanced across educational stages. The results revealed that secondary students tended to spend more time online and demonstrated more advanced search skills. Interestingly, the youngest children exhibited higher competences in creating games and practicing safety measures regarding online postings. These findings emphasize the importance of schools, in a joint action with the educational community, including parents, teachers and students, in developing a coordinated and vertically integrated approach to digital education that considers the children's current knowledge, attitudes, and skills as a starting point for pedagogical intervention.

Keywords: Internet use; digital competences; online safety; basic education

1. Introduction

Children's use of the Internet through various devices, especially mobile devices, is increasingly widespread. On the one hand, this situation accentuates opportunities to develop digital skills, but on the other hand, it can expose them to risks. In this sense, the Council of Europe's strategy for the rights of the child (2022–2027) [1] emphasizes the importance of aligning national legislation with international standards, particularly the United Nations Convention on the Rights of the Child [2]. This legislation includes guaranteeing the meaningful participation of children in decisions that affect their lives and protecting them from all forms of violence, such as physical, sexual, and emotional abuse, neglect, exploitation, and bullying. The strategy also highlights the importance of ensuring a right to education and providing education that is inclusive, accessible, and tailored to children's needs. Furthermore, it recognizes the growing impact of the digital world on children's lives and fosters initiatives to enhance their digital literacy, protect them from online risks, and promote positive and responsible Internet use.

Aspects related to children's digital literacy and online safety in Europe have been consistently studied by Livingstone et al. [3–5]. By 2010, the main results of a study conducted by the network EU Kids Online [3], involving 25,142 children 9 to 16 years old, and their parents, in 25 countries indicated that Internet use was already widespread. Children mainly accessed the Internet at home, using a desktop computer, followed by in school, to accomplish tasks like schoolwork, playing games, watching video clips, and

using instant messaging. From a safety point of view, the results of the study revealed that possible risks do not necessarily represent harm from the point of view of the children and young respondents and that "the more children in a country use the internet daily, the more those children have encountered one or more risks. However, more use also brings more opportunities and, no doubt, more benefits" (p. 7).

The most recent edition of the same study was held in 2020 [6], involving 25,101 children from 9 to 16 years old from 19 countries. The main findings point to massive changes in children's online experiences, with the more notable use of mobile technology to access YouTube and the sharing of images and videos through Instagram and other apps. The children evidenced higher operational and social skills compared to creative skills and the ability to create content and programming. Regarding security issues, a study carried out in 2020 by Mýlek et al. [7] involving five European countries provided evidence that older adolescents tend to interact more with unknown people online than younger adolescents because of developmental needs, such as identity exploration, emotional adaptation or to foster new interpersonal relationships. This behaviour can be seen because of the developmental process, particularly for adolescents between 11 and 15 years old, who have more offline social life [8]. However, it can also be understood as risky behaviour and a common cause for parental concern [7,9].

As a result of studies conducted previously, in 2012, the European Commission launched the first European strategy of a better Internet for kids (BIK). After a decade, in May 2022, a new strategy entitled "A Digital Decade for children and youth: the new European strategy for a better Internet for kids (BIK+)" was introduced. This strategy is based on the principle that "Children and young people should be protected and empowered online" and aims to complement and support the practical implementation of existing measures to protect children online, develop their digital skills, and empower them to safely enjoy and shape their online lives [10].

Portugal is a country where more than half of children share what they do online with their parents (at least sometimes), despite 40% never doing this. According to the survey's national results [6], Portuguese adolescents from 12 to 14 talk more to their parents about Internet issues than younger and older kids. In addition, this survey showed that in most of the 17 countries involved, parents have difficulty discussing online activities with their children, which increases as they age. From the point of view of the political and educational framework, Portugal is carrying out a digital transition plan in line with the European Union's Digital Education Action Plan. In this context, the government has invested in the distribution of equipment, offering a laptop for each child and young person of school age, as well as in teacher training and the production of digital educational resources [11].

The intention to leave no one behind and generalize individual access can also increase exposure to risk, as seen above, demonstrating the importance of studying this issue. Given the COVID-19 pandemic, more studies are necessary to comprehend the current landscape of children's Internet usage and digital competences to intervene promptly in potentially risky situations. In the same line of reasoning, the present article presents a study based on the perceptions of students from different school levels who participated in a digital storytelling workshop regarding online behaviours, competences, and security habits. The workshop was carried out within the framework of the European project "MINDtheGaps", which aimed to enhance young people's digital and media literacy by teaching programming and creating games and videos. The production process of the digital narratives involved collaborative work, starting from the initial conception of a unique story from a personal point of view. The following steps included oral sharing and improving the story in reading circles with peers, selecting images, audio recording for the narration, and editing the video for public sharing.

This article is divided into five sections. After this introduction, Section 2 presents the theoretical framework, and Section 3 the material and methods, followed by the results in

Section [4]. Section [5] includes the discussion. Section [6] proposes the conclusion, limitations, and future work.

2. Theoretical Framework

2.1. The Impact of Online Environments on Children's Development and Behaviours

The online environment can simultaneously function as a space for leisure, learning, and socialization for children. As a result, its frequent usage can bring about both risks and opportunities for children's development and positive behaviour [3]. Presently, the European Union's Digital Education Plan (2021–2027) prioritises the promotion of a a a highly effective digital-education ecosystem, characterized by the connection between living and non-living entities, and its hybrid nature in terms of presence, time, spaces, environments, and cultures [12]. Bronfenbrenner's "Ecological Systems Theory" [13] can serve as a reference for analysing the potential effects of this hybridity on children's development.

According to this theory, children's development can be viewed as a composition of interconnected structures: the microsystem, mesosystem, exosystem, macrosystem, and chronosystem. The microsystem corresponds to children's closest relationships, such as those related to family, daycare, preschool, and school. The interactions between elements from the microsystems constitute the mesosystem. The exosystem refers to external factors like school policies. The macrosystem represents influences from distant factors, such as values and cultural aspects. All these systems are influenced by time, both individual and historical, known as the chronosystem [14]. Evens [15] suggested that the exosystem could be broadened to include gaming, social media, and other contemporary online interactions, as they can directly impact children's well-being and mental health.

Moreover, the adaptation of Bronfenbrenner's ecological theory, referred to as the neo-ecological theory, incorporates virtual and technological contexts into personal development. Given that online experiences are now part of the current routine, Bronfenbrenner's model needs adjustments to bridge the virtual and technological contexts to real life. Hence, this theoretical adaptation addresses two forms of microsystems—physical and virtual [16]. These aspects vary based on the generation of children and adolescents under consideration (the youngest belonging to the Alpha generation, while the oldest are in the transition between Generation Z and Alpha) [17].

Domoff et al. [18] argue that interactions between children and their spheres of influence can heighten or diminish the risk for developmental psychopathology, such as behavioural disorders linked to digital media use. The same authors propose the "Interactional Theory of Childhood Problematic Media Use" (IT-CPU), grounded in the ecological systems theory, to explore the connection between problematic media use, individual factors (such as personality traits and cognitive abilities), family dynamics, peer relationships, and broader societal influences. According to this theory, the microsystem is tied to the surrounding people and situational factors that "lead to screen media use and the emergence of problematic use" (p. 345), which refers to "excessive use that interferes with the child's functioning" (p. 344).

2.2. Children's Internet Use Post-Pandemic

The recent literature investigating children's Internet usage during the post-pandemic period (2022–2023) has highlighted several key themes relating to online security, risks, and potentials, as well as Internet usage and competence development. Furthermore, there has been an exploration of how the pandemic has affected children.

In the context of online security and potential risks, research focusing on parental perceptions of safe internet and computer use, along with an awareness of cyberbullying among young children, consistently underscores the importance of equipping parents with information and training to shield their children from online hazards [19]. Notably, Tosuna and Akçay [20] observed a 70% increase in cyberbullying incidents targeting children during the pandemic, with risks intensified by increased screen time.

The impact of heightened screen exposure on cognitive processing skills in preschoolers during the COVID-19 period was investigated by Sapsağlam and Birak [21]. Their findings indicated that excessive screen time can hinder children's concentration on educational activities, leading to shorter attention spans and reduced engagement. Dere [22] identified online games and mobile gaming as primary contributors to addiction in children, noting a correlation between online gaming and challenging behaviour. Similarly, Feng [23] highlighted adverse outcomes such as decreased academic performance, compromised physical health, and compromised mental well-being stemming from excessive screen use. Both authors stressed the significance of parental supervision, imposing limits on online activity, and taking proactive measures to protect children's rights and well-being. They also emphasised the role of schools and teachers in providing information and creating an environment that supports children's self-control against game addiction.

The excessive use of the internet during the pandemic period posed specific difficulties for children with disabilities, particularly in terms of the lack of information and support available to their parents [24,25]. Conversely, Givigi et al. [26] highlighted factors contributing to the effectiveness of remote education during the pandemic. These factors include the selection of appropriate tools, the quality of internet connections, user proficiency, virtual platforms for mutual support, effective communication between schools and families, and improvements in special education policies and programmes, as well as adequate support.

Regarding the use of digital tools for enhancing learning and developing competences, according to some authors [27,28], the use of YouTube videos by young children can contribute to communication fluency development in English at the secondary education level. Additionally, the research explored the online reading habits of primary education students [29] and the types of digital books accessible to children [30], as well as problem-solving and digital transformation in kindergartens [31]. The pandemic period had effects in socio-economic and political terms [32], including difficulties faced by schools and families in terms of equipment, lack of digital skills, challenges in organizing digital learning activities by teachers, and a lack of parental support of, or resistance to, computer and Internet use for children's learning. However, in a contradictory way, parents often allow children to have unsupervised use of the Internet for playing games and watching videos.

Given these recent developments and the need to investigate these issues with children, especially in this post-pandemic period, the study presented in this article was situated in a non-formal education context. However, it involved children and young people from different school levels, belonging to three public schools and one private school. Because of the lack of direct student representation, it was decided to question young people directly, as will be presented in the following section.

The present study aimed to compare the perceptions of students from different educational levels regarding online safety, search habits, and digital competences. It was guided by the following research question: Are there differences in the search habits, digital competences, and online safety of Portuguese children in elementary and secondary schools?

The findings could benefit various spheres of influence on children, starting with their families and immediate surroundings. This includes parents, teachers, school leaders, academics, and non-formal education institutions. These findings can guide them in making informed decisions and efforts to implement effective and participatory online safety strategies, as well as to foster the development of knowledge, skills, and positive behaviours both within and outside of schools.

Within formal education, teachers can establish diverse strategies to address students' needs and their current levels of competences. Non-formal institutions and other stakeholders can use the study's findings to create educational resources and activities that empower children, parents, and educators to navigate the digital landscape safely and critically.

3. Materials and Methods

To compare the perceptions of students from different educational levels regarding online safety, searching habits, and digital competences, a quantitative study with a com-

parative research design was considered. Initially, an online questionnaire containing sociodemographic questions as well as questions concerning online safety, searching habits and digital competences (see Table 1) was created using Google Forms.

Table 1. Questions related to online safety, searching habits and digital competences that were included in the online questionnaire.

Dimensions	Question
searching habits	SH1. Indicate the social media platforms on which you have an active account. SH2. In a typical week, what is the probability of you accessing social media? SH3. On a typical weekday, approximately how much time do you spend online (excluding time dedicated to schoolwork and online classes)? SH4. Have you ever had your Internet usage restricted by an adult (parent, guardian, teacher, etc.) because they considered it excessive?
digital competences	Indicate your level of agreement with the following statements regarding your digital skills (1 = Strongly disagree; 5 = Strongly agree): DC1. I am capable of finding data, information, and content through a simple search in digital environments and navigate between them. DC2. I know how to identify simple ways to protect my devices and digital content (e.g., passwords, avoiding sensitive information, not opening emails from unknown senders, etc.). DC3. I know how to apply search filters (e.g., "+", "AND", "OR") to obtain data, information, and content in a digital environment. DC4. I am capable of selecting simple digital technologies to interact with others and can identify appropriate means of communication for a given context. DC5. I can use a variety of digital technologies to interact with other people. DC6. I know how to create and edit simple content in text formats (e.g., Word). DC7. I am capable of recording audio. DC8. I know how to edit audio files. DC9. I know how to edit images. DC10. I am capable of producing videos. DC11. I know how to create games. DC12. I am familiar with at least one programming language (e.g., Scratch, Java, Python...).
online safety	OS1. You trust that the information published online is true in the following cases. OS2. How often do you question the possibility of online information being false? OS3. Who do you usually accept or would accept a friend request from online? OS4. When you make a post on a social network, who can see it? OS5. When creating a password, what should you use? OS6. Who can you share your passwords with? OS7. You access a website that asks for your personal information (phone number, home address, etc.) or asks you to download a link before proceeding. What do you do? OS8. If a friend your age tells you they have been talking to a stranger online and plan to meet them in person, what do you do? OS9. What do you do if a stranger or someone you don't know personally asks you to send them photos or videos of yourself? OS10. If someone at your school has posted or circulated embarrassing content about a fellow student, what do you do?

The searching habits and the competence dimensions of the questionnaire were based on the European Digital Competence Framework (DIGICOMP 2.2) [33]. This is an open instrument that has been validated in several studies for different populations, including teenagers [34]. All questions presented in Table 1 were ordinal in nature with five possible answers (coded from 1 to 5) except the first question related to searching habits (SH1) and the first question related to online safety (OS1), which had a nominal nature. Concerning the ordinal questions related to searching habits (SH2, SH3, SH4), a higher score corresponded to more frequent use of the Internet (excluding use for school activities or classes). Concerning the ordinal questions related to digital competences (DC1 to DC12), a higher score corresponded to higher digital competences and, pertaining to the ordinal

questions related to online safety (OS2 to OS10), a higher score corresponded to greater safety when online.

The recruitment of participants was carried out through a digital storytelling workshop. The final sample comprised 84 Portuguese students (53.6% female and 46.4% male) from elementary and secondary education aged between 8 and 20 years old (M = 12.06; SD = 3.91), with most of them (70.2%) being elementary students.

When this study began, it was not required to submit it to an ethics committee. Therefore, since the study did not report on sensitive data, the authors chose to safeguard ethical issues with requests for authorization from the parents in the case of minors, or their own informed consent in the case of adults of legal age. In both cases, anonymity and individual confidentiality of the data collected were guaranteed. The form was approved by the Portuguese Minister of Education service "Monitoring of School Surveys" and was stored on the coordinating university servers, which ensured secure and confidential conditions. With regard to the collection and processing of personal data, the university follows the highest standards of data protection, in accordance with the General Data Protection Regulation (EU) 2016/679-GDPR and the respective Portuguese application regulation (Law No. 58/2019 of 8 August), including legal basis, data minimization, conservation limitation and adequacy of security measures, the exercise of the data subject's rights and the regulation of Data Controller/Data Processor and Joint Controller relationships.

Analysis was performed using IBM SPSS Statistics software (version 28). Due to the ordinal nature of the dependent variables, non-parametric methods were used [35]. To compare the perceptions of elementary and secondary students who participated in a digital storytelling workshop on online safety, searching habits, and digital competences, three non-parametric MANOVAs (multivariate analysis of variance) were performed. When the MANOVAs were statistically significant, posterior Mann–Whitney tests for each dependent variable were performed, with r effect sizes calculated and interpreted according to Pautz et al. [36] (0.1 being a small effect size, 0.3 being a medium effect size and 0.5 being a large effect size) and *p*-values were adjusted using Bonferroni corrections, multiplying them by the number of analyses performed. It is worth noting that multivariate methods usually require larger sample sizes than univariate methods and one of the major disadvantages of using small sample sizes is a low statistical power, which makes it likely that for small studies, only very large effects will be able to be detected [37]. However, in the present study, all three MANOVA's were able to identify statistically significant differences.

Descriptive analysis was performed to compare the social media platforms where both groups had an active account (SH1) and to compare the situations where online information was seen as believable by those two groups of students (OS1).

Reliability was assessed through the internal consistency measure Cronbach's alpha (α). Values lower than 0.60 were considered inadequate [38].

A significance level of 0.05 was considered.

4. Results

Table 2 shows the descriptive analysis of the questions from the online questionnaire related to searching habits.

As shown in Table 2, most of the elementary students had active Google+ and YouTube accounts, with Google+ being the most frequent answer. While YouTube was also one of the two most frequent platforms mentioned by secondary students, Google+ was not one of the most used, being replaced by Instagram as the number one platform where these students had an active account. In both groups, Myspace was the least used platform.

In terms of internal consistency reliability, when considering the ordinal variables SH2, SH3 and SH4, α = 0.39, which was inadequate. However, it increased to α = 0.61 when SH4 was eliminated. Since, in the present study, we were not working with total scores but with all variables, separately, SH4 was also considered in the following analysis.

Table 2. Descriptive analysis of the questions related to searching habits that were included in the online questionnaire.

Question	Total Sample (*n* = 84)					Elementary Students (*n* = 59)					Secondary Students (*n* = 25)				
	n	%	Mo	Md	Range	*n*	%	Mo	Md	Range	*n*	%	Mo	Md	Range
SH1															
Google+	62	73.8				48	81.4				14	56.0			
Facebook	53	63.1				34	57.6				19	76.0			
Myspace	1	1.2				0	0.0				1	4.0			
Twitter	27	32.1				13	22.0				14	56.0			
YouTube	68	81.0				46	78.0				22	88.0			
TikTok	59	70.2				41	69.5				18	72.0			
Instagram	62	73.8				38	64.4				24	96.0			
Other	25	29.8				15	25.4				10	40.0			
SH2			5	4	1–5			5	4	1–5			5	5	4–5
SH3			2	2	1–5			2	2	1–5			2	3	1–5
SH4			1	2	1–5			1	2	1–5			1	2	1–4

Note: Mo: Mode; Md: Median.

A non-parametric MANOVA with SH2, SH3 and SH4 as the dependent variables revealed significant differences in searching habits between elementary and secondary students ($\chi 2$ (3) = 17.181; *n* = 84; *p* = 0.001). Posterior Mann–Whitney tests revealed statistically significant differences between both groups only for SH2 (U = 348.500; z = −4.053; *p* = 0.003; r = 0.44) and SH3 (U = 477.000; z = −2.690; *p* = 0.021; r = 0.29), with medium effect sizes in both cases. Indeed, Table 2 shows that, when asked if an adult had already limited their time of Internet usage due to its excessive use (SH4), both groups had similar answers, with the most frequent answer in both groups being that it never happened. When comparing the probability of having access to social media during a typical week (SH2), the most frequent answer in both groups was several times a day. However, comparing the median and the range of the answers in elementary and secondary groups, it is possible to see that the probability of having access was higher for secondary students. Also, when comparing the time that students spent online daily during the week (excluding the time spent with school activities and classes) (SH3), the most frequent answer in both groups was between two and four hours. However, comparing the median of the answers in the elementary and secondary groups, secondary students tended to spend more time online than elementary students.

Table 3 shows the descriptive analysis of the questions from the online questionnaire that were related to digital competences.

Table 3. Descriptive analysis of the questions related to digital competences that were included in the online questionnaire.

Question	Total Sample (*n* = 84)			Elementary Students (*n* = 59)			Secondary Students (*n* = 25)		
	Mo	Md	Range	Mo	Md	Range	Mo	Md	Range
DC1	5	4	2–5	5	5	2–5	4	4	2–5
DC2	5	4.5	1–5	5	4	1–5	5	5	1–5
DC3	1	3	1–5	1	2	1–5	4	4	1–5
DC4	5	4	1–5	5	4	1–5	4	4	2–5
DC5	5	5	1–5	5	4	1–5	5	5	2–5
DC6	5	4	1–5	5	4	1–5	5	5	2–5
DC7	5	5	1–5	5	5	1–5	5	5	2–5
DC8	5	3	1–5	2/5	3	1–5	5	3	1–5
DC9	5	4	1–5	5	5	1–5	5	4	2–5
DC10	5	4	1–5	5	4	1–5	5	4	2–5
DC11	5	4	1–5	5	5	1–5	1	2	1–5
DC12	5	3	1–5	5	4	1–5	2	2	1–5

Note: Mo: Mode; Md: Median.

In terms of internal consistency reliability, when considering the ordinal variables DC1 to DC12, α = 0.75, which was adequate. None of these variables, when eliminated, would visibly improve α.

Upon analysing Table 3, it can be concluded that, in general, the sample under study had high levels of digital competence. However, a non-parametric MANOVA with DC1 to DC12 as the dependent variables revealed significant differences in digital competences between the elementary and secondary students ($\chi2$ (12) = 34.528; *n* = 84; *p* < 0.001). Posterior Mann–Whitney tests revealed statistically significant differences between both groups only for DC3 (U = 449.500; z = −2.892; *p* = 0.036; r = 0.32) and DC11 (U = 386.000; z = −3.603; *p* = 0.012; r = 0.39), with medium effect sizes in both cases. Indeed, Table 3 shows that, when asked if they agreed with the phrase "I know 'search' filters (such as "+", "AND", "OR") to find information online" (DC3), the most frequent answer was I completely disagree for elementary students, and I mostly agree for secondary students. Furthermore, the median for secondary students was also higher, pointing to higher digital competence of the secondary group in terms of "search" filter use. When asked if they agreed with the phrase "I know how to create games" (DC11), the most frequent answer was I completely agree for elementary students and I completely disagree for secondary students. Furthermore, the median for elementary students was also higher, pointing to a higher digital competence of the elementary group in terms of creating games.

Table 4 shows the descriptive analysis of the questions from the online questionnaire that were related to online safety.

Table 4. Descriptive analysis of the questions related to online safety that were included in the online questionnaire.

Question	Total Sample (*n* = 84)					Elementary Students (*n* = 59)					Secondary Students (*n* = 25)				
	n	%	Mo	Md	Range	*n*	%	Mo	Md	Range	*n*	%	Mo	Md	Range
OS1															
OS1a	11	13.1				6	10.2				5	20.0			
OS1b	15	17.9				13	22.0				2	8.0			
OS1c	45	53.6				36	61.0				9	36.0			
OS1d	18	21.4				16	27.1				2	8.0			
OS1e	43	51.2				25	42.4				18	72.0			
OS2			3	3	1–5			1	3	1–5			3	3	2–5
OS3			4	4	1–5			4	4	1–5			4	4	1–4
OS4			4	3	1–5			4	4	1–5			3	3	1–5
OS5			4	4	1–5			4	4	1–5			4	4	1–5
OS6			4	4	2–5			5	4	2–5			4	4	2–5
OS7			4	4	1–5			4	4	1–5			4	4	2–5
OS8			4	4	1–5			4	4	1–5			4	4	1–5
OS9			4	4	1–5			5	4	2–5			4	4	1–5
OS10			5	5	1–5			5	5	1–5			4	4	1–5

Note: Mo: Mode; Md: Median; OS1a = While online, I trust the information, otherwise it would not have been published; OS1b = If it is provided by a very famous Youtuber, blogger, celebrity or influencer; OS1c = If it is provided by someone I know personally, from my social media group; OS1d = If it is provided by anyone in my social media network; OS1e = On generally known social media websites, such as television channels, print newspapers, or digital news aggregators (such as Apple news, Google news, ...).

Concerning the question about the situations when online information is perceived as believable (OS1), most elementary students answered that they believed the information was true if it was on websites from well-known newspapers or TV channels. They also believed the information was true if was given by someone from their social media that they already knew in person, this being the most given answer. These were also the two main answers from secondary students, although the most frequent answer in this group was the first one. It is interesting to note that, although being older, 20% of the secondary students surveyed believed that online information was true simply because it was online. Otherwise, they thought that it would not be posted. In contrast, only 10.2% of elementary students believed that this was true (see Table 4).

In terms of internal consistency reliability, when considering the ordinal variables OS2 to OS10, $\alpha = 0.63$, which was adequate. None of these variables, when eliminated, would visibly improve α.

Upon analysing the descriptive statistics of questions OS2 to OS10 (see Table 4), it can be concluded that, in general, the studied sample had high levels of online safety. However, a non-parametric MANOVA with OS2 to OS10 as the dependent variables revealed significant differences in online safety between the elementary and secondary students ($\chi2$ (9) = 19.173; $n = 84$; $p < 0.001$). Posterior Mann–Whitney tests revealed statistically significant differences between both groups only for OS4 (U = 464.500; z = −2.760; $p = 0.045$; r = 0.30), with a medium effect size. Indeed, Table 4 shows that, when asked who could see their posts on social media (OS4), the most frequent answer for elementary students was only their families and/or close friends, while the most frequent answer for secondary students was their friends from social media. Furthermore, the median of the answers for elementary students was also higher, pointing to increased safety in this group when posting online.

5. Discussion

The use of the Internet by children and young people is inevitable, and strategies need to be found to address the challenges that arise in children's education from a multidimensional and interconnected perspective [13]. This study aimed to compare the perceptions of students from different educational levels regarding online safety, searching habits, and digital competences.

Concerning security issues, the two groups of students stated that they did not have time limitations defined by adults for Internet use or abuse. Supposing that, in most cases, those adults are their parents, it is interesting to take into account the EU Kids Online 2020 survey [6] and the study by Eyuboğlu and Yilmaz [19], since both studies considered parents' opinions about safe Internet and computer use by kids. It is important, as well, that this inquiry with parents at the microsystem level be supplemented by social learning and behavioural principles in IT-CPU, to understand sustaining factors, such as the dyadic parent–child relationship, children's coping strategies, the lack of self-regulation, and peer influence, on gaming or engaging online [18]. In Portugal, over 80% of children receive advice on safe Internet use from adults [3], and the group of 12- to 14-year-olds in this study reported being advised more than the youngest and the older groups. We must consider the level of adolescents' comprehension regarding online risky behaviours. Even those who understand the risks choose to not take them into account [39]. This may explain why our results showed an increased safety level in the students belonging to the youngest group when posting online.

Developmental factors can contribute to understanding adolescents' online behaviour. In fact, the information regarding risky behaviours in digital environments and the exposure to advertising seems not to be enough to avoid children and teenagers', particularly the latter, becoming more permeable to influencers and more vulnerable to engaging in unhealthy choices [40].

The information on how to avoid risky behaviours or parental guidance is not enough to guarantee safe behaviour, both in daily life contexts and on the Internet. Nevertheless, the feeling of being safe online (always or often) increases gradually from 9 to 16 years old, and 20% of the older students believe that information available on the Internet is credible. For example, Dumitru [41] points out that digital environments can influence children and teenagers' skills to recognise online fake news. We believe this is a worrisome factor when intervening with young people in this age group. Generational aspects related to the pace of digital transformations, as well as the dynamics within microsystems such as schools and families [16], encompass suitable information, attitudes, and behaviours needed to effectively supervise young people in digital environments.

With regard to online search habits and competences, the results show a higher probability of Internet access among the older group. This fact is in accordance with a

study by Mýlek et al. [7], in which adolescents between 14 and 16 years old tended to spend almost twice the time on online communications compared with children from 9 to 10 years old. In addition, considering all the countries included in the survey, 34% of the younger group (9- to 11-year-olds) were not allowed to use social networking sites, but in Portugal, this percentage decreased to 21%. We must be aware of the correlation between the overuse of online media and the risk of problematic Internet use, since this can develop into psychopathological situations [8]. The Diagnostic and Statistical Manual of Mental Disorders has already classified problematic Internet use among children and adolescents, with a prevalence between 4% and 8%, according to the American Psychiatric Association [42].

As expected, older students have more competences to seek information on the Internet, using filters, such as "+", "AND" and "OR", but the younger students think they are more able to create a game. Considering the study developed by Porat et al. [43] with junior high school students (about 13 years old), those students tended to overestimate their digital competences. However, those perceptions did not align with their actual performance because their results in digital tasks fell far short.

Considering the developmental issues, it is impossible to prescribe universal healthy Internet use for all pre-adolescent and adolescent individuals [44]. Using the words of Sedgwick [45], "Understanding the functions across online platforms that are supportive or detrimental for different age groups, or populations, will be important to guide clinicians' line of inquiry, risk assessment as well as recommendations about social media/internet use and future interventions" (p. 537). This idea is in line with previous studies regarding online learning mediation for people facing vulnerable situations [46].

It seems that there is a digital void in competency between the youngest and the oldest, but mainly for the older adolescents, and it is, thus, essential to implement programmes to realign and balance their perceptions about their digital competences and their actual level of digital literacy.

6. Conclusions and Limitations

The aim of the present study was to compare the perceptions of students from different school levels who participated in a digital storytelling workshop regarding online behaviours and competences.

Previous studies have indicated that Internet use occurs at home and school, especially for online gaming, watching videos, sharing images, and completing school tasks [3–5]. However, there is significant concern regarding safety issues [7,8] and the lack of information and training for parents [19] and teachers on digital literacy matters, as they require more training on the pedagogical use of digital technologies [31]. Most recent studies were based on the perceptions of teachers and parents, which means that students are heard less frequently. Furthermore, it was noted, above all, that the pandemic period has changed the form and purpose of Internet use by children and has increased and diversified the ways of learning [26,27], but it has also contributed to an increased time of exposure to screens [21] and, consequently, the risks of this use when unsupervised [23].

Regarding the research question "Are there differences regarding searching habits, digital competences and online safety of Portuguese children from elementary and secondary schools?", the main conclusions of the study presented in this article points to some similarities and some differences between the two groups of students. Both referred to using YouTube and elementary students also referred to Google Apps for Education, since it has been adopted in several Portuguese public schools, while secondary students also referred to the use of Instagram, mostly for social interaction. Secondary students tended to spend more time online [21] and demonstrated more advanced search skills. However, as referred, the youngest ones considered themselves to have more creative abilities, which may be related to the pilot project launched in 2015/2016 by the Portuguese Ministry of Education, promoting the "Initiation of Programming in the 1st Cycle of Basic Education" and the existence of clubs and other actions for this level of schooling, in line with the

Digital Action Plan [11]. Regarding security issues, it is important to continue working on raising the awareness of teachers, parents, children, and young people about the risks of the Internet and how to develop an attitude that allows them to take advantage of the Internet's potential for learning, engaging, and socializing, without exposing themselves to cyberbullying or adopting addictive habits [22].

As a limitation of the study, the sample was not representative of the entire Portuguese population aged 8 to 20 years old; therefore, it is not expected that the results can be generalized. However, they could still provide valuable insights to support the joint reflection of multiple actors. Future studies should consider evaluating actual competences rather than solely relying on perceived competences. Additionally, these studies should include gender as a variable of analysis and take the sociodemographic characteristics of the students into account. Another aspect to explore is the relationship between technological systems and mechanisms, including those used in artificial intelligence and robotics, and the new habits that children can develop in terms of learning and online interaction [47].

References

1. Council of Europe. Council of Europe's Strategy on Child Rights. 2022. Available online: https://rm.coe.int/council-of-europe-strategy-for-the-rights-of-the-child-2022-2027-child/1680a5ef27 (accessed on 20 July 2023).
2. United Nations. Convention on the Rights of the Child. 1989. Available online: https://www.unicef.org/child-rights-convention/convention-text# (accessed on 20 July 2023).
3. Livingstone, S.; Haddon, L.; Görzig, A.; Ólafsson, K. Risks and Safety on the Internet: The Perspective of European Children: Full Findings and Policy Implications from the EU Kids Online Survey of 9–16 Year Olds and Their Parents in 25 Countries. EU Kids Online, Deliverable D4. EU Kids Online Network, London, UK. 2011. Available online: https://resourcecentre.savethechildren.net/pdf/7130.pdf/ (accessed on 15 May 2023).
4. Livingstone, S.; Ólafsson, K.; Helsper, E.J.; Lupiáñez-Villanueva, F.; Veltri, G.A.; Folkvord, F. Maximizing Opportunities and Minimizing Risks for Children Online: The Role of Digital Skills in Emerging Strategies of Parental Mediation. 2017. Available online: https://onlinelibrary.wiley.com/doi/abs/10.1111/jcom.12277 (accessed on 15 May 2023).
5. Livingstone, S.; Mascheroni, G.; Staksrud, E. European research on children's internet use: Assessing the past and anticipating the future. *New Media Soc.* **2018**, *20*, 1103–1122. [CrossRef]
6. Smahel, D.; Machackova, H.; Mascheroni, G.; Dedkova, L.; Staksrud, E.; Ólafsson, K.; Livingstone, S.; Hasebrink, U. EU Kids Online 2020: Survey Results from 19 Countries. EU Kids Online. 2020. Available online: https://www.lse.ac.uk/media-and-communications/assets/documents/research/eu-kids-online/reports/EU-Kids-Online-2020-10Feb2020.pdf (accessed on 20 July 2023).
7. Mýlek, V.; Dedkova, L.; Machackova, H. Factors influencing interactions between adolescents and unknown people from the Internet: Findings from five European countries. *Child Youth Serv. Rev.* **2020**, *114*, 105038. [CrossRef]
8. Lyyra, N.; Junttila, N.; Gustafsson, J.; Lahti, H.; Paakkari, L. Adolescents' online communication and well-being: Findings from the 2018 health behavior in school-aged children (HBSC) study. *Front. Psychiatry* **2022**, *13*, 976404. [CrossRef] [PubMed]
9. Durkee, T.; Carli, V.; Floderus, B.; Wasserman, C.; Sarchiapone, M.; Apter, A.; Balazs, J.A.; Bobes, J.; Brunner, R.; Corcoran, P.; et al. Pathological Internet use and risk-behaviors among European adolescents. *Int. J. Environ. Res. Public Health* **2016**, *13*, 294. [CrossRef]
10. European Commission. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. A Digital Decade for Children and Youth: The New European Strategy for a Better Internet for Kids (BIK+). 2022. Available online: https://eur-lex.europa.eu/legal-content/PT-EN/TXT/?from=EN&uri=CELEX%3A52022DC0212 (accessed on 14 June 2023).

11. Monteiro, A.; Leite, C.; Coppi, M.; Fialho, I.; Cid, M. Education in emergency: Lessons learned about school management practices and digital technologies. *Res. Educ. Adm. Leadersh.* **2023**, *8*, 223–254. [CrossRef]

12. Moreira, J.A.; Horta, M.J. Educação e ambientes híbridos de aprendizagem. Um processo de inovação sustentada. [Education and hybrid learning environments. A process of sustained innovation]. *Revista UFG.* **2020**, *20*, 1–29. [CrossRef]

13. Bronfenbrenner, U.; Evans, G.W. Developmental science in the 21st century: Emerging questions, theoretical models, research designs and empirical findings. *Soc. Dev.* **2000**, *9*, 115–125. [CrossRef]

14. Hayes, H.; O'Toole, L.; Halpenny, A.N. *Introducing Bronfenbrenner: A Guide for Practitioner and Students in Early Years Education*; Routledge; Taylor & Francis Group: London, UK, 2017.

15. Evans, O. Bronfenbrenner's Ecological Systems Theory. 2023. Available online: https://www.simplypsychology.org/bronfenbrenner.html (accessed on 10 August 2023).

16. Navarro, J.; Tudje, J. Technologizing Bronfenbrenner: Neo-ecological theory. *Curr. Psychol.* **2022**, *41*, 1–17. [CrossRef]

17. Soly, N.; Kevin, B.; Thomas, M.R. Technological perspectives of education for generation Z and generation alpha. *Utkal Hist. Res. J.* **2021**, *34*, 153–169.

18. Domoff, S.E.; Borgen, A.L.; Radesky, J.S. Interactional theory of childhood problematic media use. *Hum. Behav. Emerg. Tech.* **2020**, *2*, 343–353. [CrossRef]

19. Eyuboğlu, F.A.B.; Yılmaz, F.G.K. Examination of the opinions of the parents attending the safe Internet and computer using course on applied education. *Educ. Q. Rev.* **2022**, *5*, 656–675. [CrossRef]

20. Tosuna, N.; Akçayb, H. Examination of cyberbullying awareness of parents with 36-72 months of children, tackle cyberbullying or victimization and prevention strategies. *Int. J. Curric. Instr.* **2022**, *14*, 350–377.

21. Sapsağlam, Ö.; Birak, E. Examining the effect of increased screen usage time on preschoolers' cognitive process skills during COVID 19 period. *Malays. Online J. Educ. Technol.* **2023**, *11*, 108–126. [CrossRef]

22. Dere, Z. Analyzing technology addiction and challenging behaviors of young children. *IJCI* **2022**, *14*, 243–250.

23. Feng, S. The detrimental effects of mobile game addiction on Chinese primary school students and possible interventions. *Sci. Insights Educ.* **2022**, *13*, 1911–1922. [CrossRef]

24. Inan, F. Educational and social impact of computing devices for children with autism spectrum disorder (ASD). *Turk. Online J. Educ. Technol.* **2023**, *22*, 60–65.

25. Eseadi, C.; Amedu, A.N.; Victor-Aigbodion, V. Information-Seeking behaviour of parents of students with NDD: A case study of parents of students with intellectual disability. *Online Submiss.* **2022**, *14*, 7959–7966.

26. Givigi, R.; Jesus, D.; Silva, R. Situation of special education in Brazil and Canada during the COVID-19 pandemic. *Probl. Educ. 21st Century* **2022**, *80*, 162–178.

27. Caldeiro-Pedreira, M.; Renés-Arellano, P.; Castillo-Abdul, B.; Aguaded, I. YouTube videos for young children: An exploratory study. *Digit. Educ. Rev.* **2022**, *41*, 32–43. [CrossRef]

28. Toleuzhan, A.; Sarzhanova, G.; Romanenko, S.; Uteubayeva, E.; Karbozova, G. The educational use of YouTube videos in communication fluency development in English: Digital learning and oral skills in secondary education. *IJEMST* **2023**, *11*, 198–221. [CrossRef]

29. Kerneža, M.; Kordigel Aberšek, M. Online reading in digital learning environments for primary school students. *Probl. Educ. 21st Century* **2022**, *80*, 836–850. [CrossRef]

30. Ozbay, I.; Ugurelli, Y. Changing children's literature in the digital age: Digital books. *Int. J. Educ. Lit. Stud.* **2023**, *11*, 68–85. [CrossRef]

31. Hollenstein, L.; Thurnheer, S.; Vogt, F. Problem solving and digital transformation: Acquiring skills through pretend play in kindergarten. *Educ. Sci.* **2022**, *12*, 92. [CrossRef]

32. Dere, A.; Akkaya, A. Distance social studies courses in the pandemic period with the experiences of teachers. *Çukurova Üniversitesi Eğitim Fakültesi Derg.* **2022**, *51*, 1172–1206.

33. Vuorikari, R.; Kluzer, S.; Punie, Y. DigComp 2.2: The Digital Competence Framework for Citizens—With New Examples of Knowledge, Skills and Attitudes. 2022. Available online: https://publications.jrc.ec.europa.eu/repository/handle/JRC128415 (accessed on 11 August 2023).

34. Iglesias-Rodríguez, A.; Hernández-Martín, A.; Martín-González, Y.; Herráez-Corredera, P. Design, validation and implementation of a questionnaire to assess teenagers' digital competence in the area of communication in digital environments. *Sustainability* **2021**, *13*, 6733. [CrossRef]

35. Marôco, J. *Análise Estatística com o SPSS Statistics*, 8th ed.; Report Number: Lisboa, Portugal, 2021.

36. Pautz, N.; Olivier, B.; Steyn, F. The use of nonparametric effect sizes in single study musculoskeletal physiotherapy research: A practical primer. *Phys. Ther. Sport* **2018**, *33*, 117–124. [CrossRef]

37. Morgan, C.J. Use of proper statistical techniques for research studies with small samples. *Am. J. Physiol.* **2017**, *5*, 873–877. [CrossRef] [PubMed]

38. Pestana, M.H.; Gageiro, J.M. *Análise De Dados Para Ciências Sociais: A Complementaridade do SPSS [Data Analysis for Social Sciences: The Complementarity of SPSS]*, 6th ed.; Edições Sílabo: Lisboa, Portugal, 2020.

39. Radesky, J.; Weeks, H.; Ball, R.; Schaller, A.; Yeo, S.; Durnez, J.; Tamayo-Rios, M.; Epstein, M.; Kirkorian, H.; Coyne, S.; et al. Young children's use of smartphones and tablets. *J. Pediatr.* **2020**, *146*, e20193518. [CrossRef] [PubMed]

40. Reid Chassiakos, Y.; Radesky, J.; Christakis, D. Children and adolescents and digital media. *J. Pediatr.* **2016**, *138*, e20162593. [CrossRef]

41. Dumitru, E.-A. Testing children and adolescents' ability to identify fake news: A combined design of quasi-experiment and group discussions. *Societies* **2020**, *10*, 71. [CrossRef]

42. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, 5th ed. Available online: https://doi.org/10.1176/appi.books.9780890425787 (accessed on 10 May 2023).

43. Porat, E.; Blau, I.; Barak, A. Measuring digital literacies: Junior high-school students' perceived competencies versus actual performance. *Comput. Educ.* **2018**, *126*, 23–36. [CrossRef]

44. Council on Communications and Media. Media use in school-aged children and adolescents. *J. Pediatr.* **2016**, *138*, e20162592. [CrossRef]

45. Sedgwick, R.; Epstein, S.; Dutta, R.; Ougrin, D. Social media, internet use and suicide attempts in adolescents. *Curr. Opin. Psychiatry* **2019**, *32*, 534–541. [CrossRef] [PubMed]

46. Monteiro, A.; Leite, C.; Barros, R. Eu ganhei mais o gosto de estudar: O e-learning como um meio de aprendizagem ao longo da vida de reclusas de um estabelecimento prisional português. [I have started to enjoy studying: E-learning as a mean of inmates' lifelong learning in a Portuguese prison]. *Educ. Soc.* **2018**, *39*, 129–150. [CrossRef]

47. Chi, R.; Li, H.; Shen, D.; Hou, Z.; Huang, B. Enhanced p-type control: Indirect adaptive learning from set-point updates. *IEEE Trans. Autom. Control* **2023**, *68*, 1600–1613. [CrossRef]