Research Article

ICT Skills – Study concerning students from seventh to ninth grade in Viana do Castelo district

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ARTICLE INFO	ABSTRACT
	The present study presents the results of an investigation within the scope of educational assessment. The main objective of this study is to assess the digital competencies of students from the 7th to 9th school years in the district of Viana do Castelo. Data were collected through a questionnaire, validated, composed by the dimensions Information and Informal Literacy, Communication and Collaboration, Creation of Digital Content, Security and Problem Solving. The sample consists of 861 respondents. After analysing the results, we consider it relevant to reflect on the trends that contribute to the importance of ICT in the young population. Similarly, it is possible to state that the students in our sample have a reasonable amount of general knowledge, skills and aptitudes regarding digital competences. However, when it comes to surfing the Internet, browsing and filtering information, as well as storing and retrieving information, adding and reformulating files, solving everyday life problems with technology, working with technological innovations and solving digital gaps, most students showed little mastery of these topics. Contrary to being in the same grade or not, it is the gender that shows a significant amount of statistically significant results, regarding digital knowledge, skills and competencies. It can be seen that most students do not ask their family members for help with school tasks, which leads to the conclusion that the acquisition of digital skills is not achieved within the household.

INTRODUCTION

Information Cybersecurity is increasingly becoming an aspect to be taken into account in today's society. The risk of cyber attacks increases exponentially due to the increasingly widespread use of Information and Communication Technologies - ICT. This evolution in the use of ICT happened in important in areas such as health (Carvalho et al., 2012; Carvalho et al., 2015), wellbeing (Queirós et al., 2010; Carvalho et al., 2022a) or tourism (Carvalho et al., 2020a; Figueiredo et al., 2022). This way, nobody is immune, being a phenomenon that affects from individual citizens to companies, including even government entities, in all sectors of our society (Carvalho et al., 2022b).

Education is one of the pillars of a democratic state and a right to every citizen. Just like society, education has been through enormous changes in the last few decades. One of the many aspects that has contributed to changes in education was the implementation of a course on information and communication technology (ICTs) on national school programs as well as in the daily lives of ordinary citizens in general. The way the world community is organized and shares a common reality in our present state, conditioned by the Covid-19 pandemic, has reinforced and accelerated the use of the ITCs, not just because it is a must-have competency in any kind of job, but because it is a key tool on the process of teaching/learning (Cabezas-González et al. 2021). Sá & Serpa (2020) point out that in our digital contemporary society, education needs to reinvent itself, something that has become even more pressing after the Covid-19 pandemic. Topics such as training, infrastructures to access the internet, hardware and software, computer literary and strategies to educate and teach students are essential. Therefore, schools are providing a critical contribution to achieve social cohesion and equity, by including the ICTs on their

programs, leading to a sustainable development of the students' digital skills.

Millions of children could have been left behind due to schools shutting down because of schools' closure due to the Covid-19 pandemic. To keep up with their classes, schools had to implement a plan that would be able to work through remote learning. However, many were the children worldwide, particularly children in the poorest households, that did not have access to the internet, nor access to a personal computer, television or radio, aggravating the already existing inequalities present in the school systems (UNICEF. 2020).

In the context of the Portuguese education system, similarly to what happened on a global scale, the aim of a course in ICT was to meet the demands of globalization, which inevitably interfered with the economy and with an information society, information in general and the educational system. The ICTs, regarded as tools which are based within digital technologies, stimulate newness regarding business and economic planning, instil swiftness on task execution, boost new forms of access, disclose and share information and knowledge.

In this context, the youth is asked to perform a competent manipulation and usage of these technologies, both individually and collectively, whereas the school is required more than just teaching the course: its job is to prepare the students so they can be able to learn and intervene in society. Therefore, it is essential that the development of digital competencies, critical thinking, communication skills, as well as the ability to learn during the various stages of life in order to respond to the demands of the modern world, chiefly in terms of constant update of knowledge, regardless of if it is personal or professional.

In this regard, Gómez-Pablos et al. (2020) refer that the teachers must plan the ICTs learning tasks in a way that their students can learn to access information which can be found through different sources (online), so to promote critical thinking which allows them to identify and select reliable information, as well as teaching them how to sort and classify it. Moreover, Casillas-Martín, et al. (2022) stress that in order to achieve efficient educative politics the ICTs must be integrated and promoted in the educational system. It is important to acknowledge the influence of the ITCs as it is a factor that cause impact on different social outcomes.

The ICTs go to school: new social and pedagogical challenges

From an historical point of view, it was thanks to the Industrial Revolution and to the benefits brought by mechanization that highlighted the necessity of deducting time in our daily work. As a result of the emergence of mass entertainment, the industrial society, focused on mass production, evolved into the consumer society. Therefore, consumerism has developed, namely because of technological innovation, leading to new measures and forms of leisure, where new problems can occur.

"Technology has led to the automatization and mechanization of our daily lives, both in fabrics, which had responded efficiently to the acceleration of production of good, and in cities, where the rhythm of life, under fresh new lightbulbs alight with electricity, announced a new age, in which the spectacles of what is new, advertisement, fashion, sophistication and luxury would feed the fugacious appetites of the consumers" (Santaella 2012, p.33).

Levy (1993) said that in each passing minute, new people access the Internet, new computers interconnect, new information is uploaded on the web. The bigger the cyberspace gets, the more universal it becomes.

According to Hernandez (2017), the impact of the ICTs, on our information society has brough big changes. Concerning form and content, the ICTs have had a massive and multiplying effect, since now information goes through society in wider range, with education having one of the widest implications and developments. Hernandez says that "the school is one of the places where technology has had the biggest impact, which in turn has affected the role of the teacher and it has now become part of the school's daily life" (Hernandez 2017, p.341).

Therefore, Assmann (1998, p.29) states that "the pedagogical environment must be both fascinating and inventive. It must not restrain, it must proportionate a dose of enthusiastic coherent hallucination, something that is required in order to make the process of learning an engaging activity". Moreover, Morin (2002) argues that, at school, we must rethink our models of teaching/learning and emphasizes the need to create a model that places the student at the core of the learning activities, especially in virtual learning activities that promote collaborative and participative attitudes, as well as socialization amongst students.

Thus, it easily understandable the importance that the identification and implementation of these dimensions and strategies for the development of these collaborative activities, in order to construct an efficient learning environment (Dias, 2004).

Siemens (2006) also argues that learning is a process that goes through different stages and phases, since it is multifaceted, oriented and determined by tasks (task-bases). The author also strives to clarify and detail this multidimensional and complex character better, diving it into four domains: (1) transmission, in which the students is expected to learn through lectures and courses, (2), emergence, which is focused on reflection and cognition, through which the student acquires and creates or, at least, adopts what they are learning, (3) acquisition, in which the student is expected to define what he need to learn and participate actively in this process, in order to guarantee their motivation and the acquisition of concepts in areas that personally interest them, and (4) increase, in which the students searches for knowledge that can be applied when and where it is objectively necessary.

Most of the changes we experience nowadays were motivates by computers. We can divide computer usage into three different aspects: as a work tool, as a learning tool, as tool that serves to entertain. There is a direct correlation between computer usage for leisure and work purposes, since children and youngsters tend to fuse these two activities and look at computers as toys (Gottschalk, 2019).

By adding ICTs in our education programs, new concerns

arise, as teachers try to understand how this tool can be used to participate in the process of learning-teaching, which makes us believe that the ICTs will be used in our classrooms, as a thinking tool (Jonassen 2007), with the hope that students will become more active in learning by themselves (Papert, 1985).

As García-Valcárcel & Tejedor (2018) argue, group projects are more valuable to teachers that have more experience regarding methodologies that rely on collaborative works. Thus, teachers that are more informed and more experienced working with ICTs have a more favourable opinion concerning collaborative projects as a learning tool. As so, Tejedor et al. (2012) understand that teachers are making an effort in order to use e-learning platforms as a tool but lack professional training with ICTs.

Results of investigations carried out on students' digital skills

There are many studies concerning the digital competencies of students. García-Valcárcel, Basilotta & López (2013) have researched the teachers' perceptions and practices regarding the collaborative methodologies offered by the ICTs. The researchers' study argues about the benefits of having professional training in ICT, from the teachers' point of view, when working in groups during classes, in the Castile and Léon region. The results of this study indicate that in this region the teachers attribute great value to the ICTs, arguing that it improves collaborative work activities between students and helps them gain other side competencies, even though they admit there are difficulties on both sides (students and teachers), on educational levels.

García-Valcárcel & Basilotta (2017) focus on the consolidation of what is learned through projects and its more frequent use at school as a mechanism to develop curricular skills, increase the students' motivation and self-esteem, promote research and collaboration. The researchers used 364 elementary school students to analyse the results of various group projects and to understand if there were any differences on the evaluation of the pupils when different forms and types of projects were done. Regarding the main results, the researchers highlighted that the students' opinion was that the projects developed on the classroom were well-organized, the task were correctly explained, the class was not too big or too small, the teachers were able to give the students the help they needed, the feedback given was relevant and, at the same time, the pupils felt that the work stimulated their interaction with each other, since they worked together on a well-rounded environment. The statistical inference analysis showed there were significant differences regarding the type of project developed, but not regarding its form.

Recently, García-Valcárcel et al. (2019) developed and analysed a questionnaire answered by 600 students, ages 12 to 14. The aim of the questionnaire was to evaluate their knowledge, skills and attitudes on 4 different security competencies identified on the DigComp model (device protection, personal data, health and natural environment). The aforementioned items show adequate levels of specificity and difficult and there were found significant correlation between the students' dimension of knowledge, skill and attitude.

Lastly, Pagán et al (2021) developed a study aimed to evaluate secondary school students' participation on social networks. The aim of the study was to understand how students are accessing and using social networks on their daily lives, and the differences according to genre, origin and disabled students. The results indicate that most of the students use social networks, but immigrants, foreign and disabled students. Students do not just use social networks out of personal interest, but towards the need to affectively socialize with others, emphasizing entertainment, the presence of friends and the need to meet new people. There is no negative perception about its usage that influences, unfavourably, their school tasks, leisure and personal relationships. There are significant changes when looking at how the students believe social networks improve their relationships with their friends. Thus, the researchers identified a less pleasant response from disabled students, while foreign and immigrant students use social networks to meet new people, mostly.

METHODOLOGY

Objectives and questions

The main objectives of this research are:

- To investigate the level of digital competencies of seventh to ninth grade students;

- To determine what the association between age and school year regarding digital competencies, their capacities and knowledge.

Tools used to gather data

Considering our goals with this study, our research relies on descriptive statistics, combining both quantitative and qualitative data. These methods were used in our research's triangulation, as argued by Cronenberg (2020) and Ghiara (2020), for whom the qualitative and qualitative analysis of data builds a methodologic table that fits the research fields associated with education.

On this research, we opted to use a quantitative analysis. This option was used because of the type of results we wanted to obtain (the profile of our sample), our available time (2022's first semester) and the readiness to obtain the data (within the district where the researcher works).

The research was developed in two areas: (i) sociodemographic characterization, and (ii) information and communication capacities, divided into 15 areas presented on tables 1 to 18. When put together, this tables show the INCODIES indicators, which was the basis to elaborate the ECODIES, that was the primary instrument used on this research (García-Valcárcel et al., 2020; Casillas-Martín et al, 2020).

The questionnaire was sent to Viana do Castelo's school clusters, after contacting the headmasters or headmistresses

responsible for these schools, in order to call the attention of the teachers responsible for the seventh to ninth grade classes.

Statistical procedures

All the following calculations were done using IBM's SPSS v.28. The significance level adopted was 5% (α=0.05). The representativeness of the sample was done through absolute (n) and relative (%) frequency. A caracterização da amostra foi efetuada com a frequência absoluta (n) e relativa (%). To verify whether the qualitative variables were independent of each other, we used Pearson's chi-squared test. The options are:

H0: there is no association between the variables, so they are independent;

H1: there is an association between the variables, so they are not independent.

RESULTS

Sociodemographic characterization

The sample is constituted by 810 students, which n=404 (50.1%) are females and n=406 (49.9%) are males: 7th grade: n=262, 32.3%; 8th grade: n=377, 46.6%; 9th grade: n=171, 21.1% (Figure 1), from Viana do Castelo (k=22 schools), but the majority of the students are enrolled in Ponte de Lima school clusters (33.2%), followed by Viana do Castelo (31.4%). Valença is the town less represented in this study (0.1%). In total, n=404 are females e n=406 are males, ages 11 to 19 (Average=13.2, Standard Deviation=0.96).
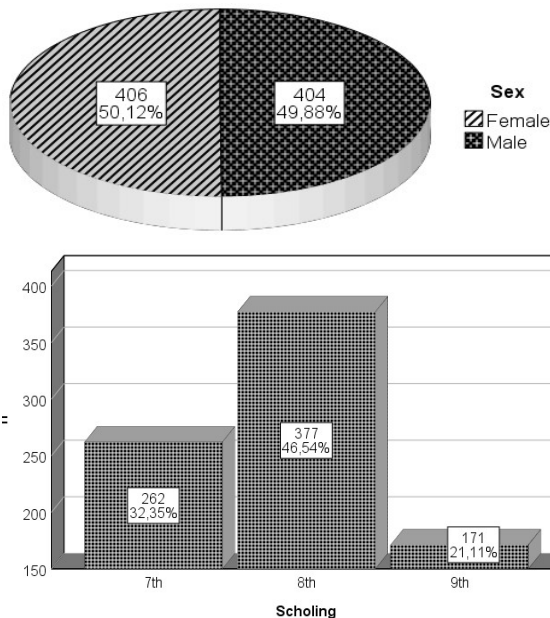
Figure 1. Absolute and relative frequency of the sample: sex and schooling.

Considering their parents' schooling, most of the students referred their fathers (20.6%) and their mothers (24.6%) had completed secondary school, even though a significant amount of the sample admitted they do not know their parents

schooling: father (22.7%) and mother (16.4%). Most fathers are unqualified personnel (24.8%) and most mothers work in domestic service, protection/security and retail (23.3%). Most of the students do not get help at home when working on school projects (53.7%) and most students are reading a book for school project purposes (54.3%).

Knowledge and ability skills in educative technology

Navigation, browsing and filtering information

Table 1 presents the absolute and relative frequency of the students that navigate, search, filter and evaluate the information they find online. Consulting specialized websites (43.2%) and all other options related to the aspects that the students use to evaluate whether the information they found online was useful or not (46.4%) are the most popular responses.

Table 1. How students navigate, browse, filter and rate information on the Internet (absolute and relative frequency).

	n	%
Q1. If I need to work on a school project about the prehistoric ages and I need use the Internet:		
I will only visit Wikipedia, because their articles appear to be very complete.	116	14.3
I will only search for documents, because it seems more trustworthy.	45	5.6
I will only search for information on specialized websites on the topic, while analysing always the sources of such information.	350	43.2
All the above.	299	36.9
Q2. I decide to browse the Internet and I come up with different results. Select the elements you would use to weight on the utility of such information		
Presentation: if the information is clear and well organized.	206	25.4
Relevance: if the information suits my needs.	166	20.5
Contemporaneity: if the information is up to date.	62	7.7
All the above.	376	46.4

Storing and retrieving information

Storing and retrieving information (**Table 2**) is done by most the students on their PC's hard drive, on the cloud, on external disks and on Pen Drives (40.1%), even though that a small minority only works on their PC's hard drive (23.7%).

Table 2. How students store and retrieve information (absolute and relative frequency).

Q3. Where can I store information and files that interest me?	n	%
Computer hard drive.	192	23.7
Cloud.	136	16.8
Pen Drives and hard disk drive.	157	19.4
All the above.	325	40.1

Interacting with each other using new technologies

When students interact with each other using new technologies (**Table 3**), especially when writing text messages,

most are careful with form and content, spelling and grammar (46.8%), even though a big sum write in the same way they speak (45.6%).

Table 3. How students interact with new technologies (absolute and relative frequency).

Q4. When I send text messages using different applications (email, SMS, WhatsApp, chat, blog, etc.), I should:	*n*	*%*
Pay attention to form and content, spelling and grammar.	379	46.8
Always use emojis.	31	3.8
Write in the same way as I speak, so that the other person can understand me better	369	45.6
Write using all caps, so that the other person can read and understand me better.	31	3.8

Sharing information and content with teachers

When sharing information and content with teachers (**Table 4**), by sending a school project via email, most of the students (55.1%) attaches the file to the email, writes in the email address and sends it.

Table 4. Methods students use to share information and content with their teachers (absolute and relative frequency).

Q5. You have just finished a project on a famous artist. Your teacher asked you to send it via email. How would you do it?	*n*	*%*
I would attach my file to the email, write the teacher's email address and send it.	446	55.1
I would write the teacher a message with the content of my project, write the teacher's email address, write the subject of the email and send it	297	36.7
I would copy my project and paste it on the email and send it.	44	5.4
I would copy and paste my project on the area designated for the subject, write the teacher's email address and send it.	23	2.8

Participating on the Internet responsibly

Regarding responsible participation online (**Table 5**), when asking the local library to purchase a book, most students would access the website and fill in the form to request its purchase (54.7%). If it was necessary to report an incident to the City Council, most students (51%) would choose to access the City Council website, where they would look for the "complaints and suggestions" section and fill in the existing form.

Table 5. Methods students use to participate on the Internet responsibly (absolute and relative frequency).

	n	*%*

Q6. I am interested in a book that is not available in my local library and I want to request its addition to the catalogue:		
I will ask the library's security staff.	118	14.6
I am unable to do it, because it is up to the library's staff to decided which books are available.	84	10.4
I will go online and submit a form to ask the library's staff to purchase the book.	443	54.7
I will just wait for it to be purchased.	165	20.4
Q7. At school we are studying the importance of recycling to help the environment and we realised there are not any recycling bins near ours. We decide to submit a complaint to the city council. To do so we:		
Resorted to television to address the problem.	30	3.7
Went straight to the city council and demanded to the mayor to explain him the problem.	194	24.0
Asked the headmaster to buy bins and send the bill to the city council.	173	21.4
Accessed the city council's website and look for a form that allows me to submit a suggestion.	413	51.0

Online collaboration between schoolmates

Regarding online collaboration between schoolmates (**Table 6**) when working on a school project, most students would write and add text on the document itself (53%). To correct a document that was written by another schoolmate, they would look for a key that would allow them to save the alterations (54.1%).

Table 6. Different methods students use to collaborate with each other (absolute and relative frequency).

	n	*%*
Q8. I need to create an online shared document with the rest of my class, since every one of us is expected to collaborate in a final project. How do achieve this?		
I write and add information on the document itself	429	53.0
I print the document and add notes on every point that needs to be improved.	277	34.2
I do it all by myself to save time.	77	9.5
This is not possible to achieve.	27	3.3
Q9. I need correct certain portions of my colleague's document. How can I do this?		
I will look for the key that allows me to register my alterations and then I will select the parts that need to be reworked.	438	54.1
I will select the key that allows me to register my alterations and the program does the rest automatically.	145	17.9
I will do any alteration necessary and then send the document via email.	161	19.9
It is not possible to make alterations on documents that are already written.	66	8.1

Netiquette

Concerning netiquette (**Table 7**), the code of policies of good manners on the Internet, on email usage, most students know that on messages that have multiple email addresses it is needed, before replying, to check if they want to include every person involved in the thread in my response (65.2%); when they receive a text message via WhatsApp that tells them to send it to ten other people to get a free new smartphone, most of them would

search online to check if this information is true, looking for official sources, and would not forward the text unless they know it is not misleading (68.3%).

Table 7. Students' netiquette (absolute and relative frequency).

	n	%
Q10. Regarding email usage.		
My email address is not a personal contact.	71	8.8
It is not needed to write a subject on an email.	121	14.9
It is not needed to greet someone when sending an email neither it is needed to write any sort of farewell.	90	11.1
On messages that have multiple email addresses it is needed, before replying, to check if I want to include every person involved in the thread in my response.	528	65.2
Q11. If I receive a text via WhatsApp that says that if I forward the message to at least ten people, I get the last smartphone available at a certain store my decision is to:		
Immediately forward the text to at least ten close friends in my classroom.	65	8.0
I look at the subject and then search to see if there is any official source that guarantees this information is accurate before I send it to my colleagues.	553	68.3
I will forward the message to ten close friends in my classroom, and then I will verify if the information is accurate. If it is not, then I will swiftly apologize.	60	7.4
Even though I believe this information is false, I will still forward it to see if I can get the prize.	132	16.3

Online identity

Most students manage their online identity (**Table 8**) on the same manner (75.3%), when talking with their friends via social networks or not. Most students understand that negative data concerning them online can have real damaging consequences outside the Internet, both on their daily lives and at school (64.2%).

Table 8. How students manage their online identities (absolute and relative frequency).

	n	%
Q12. My relationship with my friends, whether I am using or not a social network:		
Does not change, since we both share the same interests (music, sports, interesting web pages, video game walkthroughs).	610	75.3
It is different. I can only talk freely with my friends via social networks.	89	11.0
I cannot communicate with my friends using social networks. I can only form real connections with my friends in person.	86	10.6
It is not possible to develop friendships on social networks, because the content that is posted there is fictious.	25	3.1
Q13. Bad behaviour on social networks can result on which of the following consequences?		
My negative reputation online can have consequences both in my daily and in my school life.	520	64.2
There is no consequence, because there is a concrete distinction and a degree of separation between social networks and the real world.	102	12.6
Most people do not care about their reputation.	85	10.5
My negative reputation can lead to negative school grades.	103	12.7

Content creation

Regarding content creation (**Table 9**), most students say that it is not possible to insert a video on a word process (65.4%) and that i tis needed to use a video editor to add subtitles (52.6%).

Table 9. How students create content digitally (absolute and relative frequency)

	n	%
Q14. When using a word processor, which of the following files CANNOT be inserted:		
An image.	96	11.9
A graph.	150	18.5
A video.	530	65.4
A text,	34	4.2
Q15. In my English class, my teacher asked us to make a five-minute video about the human body in English, using subtitles. How can we do this?		
By adding subtitles to my video on my media player.	160	19.8
Record the video using cardboards that function as subtitles.	158	19.5
Record the video and then add subtitles using an editor.	426	52.6
By uploading the video on YouTube and then use the automatic caption.	66	8.1

Adding and reworking digital files

Regarding adding and reworking digital files (**Table 10**) most of the students answered correctly, and most of the pupils responded that it is needed a software that allows them to convert videos into images (33.8%).

Table 10. How students add and rework digital files (absolute and relative frequency).

	n	%
Q16. If I want to obtain an image from a video, what should I do?		
I need to use a software that allows me to convert videos into images. Once the software is working, I can select an image and then create a video from the said image.	206	25.4
I need to use a software that allows me to convert videos into images. Once the software is working, I can select a video and then create an image from the said video.	274	33.8
I need to use a software that allows me to convert videos into images.	218	26.9
It is not possible to extract images from a video.	112	13.8

Copyright and licensing

Regarding copyright and licensing (**Table 11**), when answering what were copyright, most students replied that is the

rights to artistic creations (62.7%). When questioned about the use of books, images and other materials on school projects, most of the students replied that it is also possible to use images, if the source is referenced (55.4%). The open-source software the students are more familiar with is Scratch (37.3%).

Table 11. How well do students work with copyright and licensing (absolute and relative frequency).

	n	%
Q17. What is copyright?		
The rights to artistic creations, such as books, music, paintings, movies, videogames, etc.	508	62.7
When you use an original work, which can be used in many forms, you need to ask for permission to use the rights of said work.	209	25.8
My personal right to reproduce and distribute information.	54	6.7
The rights that belong to authors who use works created by other people.	39	4.8
Q18. When I use a book, an image, or other materials to work on a school project, I:		
Copy entire sentences from the book, to use in my project, without referencing the name of the author.	176	21.7
Copy entire sentences from a web page I found during my research, without referencing my sources.	123	15.2
Use information from a book without referencing neither its author nor its title.	62	7.7
Can use images taken from the Internet and I reference my sources.	449	55.4
Q19. I want to edit an open-source software. Which of the following can I use?		
HTML.	136	16.8
Pytom.	136	16.8
App Inventor.	236	29.1
Scratch.	302	37.3

Data protection/security: devices, personal data protection, mental health and natural environment

Regarding methods to protect their devices (**Table 12**), most students referred that from time to time they use their antivirus to scan their hard drives (59.3%). When creating a new password, most students state that they use a combination of a wide Variety of characters (capital letters, lower case, numbers, symbols, etc.) (69.4%).

Table 12. Methods students use to protect their personal devices (absolute and relative frequency).

	n	%
Q20. When I use my personal computer:		
From time to time, I check my antivirus and my hard drive.	480	59.3
I never check my antivirus.	98	12.1
I do not have an antivirus because it is not needed.	91	11.2
I only use my antivirus when working with external devices, such as Pen Drives, etc.	141	17.4
Q21. If I need to create a password, I:		
Use different and a wide variety of characters (capital letters, lowercases, numbers, symbols, etc.)	562	69.4
Come up with a short word because it will be easier to memorize.	188	23.2
Will only use capital letters.	34	4.2
Will only use letters.	26	3.2

Regarding methods to protect their personal data (**Table 13**), in case a schoolmate finds out their passwords, most students (57.7%) (1) say that there is a chance their schoolmates may try to contact teachers, committing identity theft, (2) will be able read their messages (3) know that their colleagues might change their password, locking them out of their emails. When asked about what would not compromise their identity protection, most students mention posting a comment on a newspaper article they just read (51.6%).

Table 13. Methods students use to protect their personal data (absolute and relative frequency).

	n	%
Q22. If a schoolmate finds out my email password, they could:		
Send emails to my teachers pretending to be me.	78	9.6
Read all my emails.	105	13.0
Change my password and prevent me from reading my emails.	160	19.8
All the above.	467	57.7
Q23. Which of the following would not compromise my personal data protection:		
An image pinned at my doorstep, with my address.	159	19.6
A blog post in which I write my personal phone number.	81	10.0
A photograph of my latest summer vacation.	152	18.8
Posting a comment about a newspaper article I just read.	418	51.6

Considering strategies to preserve their mental health (**Table 14**), and to avoid being victims of online harassment, most students does not trust people they do not know and that are trying to contact them using the Internet (71.1%). Regarding web surfing when searching for information they are interested in, most students answered that they go directly to the source and do not waste time (57.2%).

Table 14. Different strategies students use to protect themselves from being victims of online harassment or when surfing the Internet (absolute and relative frequency).

	n	%
Q24. To avoid being harassed online I:		
Would not trust people I do not know and are trying to contact me.	576	71.1
Do not communicate with people, but in person.	104	12.8
Will not be harassed online, considering the way I am.	87	10.7
Create a fake profile on social networks.	43	5.3
Q25. When I surf the web, search for information that interests me:		
It takes me a long time because I usually find webpages that humour me.	159	19.6
I head straight to the source, to finish my task faster.	463	57.2
I end up reading and watching videos that are unrelated to my search.	73	9.0
Usually, I end up consulting various sources, but I never find what I am looking for.	115	14.2

Regarding the preservation of their natural environment (**Table 15**), most students (65.3%) consider frequently switching their electronic devices has a negative impact on the

environment.

Table 15. How students behave in order to protect the environment (absolute and relative frequency).

Q26. Frequently buying new personal computers, tablets, smartphones, video game consoles, etc.:	*n*	%
Has a negative impact on the environment because it produces waste that is not easy to recycle.	529	65.3
It is necessary to purchase new devices frequently, so that I can use the various new apps that come out.	112	13.8
It does not harm the environment.	57	7.0
There is not direct relation with the environment.	112	13.8

Using technology to solve daily issues

Regarding using technology to solve their daily issues, identifying the need to use electronic devices (**Table 16**), most students communicate with relatives that live faraway with their smartphones (76.9%).

Table 16. Devices students use to communicate with relatives living in a distant location (absolute and relative frequency).

Q27. Which of the following devices would you use to communicate with relatives that live in a distant location?	*n*	%
Tablet.	24	3.0
E-mail.	83	10.2
Smartphone.	623	76.9
Computer.	80	9.9

Innovating using technology

Regarding innovation and the creative usage of technology to work on school projects (**Table 17**), most students answer they would use an online tool to communicate with their classmates (48.3%).

Table 17. The capacity of the students to innovate when using technology (absolute and relative frequency).

Q28. If you had to do a group project for school and the students could not be together in the same room, how would you work?	*n*	%
I would use a software that allows me to edit text and communicate with each other online.	391	48.3
I would use a software that would allow me to edit text and another to edit images.	108	13.3
I would do a slide show presentation using an online software and another software to edit videos.	150	18.5
I would use an online software to prepare a slide show presentation and another software to edit text.	161	19.9

Difficulties

Concerning the students' ability to identify their difficulties (**Table 18**), answering the question "What is Augmented Reality?", their answers were the same, highlighting the answers "Technology that allows us to be part of virtual reality "(31.4%).

Table 18. How students identify their difficulties (absolute and relative frequency).

Q29. What is Augmented Reality?	*n*	%
Technology that allows me to study what I learn at school.	186	23.0
Technology that allows us to augment the size of reality.	149	18.4
Technology that allows us to be part of virtual reality.	254	31.4
Technology that adds virtual information to the reality we live in through a device's camera.	221	27.3

Hit rate

Table 19 presents the hit rate of each question of our research about digital competencies. We highlight the answers to question 12, "relationships with friends whether I am using or not social networks", which shows the highest hit rate (75.3%), while question 27, about using technology to solve daily life problems, "which of the following devices would you use to communicate with relatives that live in a distant location?", registers the lowest hit rate (10.2%). Besides question 27, so do questions 1, 2, 3, 4, 16, 19, 28 and 19 register hit rates inferior to 50%. On average, the hit rate is 53.2%, which shows that students have solid digital capacities.

The coefficient of variation (CV=14.10/53.2*100=26.5%) shows moderate dispersion. Therefore, the number of correct answers is close to average.

Table 19. Absolute and relative frequency of the correct answers for every question on the questionnaire about digital capacities and computer knowledge.

			Correct answers					
Questions	*n*	%	Questions	*n*	%	Questions	*n*	%
Q1	350	43.2	Q11	553	68.3	Q21	562	69.4
Q2	376	46.4	Q12	610	75.3	Q22	467	57.7
Q3	325	40.1	Q13	520	64.2	Q23	418	51.6
Q4	379	46.8	Q14	530	65.4	Q24	576	71.1
Q5	446	55.1	Q15	426	52.6	Q25	463	57.2
Q6	443	54.7	Q16	274	33.8	Q26	529	65.3
Q7	413	51.0	Q17	508	62.7	Q27	83	10.2
Q8	429	53.0	Q18	449	55.4	Q28	391	48.3
Q9	438	54.1	Q19	302	37.3	Q29	221	27.3
Q10	528	65.2	Q20	480	59.3	---	---	---

Note: although it is not presented here, the hit rate concerning the relationship between grade and level of education was the following: 53.1%: seventh grade; 52.6%: eighth grade; 54.4%: ninth grade. Concerning sex, the hit rate was the following: de 57.1%: female; 49.2%: male.

Measure of association

In this section we intend to analyse the relationship/influence between sex and schooling with the variables presented on tables 1 to 18. To do so, we used Pearson's chi-squared test, concerning a level of statistical significance of 5%.

On **Table 20**, we can see that the female sex shows a bigger number of statistic significant associations (p<0,05) with the variables that refer to digital capacities, leading us to conclude these variables are not independent: between sex variables are

marked with an asterisk (*). In other words, sex interferes with these variables. Contrary to this, we can state that sex has no statistic significant relationship with the interacting using new technologies, with sharing content and information, with collaborating online, with adding and reworking, and device protection.

Considering schooling and its relationship with the variables that concern digital capacities, we can only observe a statistic significant relationship (p<0.05) concerning content creation, copyright, device protection and difficulties. With the rest of the variables, this relationship is inexistent.

We also highlight that sex and schooling show a marginally significant relationship (0.05 <p≤0.10) with the variables marked with this symbol: •.

Table 20. Relation between gender and schooling (7th, 8th and 9th grades): the variables presented here concern digital capacities and computer knowledge.

Variables	Gender		Schooling	
	χ^2	p	χ^2	p
Q1	0.133	0.716	0.800	0.670
Q2	44.865	<0.001*	2.449	0.294
Q3	16.229	<0.001*	1.806	0.405
Q4	1.595	0.207	1.068	0.586
Q5	3.665	0.056 •	1.571	0.456
Q6	1.974	0.160	2.852	0.240
Q7	11.373	0.001*	1.502	0.472
Q8	1.595	0.207	2.247	0.325
Q9	2.175	0.140	0.644	0.725
Q10	35.425	<0.001*	0.018	0.991
Q11	7.237	0.007*	4.512	0.105
Q12	25.930	<0.001*	1.391	0.499
Q13	25.363	<0.001*	0.673	0.714
Q14	2.810	0.094 •	0.529	0.768
Q15	14.950	<0.001*	11.451	0.003*
Q16	0.010	0.922	0.178	0.915
Q17	7.129	0.008*	0.702	0.704
Q18	30.319	<0.001*	0.852	0.653
Q19	0.452	0.501	11.834	0.003*
Q20	3.149	0.076 •	5.796	0.055 •
Q21	1.604	0.205	7.744	0.021*
Q22	10.629	0.001*	2.393	0.302
Q23	6.045	0.014*	0.644	0.725
Q24	31.656	<0.001*	0.378	0.828
Q25	0.334	0.563	2.502	0.286
Q26	5.474	0.019*	4.846	0.089 •
Q27	4.951	0.026*	5.180	0.075
Q28	5.727	0.017*	3.560	0.169
Q29	7.387	0.007*	7.772	0.021*

* Reject the "H_0: there is no association between the variables, therefore they are not dependent on each other".
• Marginally significant relationship.

CONCLUSION

In conclusion, considering our results, it is important to meditate on the importance of the ICTs on the youth population. Regarding digital competencies, the students show, in general, average skills, and concerning knowledge and capacity competencies, such as content creation, safety concerns and problem solving, most of them demonstrated they mastered these subjects. The department with which the students are more comfortable with is the one concerning identity and online harassment. Contrary to this are the results shown regarding solving daily life problems through technology and difficulties. Opposite to schooling, sex revels a significant association with the items related to digital capacities, and the female sex had better results overall. Considering the educational system in Portugal, the ICTs are always present at school, on every course, which explains why there was little association between the variables and schooling, susceptible to occur in the Portuguese population (or even in other countries) with similar magnitude. We also understood that most students do not ask their relatives for help with their schoolwork, and, therefore, we conclude that they do not learn about digital capacities within their household.

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