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Realising children's rights in the digital age: The role of digital skills

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Realising children's rights in the digital age: The role of digital skills

Work Package 7 – Deliverable 7.5

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1. Executive summary

"On Instagram I will look whether it is something that a lot of people are following or a news site or something I know. I find TikTok less reliable then, unless it is a real news site, but then I will first check whether it is the real news site." (teenager, Belgium) (24)[1]

"Most kids are very active gaming, socialising and watching videos with their personal smartphones, even though these are not usually considered as learning opportunities by adults. But, of course, they are practising their digital skills when they do that." (education expert, Finland) (12)

As children gain digital literacy and skills, does this help the realisation of their rights?

The EC-funded research network ySKILLS aimed to identify the actors and factors that undermine or promote the wellbeing of children aged 12–17 in a digital age. This report synthesises its findings to inform child rights organisations, advocates and duty bearers, and researchers concerned with child rights. It reviews new evidence from the ySKILLS to determine whether gaining digital literacy facilitates the realisation of children's rights. It also examines the opposite possibility: is there evidence from ySKILLS research that the insufficient realisation of children's rights impedes children in gaining digital literacy?

ySKILLS conceives and measures digital literacy as the combination of digital knowledge and digital skills. Four dimensions of digital literacy are distinguished: technical and operational, information navigation and processing, communication and interaction, and content creation and production. Involving 16 partners from 13 countries, ySKILLS deployed multiple methods (see Appendix 1), including a three-year longitudinal survey complemented by a range of qualitative and quantitative studies.

The findings are mapped onto 11 child rights principles applicable to the digital environment. These principles encompass the full range of articles in the *United Nations Convention on the Rights of the Child* (UNCRC). They were originally formulated by the Digital Futures Commission (https://digitalfuturescommission.org.uk/) and further developed by the ySKILLS project. The principles, in turn, are mapped onto the European regulatory framework, to establish how children's rights and digital literacy have already been substantially incorporated into legislation and policy (see Appendix 3).

In what follows, we highlight the most up-to-date and important findings relating to each of the 11 child rights principles.

1. Equity and diversity

The principle of equity and diversity in relation to the digital environment means that all children, regardless of their characteristics and circumstances, are treated fairly and have equal access to digital products and services, and the opportunity to use them in ways they find meaningful. How do ySKILLS findings relate to this principle? Does gaining digital literacy support children's rights relating to equity and diversity in a digital world?

- ySKILLS findings showed that the main variables that account for higher levels of digital skills were socioeconomic status (SES), gender, age, time spent online, preference for online social interaction,

[1] Numbers 1–28 in brackets throughout refer to Appendix 1.

self-efficacy, personal attitudes towards the internet use, and parental mediation (only on technical skills).

- Put differently, the findings show that young people who are most disadvantaged offline because of lower SES or migration are also more disadvantaged online.

- Gender is a key form of perceived difference and inequality: boys and gender-diverse youths report having greater information skills, while girls report greater communication skills. However, when ySKILLS tested their skills via practical tasks, there was no difference in digital skills between boys and girls.

2. Best interests

The idea of 'best interests' as a primary consideration is fundamental to a child rights framework. It requires a balancing act across the full spectrum of children's rights as well as the rights of others, also taking into consideration the contexts of use. Consequently, ensuring children's best interests includes giving at least equal consideration to children's wellbeing, growth, development and agency as to the interests of other stakeholders including businesses.

- ySKILLS findings confirm that identifying what is in everyone's best interests is difficult. Approaches should acknowledge the diversity of children's circumstances and vulnerabilities. For example, gaining digital skills and literacy increases children's online opportunities, but also the likelihood that children will encounter risky content online, although not necessarily harm.

- What seems beneficial to children can affect rights in other areas. For example, an unintended result from safety efforts is that children have become fearful of and cautious regarding the internet, more aware of the risks than the potential benefits. The best interests of children require a balanced approach.

3. Consultation

Consultation is vital to respect children's voices and experiences in the digital environment. The right to be heard assures children opportunities to 'freely' express their views and have these views given 'due weight' 'in all matters affecting [them]' (UNCRC). This right is crucial to counterbalance social and cultural biases against recognising children's views.

- ySKILLS heard that children are adamant in wanting to be consulted about the digital skills and literacies they want to develop and the ways these should be delivered.

- However, digital skills are not a priority topic in home–school communication; such communication most often takes place in the context of special projects and events, with the initiative coming from school more than parents.

4. Age appropriate

Age-appropriate products and services depend on children's developmental milestones and life circumstances. Innovators and policy makers must consider the role of parents and caregivers, states and businesses in realising children's rights to provision, participation and protection in accordance with the child's evolving capacities and the gradual acquisition of autonomy.

- ySKILLS shows that, on the one hand, children's digital skills improve with age, but on the other, age alone does not guarantee that children will gain skills in all dimensions or that they will master them fully.

- Generally, however, older adolescents have higher digital skills to manage their online presence and they achieve beneficial outcomes in terms of psychological and social wellbeing.

5. Responsible

Responsible digital governance and innovation means policy makers and businesses should keep up with ethical, rights-based and legal frameworks and guidance so that children's digital lives are enabled and empowered by design.

- There is a need for coordinated effort, with responsibility falling on all stakeholders. ySKILLS research shows that not all dimensions of digital skills are developing equally or at the optimal pace. For example, more advanced information, communication and content creation skills require formal educational support.

- The considerable cross-country differences in both the level and development of digital skills and literacy demonstrate the importance of the local context, and the necessity of national actions. More information is needed on the effectiveness of different country models.

- Digital skills and literacy cannot always guarantee children's wellbeing in the digital world, and joint responsibility from various agencies (educational authorities, governments and industry) is needed to ensure children's rights are protected.

6. Participation

Innovating for child participation in a digital world means creating opportunities for children to form opinions, impart and receive diverse information, and freely join social and political activities. Although these are sometimes overlooked or sacrificed for safety reasons, children's civil rights and freedoms are vital for their participation in a digital society, no less than for adults. ySKILLS findings show that:

- Information, news and critical literacies are vital for children's effective participation as young citizens growing up in a digitally mediated democracy. Social media are children's main way of keeping up to date with current events, followed by television and online news sites.

- Civic engagement is more common in children with higher content creation and production skills and greater digital knowledge.

- Children use their skills socially, not only for individual benefit, but also to benefit others – children with high digital skill levels are often asked for advice (and frequently provide advice) to their peers.

- Online participation is not inevitably a positive experience for children, who report a wide range of concerns such as excessive social media use, increasing pressure to be constantly online and the fear of missing out, conflicts with peers such as misunderstandings as well as more severe forms of online aggression such as cyberbullying or hate speech.

7. Privacy

Privacy-respecting policy and innovation starts with strong data protection and privacy legislation, as well as with business models that align with lawfulness, fairness, transparency, data minimisation, purpose and storage limitations. Privacy-by-design manifests through policies and design features that give users meaningful control over the visibility, access and use of personally identifiable data. Privacy also requires legislation and security measures to prevent unauthorised access to data.

- Children with higher levels of digital skills may be better able to protect their privacy online. However, dark patterns can override any level of skill and expose children's vulnerabilities.

- A majority of children report that they know how to adjust their privacy settings online. Identifying commercial content remains a challenge.

8. Safety

Children have the right to be protected online and offline. Safety in digital environments requires policy makers and business innovators to take preventive measures proportionate to the risks, remedies, support and care for victims.

- Vulnerable children seem aware of online risks, and they have developed a variety of coping strategies. Still, finding a way out of difficult situations may be a lonely and uncertain endeavour and require trusted and secure points of contact for help and support.

- Higher levels of digital skills (particularly content creation) are associated with more, not less, exposure to risky and potentially harmful online content, including racist and discriminatory content, self-harm and pro-anorexia content, for example.

- Gaining digital skills means that children know better how to access and find risk online and yet they may be better able to avoid harm by protecting themselves, coping with what they find and/or building digital resilience.

- Better digital skills are not linked to more harm, and may even reduce harm, possibly because children with better digital skills appear better able to cope with online risks.

9. Wellbeing

Wellbeing in relation to the digital environment relies on policy and design choices that enhance a child's life satisfaction. These can include, for example, promoting a balanced lifestyle, emotional regulation and supportive social connections. Good design and practice can also make mental and physical health and other forms of support easily accessible. Understanding the relation between digital literacy and children's wellbeing was the main aim of the ySKILLS project.

- 'Wellbeing' is defined in social research in multiple ways. ySKILLS found it valuable to distinguish the dimensions of cognitive, physical, psychological and social wellbeing. Gaining digital skills may both support and undermine cognitive and social wellbeing, depending on the dimensions of digital skills gained. More obviously, children who used the internet more often had less physical activity. However, children with greater digital skills were also more capable of searching for information related to health online.

- Generally, children who used the internet more reported less physical activity. Excessive gaming was associated with lower linguistic performance accuracy, as shown by fMRI tests. Adolescents who reported using the phone in bed and browsing social media and websites more slept less overall. However, there was also a small association between watching videos and increased relaxation. Interestingly, although time spent online can negatively impact on children's physical and psychological and mental wellbeing, gaining digital skills reduces this negative effect.

- The dimensions of digital skills also make a difference. Children with higher information navigation and processing skills reported better school performance, but children with higher content creation and production skills reported lower school performance. However, those with higher content creation and production skills were subsequently more likely to search for information about health, injury or physical treatment. Finally, children with higher programming skills reported lower life satisfaction, and children with higher communication skills reported higher life satisfaction. Support from friends was higher among children with higher communication and interaction skills.

- Vulnerable groups find digital skills particularly helpful. Young people with internet-related mental health difficulties try to develop ad hoc digital skills to protect their psychological wellbeing. Migrant children develop identity-related skills, which are necessary for their socio-emotional development. For many young refugees, digital skills are vital for self-care and for the caring of others.

10. Development

While the digital environment provides children with opportunities for learning and social, cultural, recreational and playful activities, child development requires resources and designs that offer creative outlets to encourage imagination, educational opportunities of all kinds, resources that recognise and celebrate cultural and linguistic diversity, and an enabling environment for children to thrive in, belong to and pursue the opportunities they choose.

- Children with higher information navigation and processing skills reported better school performance. The individual increase of communication and interaction skills had a positive effect on school performance. The higher a child's academic achievement, the better their digital skills.

- Skills are interdependent: retrieving and assessing the quality and veracity of information are considered as important skills to acquire, but require both digital and other (critical, interpretative) skills.

- There is a need to go beyond operational skills into more social digital skills and the role of digital skills as 'life skills.'

11. Agency

Having agency means children can decide freely how they want to engage with the digital environment. This includes being able to start and stop using digital products and services of their choice easily, without feeling they are losing out, and knowing and getting precisely what they have signed up for, while not being tempted, manipulated or nudged into doing anything that undermines their safety, privacy, development and wellbeing.

- The more complex or opaque the digital environment, the more skilled the user must be if they are not to be deceived or manipulated. The power of platforms is often greater than the capacity of even skilled young people to manage.

- Platform algorithms are often 'out of sync' with and insensitive to the young person's state of mind or ability to cope, leading to experiences of 'triggering'.

- There is growing concern that the digital environment is designed to be risky in ways that prioritise profit over children's rights and best interests. We need to consider new and emerging dimensions of digital literacy including 'data literacy' (Pangrazio & Sefton-Green, 2020; Stoilova et al., 2021) or 'algorithm literacy' (Bucher, 2018; Selwyn, 2022).

2. 10 recommendations to ensure digital literacy supports children's rights

1. Europe's children want to learn about all things digital, but need more guidance, support and education if they are to manage their digital environment as well-rounded citizens now and in the future. This is not only of practical concern but also a matter of realising their human rights.

2. Digital skills and literacy represent both a valued outcome and also the means to the further, even more important, outcome of realising a wide range of children's rights. We observed that digital skills and literacies make a difference to most, if not all, of children's rights in the digital age.

3. Encouraging children to learn for themselves can be powerful. Stakeholders should be supportive of children's own interests, agency and participation, as it might prove more beneficial in the long run than adult guidance, judgement or restriction, however well intentioned.

4. Children's rights are in many ways contingent, contextual and interdependent. Any lack, or inequality, in children's digital skills impedes the full realisation of their rights. Gaining the multiple dimensions of digital skills enables children's realisation of their rights individually and holistically– encompassing their provision, protection and participation rights.

5. To overcome digital inequalities, supporting children's online activities, especially social and creative activities with digitally skilled peers, could build their self-efficacy and, thereby, the digital literacy they need. To this end, highly targeted rather than generic ('open door') efforts are required to counter inequalities.

6. Not all child rights principles are equally represented in research and policy and regulation. The lack of ySKILLS evidence related to the principle of responsibility highlights the difficulty of demonstrating responsible digital governance and innovation related to the promotion of youth digital literacy and the need for a Child Rights Impact Assessment (CRIA).

7. Educators should be supported to develop the capacity to both teach the skills and administer digital tests, so they can assist in assessing and improving student performance.

8. It is insufficient to redress wrongs after the fact when it is feasible to anticipate the opportunities for and risks to children's rights in the policies, provision and design of the digital environment. Hence, we propose a 'by design' approach – to child rights broadly, and digital literacy in particular.

9. Enabling children's digital skills and literacy and overcoming the barriers they face is not only a priority but also an obligation for governments. Educational and policy initiatives ought to be based on accurate reports of a child's digital skills and literacy.

10. There are clearly a host of structural factors that enable and impede children's digital literacy and the opportunities to exercise it, and these must remain high on national and European stakeholders' agendas, in order to realise children's rights in a digital world.

3. The ySKILLS project

The ySKILLS project is funded by the European Union's (EU) Horizon 2020 Research and Innovation programme. It involves 16 partners from 13 countries with the aim to enhance and maximise the long-term positive impact of the information and communication technology (ICT) environment on multiple aspects of wellbeing for children by stimulating resilience through the enhancement of digital skills.

ySKILLS research objectives:

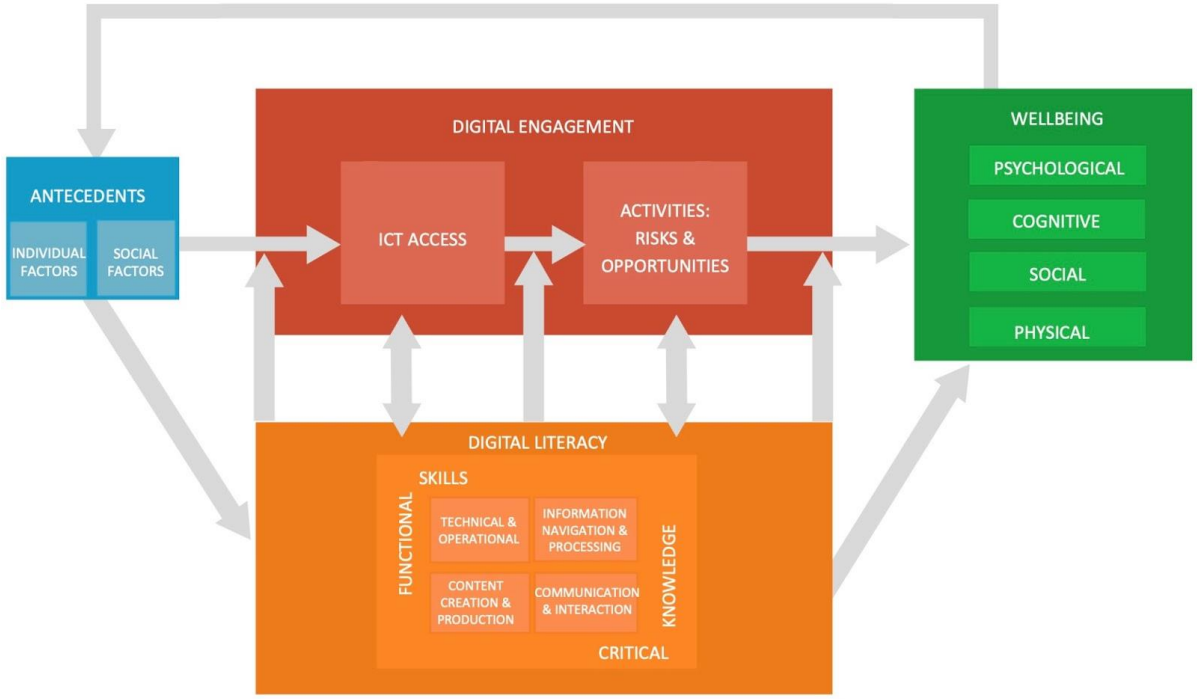
1. To acquire extensive knowledge and better measurement of digital skills.

2. To develop and test an innovative, evidence-based explanatory and foresight model predicting the complex impacts of ICT use and digital skills on children and young people's cognitive, physical, psychological and social wellbeing.

3. To explain how at-risk children and young people (due to their poor mental health, ethnic or cultural origin, socioeconomic status and gender) can benefit from online opportunities despite their risk factors (material, social and psychological).

Starting from the view that children are active agents in their own development, ySKILLS examines how digital skills mediate the risks and opportunities related to ICT use by 12- to 17-year-olds in Europe (see Figure 1 and www.ySKILLS.eu). ySKILLS aimed to identify the actors and factors that undermine or can promote children's wellbeing in a digital age. The relations between ICT use and wellbeing were critically and empirically examined over time.

Figure 1: The ySKILLS theoretical model (see Smahel et al., 2023)



During 2023, ySKILLS has revised and finalised its **theoretical model** (see Figure 1), building on its original proposal, the findings and theoretical work undertaken during 2021–23, and explained in Deliverable 2.3 (Smahel et al., 2023). The key concepts (coloured boxes) and their interrelations (grey arrows) comprise the conceptual domain of investigation for all ySKILLS reports including this one.

4. This report

4.1 Synthesis of results and recommendations for policy and practice

This report concerns the role of digital skills in realising children's rights in the digital age. It represents the final task of Work Package 7. Previous tasks have synthesised the findings of all preceding ySKILLS work packages (see d'Haenens et al., 2023), and then deliberated on these with children and adolescents (see Zaman et al., 2023) to identify, respond to and incorporate their views, priorities and experiences in developing the recommendations for policy and practice (see Ní Bhroin et al., 2023). Following this, ySKILLS researchers then mapped the results and recommendations onto European regulation and policy and relevant legal standards and legislative and regulatory bodies to identify both evidence-based priorities and significant gaps yet to be addressed by relevant stakeholders (see Chatzinikolaou et al., 2023). Each of these tasks and outputs are stand-alone and can be read independently, but jointly they represent the recommendations from all the work of the ySKILLS project.

4.2 Research questions

Does gaining digital skills and literacy matter? This report examines the theory, findings and conclusions of the ySKILLS project in terms of children's rights, since these must now be realised in a digital world. The *UN Convention on Rights of the Child* (UNCRC) (1989) sets out children's rights, and their relation to the digital environment is set out in *General comment No. 25* by the UN Committee on the Rights of the Child (2021). Both centre the child as a rights bearer and actor in their own life, but both are concerned with the actions required by states and other duty bearers to ensure children's rights are respected, protected and fulfilled. In a digital world, youth digital skills and literacy have a vital role to play.

This report asks two main research questions:

1. Is there evidence from ySKILLS research that gaining digital skills and literacy facilitates the realisation of children's rights?
2. Is there evidence from ySKILLS research that the insufficient realisation of children's rights impedes children in gaining digital skills and literacy?

4.3 Who is this report for?

This report has been written primarily for child rights organisations, as well as policy makers, advocates and researchers concerned with child rights. This includes multiple stakeholders working at international, European and national levels, whether their primary focus is (i) children and child rights; (ii) the provision, design or governance of digital technologies; (iii) digital skills, literacies and pedagogy; or any combination thereof.

For any organisation seeking a child rights-respecting approach to the digital environment, decision making must be grounded in evidence – hence the value of mapping ySKILLS research findings regarding children's digital lives onto a child rights framework. The main purpose of reviewing and evaluating the evidence is to identify what is known and what is not known so as to inform research-led priorities for policy and likely levers of change.

Evidence can also provide insights into critical pathways and interdependencies arising as part of the wider effort to support children's rights and wellbeing in relation to the digital environment, including possible unintended consequences of particular policies or practice. Finally, it is important to identify research gaps, to introduce caution when empirical support for a preferred policy is lacking and to focus future research agendas.

4.4 A child rights framework

The UNCRC has been ratified by all states worldwide except the USA (which has, nonetheless, signed the UNCRC). Its substantive articles encompass the full range of children's rights which (see Figure 2), it should be noted, include human rights plus child-specific rights (notably, to information, play, fullest development, care from parents or alternative bodies, and to having their best interests and evolving capacity respected). The four 'general principles' of the UNCRC are: non-discrimination (Article 2), best interests of the child (Article 3(1)), survival and development (Article 6), and respect for children's views (Article 12). Since human rights cannot be ranked, the UNCRC must be understood holistically in the global mandate of states to respect, protect and fulfil children's rights.

Figure 2: The UN Convention on the Rights of the Child (Source: UNICEF)

The UN Committee on the Rights of the Child, the treaty body for the UNCRC, published its authoritative guidance on the implementation of the Convention in relation to the digital environment in 2021 (*General comment No. 25*). This was informed by substantial consultation with experts, states and children around the world, and sets the expectations according to which states will periodically be formally held to account in their reporting obligations to the Committee.

At international, regional and national levels, a host of public and third sector organisations have embraced children's rights as core to their mandate, values and work, and some private sector organisations also assert their support (see for example, UNICEF, 2023; 2019; Eurochild, 2023; European Network of Ombudspersons for Children (ENOC), 2019. At the European level, both the European Union and Council of Europe have dedicated structures and resources to mainstream, implement and promote children's rights across all relevant areas of policy and practice that concern or impact children, directly or indirectly, including in relation to the digital environment (Chatzinikolaou et al., 2023).

Article 24 of the *EU Charter of Fundamental Rights* (EU, 2012) specifically encompasses the rights of the child, stating that:

1. Children shall have the right to such protection and care as is necessary for their wellbeing. They may express their views freely. Such views shall be taken into consideration on matters that concern them in accordance with their age and maturity.

2. In all actions relating to children, whether taken by public authorities or private institutions, the child's best interests must be a primary consideration.

3. Every child shall have the right to maintain on a regular basis a personal relationship and direct contact with both his or her parents, unless that is contrary to his or her interests.

The *EU Strategy on the rights of the child* (EC, 2021a), adopted in 2021, sets out the key actions to be taken by the European Commission and its expectations of member states to protect and promote children's rights. Pillar 5, entitled 'Digital and information society: An EU where children can safely navigate the digital environment, and harness its opportunities', is being enacted by the *New European strategy for a Better Internet for Kids (BIK+)* (EC, 2022a). Relatedly, the Council of Europe's latest *Strategy for the Rights of the Child (2022–27)* (CoE, 2022) includes as one of its six strategic objectives 'Access to and safe use of technologies for all children' – for all its 46 member states.

The importance of digital skills has long been central to these and related policies, including the *Digital agenda for Europe* (EC, 2010) and the EC's *2030 digital compass* (EC, 2021b) that succeeded it. We map these key international and European rights statements, and their relation to digital skills and literacy, in Appendix 3.[2] Nonetheless, it remains to be specified whether, why and how digital skills can support children's rights. Nor is it clear which evidence underpins the importance of digital skills in ways that can guide the policy actions needed.

4.5 The structure of this report

Since ySKILLS has many and diverse findings, and these concern children's rights in multiple ways, this report has been prepared in two formats – a regular report (this document) and an interactive online report. The interactive report is searchable and organised according to groupings of rights and type of evidence. It includes an animation explaining children's rights in the digital age, and the main principles that policy makers and industry should follow to fulfil these rights (see Figure 3).[3]

The primary purpose of this report is to review ySKILLS findings for whether and how they show that gaining digital skills and literacy facilitates or undermines the realisation of children's rights. To map the ySKILLS findings onto children's rights, the report has been organised around 11 child rights principles. In Section 5 we introduce the 11 principles and discuss their development as well as their practical value for stakeholders.

The methodology adopted to prepare this report therefore included (i) translating children's rights into principles for stakeholders; and (ii) mapping ySKILLS evidence onto the principles (see Appendix 2). Working iteratively with ySKILLS researchers to ensure the quality of the analysis, we reviewed all ySKILLS deliverables available at the time of writing. (Further details of ySKILLS findings can be found in Appendix 1, mapped by publication and method. Note that some ySKILLS findings do not directly concern digital skills and literacy, so we used our judgment in deciding which to include.)

The report concludes with suggestions as to how children's rights can be better realised, based on the available evidence. Since evidence is uneven, it may raise new questions even as it answers others, so we also note the limitations and gaps in the evidence base. As will be seen, children's rights are in many ways contingent, contextual and interdependent, including in relation to digital skills and literacy.

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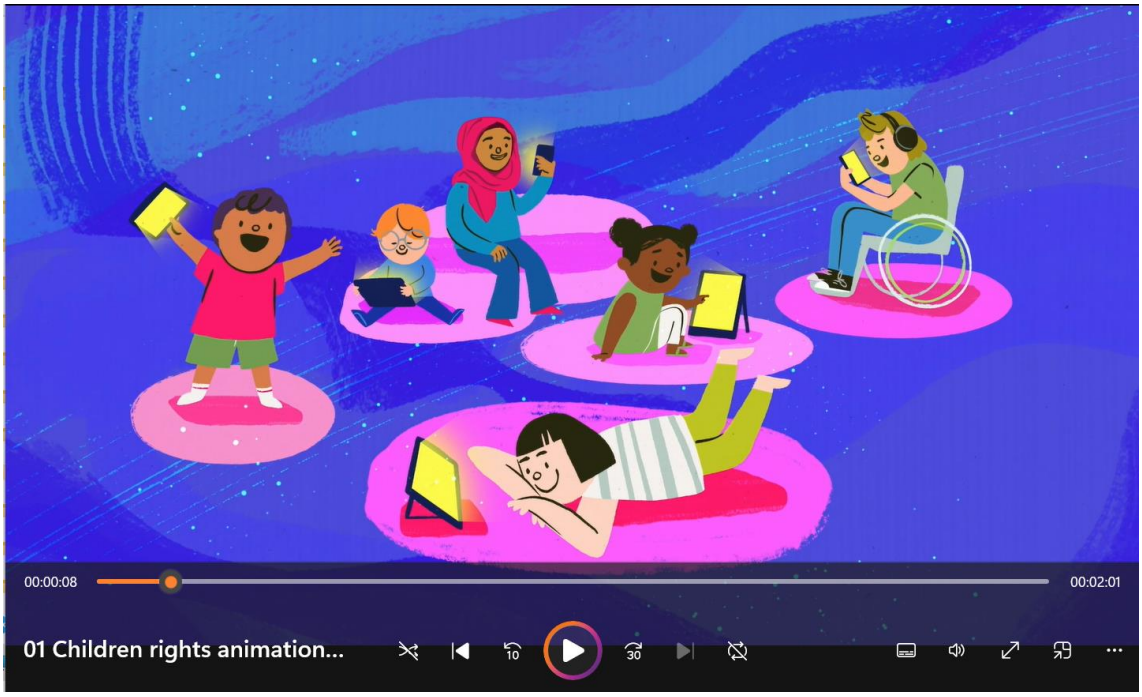
[2] Appendix 3 provides a summary mapping of the following key international and European rights instruments, noting their specific relevance to children, to digital literacy and to human rights: *UN Convention on the Rights of the Child* (UN, 1989), *General comment No. 25 on children's rights in relation to the digital environment* (UN Committee on the Rights of the Child, 2021), *EU Charter of Fundamental Rights* (EU, 2012), *Strategy on the rights of the child* (EC, 2021a), *European strategy for a Better Internet for Kids (BIK+)* (EC, 2022a), and *European Declaration on Digital Rights and Principles* (EC, 2023a).

[3] The London School of Economics and Political Science (LSE) produced this animation for the ySKILLS project in different versions so that it can be easily translated into different languages. The animation can be used and edited under an Attribution-NonCommercial 4.0 International (CC BY-NC 4.0) license. For guidance see here: http://eprints.lse.ac.uk/120375/2/Childrens_Rights_Animation_by_LSE_ySKILLS_Script_translation_instructions.docx

Figure 3: Children's rights in the digital age animation



4.6 Definitions

In this report we use the following terms:

- **Children, young people and youth:** A 'child' is defined as a person under the age of 18, in accordance with Article 1 of the UNCRC. 'Young people' (or 'youth') – defined as 15- to 24-year-olds, following the UNCRC – overlaps with the later stages of childhood and adolescence, and includes the transition to training, further education or employment. ySKILLS specifically includes those aged 12–17.
- **Digital literacy:** Digital skills in combination with digital knowledge comprise digital literacy. Building on the International Telecommunication Union's (ITU, 2018) definition, ySKILLS recognises that digital literacy is both functional and critical, encompassing 'the abilities needed to engage with technology in ways that allow people to shape as well as use digital platforms and environments, building on knowledge about why ICTs do what they do and what the consequences of this for individuals and society might be' (Smahel et al., 2023: 13). ySKILLS distinguishes four dimensions of digital literacy: technical and operational, information navigation and processing, communication and interaction, and content creation and production (see Smahel et al., 2023).
- **Children's rights:** As set out in the UNCRC, children are full human rights holders, and their rights are set out in the 54 articles of the UNCRC (see Figure 3). The obligation to respect, protect and fulfil these rights falls to states who have ratified the UNCRC. The UN Committee on the Rights of the Child holds states to account in this regard.
- **Digital environment:** This is constantly evolving and expanding, encompassing diverse information and communications technologies, and including digital networks, content, services and applications, connected devices and environments, automated systems, algorithms, and so forth (adapted from the UN Committee on the Rights of the Child, 2021, para. 2).
- **By design:** The idea of 'by design' harnesses the generative power of providers, designers and policy makers to shape technological innovation in ways that prioritise values that promote human wellbeing – privacy, safety, security, ethics, equality, inclusion and, encompassing all these, human rights, including children's rights (Livingstone & Pothong, 2021b).

5. Children's rights and digital literacy

"Digital skills are the future and cover a lot of things." (teenager, Portugal) (25)

5.1 Translating children's rights into principles for stakeholders

Recognising the wide range of children's rights to be examined in relation to ySKILLS evidence, it was decided to group these according to the 11 principles developed by the Digital Futures Commission in creating its toolkit for developers and designers of digital products and services used by or likely to impact on children's lives – *Child Rights by Design* (Livingstone & Pothong, 2023).

The issues raised by each principle were interpreted by reference to the relevant paragraphs of *General comment No. 25* (UN Committee on the Rights of the Child, 2021) and discussed by the Digital Futures Commission with children during 20 co-design workshops around the UK in 2022 (Livingstone et al., 2023b). The outcome was an elaboration of how children's rights set requirements for digital products, service design and policy.[4] This was published as a *Child Rights by Design toolkit*, encompassing practical guidance and resources for product managers, developers and designers. In short, the claim is that, if children's rights were embedded 'by design' into digital innovation and product development, as well as policy and practice relating to the digital environment, children's rights would be better respected, protected and fulfilled in the digital world.

In Figure 4, the 11 *Child Rights by Design* principles are described in ways relevant not only to digital providers but also to the intended audience of this report – child rights policy makers and practitioners across public, private and third sector organisations. Thus, in preparing this report, we revised the prior work of the Digital Futures Commission in two respects – first, we amended the description of each principle, and second, we reviewed how each maps onto the articles of the UNCRC. The rationale for these revisions was to recognise that ySKILLS addresses child rights advocates, policy makers and other stakeholders, this including, but also going beyond, the designers of digital products and services who were the target audience of the Digital Futures Commission.

[4] The principles group rights in a similar way to the UN Committee on the Rights of the Child for its reporting requirements for states parties (CRC/C/58/Rev.3), with modifications to highlight issues of particular significance in the digital environment (namely, best interests, right to be heard, privacy, and protection from commercial exploitation).

Figure 4: The 11 Child Rights by Design principles (Source: Digital Futures Commission)

5.2 Mapping child rights principles onto European regulation and policy

Children's rights in relation to digital skills and literacy are directly or indirectly built into European regulation and policy in multiple ways, and the efforts of states and other powerful actors are required to support both children's rights and digital literacies in Europe and beyond (UNICEF, 2019; 2023; Eurochild, 2023; ENOC, 2019). For example, the Position Statement on "Children's Rights in the Digital Environment" of ENOC urges the Council of Europe, European Commission, States and duty bearers to "ensure children have the necessary digital skills and digital learning, including technical, creative and critical assessment skills in recognition of their multiple roles as digital users, creators, developers and leaders" (ENOC, 2019: 5).

Hence, we have mapped key European child rights and digital rights instruments onto the 11 principles (see Appendix 3). These include the EU *Charter of Fundamental Rights* (EU, 2012), the *Strategy on the rights of the child* (EC, 2021a), the *European strategy for a Better Internet for Kids (BIK+)* (EC, 2022a) and the *European Declaration on Digital Rights and Principles* (EC, 2023). The purpose is, first, to make it clear why a child rights approach should be implemented in the European context, especially in EU member states. Although the EU is not a party to the UNCRC, all its member states are, and they have conferred certain competences on the EU to act. Article 24 of the *EU Charter* embeds the commitment to guarantee children's rights. Second, we wanted to document how ySKILLS findings provide a sound evidence base for needed actions by European stakeholders. Further discussion of the legal and regulatory issues that arise is provided in Deliverable 7.4 (see Chatzinikolaou et al., 2023).

This mapping exercise reveals both strengths and gaps in European regulation and policy. Indeed, it is striking how many references to children's rights, including in relation to the digital environment, and their digital skills and literacy can be found in these key instruments. However, provisions related to digital literacy are largely missing from or only addressed marginally even in recent texts dealing with the digital environment, such as the *European Declaration on Digital Rights and Principles* (EC, 2023). The documents that address digital literacy more substantially are *General comment No. 25* (UN Committee on the Rights of the Child, 2021) and the *European strategy for a Better Internet for Kids (BIK+)* (EC, 2022a). When addressed, provisions regarding digital literacy relate most clearly to the principle of 'development'. However, digital literacy can influence and be influenced by the infringement of rights in many domains of children's lives (as we demonstrate later). For example, the principle of equity and diversity encompasses fair access to digital technologies, which matters for digital literacy. Digital literacy can, in turn, influence other child rights, such as wellbeing or participation. This demonstrates the importance of considering children's rights as indivisible and interdependent, as we have reflected in this report. For specific recommendations related to digital skills and literacy in EU legal frameworks, see Chatzinikolaou et al. (2023), and for policy, see Ní Bhroin et al. (2023).

Many of the ySKILLS empirical findings can be categorised according to whether they concern the antecedents or consequences of gaining digital skills in children's lives. For example, as shown in Figure 1, some of the findings relate to whether individual or social factors are antecedents of (and so likely to increase or decrease) digital literacy (conceived as the combination of digital skills and digital knowledge). Other findings relate to whether a gain in digital skills and literacy is associated with (and likely to lead to) an increase in wellbeing. Some pathways are more complex with findings likely to show bi-directional or transactional effects over time: for instance, that better ICT access provides the opportunity to gain greater digital skills while in turn, such digital skills may lead children to seek out better ICT access.

6. Evidence about how digital skills and literacy support children's rights

In the 11 sections that follow, for each child rights principle, we:

- Include quotations from children (who took part in ySKILLS research) to facilitate children's right to be heard (UNCRC, Article 12), especially those in vulnerable or disadvantaged situations.

- Explain how each principle draws on particular articles of the UNCRC, also highlighting key points addressed in *General comment No. 25* (UN Committee on the Rights of the Child, 2021). This text has been adapted from Livingstone and Pothong (2023).

- Review and discuss how ySKILLS findings answer the question of whether digital skills and literacy can facilitate the realisation of children's rights.

- Provide a summary of additional findings from the EU Kids Online's survey of 25,101 children who used the internet, aged 9–16, from 19 European countries, as a baseline against which ySKILLS findings advance knowledge.[5]

6.1 Principle 1: Equity and diversity

Be inclusive, treat everyone fairly and provide for diverse needs and circumstances.

Equity and diversity in relation to the digital environment means that all children, regardless of their characteristics and circumstances, are treated fairly and have equal access to digital products and services, and the opportunity to use them in ways they find meaningful.

The principle of equity and diversity draws together three sets of children's rights:[6]

- Non-discrimination: the right to be treated fairly and not discriminated against.
- Family provision and alternative care: to ensure that parents and caregivers are supported, and that children living in alternative care do not miss out.
- Special protective measures: to make explicit provisions for children with disabilities or those living in disadvantaged, marginalised or vulnerable situations, and empower parents and caregivers to support their children.

Respecting the principle of equity and diversity does not mean that all children should be treated just the same, or that businesses cannot tailor their products to specific user groups. But policy makers and innovators should prioritise fairness by recognising and addressing the diverse needs and expectations of the children likely to use or be impacted by digital products and services and taking active steps to avoid or overcome potential forms of exclusion or discrimination.

"If I don't have a phone, I have nothing." (Afghani teenager, Greece) (26)

"Not everyone has the equipment, internet access, appropriate learning conditions." (policy maker, Poland) (5)

In much of this report, we ask whether ySKILLS evidence shows convincingly that gaining digital skills and literacy enables children to better realise their rights in a digital world. However, following ySKILLS' conceptual framework that distinguishes not only the consequences of gaining skills but also the antecedents of skills development, we begin by recognising that children are unequally positioned in society, and this matters for their digital literacy and, more broadly, the exercise of their rights. The articles brought together under this first principle of equity and diversity encompass a wide array of circumstances of vulnerability and disadvantage, some of which were explicitly addressed by the design of ySKILLS research. There are three groups of factors identified in the survey data that create grounds for

[5] These data were collected between autumn 2017 and summer 2019 by national teams from the EU Kids Online network (Smahel et al., 2020). For details on methodology, see Zlamal et al. (2020).

[6] UNCRC, Articles 2, 9, 10, 18, 20–23, 25, 30, 37–38, 40.

vulnerability: socioeconomic disparities, mental and/or physical health disparities, and academic disparities (d'Haenens et al., 2023).

In short, in ensuring children's right to be treated fairly and not to be discriminated against in a digital world, it is vital to consider the many and diverse forms of disadvantage or marginality that characterise children's lives. Too often, digital skills and literacy policy and initiatives imagine a 'typical' or 'generic' child, failing to provide the particular and necessary supports to ensure that all children benefit not only from equality of opportunity but also equity in outcomes. This is not to say that all children should be steered towards the same outcomes – diversity in culture, context and heritage matters and must be respected – but differences should not become sources of disadvantage, and prior inequalities should not be perpetuated or exacerbated by digital literacy initiatives.

Children and young people encounter many barriers to gaining digital literacy, whether precarious lives, interrupted educational experiences or social exclusion (3). These matter both to individuals and to society. Labour market experts underlined a concern about digital inequalities in shaping future labour opportunities, and they call for attention to overcoming such inequalities as a priority action (12). The ySKILLS systematic evidence review found that **children from higher SES households have greater digital skills** (14). One reason is that when parents have poor digital skills themselves, and do not fully understand what skills their children should have or need, in such circumstances, they may not be able to contribute to the school–home dialogue on what skills should be taught or developed (4). Indeed, **the factors inhibiting school–home communication are strong predictors of digital inequalities** – experts consulted by ySKILLS reported that young people who are most disadvantaged offline because of lower SES or migration are also more disadvantaged online (5).

Non-formal learning initiatives designed precisely to overcome such disadvantages can end up perpetuating them. Coding and robotics workshops delivered by the ySKILLS researchers found that, unless initiatives are specifically tailored for underrepresented groups (including girls, adolescents from lower SES households and those from minority ethnic groups), digital skills workshops held in public libraries, youth clubs and **extra-curricular school activities were mainly attended by upper- or middle-class boys** (7). **To counter inequalities**, **highly targeted** rather than generic ('open door') **digital literacy interventions are required** (8). These efforts must attend to outreach, curriculum design and the informal discourse in non-formal learning settings. During the workshops, ySKILLS researchers observed that the structure of the learning activities, the organisation of the learning environment and **the choices of children themselves all tend to promote individualistic practices where each child works on their own to achieve their personal goals** (8). Targeted interventions should include extra-curricular digital training designed to suit children's interests, and literacy programmes tailored to the needs of vulnerable students, as those programmes that increase students' receptivity to acquiring digital skills are most successful in closing digital divides (21). Such digital skills and literacy initiatives could and should become embedded in the social fabric of the urban environment where children and young people live (7).

Broadly speaking, the ySKILLS systematic review of the literature reveals that, while **children's digital skills improve with age** (14), multiple factors introduce inequalities in the process. This is often measured as a loss of self-efficacy linked to poorer digital skills among children from minority or disadvantaged groups (19). Conversely, improved self-efficacy showed a subsequent positive effect on children's technical and operational skills, information navigation and processing skills, communication and interaction skills, and content creation and production skills (18). Note, however, that self-efficacy rests on the quality of resourcing and support enjoyed by or denied to different groups in society.

The ySKILLS three-wave longitudinal study highlights that **gender is a major factor of difference and inequality**. Boys reported higher perceived technical and operational skills (including programming skills), and information navigation and processing skills, while girls reported higher perceived communication and interaction skills (18). In contradiction to the claims, **performance tests indicate no difference in digital skills between boys and girls** (14). However, claims can matter in themselves, indicating confidence and motivation to learn – boys' greater claims regarding their digital skills, compared with girls, were larger among those children who felt discriminated against (20). Also interesting is that, since students of the same gender tend to be friends, and therefore ask advice of each other regarding digital technology (6),

students' peer relations can consolidate both differences and inequalities in the development of digital skills. Interestingly, the ySKILLS survey found that non-binary youth's digital skills are closer to boys' than girls', although they report greater content creation skills than boys and girls (10).

The ySKILLS survey sought to better understand discrimination, and the extent to which children who report being discriminated against differ from their non-discriminated peers. Children who responded feeling discriminated against 'daily' or 'weekly' were coded as 'discriminated', whereas those who reported 'monthly' or 'never' were marked as 'non-discriminated'. There was a pattern that showed those who were discriminated against had better skills than those who were not, but these results were only statistically significant for programming and content and production skills (11).

The ySKILLS systematic evidence review found that ethnicity is examined by only a handful of studies as a potential source of digital inequality, and with mixed results (14). Secondary analysis of nationally representative survey data from 10,820 children suggests that doing more online, along with self-efficacy, are stronger predictors of digital skills than being part of a discriminated-against group (20). Indeed, there is evidence that young people from such groups may develop greater digital skills, especially programming and content creation (11). On the other hand, children from discriminated-against groups can benefit less from social uses of digital technologies, also gaining less improvement and self-efficacy in digital skills as they grow older, compared to their peers from majority groups (20). It might be concluded that, to overcome digital inequalities, supporting minority children and young people's online activities, especially social and creative activities with digitally skilled peers (6), could build their self-efficacy and, thereby, the digital literacy they need to exercise their rights in a digital world.

Efforts to model the relations among factors to understand digital inclusion suggest that **the online and offline disadvantages that girls and children with lower-level education face can be countered if efforts are made to improve their digital skills**. SES and age are independently associated with outcomes, but again, improving digital stills can mitigate inequalities (14). **The most pressing challenge for educators is to detect children who are at risk of being left behind regarding their digital skills and access to new technologies, and to cater appropriate services and support for them** (4). While structural barriers must be addressed by policy makers (see Ní Bhroin et al., 2023 and Chatzinikolaou et al., 2023), most crucially in relation to SES, gender and sources of discrimination, it is striking that online social interaction was a positive predictor of digital skills, suggesting that children who find it easier to express themselves online may actually benefit from this usage to develop skills relevant to the digital environment they feel more at ease in (19). Adult society tends to denigrate children's social media activities and yet, as evidenced by ySKILLS survey data, a positive association was found between digital skills and online opportunities, information benefits and orientation to technology (16). Encouraging children to learn for themselves can be powerful: supporting children's own interests, agency and participation as they take their first steps in gaining digital literacy might prove more beneficial in the long run than adult guidance, judgement or restriction, however well intentioned.

Additional data

EU Kids Online findings for 9- to 16-year-olds in 19 countries showed that:

- In many respects, children's experiences of the internet are similar by gender. However, of the one in six teenagers who reported receiving unwanted sexual requests online, more girls than boys said this. Similarly, while most teens across the 19 countries (61%) had seen sexual images online, considerably more girls (51%) than boys (26%) reported being upset by what they saw.

- Further analyses of the EU Kids Online survey data show that (perceived) individual and social discrimination affect the relationships of socio-cultural resources (age, gender, preference for online social interaction) and personal resources (self-efficacy) with digital skills (see Mascheroni et al., 2022)

6.2 Principle 2: Best interests

Embed children's best interests in product development, design and policy.

- This principle requires a balancing act across the full spectrum of children's rights as well as the rights of others, also taking into consideration the contexts of use. Consequently, ensuring children's best interests includes giving at least equal consideration to children's wellbeing, growth, development and agency as to businesses' interests.[7]

- The significance of the child's best interests is to ensure the full and effective enjoyment of the rights recognised in the UNCRC and the holistic development of the child. Crucially, policy, business or design decisions will not be in the best interests of children if the outcomes of such decisions conflict with children's rights, viewed holistically. Nor can decisions be reached without consulting children and considering their opinions.

- Making children's best interests 'a primary consideration' in the 'provision, regulation, design, management and use of the digital environment' does not mean innovators cannot profit from their investments. But in the search for suitable compromise, authorities and decision makers must weigh up the rights of all those concerned, bearing in mind that the best interests of the child have high priority and are not just one of several considerations.

"I made a Facebook account to try to contact my family, but I was sadly unsuccessful because they … don't even have internet. I am keeping it in case I can find them one day." (Sudanese teenager, UK) (26)

"With digital skills we are able to use the internet for our benefit and also to protect ourselves." (teenager, Portugal) (25)

While a migrant adolescent may be put at risk from exploitative online contacts, it may also represent their lifeline to their family (26). Such an intense situation illustrates the difficult decisions facing those responsible for such children. *General comment No. 25* observes that, 'The best interest of the child is a dynamic concept that requires an assessment appropriate to the specific context... States parties should ensure that, in all actions regarding the provision, regulation, design, management and use of the digital environment, the best interests of every child is a primary consideration' (UN Committee on the Rights of the Child, 2021). The digital environment increasingly encompasses and provides the infrastructure for most activities in children's and young people's lives – for all society, in fact. This means that it is now vital for the realisation of children's rights, as emphasised by *General comment No. 25*. It also means that the complexities and contingencies that have long shaped children's lives now create not only opportunities but also complications and disagreements in determining what is in children's best interests in a digital world.

As discussed in relation to the principle of equity and diversity, tensions may arise between ensuring equity of outcome without overriding cultural differences or forcing girls and boys into the same digital activities irrespective of different preferences and interests. Another tension arises in the relation between online risks and opportunities, as indicated regarding the EU Kids Online findings (9). These are themselves deepened by ySKILLS findings that **gaining digital skills and literacy increases children's online opportunities**. However, certain dimensions of skills (notably, content creation skills) can also increase the likelihood that **children and young people will encounter risky content online** (12, 13, 17, 19) (see the discussion of the principle of safety, Section 6.8). Indeed, **sophisticated digital skills do not necessarily make for better mental health and wellbeing outcomes, as being skilled internet users can also result in riskier online engagement**, at times breaching young people's abilities to cope (17). As the research with young people facing mental health difficulties further reveals, young people might find themselves in

[7] UNCRC, Article 3(1).

unhelpful communities or problematic online spaces, yet their efforts to leave can be experienced as a betrayal of that community, adding to the isolation of both those who leave and those who relied on their community participation. In short, in such circumstances **identifying what is in everyone's best interests is difficult** (17).

The UN Committee on the Rights of the Child has provided authoritative guidance on enacting Article 3(1) of the UNCRC in the form of *General comment No. 14*, making it clear that consultation with children (see the next principle) is a requirement in making best interests decisions, whether for an individual child or for children collectively. Also, it is a requirement to ground decisions in the best available evidence, as we seek to identify in this report. Ultimately, questions of balance and best interests require a broad view. For instance, ySKILLS research found that children and young people found it easier to discuss negative than positive dimensions of their digital engagement, perhaps due to their exposure to numerous awareness-raising and educational efforts that tend to prioritise online safety initiatives over comprehensive efforts to foster media and digital literacy (13). In this instance, we can recognise that while awareness-raising efforts are well intentioned, **an unintended result is that children have become fearful of and cautious regarding the internet, more aware of the risks than of the potential benefits**. This might make them worried about exploring, experimenting or following their enthusiasms online (Livingstone & Pothong, 2021a).

Translating the Committee's guidance in relation to the digital environment is challenging, given that digital providers do not always know when users are children. Nor is it straightforward to design products and services that treat children according to their particular needs and circumstances, especially without unwarranted collection of personal data that risks children's privacy. This poses a particular challenge for the principle of 'age appropriate' – intended to respect children's evolving capacity. However, **a holistic approach remains a priority if children's best interests are to be respected**. The task for child rights advocates is eased by evidence of positive synergies across children's rights in relation to the digital environment. For example, the findings shows that the breadth of online activities children engage in is a significant predictor of digital skills. Feeling safe on the internet was likewise a positive predictor, and when all other variables are held constant, adolescents who are more invested in online activities or those feeling safe on the internet tend to have better digital skills. In other words, the more children feel safe online, the better knowledge and understanding of the internet they gain, thereby supporting their acquisition of digital skills (19). Hence, **the best interests of children require a balanced approach that enables the development of synergies across children's rights in relation to the digital environment.**

Additional data

EU Kids Online findings for 9- to 16-year-olds in 19 countries showed that:

- The more children that experience online opportunities, the more they also encounter online risks in that country. However, the association is fairly weak, and it seems that in some countries, children enjoy more opportunities without a commensurate increase in risks. Meanwhile, in other countries, the balance is tipped towards the risks without also benefiting from more opportunities.

- In short, national factors (e.g., policies and practices among others) seem to make a difference to the balance of risks and opportunities that the internet affords to children, and there is considerable scope to serve children's best interests better.

6.3 Principle 3: Consultation

Engage and listen to the views of children in product development, design and policy.

- Consultation is vital to respect children's voices and experiences in digital innovation. The right to be heard assures children opportunities to 'freely' express their views and have these views given 'due

weight' 'in all matters affecting [them]'.[8] This right is crucial to counterbalance social and cultural biases against recognising children's views.

- While engaging children in designing and developing digital technologies is an already established design practice, it is often only used for products and services intended for children. Yet many children use products and services not intended for them, and consultation matters here, too.

- To be meaningful and effective, consultation with children should be 'transparent and informative, voluntary, respectful, relevant [to the child], child-friendly, inclusive, supported by training, safe and accountable'. Policy makers and innovators should flexibly use the forms of communication that work best for children, bearing in mind their age (or 'evolving capacities') and circumstances (including digital inclusion or barriers to participation). Crucially, it should include communicating to children how their views 'influence the outcome of the process' in practice.

"We don't want to seem too hard, like school. It has to be enjoyable. Getting together with other peers, with other like-minded souls." (digital skills workshops organiser, Belgium) (8)

Consulting children on matters that affect them – which nowadays definitely includes their digital lives – lies at the heart of Article 12 of the UNCRC. Indeed, from a research and policy-making perspective, it is important for children's right to be heard to consider whether adults are paying enough attention to what the young people have to say, and to seek ways to incorporate their voices actively into research and policy making related to children and young people's engagement with digital technologies (13). This does occur in certain areas of policy making regarding digital literacy – for example, in the Better Internet for Kids Plus programme (EC, 2022a), and the work of the Council of Europe (European Parliament and the Council of Europe, 2005). It is less evident in the European Commission's 'Digital agenda' (European Parliament, 2023), its 'Year of Skills 2023' (EC, 2022b), or until recently, its work on DigComp (Vuorikari et al., 2022).

The ySKILLS research was not primarily focused on ways that digital skills could enable the process of consultation itself, although the research has prioritised consultation with children and other stakeholders in a range of ways. Other research exists on the purpose, value and practice of child consultation (Livingstone et al., 2023b; McNally et al., 2016; Mukherjee & Livingstone, 2020), and could be built on in future research in this field. ySKILLS research did find that **digital skills are not a priority topic in home–school communication; such communication most often takes place in the context of special projects and events, with the initiative coming from school more than parents** (4). This suggests a route to encourage further communication and consultation, recalling the principle of consultation emphasises both listening to children's views and taking them into account in making decisions that affect them.

More positively, ySKILLS consulted children in seven countries (Estonia, Finland, Germany, Italy, Poland, Portugal, and the UK) for the creation of a child-friendly synthesis of the findings and a participatory toolkit. This involved pilot and validation sessions, as well as co-design jams with children aged 14–17 from a diverse range of backgrounds. The practical end result is a publicly available hands-on participatory toolkit (see Zaman et al., 2023) and an educational toolkit available in several languages (see https://sites.google.com/fcsh.unl.pt/yskillseducationtoolkit). In addition, the ySKILLS researchers followed up with young people facing mental health difficulties, during and after the research, consulting them about the findings, the stakeholders who should know of them, and the resulting policy recommendations. The result was a richer set of findings, a more tailored set of recommendations, and their more compelling dissemination (17) (Livingstone & Stoilova, 2023). From the consultation, an online resource for young people about mental health in the digital environment was developed (available in English, Portuguese, Dutch, French, Norwegian, Finnish, Polish, German and Italian).

[8] UNCRC, Article 12.

Additional data

- The EU Kids Online network surveyed 25,101 children across Europe, asking questions about their online experiences and concerns. This contributed substantially to unfolding policy developments in many countries: according to the *Better Internet for Kids policy map* report (O'Neill et al., 2020), **24** of 30 countries say that such evidence has influenced the design of public policies for a better internet for children.

- However, the evidence base must be kept up to date given the pace of technological innovation, and use of the evidence by policy makers is uneven and could be strengthened, notably by now drawing on ySKILLS research to inform further policy and practice.

6.4 Principle 4: Age appropriate

Develop policies and products that are age appropriate by design and consider using age assurance.

Age-appropriate products and services depend on children's developmental milestones and life circumstances. Innovators and policy makers must consider the role of parents and caregivers, states and businesses in realising children's rights to provision, participation and protection in accordance with the child's evolving capacities and the gradual acquisition of autonomy.

This principle draws together three central issues in children's rights:[9]

- The concept of the child's evolving capacities recognises the gradual process through which children acquire greater competencies and understanding, along with the necessary transfer of responsibility for decision making from the parents or caregivers to the child.

- The obligations of the state include providing support and guidance to parents and caregivers so that they can protect their child's rights. In a digital world, parental responsibilities include mediating the use and impact of technologies, and the state – and businesses – play a key role in supporting this.

- When considering the use of age-assurance or age-gating mechanisms, policy makers and product developers must ensure these do not have adverse unintended uses and protect children's privacy and other rights.

"We have an illusion, it seems, that young people are born with a mobile phone in their hands these days and that they automatically possess all the skills needed to handle it, but it is like you are giving a Ferrari to a five-year-old and saying: go ahead and drive." (labour market expert, Finland) (12)

The relationship between digital skills and the principle of an age-appropriate digital environment is easy to discern – as part of children's development we expect them to gradually expand their competence and acquire skills in all areas, including digital skills and literacy. It is easy to envision an environment that fosters such positive development and learning, and allows this to occur at a pace that accommodates the changing needs and capacities of each child. For example, in the UK the Age Appropriate Design Code (2020) identifies 15 standards for services which process personal data and are likely to be accessed by children and takes into account differing ages, capacities and development needs (Information Commissioner's Office, 2023).

In practice, however, this remains hard to achieve in a context where providers do not always know when users are children, and children themselves are diverse and develop at different paces (Livingstone, 2014).

[9] UNCRC, Articles 5, 18.

The findings from the ySKILLS project show, loudly and clearly, that there are further complications arising specifically from the development of digital skills.

The ySKILLS systematic review of the literature reveals that **most of children's digital skills improve with age** (14). Out of 26 reviewed studies focused on this topic, 22 find a positive relation between age and digital skills. The secondary analysis of the EU Kids Online data showed that older children are more likely to use the internet for information, communication and entertainment (9). This means that provided with the necessary opportunities, children will gradually learn digital skills over time. We have already discussed how existing inequalities might prevent some children from having such opportunities. In addition, the findings show that **not all skills improve with age, suggesting that the development of some skills needs additional scaffolding**. The ySKILLS three-wave longitudinal research shows a positive relationship between age and the four digital skills dimensions: technical and operational, information navigation and processing, communication and interaction. The survey also found improvement of children's knowledge (18). While **age contributes to the development of most skills, specialised digital skills such as programming or content creation do not develop at the same pace as children get older**. This demonstrates the need for a learning environment that facilitates the acquisition of the full spectrum of digital skills at different ages, and the need for targeted efforts in areas where some children might fall behind.

Children develop skills when their circumstances present them with opportunities to learn – this is demonstrated by the ySKILLS qualitative case studies. They show that **children develop specific skills to manage the circumstances that they encounter and sometimes they learn in risky situations**. The research with young refugees shows that they develop digital skills through a process of learning by doing, which is linked to the crucial role of digital connectivity in addressing their numerous needs (3). Many refugee children manage to develop high levels of digital skills, particularly in communication and information, which are particularly useful to their lives in a new country (3). Similarly, the research with children and young people with mental health difficulties (17) shows that they develop skills that help them to manage better the effects of their digital engagement on their wellbeing. For example, they learn to trick algorithms into suggesting more positive content, to avoid unhelpful spaces or triggering content, and to find peer support and helpful information online (17). Generally speaking, **older adolescents among vulnerable groups have developed more digital skills**, primarily as a result of the many opportunities they have had to access and use digital media in the past and present, and to learn from more experienced peers (3).

Our findings show that these **skills develop in environments that enable their learning, especially if it concerns specialised skills**. Research on digital skills practices in non-formal learning settings (7) shows that, **if not specifically targeted, learning opportunities are missed**. For example, non-formal learning workshops are attended mostly by primary school children (7- to 11-year-olds), because of the activities offered (e.g., basic programming with Scratch) and because the children's participation is encouraged by their parents. Unless targeted specifically at an older age group, these opportunities to develop specialised skills are missed by older children and young people. This example also speaks to the **crucial role of parental encouragement of age-appropriate activities**.

Parents themselves might need information, support and guidance as **parental mediation may work against children's digital skills development.** The ySKILLS systematic evidence review showed that when parents practise restrictive mediation, this is linked to lower digital skills for their children, while enabling mediation is generally linked to better digital skills, although some studies found no relationship (14). More nuanced findings are offered by the three-wave survey, which shows that **an increase in restrictive mediation causes a decrease in technical and operational skills** (18). This shows that when parents limit the time children spend on the internet and the activities they do online, their children's ability to develop digital skills over time is affected. Understanding what facilitates the development of skills is somewhat more complex as, **perhaps surprisingly, the positive influence of active parental mediation on children's digital skills was small** (19). Also surprisingly, enabling parental mediation did not have a helpful effect in relation to technical and operational skills – these were negatively related to both parental restrictive and enabling mediation (18).

While parents might be best positioned to make decisions about what is age appropriate to their child, **there is a constant need to guide parents in their mediation practices**. Parents need information and support regarding the best situated approaches and tools (Stoilova et al., 2023a), as well as the long-term effects of their (mostly restrictive) practices on children's skills and literacy, which can sometimes go against what was originally intended or desired by the parents. **Such guidance needs to be based on robust research evidence as to what is beneficial for children's development** in the light of existing concerns that the digital tools for parental control or age verification might not fulfil parental expectations for children's safety, and cause unintended loss of online opportunities and digital skills (Stoilova et al., 2023a). The voices of children in such research are paramount, and **ethical guidelines and practices also need to consider children's evolving capacities with regard to age limits when it comes to the requirement of parental consent for participation in research**.

Additional data

EU Kids Online findings for 9- to 16-year-olds in 19 countries showed that:

- Parents have a key role in deciding what is age appropriate for their child. One in three children said their parents 'often' talked to them about their internet use, while another third said this happened 'sometimes', and the last third said their parents 'never or hardly ever' talked about this. Girls and younger children were more likely to say their parents talked to them about going online.
- Two-thirds of children received guidance on internet safety from parents, although fewer (still, over half of children) said their parents encouraged them to explore and learn things online; two-thirds also said their parents helped them when something bothered them online.
- Reported use of parental control technology is lower – one in five children said their parents used these to block or filter some types of content – more younger than older children, with no clear gender differences.
- Parents' views about their child's age of digital independence varied substantially across countries, with parents more relaxed about their child making their own decisions online in some countries than others.
- Parents' views on the usefulness of control tools also varied. Many did not understand why this was necessary (between 14% and 47% in the different countries), would find it difficult to decide what to be permitted (35% to 50%), or did not feel that this would make much of a difference to how the child used apps or online services (39% to 63%).

6.5 Principle 5: Responsible

Comply with legal frameworks, provide remedies as needed and conduct a Child Rights Impact Assessment.

Responsible digital governance and innovation means policy makers and businesses should keep up with ethical, rights-based and legal frameworks and guidance so that children's digital lives are enabled and empowered by design.[10]

The principle of responsibility emphasises that relevant stakeholders (or, in child rights language, 'duty bearers') should:

- Know of and comply with laws, regulations, industry standards and other measures to ensure the realisation of children's rights.

[10] UNCRC, Articles 4, 18, 41–42.

- Provide children with accessible and safe pathways to meaningful remedies if things go wrong.

Navigating the complex legal, regulatory and standards landscape applicable to digital products and services can be daunting. A Child Rights Impact Assessment (CRIA) is a commonly used tool in policy-making processes to be sure of anticipating the likely impact of a product or service on children. It follows eight practical steps, and is now being adapted and applied to the digital environment by a growing number of states and businesses (Mukherjee et al., 2021).

"All young people need digital skills so that they can be active citizens. It means that you really know how to use the systems, how to work with officials and government. But you should also be able to participate in society. Be able to write things or use social media or use other media elements." (industry/labour market expert, Finland) (12)

"We are living in some kind of media-augmented reality where we no longer have the possibility of not using digital skills. Maybe we should call it 'competences of the future' or 'competences of continuous learning' rather than digital." (education expert, Poland) (12)

Various strands of the ySKILLS research demonstrate that **there is a need for coordinated effort, with responsibility falling on all stakeholders** including governments, educational authorities, policy makers, child rights advocates and industry. Not all dimensions of digital skills are developing at the same or at the optimal pace (14, 18), showing the need for organised educational endeavours to scaffold learning. **For more advanced information, communication and content creation skills, formal support such as education is required.** This necessitates collaboration in the areas of policy, education and industry to provide the necessary tools, processes and outcome evaluations ensuring the development of digital literacy of children. **The considerable cross-country differences in both the level and development of digital skills and literacy demonstrate the importance of the local context, and the necessity of national actions** (14). While beyond the scope of this project, more work is needed in the future to establish why certain country contexts are more beneficial, and which factors make for more favourable pathways towards better digital skills and literacy. More evidence is also needed on how coordination among different agencies can best support the development of longer-term beneficial outcomes from digital skills on children's wellbeing, participation, employability and life-long learning.

ySKILLS measured digital skills through both self-assessment (14) and performance testing (22), providing a rounded understanding of children's digital skills and literacy. **As these methods show different strengths and produce different viewpoints on the results, this can be used as a model for measuring the effectiveness of digital literacy interventions** that should be developed further via the collaboration of different agencies. To justify the investment of public and private sector resources in the promotion of children's digital skills, it is vital to conduct independent evaluations so as to learn from what works (and what has not worked). Also vital is greater clarity regarding the outcomes of gaining digital skills that society desires and expects, so that digital initiatives can be judged against these specific outcomes.

Various strands of the ySKILLS research show that **vulnerable children and young people can be highly skilled and yet still experience risks or harm online** (3, 17, 20) (see also d'Haenens et al, 2023). Hence **digital skills and literacy cannot always guarantee children's wellbeing in the digital world, and joint responsibility from various agencies, including industry, is needed to ensure children's rights are protected**. For example, the work with children and young people experiencing mental health difficulties (17) shows the need for a joint effort to prevent the negative effects of algorithms on children's health in ways that integrate technological innovation, regulation, awareness raising and the provision of timely help and remedy.

As the principle of 'responsibility' in a child rights context emphasises, many of these requirements can be actioned by **conducting a CRIA as part of the design of digital literature initiatives and interventions**. **This would ensure relevant child rights expertise is drawn on**, children are duly consulted, and a mechanism is created by which to conduct a holistic analysis of how digital skills may mediate (and later, have mediated) the realisation of children's rights (Mukherjee, et al., 2021).

Additional data

EU Kids Online findings for 9 to 16-year-olds in 19 countries showed that:

- When children had a negative online experience, between 3% (Italy) and 35% (Poland) of children reported the problem online. This may suggest that platforms need to take greater responsibility for children's online safety, and provide more effective child-accessible forms of support and remedy.
- There is considerable scope for platforms to enhance children's online experiences, both by maximising their opportunities and minimising the attendant risks.

6.6 Principle 6: Participation

Enable children's participation, expression and access to information.

Innovating for child participation in a digital world means creating opportunities for children to form opinions, impart and receive diverse information, and freely join social and political activities. Although these are sometimes overlooked or sacrificed for safety reasons, children's civil rights and freedoms are vital for their participation in a digital society, no less than for adults.

The principle of participation draws together multiple rights:[11]

- Freedom of expression, including the right to free speech, opinions and political views: both for themselves and to engage with those of others, subject to the rights of others, national security and public order.
- Freedom of thought: the ability to form one's own opinion, decisions and choice of faith, and have this respected and supported, proportionate to the child's evolving capacities, and not be manipulated, nudged or punished.
- Freedom of association and peaceful assembly: the ability to participate freely and safely in social and political activities, including child-led activism, without surveillance or undue restrictions.
- Information access: meaning that children can both access and contribute to content of all kinds; this should be easy to find, in their native language, from a plurality of sources, and be beneficial in multiple ways; any restrictions should be transparent and in children's best interests.

"I try learning general information and knowing about new things, so I follow channels that give new information and tell stories or narrate religious events." (Syrian teenager, UK) (26)

[11] UNCRC, Articles 7, 8, 13–15, 17.

"A lot of people are making other people aware of problems in the world, for example, the things that happen in China. I used to know nothing, but then they make a video or post of it to explain what is happening there and I think it's very important." (teenager, Belgium) (13)

The principle of participation encompasses children's civil rights and freedoms. In relation to the digital environment, these include access to information and multiple forms of social, cultural, civic or political activities, both online, but also participating in non-digital activities, whether these are local, national or even transnational, insofar as these are facilitated by being able to access and use digital technologies. It is commonly supposed that gaining digital skills will enable children to participate more fully in a digital world.

Online participation is not inevitably a positive experience for children and young people, who report a wide range of concerns such as excessive social media use, increasing pressure to be constantly online and the fear of missing out, conflicts with peers such as misunderstandings, as well as more severe forms of online aggression such as cyberbullying or hate speech (13). Girls were particularly concerned about the potential reputational consequences of the content they shared online (13). Also concerning, children who encounter a negative online experience tend to report more mental health difficulties subsequently (23). Indeed, as examined further in relation to the principles of safety and wellbeing, online participation can expose children to online hate material, seeing explicit images or becoming the victim of cyberbullying, all of which were found to be associated with lower levels of wellbeing (23). The implication is that **gaining the skills to participate online is one thing, but then young people need to gain the skills to cope with the problems they find there**, or society needs to make the digital environment more supportive and less problematic, whether through regulation or other means.

More straightforwardly, the ySKILLS survey found a positive link between technical and operational skills and higher internet use, suggesting that **greater skills enable more online participation (18), although there is also evidence for the converse, namely that greater internet use was linked to greater digital skills and knowledge, with the exception of programming** (11), as discussed further in relation to the principle of development.

Beyond technical and operational skills, other dimensions of digital skills can also facilitate participation – for instance, secondary analysis of the EU Kids Online survey found that **information navigation and processing skills predict online information seeking and communication** (19). Further, the ySKILLS survey found that **civic engagement was more common in children with higher content creation and production skills and greater digital knowledge** (18). Relatedly, children reported that **social media is their main way of keeping up to date with current events, followed by television and online news sites**, even though social media is trusted the least as a source of reliable and credible information (24). This suggests that, in addition to trustworthy and reliable sources of information and news, tailored to their needs and competences, as is their right (UNCRC, Article 17; Howard et al., 2021), **information, news and critical literacies are also vital for children's effective participation as young citizens growing up in a digitally mediated democracy**. Adult observers can be concerned that children gain their civic and news information from social media, yet ySKILLS research shows that in this regard, the children are not without the needed skills to navigate news on social media – participants estimated correctly the credibility of 12 news messages, rejecting false news as not credible, generally recognising genuine news (although some was regarded with excessive scepticism and so judged to be 'fake', and aware of the importance of gaining the skills to make such judgements) (24).

Overall, children reported being able to engage with important things and experience a sense of belongingness through their use of technology (15). They also attach importance to the different types of content they share online (e.g., pictures, video clips), and how this is perceived and received by others (13). However, **while digital skills enable participation, they are far from the only prerequisite for participation but rather, make their contribution, along with other factors**. For instance, sensation seeking, perceived informational digital skills, and both enabling and restrictive parental mediation (broadly indicative of parental engagement) were positively associated with social online activities (9). Intriguingly, **children use their skills socially, not only for individual benefit, but also to benefit others** – notably, socio-centric

network data collected by ySKILLS researchers found that students tend to ask for and seek advice from students with similar proficiency in digital skills; however, children and young people with high digital skill levels are often asked for advice – and frequently provide advice – to peers (6). Such findings point to the **benefits of implementing peer mentoring and peer learning structures and initiatives to capitalise on the personal and social network relevance of digital skills** (21).

We can conclude that, **to facilitate participation in a digital world, gaining multiple dimensions of digital skills is important**. Given that ySKILLS has also documented that self-reported technical and operational skills, as well as communication and interaction skills, are notably higher than either information navigation and processing skills or content creation and production skills, educational and policy initiatives are required (24). In short, **children's communication and creative skills need effective, trustworthy and timely support for them to express themselves and to be heard in the digital world**. This matters not only to individuals but also to society: expert interviews conducted by ySKILLS reported that digital skills that support communication and collaboration are highly prioritised by labour market experts (12), presumably because they enable work-related forms of action and participation. These communication and collaboration skills are easily overlooked in our competitive society, yet they have wide value. Children and young people use a wide variety of digital tools with different audiences and for different purposes, with their choice of applications and online services used for communication purposes varying across countries, and in some cases also by age and gender (13). Such nuance is not a luxury: an interesting finding from the ySKILLS qualitative research is that young refugees are active and engaged communicators, often across different social media platforms, in ways enabled by their digital skills and motivated by their often-difficult circumstances and needs (3).

Additional data

EU Kids Online findings for 9 to 16-year-olds in 19 countries showed that:

- The use of digital devices and the internet are key enablers of children's participation. More than half of the children reported using their smartphones or mobile phones 'daily' or 'almost daily', 'several times a day' or 'all the time' (average = 57%), although this percentage ranged between 39% in Slovakia and 71% in Norway, and was a little greater for girls than boys, and a lot greater for older than younger children. Greater use of smartphones is linked to more communication and entertainment activities.

- Using the internet daily to communicate with friends and families ranged between 14% (Germany) and 77% (Romania), while visiting a social networking site varies between 38% (Spain) and 73% (Serbia), and there were few gender differences. Using the internet to read or watch the news ranged between 9% (Germany) and 39% (Lithuania).

- Around one-third of children (37%) had contact online with someone they had not met face-to-face, thereby extending their circle of contacts. Fewer than half of these led to in-person contact (16% of children overall), and after almost all these experiences, children reported feeling positive or neutral, although 8% (of those who had a face-to-face meeting) reported being upset to some degree.

- Across the countries, most children aged 12–16 scored highly on operational and social skills. Information navigation and processing skills were found to be uneven across countries, and particularly low in Switzerland, Germany, Spain, France and Italy. Countries were also uneven for creative skills, although in most of them, fewer than half of the children said they could edit or make basic changes to online content.

6.7 Principle 7: Privacy

Embed privacy-by-design and data protection in policies and product development and use.

Privacy-respecting policy and innovation starts with strong data protection and privacy legislation, as well as with business models that align with lawfulness, fairness, transparency, data minimisation, purpose and storage limitations. Privacy-by-design manifests through policies and design features that give users meaningful control over the visibility, access and use of personally identifiable data. Privacy also requires legislation and security measures to prevent unauthorised access to data.[12]

The principle of privacy-by-design draws on children's right to the protection of privacy and image, requiring responsible handling of personal data, including:

- Deployment of appropriate security measures to guard against unauthorised access to personal data.
- Compliance with data protection principles of lawfulness, fairness, transparency, data minimisation, accuracy, purpose and storage limitation.
- Respect for children's agency, dignity and safety in the sharing and use of children's data.

Threats to children's right to privacy and data protection in the digital environment manifest in three domains: interpersonal, institutional (e.g., education, health) and commercial (Stoilova et al., 2021). In each domain, specific considerations apply to ensure children's privacy is protected along with their other rights.

"It's almost absurd, I was searching for a computer and I visited an online shop and suddenly I had computer ads everywhere, so they're definitely tracking me." (teenager, Czech Republic) (24)

"On Instagram, I have two accounts. I have a more public account that has more people that I might not be close with. But I also have a private account with, like, 20 people, like, my closest friends. I feel like I can reveal a bit more about myself on my private account." (teenager experiencing mental health difficulties, UK) (17)

In the digital age, the right to privacy is in practice increasingly being managed through data protection regulation, whether or not appropriately. This puts a focus on data-related aspects of privacy, leaving other areas such as physical or psychological integrity, identity building or sexuality to other regulations, not necessarily deriving from the digital environment. Important in this regard is framing the child as a data subject, for which digital skills are needed if children are to access their data subject rights vis-à-vis those organisations that collect, store and share their personal data. Privacy is not simply a matter of having control over one's data, however, and judgement of what is public or private is heavily contextual. At least three contexts are important for children – interpersonal (including family, peers, online publics and strangers), institutional (such as data held by the child's school, doctor or other health provider, or public transport system) and commercial (encompassing a host of businesses – those that are primarily digital such as social media companies or search engines and also those that operate in digital contexts – banks, shops, entertainment providers, advertisers, insurers, data brokers, and more). This results in a highly complex and often opaque set of contexts within which children's rights to privacy may be respected or

[12] UNCRC, Article 16.

infringed. It also implies the need for a demanding set of digital skills and literacies if children are to play an active role in exercising and defending their right to privacy (Stoilova et al., 2021).

The findings from ySKILLS research show that **children with higher levels of digital skills may be better able to protect their privacy online** (14). The qualitative research shows how children value the skills to manage their privacy online – for instance, a number of refugee children and young people reported that they have ensured their settings are private, blocked individuals and/or adjusted their practices to avoid harmful content (26). Relatedly, children and young people experiencing mental health difficulties reported both heightened attention to online privacy, but also a host of challenges when their privacy was infringed (17).

Overall findings from the survey show that **a majority of children (83%; N=6,022) report that they know how to adjust their privacy settings online**, and nearly as many have used them (for instance, 78% limit how many people can see their social media profile) (d'Haenens et al., 2023). The ySKILLS performance tests broadly confirmed these encouraging findings, showing, for example, that, when asked which of four posts was not okay to share with others without asking for permission first, 73% of children selected the right post. However, the report observes that one-third of the participating children and young people 'do not consider blocking an unknown person who's sending nasty comments' and most 'do not have the skills to choose the right settings in an online meeting or to send a message appropriate to the situation' (22:32).

Notably, the ySKILLS research prioritised skills to manage interpersonal privacy. Further research is needed to understand children's capacity to manage how their data are processed by institutions and businesses, insofar as such management is made possible for users by the digital design of these organisations, although the qualitative studies did reveal that children and young people are often aware that platforms track their behaviour, and that the content they get presented with is based on this tracking (17, 24, 26). Further analysis of ySKILLS findings is also needed to understand the role that digital skills (including, but not limited to, skills specifically relating to privacy) may play in improving children's privacy online.

Additional data

EU Kids Online findings for 9- to 16-year-olds in 19 countries showed that:

- One in five children said their parents had published something online about them without asking them first.
- Across countries, an average of 7% of children said someone had used their password to access their information or pretended to be them, 7% said somebody had used their personal information in a way they didn't like, and 5% said someone had found out had where they were because they had tracked their phone or device.
- Fifteen per cent of children said their parents used technology to track their location – more younger than older children, with no clear gender differences.
- Four in five children aged 12–16 said they knew how to change their privacy settings, and even more said they knew which information they should and shouldn't share online and how to remove people from their contact lists.

6.8 Principle 8: Safety

Embed safety-by-design in policies and product development and use.

Safety in digital environments requires policy makers and business innovators to take preventive measures proportionate to the risks, remedies, support and care for victims. The principle of safety draws together three sets of children's rights:[13]

- Protection against abuse and neglect: considering how digital technologies can be abused to facilitate violence and harm against children or to recruit children for extremist, terrorist or other violent activities.
- Special protection against sexual exploitation and sexual abuse: including the use of digital technologies 'to solicit children for sexual purposes and to participate in online child sexual abuse'.
- Promotion of physical and psychological recovery and social reintegration of child victims: within an environment that encourages good 'health, self-respect and dignity of the child'.

In the digital environment, risks of harm to children manifest in various forms and can be classified according to the 4Cs of content, contact, conduct and contract risks (Livingstone & Stoilova, 2021). The protection of children requires a risk assessment to determine the measures needed; it should not normally come at the cost of children's full enjoyment of the digital environment and other rights.

"To have digital skills means knowing how to stay safe on the internet, not visiting unsafe websites or sharing personal information with strangers as it is dangerous to surf the internet without security." (teenager, Portugal) (13)

"Playing video games online can be dangerous because you could be playing with people who are lying to you, they can be friendly online but try to meet you and kidnap you in real life." (Syrian teenager, UK) (26)

European efforts at e-safety education and awareness raising over recent years mean that children are increasingly aware, even hyperaware, of online risks, although this may not be sufficient to protect them against all risks. A children's rights framework emphasises the responsibility of society – especially governments and other duty bearers including industry – to protect children from abuse, including sexual abuse, in digital (and non-digital) contexts. This includes ensuring children's safety in the face of all 4Cs of online risk of harm (content, contact, conduct and contract) (Livingstone & Stoilova, 2021; Stoilova et al., 2023b). One way that society exercises this responsibility is by promoting children's digital skills. This strategy is required because the risks children face online may be extreme or overwhelming, and hence it is inappropriate to expect children to develop the digital skills to deal with them (or for their teachers to teach them to). For this reason, efforts to regulate online risks and safety measures are vital in ways that should complement digital literacy, never expecting digital literacy to substitute for failures of policy or regulation (see Chatzinikolaou et al., 2023). In short, digital literacy policies are important, but cannot be the silver bullet to all online safety problems.

Does gaining digital skills and literacy protect children from online risks? ySKILLS qualitative research found that **most young refugees were aware of online risks, and they have developed a variety of coping strategies** (3). Similar findings arose from research with children and young people with mental health difficulties, although they often felt alone in having to manage their safety online and, since they encountered extreme content, contact, conduct and contract risks, these could be highly challenging, even

[13] UNCRC, Articles 11, 19, 34, 35, 37, 38, 39, 40.

overwhelming (17). Indeed**, finding a way out of difficult situations may be a lonely endeavour**, as interview findings reveal that children rarely sought help or advice when they were in trouble. This was due to do with feeling shame and guilt for engaging in risky behaviour, fearing that adults would not understand and could not be trusted, or being afraid of the consequences (17).

Even assuming a better regulated digital context in the future, supporting children to gain digital skills requires nuance. Survey findings show that **higher levels of digital skills are associated with more, not less, exposure to risky and potentially harmful online content, including racist and discriminatory content, self-harm and pro-anorexia content, for example** (23). Moreover, gaining digital skills increases the likelihood that children with emotional problems in particular encounter risky content online (19). However, **the association between better digital skills and more online risk is shown by longitudinal studies in the evidence review to be indirect, as better skills are linked to more online opportunities, and those, in turn, are linked to more risk** (14, 16). The link from risk to harm remains complex, however: **gaining digital skills means that children know better how to access and find risk online and yet they may be better able to avoid harm by protecting themselves, coping with what they find and/or building digital resilience** (23). The evidence also suggests that the type of skills matters: critical digital skills, for instance, are not linked to online risk. Moreover, **better digital skills are not linked to more harm, and may even reduce harm, possibly because children with better digital skills appear better able to cope with online risks** (14).

In short, it appears that increasing digital skills among young people brings the opportunities widely hoped for, but because the digital environment itself inextricably links opportunities and risks, children's skills and opportunities can end up leaving them unsafe. For instance, although the qualitative research found that children's **digital journeys are linked to fluctuations in mental health, they also contribute to the development of resilience** (17). Again, the survey findings suggest that the different dimensions of digital skills can play different roles. On the one hand, not being upset from unintended exposure to cyberhate content was linked to lower technical and operational skills, information navigation and processing skills, and programming skills (18). On the other hand, being upset after intended exposure to sexual content was lower for children with higher communication and interaction skills, technical and operational skills, or content creation and production skills (18). But when it comes to assessing emotional impact, the limitations of the three-wave survey advise caution as effect sizes were small.

Greater digital skills allow for more effective coping strategies that protect against harm to wellbeing (23). Digital skills were positively linked to coping behaviours online (such as privacy behaviour, deleting unwelcome messages and blocking senders). More digitally literate children were more likely to delete messages and block senders when experiencing cyberbullying or unwelcome sexting (16). Children with fewer skills were more upset and less able to cope with sexual images and cyberbullying (16). Longitudinal research with ySKILLS survey data shows that young people's digital skills protect against negative effects that intensive Internet use has their psychological and physical wellbeing (28). Children and young people with mental health difficulties are developing particular digital skills that encompass technical, informational, communication and creation skills – such as identifying a callous algorithm, recognising extreme spaces or dangerous people, or knowing how to game the system to make a feed more positive or locate 'safe' spaces (17). Digitally literate children are not better at avoiding negative online experiences than children with rather limited digital skills, but they possess certain skills that allow them to avoid feelings of harm as a result of an online risk experience (23)

The specific skills needed by more vulnerable children (cf. UNCRC, Article 39) have received little research, policy or pedagogical attention, to the best of our knowledge. Different dimensions of digital skills may play different roles – for instance, greater content creation and production skills increased the chance of children's exposure of harmful content, while greater informational and navigational skills were linked with lower chances of cyberhate exposure (18).

Children from families with higher family support reported higher communication and interaction skills, which suggests that good family support is positive for communication skills more broadly (18). For instance, in Belgium and Italy parents actively encouraged their children to participate in programming workshops (8). The fact that these children were accompanied by their parents suggests parental interest

in their children's digital education, and their adherence to the normative understanding of programming skills as a gateway to the labour market.

While the popular discourse of parental mediation appears to exhort parents to control, restrict or ban children's digital activities, ySKILLS research also finds that **enabling parental mediation positively predicts children's engagement in informational and social activities while restrictive mediation negatively predicts social and entertainment activities** (9). In the ySKILLS longitudinal research (18), **there was a negative effect for restrictive parental mediation on technical and operational skills**. In other words, the individual increase of parental restrictive mediation lowered children's technical and operational skills. It could be that if parents are actively helping their children, they prevent them from developing technical digital skills, and thus their presence serves as a barrier to children's autonomous learning.

Additional data

EU Kids Online findings for 9- to 16-year-olds in 19 countries showed that:

- Ten per cent of children reported 'never' feeling safe online, while 28% said they 'always' felt safe, and for most children, going online was 'sometimes' or 'often' safe, but not always. Boys were more likely to feel safe than girls, as were older children. Asked whether they found people online to be kind and helpful, results were similarly mixed, and varied considerably by country.

- Between 7% (Slovakia) and 45% (Malta) of children said 'Yes' when asked, 'In the PAST YEAR, has anything EVER happened online that bothered or upset you in some way (e.g., made you feel upset, uncomfortable, scared or that you shouldn't have seen it)?' More older than younger children said 'Yes', and more girls than boys in some countries.

- These percentages are lower than the percentage of children who reported online risks, implying that not all risk results in harm, as children report it. However, these percentages have substantially increased since the previous EU Kids Online survey in 2010. Older children reported more such negative online experiences than younger children, with few gender differences.

- Two-thirds told a friend or parent, although around one in five told no one what had happened, and few told a teacher or professional whose job it is to help children.

- In most countries, the most common risk children reported was exposure to hate messages – from 4% (Germany) to 48% (Poland). Next most often reported was exposure to gory or violent images or to content showing ways to be very thin or to self-harm. Around one in ten reported being a victim of online bullying, and twice that had been a victim of aggression altogether (on or offline). Girls reported finding online bullying more upsetting than boys.

6.9 Principle 9: Wellbeing

Enhance and do not harm the health and wellbeing of all children, including through the use of inclusive design.

Wellbeing in relation to the digital environment relies on policy and design choices that enhance a child's life satisfaction. These can include, for example, promoting a balanced lifestyle, emotional regulation and supportive social connections. Good design and practice can also make mental and physical health and other forms of support easily accessible.

The principle of wellbeing draws together several children's rights, including:[14]

[14] UNCRC, Articles 6, 7, 9, 10, 20, 21, 22, 23, 24, 25, 26, 27, 33, 39.

- Life, survival and development.
- Recognition of the specific requirements of children with disabilities and their entitlement to special care and assistance.
- Enabling children to access 'the highest attainable standard' of health, including services, treatments and rehabilitation.
- Adequate standard of living and material assistance to support wellbeing.
- Protection from substance abuse and forms of addiction.

Digital innovation and policy that promotes children's wellbeing encompasses diverse products and services, including games, social media and video streaming platforms. To promote children's wellbeing, it is important to encourage a healthy and balanced lifestyle rather than feeding compulsions, unhealthy habits or harmful experiences.

"On Twitter sometimes there are feeds trending or threads trending on my feed where it's like ways to cope. And I have got a bunch of those added to my bookmarks so that I can go to them quickly." (teenager experiencing mental health difficulties, UK) (17)

In framing the 11 principles of children's rights in the digital environment, the principle of wellbeing centres on both broad wellbeing (vital for the right to life, survival and development) as well as specific requirements for children's physical and mental health, including sufficient standard of living, attention to threats to health (e.g., addiction) and specific assistance for children with specific educational needs and disabilities.

The ySKILLS framework recognises that wellbeing is defined in social research in multiple ways, and there is value in **distinguishing the dimensions of cognitive, physical, psychological and social wellbeing**, given that children's wellbeing represents the main outcome of the ySKILLS model.

For cognitive wellbeing, the ySKILLS analysis of the EU Kids Online survey found that **children with higher information navigation and processing skills reported better school performance**, but children with higher content creation and production skills reported lower school performance (27).

For physical wellbeing, **children who used the internet more reported less physical activity** (27). Further, adolescents who reported **higher use of their phone in bed to browse social media slept less overall** (15). There was also a small association between **watching videos and increased relaxation** (15). Those **with higher content creation and production skills were subsequently more likely to search for information about health, injury or physical treatmen**t (18).

The longitudinal ySKILLS research shows that relationships between digital skills and wellbeing are overall very weak. Still, there is evidence that **digital skills reduce the negative long-term effect of time spent online on young people's physical and psychological wellbeing** (28).

When it comes to psychological wellbeing, quantitative studies found that frequent social media use was linked with feelings of loneliness, while listening to music was associated with boredom, loneliness and frustration (15). Intriguingly, children with **higher programming skills reported lower life satisfaction**, and children with **higher communication skills reported higher life satisfaction** (18). Meanwhile, **excessive gaming was associated with lower performance accuracy**, although the direction of causation could not be determined (1).

The qualitative research tells a more nuanced story. **Young people with internet-related mental health difficulties try to develop ad hoc digital skills to protect their psychological wellbeing**, avoiding being exposed to extreme content and locating safe spaces and contacts where they can receive important social

support; however, they do not always manage to gain the needed skills, or put them into practice, especially when faced with dark patterns or risky designs that can overwhelm vulnerable children and young people (17). Also, **migrant children develop identity-related skills, which are necessary for their socio-emotional development** (i.e., to gain social validation, social control and achieve self-awareness) and communication skills that help them keep in touch with their diasporic families and networks. **For many young refugees, digital skills are vital for self-care and for the caring of others** (3).

With regard to social wellbeing, ySKILLS findings show that **communicating with friends** was increased for those who had gained higher technical and operational skills, communication and interaction skills and content creation skills, but decreased by higher information and programming skills. Interestingly, **support from friends was higher among children with higher communication and interaction skills** (18) – and children with higher digital skills are more often asked for advice and frequently provide advice to peers (6).

Overall, the ySKILLS findings suggest that **gaining digital skills may both support and undermine both cognitive and social wellbeing, depending on the dimensions of digital skills gained**. More obviously, an increase in internet use correlated with a decrease in physical activity. However, children with greater digital skills were also more capable of searching for information related to health online.

Finally, for psychological wellbeing, the results are nuanced, and need further exploration to determine causal direction. When online, young people develop the digital skills they need for their psychological wellbeing. ySKILLS research indicates that **more time online means lower (physical and psychological) wellbeing, but digital skills reduce this negative impact** (28).

As discussed in Smahel et al. (2023), improving children's wellbeing is an ambitious aim and yet may be insufficient, from a children's rights perspective. Lundy (2020) observes that improving children's wellbeing is not necessarily linked to improving their civil rights and freedoms in a digital world. Children can be comfortable and happy and yet not fully realise their rights in a digital world. It is equally possible that many children's rights can be realised yet their wellbeing be poor.

Additional data

EU Kids Online findings for 9- to 16-year-olds in 19 countries showed that:

- Between 2% (Germany and Slovakia) and 19% (Poland) of children reported seeing self-harm content (related to physically harming or hurting themselves). Sporadic exposure (i.e., a few times a year) was more common, experienced by 11% (Germany) to 37% (Russia) of children. In most countries there were almost none or very low gender differences in exposure to this type of content.

- Even higher numbers reported seeing content related to eating disorders (e.g., ways to be very thin, such as being anorexic or bulimic, or thinspiration). Between 3% (Germany) and 32% (Poland) saw such content at least every month or more often. Girls were more likely to see such content in eight out of the 18 countries that collected data on this.

- On average, 4% of children aged 12–16 reported going without eating or sleeping because of the internet; 10% were bothered when they were not online; 13% spent less time with family or friends or doing homework because they were online; 11% said that they continued using the internet when they were no longer interested, and 10% had unsuccessfully tried to spend less time online.

- Being online, however, can be a positive and freeing experience. Over one-quarter of children (29%) – ranging between 19% (Poland) and 38% (Romania) – said they 'often' or 'always' found it easier to be themselves online than offline, and a further third (32%) said they experienced this 'sometimes.' In all, most children recognised this experience, with slightly more boys finding the internet a conducive place to be themselves online.

- One in five children said they talked about different things online than when speaking to people face-to-face and, 11% said they talked about personal things online that they did not talk about with people face-to-face.

6.10 Principle 10: Development

Enable children's learning, free play, sociability and belonging, and their fullest development.

While the digital environment provides children with opportunities for learning and social, cultural, recreational and playful activities, child development requires resources and designs that offer creative outlets to encourage imagination, educational opportunities of all kinds, resources that recognise and celebrate cultural and linguistic diversity, and an enabling environment for children to thrive in, belong to and pursue the opportunities they choose.

The principle of development draws together three sets of children's rights:[15]

- Education: making education (formal, non-formal and informal) accessible and affordable to children of all ages and circumstances to enable learning and, more ambitiously, children's fullest development.
- Culture: enabling children to enjoy their own cultures and that of others and allowing children to 'profess or practise' their religion and speak their native language.
- Play, leisure and artistic activities: the right to play, recreational activities and rest.

While adults have the power to provide these opportunities, too often these are insufficient, inappropriate or restricted from children's points of view. Society is often ambivalent about the role of digital technologies in children's development, being unclear which digital activities bring benefits or harms. Public, private and third sector actors all have a crucial role to play in building a digital world in which children can fully develop.

"In Mali I did not have a mobile phone. I left Mali and went to Gabon, where I got a cell phone and it helped me a lot to be able to communicate in French, I watched videos to learn French and English, on YouTube and Google Translate." (Mali teenager, UK) (26)

The level of skill achievement relies, in fact, on the children themselves, whether they engage with all this digital stuff in their private lives and whether they are interested in it." (education expert, Finland) (12)

Under the principle of development, we have grouped a number of key outcomes for children that centrally concern their rights. These concern the right to education (UNCRC, Article 28) which, in the present context, includes both the right to education about the digital environment (i.e., digital skills as a valuable outcome in their own right) as well as gaining digital skills as a means to an end (i.e., by facilitating access to e-learning resources and other opportunities to learn). Children's fullest development (UNCRC, Articles 6, 29) is also linked to children's cultural, creative and recreational rights (UNCRC, Articles 30, 31). So, does gaining digital skills enable children to better realise these rights?

Many of the ySKILLS longitudinal survey findings across six European countries help answer this question. Moreover, they add clarity to prior research by distinguishing particular outcomes related to the different dimensions of digital skills. For instance, **content creation and production skills were positively predicted by number of daily online activities and higher internet use** (18). Further, higher engagement online

[15] UNCRC, Articles 6, 28, 29, 30, 31.

positively impacted the information navigation and processing skills, and communication and interaction skills (18). Indeed, ySKILLS results **generally confirm that children who engage in more online activities seemed to develop more digital skills and literacy** (19).

While **multiple dimensions of digital skills are important, they develop unevenly, and they have differential outcomes**. The ySKILLS evidence review found that, while gaining technical skills was linked with mixed or even negative outcomes, information skills were linked with positive outcomes (16). The three-wave longitudinal study confirmed that higher content creation and production skills increased the creation and editing of digital content (18). However, the multiple dimensions of digital skills are not all equally valued. Although they pay less attention to creation and participation, experts generally underline that **there is a need to go beyond operational skills into more social digital skills and the role of digital skills as 'life skills.'** Further, labour market experts emphasised the close connection between digital and non-digital skills, arguing for their integration into a broader concept of skills (12). For instance, **retrieving and assessing the quality and veracity of information are considered as important skills to acquire (13) and arguably, they require both digital and other (critical, interpretative) skills**.

Children with positive attitudes towards ICT have higher digital skills (14) and relatedly, research finds a positive association between digital skills and online opportunities, information benefits and orientation to technology (16). This suggests that **children and young people need appropriate and meaningful external support, individual effort and motivation to become digitally skilled** (7). This may occur in formal, non-formal or informal learning (Sefton-Green, 2012). **When ICT is more available in schools, children's digital skills tend to be better** (14), and teachers can play a key role as change agents in stimulating children's digital skills (5). Teachers need support therefore to develop up-to-date skills to support children's right to education. Also, **those with earlier or broader access to ICT, including at home, have better digital skills** (14). The home–school link is often underdeveloped, with more teachers than parents facilitating the development of children's digital skills in ways that can support this link, connecting sites of learning productively (5).

As for non-formal learning, ySKILLS qualitative research suggests that workshops should allow a certain degree of open-endedness and freedom, so that children and young people can adjust and embed the projects into their own lived experiences and future-oriented imaginaries (7). Across these different settings, a child-centred teaching style could be far more engaging and more likely to keep children motivated in the long run (8). Tellingly, **when it comes to informal learning, children and young people often say they gain digital skills by trying things out**: young refugees acquire various digital skills through learning by doing, for instance, and this is linked to the crucial role of digital connectivity in tackling their numerous needs (3). The children and young people with mental health difficulties were also eloquent about learning by doing, and just-in-time learning, rather than the skills they were taught by teachers or parents (17).

There is considerable public anxiety that online activities undermine children's development. However, the fMRI research found **children who played more online games performed better on some linguistic tasks**, while their digital activities were unrelated to their performance on mathematical tasks (1). **Young action video gamers were also better than non-gamers at tasks demanding visual attention, visual working memory, tracking of multiple visual objects or switching between two visual tasks** (2). Moreover, training in a visual matching game or hidden object game resulted in improved visual search performance and visuo-spatial working memory, and training in a hidden object game improved verbal working memory (2). On the other hand, when specific skill dimensions were examined, it appeared that participants who scored higher on communication and interaction skills and content creation and production skills, scored worse for their semantic classification performance during distracted reading, non-distracted reading and non-distracted listening (1). Attention skills were also negatively related to the frequency of children's online activities and sharing in social media (1). Put the other way around, **children with higher working memory had lower communication and interaction skills as well as content creation and production skills** (1).

There is some evidence that **greater digital skills are linked to better learning outcomes for children, although the evidence base for this is small** (and further research is needed) (14). The systematic evidence review found that the higher a child's academic achievement, the better their digital skills (14). This was

confirmed by the ySKILLS longitudinal survey, where **increases in communication and interaction skills led to a subsequent increase in self-reported academic performance** (18).

Participants in the qualitative ySKILLS study generally had a good awareness of the presence of mis- and disinformation on the internet and of the importance of credibility evaluation skills to build resilience and to avoid being misled by such falsehoods (24). A large proportion of children reported their technical and operational skills as well as their communication and interaction skills at a high level, while they perceived their information navigation and processing skills and their content creation and production skills to be the lowest (24). Further, **self-reported technical and operational skills, as well as communication and interaction skills, were far higher than information navigation and processing skills as well as content creation and production skills** (24). However, the ySKILLS performance tests revealed some concerning gaps in children's digital skills. Notably, **they cannot always distinguish between reliable and unreliable information sources** because their information evaluation skills are lacking.

The most significant variables that account for higher levels of digital skills were parental mediation, age, gender, time spent online, preference for online social interaction, self-efficacy and personal attitudes towards the internet (20). Restrictive parental mediation negatively predicts skills in in most countries, although regrettably the active mediation results were too weak to derive clear conclusions as to the value of active mediation.

Additional data

EU Kids Online findings for 9- to 16-year-olds in 19 countries showed that:

- Using the internet daily for schoolwork ranged between 16% (Poland) and 46% (Lithuania), with considerable age differences and few gender differences (although more girls than boys in some countries).
- A number of children played online games every day, ranging from between 27% (Slovakia) and 71% (Lithuania) – more boys than girls did this.
- Children's self-reported digital skills increased with age and varied little by gender. While most children scored high on the operational and social skills scales, a significant proportion lacked information navigation and processing and content creation and production skills.

6.11 Principle 11: Agency

Support child users' decision-making and reduce exploitative features and business models that harm their agency.

Having agency means children can decide freely how they want to engage with the digital environment. This includes being able to start and stop using digital products and services of their choice easily, without feeling they are losing out, and knowing and getting precisely what they have signed up for, while not being tempted, manipulated or nudged into doing anything that undermines their safety, privacy, development and wellbeing.

The principle of agency draws together two sets of children's rights:[16]

- Protection against economic exploitation: the right not to be subjected to unfair exchange.
- Protection against other forms of exploitation: the right not to be subjected to treatment that undermines children's decision making and welfare.

[16] UNCRC, Articles 32, 33, 34, 35, 36.

Economic (or commercial) exploitation in the digital environment extends beyond the traditional notion of economic exploitation centred on child labour, and manifests in various forms. It includes persuasive design to maximise children's attention and monetisation of personal data as well as dark patterns and other features crafted to manipulate users' choices. It also includes processing data for commercial purposes such as advertising without considering children's vulnerabilities or profiting from children's data unfairly.

"TikTok has a nice function – there are three dots, and you can click 'Not interested'. It does something with the algorithm… You can take some control over some posts." (teenager with mental health difficulties, Norway)

Digital skills and literacies cannot only be understood as the capacity of the individual user or group of users; they are also intrinsically entwined with the design of the digital environment. **The more complex or opaque the digital environment, the more skilled the user must be if they are not to be deceived or manipulated.** The more transparent and fairer that environment, the more the user can exercise their digital skills and literacies to engage in ways of their choosing and to achieve outcomes that benefit them. The principle of agency, therefore, concerns what children can do online in particular contexts, faced with particular design challenges, and it is also surely aided by what they know about the digital environment, including the business models, attention economy and data ecology that increasingly drive it (Lukoff et al., 2021; van der Hof et al, 2020).

Do they know what they need to know? In the ySKILLS performance tests, children were asked to take a close look at the textual and visual information of three social media posts, representing an advertisement, fake news and a phishing scam. After each post, they were asked about the intention of the creator of the post. On average, **63% of the children and young people were able to successfully identify the social media post** (22). Here considerable differences also emerged across the countries: **in Italy, 78% of the children and young people successfully identified a post as an advertisement, while in Poland this was 48%** (22). Nonetheless, adolescents are often optimistic, and in the experience sampling method (ESM) research they reported to ySKILLS researchers a moderate sense of self-determination in their daily ICT use, with a sense of importance and belongingness (15).

However, in regulatory and child rights debates, **there is growing concern that the digital environment is designed to be risky in ways that prioritise profit over children's rights and best interests** (5Rights Foundation, 2021; Federal Trade Commission, 2022; Norwegian Consumer Council, 2018). Are children's growing digital skills and literacy proof against such pressures? To answer this question, **we need to consider new and emerging dimensions of digital literacy including 'data literacy'** (Pangrazio & Sefton-Green, 2020; Stoilova et al., 2021) **or 'algorithm literacy'** (Bucher, 2018; Selwyn, 2022). While this was not the primary focus of the ySKILLS research, we can draw some conclusions, although undoubtedly research on digital skills and literacy must continue to track innovations in business practices and digital design, along with the policy and regulation that affects them.

The qualitative report on children and young people with mental health difficulties explored how they are developing digital skills and literacy that encompass but also transcend the dimensions of technical, informational, communication and creation skills – for example, the adolescents described the skill of identifying a callous algorithm, recognising an extreme space or a dangerous person or, more positively, knowing how to game the algorithm to make their feed positive or locate 'safe' spaces or trustworthy people (17). In such ways, they hoped to exercise agency to shape their online experiences in ways that serve rather than undermine them, although in this regard they were not always successful:

"... algorithms can act as a distorting mirror, magnifying problematic content and pushing young people with mental health vulnerabilities down a spiral of ever-more overwhelming, upsetting or extreme content that they find hard to break away from." (17)

After all, the power of platforms, hosted by global corporates, is inevitably greater than the capacity of even skilled young people to manage. No wonder that **platform algorithms are often 'out of sync' with and insensitive to the young person's state of mind or ability to cope, leading to experiences of 'triggering'** (when particular online content proves upsetting because of prior mental health difficulties), unwanted re-exposure to such content, and setbacks in their mental health. In other ySKILLS qualitative studies, similarly, **information skills (e.g., seeking information about their country of origin on social media) mean being exposed to harmful content (e.g., violent war content) that makes them anxious, or awareness of different technological affordances means that they skilfully make choices that are also risky** (3).

Additional data

EU Kids Online findings for 9- to 16-year-olds in 19 countries showed that:

- Across countries, an average of 7% of children said they spent too much money on in-app purchases or online games.
- Ten per cent said they had tried unsuccessfully to spend less time on the internet. However, measured using five criteria of excessive use, one in four children reported at least one criterion, but fewer than 2% of children reported all five.

7. Conclusions: digital literacy-based pathways to realise children's rights

This report examined whether there is evidence from ySKILLS research that gaining digital skills facilitates the realisation of children's rights. Then, it examined whether there is evidence from ySKILLS research that the insufficient realisation of children's rights impedes children in gaining digital skills. It did so by grouping children's rights according to 11 principles of *Child Rights by Design*. We focused on a 'by design' approach since it is insufficient to redress wrongs after the fact when it is feasible to anticipate the opportunities for and risks to children's rights in the policies, provision and design of the many digital products and services that, together, comprise the digital environment.

Given our aim of informing child rights organisations, advocates and duty bearers, in Europe and internationally, we conclude as follows:

Digital literacy matters: as demonstrated by ySKILLS findings, gaining digital skills and literacy makes a difference to enabling children's rights, as does the lack of opportunity to gain literacy or the existence of barriers, since not having skills adversely affects rights. There has been considerable interest over recent decades in the ways that children are gaining digital skills and literacy, evidenced on both international (UNICEF, 2019; 2023) and European levels (Eurochild, 2023; ENOC, 2019). Often, the process is informal, part and parcel of everyday online activities. Although children's enthusiasm and growing competence has led to them being dubbed 'digital natives', this concept has been widely critiqued for overestimating children's achievements and underestimating the importance of structural – usually educational – resources (Davies & Eynon, 2018).

The results of ySKILLS' multimethod investigation of youth digital skills reveal children's considerable desire to learn about all things digital, but they experience notable gaps in both provision and outcomes. Europe's children need more guidance, support and education if they are to manage their digital environment as well-rounded citizens now and in the future. This is not only of practical concern, but also a matter of realising their human rights. Notably, the Strategy on the rights of the Child (EC, 2021a) calls for actions relating to all the principles discussed in this report, and recognises that media literacy, critical digital literacy and other key competences are crucial for European children. As ySKILLS evidence shows, there remains a continued and pressing need for the European strategy for a Better Internet for Kids (BIK+) (EC, 2022a) and its detailed action plan and resources to advance digital literacy, empowerment and citizenship skills.

The value of mapping ySKILLS research findings onto a child rights framework adds greater depth to a field concentrated on efforts to embed privacy and safety by design. **The mapping of the evidence and international and European rights instruments demonstrated that not all child rights principles are equally represented in research and policy and regulation.** Some of the noticeable evidence gaps (e.g., the available data with regard to the principle of privacy) are directly related to the specific focus of the ySKILLS project and its research design strategy that emphasised a wider and inclusive range of positive rights and freedoms. Other gaps (e.g., the evidence related to the principle of responsibility) highlight more general difficulties in demonstrating responsible digital governance and innovation related to the novelty of such efforts and the need for advancing Child Rights Impact Assessments.

The mapping of ySKILLS evidence onto the 11 principles of children's rights shows that digital literacy contributes to rights in different ways and, according to the evidence available, plays a greater role in realising some rights compared with others. **ySKILLS' focus on the antecedents and consequences of digital literacy generated a considerable body of evidence showing that inequalities among children are linked to inequalities in their digital literacy, and that this, in turn, has consequences for their wellbeing and other outcomes.** Gaining digital literacy is of value in and of itself, vital for children's education and fullest development in the digital world. The evidence shows that it also facilitates the exercise of children's civil rights and freedoms. Illustrating important interdependencies among the pillars of the BIK+ strategy, ySKILLS evidence shows that digital literacy is associated on occasion with greater risk online, but it can also support children in gaining resilience and thus minimising harm.

Crucially, as ySKILLS research has also shown, **digital skills and literacy represent both a valued outcome and also the means to the further, even more important, outcome of realising a wide range of children's rights** (see Appendix 1). The output from the workshop-mapping session (see Appendix 2) demonstrates how children's rights are in many ways contingent, contextual and interdependent, including in relation to digital skills and literacy. Nevertheless, we conclude by observing that digital skills and literacies make a difference to most, if not all, of children's rights in the digital age (see Appendix 3). From the perspective of implementing the Strategy on the rights of the child, supporting digital literacy may therefore advance many aspects of the strategy in one way or another.

Any lack, or inequality, in children's digital skills impedes the full realisation of their rights. Gaining the multiple dimensions of digital skills enables children's realisation of their rights individually and holistically – encompassing their provision, protection and participation rights, as set out in the UNCRC and as explained in relation to the digital environment in *General comment No. 25* (UN Committee on the Rights of the Child, 2021). Since children's Convention rights are incorporated into multiple EU and member state legal and regulatory instruments, enabling children's digital skills and literacy and overcoming the barriers they face (some children or groups of children more than others) is not only a priority, but also an obligation for governments. The EU Charter of Fundamental Rights is clear that there should be no discrimination, and this includes no discrimination in children's access to and activities in the digital environment.

It is crucial for educational and policy initiatives regarding the range of children's rights to be based on accurate reports of a child's digital skills and literacy. Educators should be supported to develop the capacity to both teach the skills and administer digital tests, so they can assist in assessing and improving student performance. However, the ySKILLS findings also address many other stakeholders – government, industry, regulators, healthcare providers, digital service providers, multiple civil society and voluntary sector workers (e.g., those who work with youth or young migrants and refugees, or other disadvantaged groups). Particular attention must be paid to digital provision for children with vulnerabilities or living in disadvantaged situations. Note, usefully, that Pillar 3 of the BIK+ strategy calls for efforts to give children a say in shaping the digital environment and their inclusion within it.

Our recommendations centre on fostering digital equity, as inequalities affect children's ability to develop skills and to gain the benefits from such skills. It is striking that online social interaction was a positive predictor of digital skills, suggesting that children who find it easier to express themselves online may actually benefit from this usage to develop skills relevant to the digital environment they feel more at ease in. To this end, highly targeted rather than generic ('open door') efforts are required to counter inequalities.

Furthermore, encouraging children to learn for themselves can be powerful. When they spend more time online exploring, experimenting and following their enthusiasm, they are taking their first steps in gaining digital literacy. **Stakeholders should be supportive of children's own interests, agency and participation, as it might prove more beneficial in the long run than adult guidance, judgement or restriction, however well intentioned.** By promoting individual practices, each child can work on their own to achieve personal goals. It might also be concluded that, to overcome digital inequalities, supporting children's online activities, especially social and creative activities with digitally skilled peers, could build their self-efficacy and, thereby, the digital literacy they need.

A comprehensive approach is needed that addresses children's rights holistically, since rights are indivisible and should not be ranked, and since digital skills and literacy are themselves complex, multidimensional and contextual. However, there is clearly a host of structural factors that enable and impede children's digital literacy and the opportunities to exercise it, and these must remain high on national and European stakeholders' agendas, to realise children's rights in a digital world.

References

5Rights Foundation (2021). *Pathways: How digital design puts children at risk*. July. https://5rightsfoundation.com/uploads/Pathways-how-digital-design-puts-children-at-risk.pdf

Bucher, T. (2018). *If... then: Algorithmic power and politics*. Oxford University Press.

Chatzinikolaou, A., Lievens, E., Venturato, B., Lamanuzzi, M., & Mazzucato, C. (2023). *Turning ySKILLS recommendations into action points for EU policy on children's digital skills.* KU Leuven: ySKILLS. https://zenodo.org/records/10201317

CoE (Council of Europe) (2022). *Council of Europe Strategy for the Rights of the Child (2022–2027).* https://search.coe.int/cm/pages/result_details.aspx?objectid=0900001680a5a064

d'Haenens, L., Joris, W., & Bossens, E. (2023). *Synthesis of ySKILLS results.* KU Leuven, ySKILLS. https://zenodo.org/records/10115936

Davies, H., & Eynon, R. (2018). Is digital upskilling the next generation our 'pipeline to prosperity'? *New Media & Society*, *20*(11): 3961–79.

EC (European Commission) (2010). *A digital agenda for Europe*. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. COM(2010) 245 final. 19 May. https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:52010DC0245

EC (2021a). *EU strategy on the rights of the child*. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. COM(2021) 142 final. 24 March. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021DC0142

EC (2021b). *2030 digital compass: The European way for the digital decade*. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. COM(2021) 118 final. 9 March. https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021DC0118

EC (2022a). *A digital decade for children and youth: The new European strategy for a Better Internet for Kids (BIK+).* Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. COM(2022) 212 final. 11 May. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2022:212:FIN

EC (2022b). Commission kick-starts work on the European Year of Skills. Press release, 12 October. https://ec.europa.eu/commission/presscorner/detail/en/ip_22_6086

EC (2023). *European Declaration on Digital Rights and Principles for the Digital Decade*. Official Journal of the European Union, 2023/C 23/01. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:JOC_2023_023_R_0001

EU (European Union) (2012). *Charter of Fundamental Rights of the European Union*. Official Journal of the European Union, 2012/C 326/02. https://eur-lex.europa.eu/eli/treaty/char_2012/oj

Eurochild (2023). *Protecting Children's Rights in the Digital Environment*. 16 February 2023. https://eurochild.org/initiative/protecting-childrens-rights-in-the-digital-environment/

ENOC (European Network of Ombudspersons for Children) (2019). *Position Statement on "Children's Rights in the Digital Environment"* https://enoc.eu/what-we-do/annual-advocacy-areas/enoc-2019-annual-focus-childrens-rights-in-the-digital-environment/

European Parliament and the Council of Europe (2005). *Safter Internet Programme 2005-2008 (Safer Internet Plus).* Decision no. 854/2005/EC. 11 May. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM:l24190b

European Parliament (2023). Digital agenda for Europe. Fact Sheets on the European Union. April. www.europarl.europa.eu/erpl-app-public/factsheets/pdf/en/FTU_2.4.3.pdf

Federal Trade Commission (2022). *Bringing dark patterns to light.* September. www.ftc.gov/reports/bringing-dark-patterns-light

Howard, P.N., Neudert, L.-M., Prakash, N., & Vosloo, S. (2021). *Digital misinformation/disinformation and children*. UNICEF Office of Global Insight and Policy. www.ictworks.org/wp-content/uploads/2021/10/UNICEF-Global-Insight-Digital-Mis-Disinformation-and-Children-2021.pdf

Information Commissioner's Office (2023). *Introduction to the Children's Code*. https://ico.org.uk/for-organisations/uk-gdpr-guidance-and-resources/childrens-information/childrens-code-guidance-and-resources/introduction-to-the-childrens-code/

ITU (International Telecommunication Union) (2018). *Measuring the Information Society Report.* https://www.itu.int/en/ITU-D/Statistics/Pages/publications/misr2018.aspx

Livingstone, S. (2014). Developing social media literacy: How children learn to interpret risky opportunities on social network sites. *Communications. The European Journal of Communication Research*, *39*(3): 283–303. http://eprints.lse.ac.uk/62129

Livingstone, S., & Pothong, K. (2021a). *Playful by Design®: Free play in a digital world*. Digital Futures Commission and 5Rights Foundation, November. https://digitalfuturescommission.org.uk/wp-content/uploads/2021/11/A-Vision-of-Free-Play-in-a-Digital-World.pdf

Livingstone, S., & Pothong, K. (2021b). What is meant by 'design'? Digital Futures Commission, Blog. https://digitalfuturescommission.org.uk/blog/what-is-meant-by-by-design

Livingstone, S., & Pothong, K. (2023). *Child Rights by Design: Guidance for innovators of digital products and services used by children*. Digital Futures Commission and 5Rights Foundation, March. https://digitalfuturescommission.org.uk/wp-content/uploads/2023/04/CRbD_singles-web.pdf

Livingstone, S., & Stoilova, M. (2021). *The 4Cs: Classifying online risk to children.* CO:RE Short Report Series on Key Topics. Leibniz-Institut für Medienforschung, Hans-Bredow-Institut (HBI), CO:RE – Children Online: Research and Evidence. https://doi.org/10.21241/ssoar.71817

Livingstone, S., & Stoilova, M. (2023). *Internet use and digital skills: Deliberative workshops with young people.* London School of Economics and Political Science and ySKILLS. www.lse.ac.uk/media-and-communications/assets/documents/research/projects/ySKILLS/Livingstone-Stoilova-2023-Internet-use-digital-skills-and-mental-health-deliberative-workshops-with-young-people.pdf

Livingstone, S., Ólafsson, K., & Pothong, K. (2023a). Digital play on children's terms: A child rights approach to designing digital experiences. *New Media & Society*. https://doi.org/10.1177/14614448231196.

Livingstone, S., Pothong, K., & Kidron, B. (2023b). *Digital Futures Commission – Final report.* Digital Futures Commission and 5Rights Foundation. https://digitalfuturescommission.org.uk/wp-content/uploads/2023/03/DFC-singles.pdf

Lukoff, K., Lyngs, U., Zade, H., Liao, J.V., Choi, J., Fan, K., Munson, S.A., & Hiniker, A. (2021). How the design of YouTube influences user sense of agency. *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*, May: 1–17. Yokohama, Japan. https://doi.org/10.1145/3411764.3445467

Lundy, L. (2020). A Lexicon for Research on International Children's Rights in Troubled Times, *The International Journal of Children's Rights*, *27*(4), 595-601. doi: https://doi.org/10.1163/15718182-02704013

Mascheroni, G., Cino, D., Mikuška, J., & Smahel, D. (2022). Explaining inequalities in vulnerable children's digital skills: The effect of individual and social discrimination. *New Media & Society*, *24*(2): 437–57. https://doi.org/10.1177/14614448211063184

McNally, B., Guha, M.L., Mauriello, M.L., & Druin, A. (2016. Children's perspectives on ethical issues surrounding their past involvement on a participatory design team. *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*, May: 3595–606. https://doi.org/10.1145/2858036.2858338

Mukherjee, S. & Livingstone, S. (2020). *Children and young people's voices*. Digital Futures Commission and 5Rights Foundation, November. https://digitalfuturescommission.org.uk/wp-content/uploads/2020/10/Children-and-Young-Peoples-Voices.pdf

Mukherjee, S., Pothong, K., & Livingstone, S. (2021). *Child Rights Impact Assessment: A tool to realise child rights in the digital environment*. Digital Futures Commission and 5Rights Foundation, March. https://digitalfuturescommission.org.uk/wp-content/uploads/2021/03/CRIA-Report.pdf

Ní Bhroin, N., Krutzinna, J., & Staksrud, E. (2023). *ySKILLS – Children and young people (aged 12-17)'s Digital Skills: Evidence-based recommendations for policy and practice. KU Leuven: ySKILLS.* https://yskills.eu/publications

Norwegian Consumer Council (2018). *Deceived by design*. https://www.conpolicy.de/en/news-detail/deceived-by-design-how-tech-companies-use-dark-patterns-to-discourage-us-from-exercising-our-right

O'Neill, B., Dreyer, S., & Dinh, T. (2020). *The Third Better Internet for Kids policy map: Implementing the European strategy for a Better Internet for Children in European member states*. November. www.betterinternetforkids.eu/bikmap

Pangrazio, L., & Sefton-Green, J. (2020). The social utility of 'data literacy'. *Learning, Media and Technology*, *45*(2): 208–20. https://doi.org/10.1080/17439884.2020.1707223

Sefton-Green, J. (2012). *Learning at not-school: A review of study, theory, and advocacy for education in non-formal settings*. The MIT Press. https://direct.mit.edu/books/oa-monograph/2977/Learning-at-Not-SchoolA-Review-of-Study-Theory-and

Selwyn, N. (2022) *What should 'digital literacy' look like in an age of algorithms and AI? Parenting for a Digital Future* (06 Apr 2022). Blog Entry. https://eprints.lse.ac.uk/116808/

Smahel, D., Machackova, H., Mascheroni, G., Dedkova, L., Staksrud, E., Ólafsson, K., Livingstone, S., & Hasebrink, U. (2020). *EU Kids Online 2020: Survey results from 19 countries*. EU Kids Online. https://doi.org/10.21953/lse.47fdeqj01ofo

Smahel, D., Mascheroni G., Livingstone, S., Helsper, E., van Deursen, A.J. A.M., Tercova, N., Stoilova, M., Georgiou, M. A., Machackova, H., & Alho, K. (2023). Theoretical Integration of ySKILLS: Towards a New Model of Digital Literacy. KU Leuven: ySKILLS. https://zenodo.org/doi/10.5281/zenodo.10090716

Stoilova, M., Bulger, M., & Livingstone, S. (2023a). Do parental control tools fulfil family expectations for child protection? A rapid evidence review of the contexts and outcomes of use. *Journal of Children and Media.* https://doi.org.10.1080/17482798.2023.2265512

Stoilova, M., Nandagiri, R., & Livingstone, S. (2021). Children's understanding of personal data and privacy online – A systematic evidence mapping. *Information, Communication & Society*, *24*(4): 557–75. https://doi.org/10.1080/1369118X.2019.1657164

Stoilova, M., Rahali, M., & Livingstone, S (2023b). *Classifying and responding to online risk to children: Good practice guide*. Better Internet for Kids. Insafe helplines and the London School of Economics and Political Science (LSE), February. www.betterinternetforkids.eu/documents/167024/200055/Good+practice+guide+-+Classifying+and+responding+to+online+risk+to+children+-+FINAL+-+February+2023.pdf

UN (United Nations) (1989). *United Nations Convention on the Rights of the Child*. Resolution 44/25 of 20 November. www.unicef.org.uk/what-we-do/un-convention-child-rights

UN (2015). *Convention on the Rights of the Child*. CRC/C/58/Rev.3, 3 March. https://tbinternet.ohchr.org/_layouts/15/TreatyBodyExternal/Download.aspx?symbolno=CRC%2FC%2F58%2FREV.3&Lang=en

UN Committee on the Rights of the Child (2021). *General comment No. 25 on children's rights in relation to the digital environment*. https://digitallibrary.un.org/record/3906061

UNICEF (United Nations Children's Fund) (2023). *A global review of selected digital inclusion policies: key findings and policy requirements for greater digital equality of children*. https://www.unicef.org/globalinsight/media/3076/file/UNICEF-Innocenti-Digital-Inclusion-Global-Policy-Review-2023.pdf

UNICEF (2019). *Digital literacy for children: exploring definitions and frameworks*. https://www.unicef.org/globalinsight/media/1271/file/%20UNICEF-Global-Insight-digital-literacy-scoping-paper-2020.pdf

van der Hof, S., Lievens, E., Milkaite, I., Verdoodt, V., Hannema, T., & Liefaard, T. (2020). The child's right to protection against economic exploitation in the digital world. *The International Journal of Children's Rights*, *28*(4): 833–59. https://doi.org/https://doi.org/10.1163/15718182-28040003

Vuorikari, R., Kluzer, S., & Punie, Y. (2022). *DigComp 2.2: The Digital Competence framework for citizens – With new examples of knowledge, skills and attitudes*. EUR 31006 EN. Publications Office of the European Union. doi: 10.2760/490274. https://op.europa.eu/en/publication-detail/-/publication/50c53c01-abeb-11ec-83e1-01aa75ed71a1/language-en

Zaman, B., Bossens, E., & Donoso, V. (2023). *Introducing the ySKILLS child-friendly summary: Empowering youth in the digital age*. KU Leuven: ySKILLS. https://yskills.eu/introducing-the-yskills-child-friendly-summary-empowering-youth-in-the-digital-age

Zlamal, R., Machackova, H., Smahel, D., Abramczuk, K., Ólafsson, K., & Staksrud, E. (2020). *EU Kids Online 2020: Technical report*. EU Kids Online. https://doi.org/10.21953/lse.04dr94matpy7

Appendices

Appendix 1: ySKILLS outputs, aims and methods

Source	Reference	Aim	Type of evidence
1	D5.5 Alho, K., Hartmann, H., Ylinen, A., Hannula-Sormunen, M. M., McMullen, J., Lehtinen, E., Rinne, N., Hietajärvi, L., Salmela-Aro, K., Wikman, P., Bellon, E., & De Smedt, B. (2023). *Report on collected fMRI data related to effects of intensity of ICT use on brain activity associated with attention and with linguistic and mathematical processes*. KU Leuven, ySKILLS. https://doi.org/10.5281/zenodo.8304737	To study associations between adolescents' ICT skills and activities measured with the ySKILLS questionnaire and their task performance and brain activity in closed and open mathematical tasks.	Finnish participants engaged in fMRI tasks related to maths and language, while Belgian participants completed the flanker and n-back tasks to assess attention, inhibition and working memory. The samples included 189 12- to 14-year-old Finnish participants and 51 12- to 13-year-old Belgian participants.
2	Alho, K., Moisala, M., & Salmela-Aro, K. (2022). Effects of media multitasking and video gaming on cognitive functions and their neural bases in adolescents and young adults. *European Psychologist*, *27*(2): 131–40. https://doi.org/10.1027/1016-9040/a000477	To determine the effects of media multitasking and video gaming on cognitive functions and their neural bases.	Systematic review of published literature that focuses on the effects of two of the most common forms of modern-day digital technology use in children on cognitive functions and their neural bases – media multitasking and video gaming.
3	Baptista, R., Mascheroni, G., Vissenberg, J., Georgiou, M., Livingstone, S., d'Haenens, L., & Ponte, C. (2022). *Vulnerabilities and digital skills. Interactive report on the in-depth studies*. KU Leuven, ySKILLS. www.kuleuven.be/digisoc/vulnerabilities	To examine how young refugees use digital technologies to navigate life before, during and after migration, including to manage risk, and to determine whether digital technologies support or hinder wellbeing.	Study 1: Observations of workshops in Belgium, Denmark and Italy (children and young people aged 9–18). Study 2: Interviews with young refugees (aged 14–18) and asset mapping in Belgium, Greece and the UK. Study 3: Interviews with 62 children and young people with mental health difficulties in Norway and the UK (aged 12–22). Study 4: Online surveys, performance tests and focus groups in Belgium, Finland and the Czech Republic (children aged 12–15).
4	Beilmann, M., Opermann, S., Kalmus, V., Donoso, V., Retzmann, N., & d'Haenens, L. (2020). *Home–school communication on children's digital skills development: Based on interviews with experts from the education sector*. KU Leuven, ySKILLS. https://doi.org/10.5281/zenodo.5226897	To understand the digital skills needed for wellbeing, education and social life, and to improve existing knowledge about how children and youth build resilience against negative impacts.	34 in-depth interviews with experts from the education sector and labour market across Estonia, Finland, Germany, Italy, Poland and Portugal.
5	Beilmann, M., Opermann, S., Kalmus, V., Vissenberg, J., & Pedaste, M. (2022). The role of school–home communication in	To understand the digital skills needed for wellbeing, education and	20 in-depth interviews with experts in education sectors and policy makers across

	supporting the development of children's and adolescents' digital skills, and the changes brought by Covid-19. *Journal of Media Literacy Education*. https://digitalcommons.uri.edu/jmle-preprints/40	social life, and to understand the role of digital skills education – in both formal and informal settings.	Estonia, Finland, Germany, Italy, Poland and Portugal.
6	D5.1 Boomgaarden, H., Tolochko, P., & Song, H. (2022). *Report on the influence of situational variables and personal networks on online resilience and digital skills.* KU Leuven, ySKILLS. https://doi.org/10.5281/zenodo.7620931	To explore how peer networks affect digital skills among children and adolescents.	Socio-centric network data was collected across school classes in Germany, Italy and Portugal; 2,562 students aged 12–20 were observed for networks of friendship, digital advice seeking and giving. Findings relate to the structural effects of networks and their impact on the interplay of ICT use and skills and wellbeing.
7	Cino, D., Brandsen, S., Bressa, N., Eriksson, E., Mascheroni, G., & Zaman, B. (2022). *Young people's digital skills practices in non-formal learning contexts: Observations, interviews, co-design*. KU Leuven, ySKILLS. https://doi.org/10.5281/zenodo.6832846	To understand how to foster digital skills acquisition and practices in non-formal learning contexts.	Qualitative study that combined 16 observations of digital skills workshops (participants were children and young people aged 9–18), 11 interviews with the organisers and 4 co-design activities with a group of participants in Belgium, Denmark and Italy.
8	Cino, D., Brandsen, S., Bressa, N., Eriksson, E., Mascheroni, G., & Zaman, B. (2023). Children's digital skills acquisition in non-formal educational contexts: Pedagogical practices, learning, and inclusion opportunities in coding and robotics workshops. *Italian Journal of Educational Research*, *30*: 54–72. https://doi.org/10.7346/sird-012023-p54	To understand how to foster digital skills acquisition and practices in non-formal learning contexts.	Qualitative study that combined 16 observations of digital skills workshops (participants were children and young people aged 9–18), 11 interviews with the organisers and 4 co-design activities with a group of participants in Belgium, Denmark and Italy.
9	Cino, D., Lacko, D., Mascheroni, G., & Smahel, D. (2022). Predictors of children's and young people's digital engagement in informational, communication, and entertainment activities: Findings from ten European countries. *Journal of Children and Media*, *17*(1): 37–54. https://doi.org/10.1080/17482798.2022.2123013	To identify predictors of children's and young people's digital engagement.	Analysis of EU Kids Online survey data collected with a sample of 9,731 youth aged 11–17 from 10 European countries using multigroup structural equation modelling.
10	De Coninck, D. & d'Haenens, L. (2023). *Gendered perspectives on digital skills and digital activities: Comparing non-binary and binary youth*. Comunicar, 75. https://doi.org/10.3916/C75-2023-03 [in Spanish]	To focus on the differences in the digital skills and activities of non-binary young people.	Online survey data from 6,221 European children aged 12–20 who were discriminated against based on ethnic or cultural differences.

11	De Coninck, D., Vissenberg, J., Joris, W., & d'Haenens, L. (2023). Perceived discrimination and digital inequalities among children and young people: Studying the multidimensional concepts of digital skills and digital knowledge. *Information, Communication & Society*. https://doi.org/10.1080/1369118X.2023.2205508	To determine how discriminated youths differ from their more advantaged peers with respect to digital skills.	Online survey data from 6,221 European children 12–20 who were discriminated against based on ethnic or cultural differences.
12	Donoso, V., Pyżalski, J., Walter, N., Retzmann, N., Iwanicka, A., d'Haenens, L., & Bartkowiak, K. (2020). *Report on interviews with experts on digital skills in schools and on the labour market*. KU Leuven, ySKILLS. www.researchgate.net/publication/344071016	To understand the role of digital skills education in formal (e.g., the school), informal (e.g., an extracurricular course) and non-formal (e.g., home) learning settings.	34 interviews with experts from the educational sector and the labour market were carried out across Estonia, Finland, Germany, Italy, Poland and Portugal.
13	Donoso, V., Retzmann, N., Joris, W., & d'Haenens, L. (2020). *Digital skills: An inventory of actors and factors*. KU Leuven, ySKILLS. https://zenodo.org/record/5557144	To understand how children conceptualise digital skills, social interaction and content creation, and in what ways they value digital skills.	Roundtable consultation with 46 European children (aged 12–18).
14	Haddon, L., Cino, D., Doyle, M.-A., Livingstone, S., Mascheroni, G., & Stoilova, M. (2020). *Children's and young people's digital skills: A systematic evidence review*. KU Leuven, ySKILLS. https://zenodo.org/record/6921674	To identify what is known about youth digital skills and examine the evidence for the antecedents of digital skills and the consequences of having digital skills.	Systematic evidence review of 110 recent high-quality empirical studies related to the digital skills of 12- to 17-year-olds.
15	D5.4 Järvinen, J., Maksniemi, E., Hietajärvi, L., Gale, J., Bossens, E., & Salmela-Aro, K. (2023). *Situational and daily technology use and wellbeing among adolescents: A report on the findings from an ESM study conducted in Belgium and Finland*. KU Leuven, ySKILLS. https://doi.org/10.5281/zenodo.8304663	To examine adolescents' situational and daily ICT use and its associations with wellbeing.	ESM (experience sampling method) was used to elicit responses. Data was derived from 17,671 momentary and daily questionnaire responses from 456 participants aged 13–17 in Belgium and Finland.
16	Livingstone, S., Mascheroni, G., & Stoilova, M. (2023). The outcomes of gaining digital skills for young people's lives and wellbeing. *New Media & Society*, *25*(5): 1176–202. https://doi.org/10.1177/1461444821104	To determine whether different dimensions of digital skills are linked to distinct outcomes.	A systematic evidence review identified 34 studies that employed cross-sectional survey methods to examine the association between digital skills and tangible outcomes.
17	D6.1 Livingstone, S., Stoilova, M., Stänicke, L.I., Jessen, R.S., Graham, R., Staksrud, E., & Jensen, T. (2022). *Young people experiencing internet-related mental health difficulties: The benefits and risks of digital skills*. KU Leuven, ySKILLS. https://doi.org/10.5281/zenodo.7372552	To determine the relevance of digital skills in the lives of young people experiencing mental health difficulties, and whether digital skills	In-depth interviews with 62 people (aged 12–22) experiencing a range of mental health difficulties in Norway and the UK.

		help or worsen their mental health difficulties.	
18	D5.2 Machackova, H., Jaron Bedrosova, M., Tolochko, P., Muzik, M., Waechter, N., & Boomgaarden, H. (2023). *Digital skills among children and youth: A report from a 3-wave longitudinal study in 6 European countries*. KU Leuven, ySKILLS. https://doi.org/10.5281/zenodo.8304511	To determine whether the use of ICT leads to beneficial or harmful impacts on wellbeing, and the role of digital skills in shaping this relationship.	A three-year longitudinal survey. It aimed for a purposive, non-probability sample of children aged 12–15 attending secondary schools. The sample size varied across waves and countries, with a total of N=2,660 European participants across three waves.
19	Mascheroni, G., Cino, D., Mikuška, J., Lacko, D., & Smahel, D. (2020). *Digital skills, risks and wellbeing among European children: Report on (f)actors that explain online acquisition, cognitive, physical, psychological and social wellbeing, and the online resilience of children and young people*. KU Leuven, ySKILLS. https://zenodo.org/record/5226902	To test the relationship between children's online activities, preference for online social interaction, self-efficacy, attitudes towards the internet (namely, feeling safe online) and types of parental mediation.	EU Kids Online survey data collected from nationally representative samples of 10,820 children aged 12–16 in 14 European countries. Analytical effort seeks to explore what variables predict the digital skills of 12- to 16-year-olds (N=13,138, 50% female) and the consequences of digital skills.
20	Mascheroni, G., Cino, D., Mikuška, J., & Smahel, D. (2022). Explaining inequalities in vulnerable children's digital skills: The effect of individual and social discrimination. *New Media & Society*, *24*(2): 437–57. https://doi.org/10.1177/14614448211063184	To uncover the role played by perceived individual and social discrimination in acquiring digital skills.	This study conducted secondary analysis of EU Kids Online survey data collected from nationally representative samples of 10,820 children aged 12–16 in 14 European countries.
21	D5.3 Song, H., Boomgaarden, H., Tolochko, P., & Kronschnabl, H. (2023). *The impact of policy interventions on young people's digital skills development: A simulation approach*. KU Leuven, ySKILLS. https://doi.org/10.5281/zenodo.8304613	To elaborate on the dynamics of digital skill developments among children.	A series of computer simulation-based approaches to test the effectiveness of intervention programmes that aim at improving digital skills with a focus on particularly vulnerable ('at-risk') groups.
22	van Deursen, A.J.A.M., van Laar, E., Helsper, E.J., & Schneider, L.S. (2023). *The youth Digital Skills Performance Test Results: Report on the results of real-life information navigation and processing, communication and interaction, and content creation and production skills tasks*. KU Leuven, ySKILLS. https://doi.org/10.5281/zenodo.8297778	To determine level of digital skills (referring to information navigation and processing, communication and interaction, and content creation and production) when measured through realistic tasks.	Participants (aged 13–18) across six European countries (Estonia, Finland, Germany, Italy, Poland and Portugal) were asked to use the internet to demonstrate skills, using direct performance testing.
23	Vissenberg, J., d'Haenens, L., & Livingstone, S. (2022). Digital literacy and online resilience as facilitators of young people's well-being? A systematic review. *European Psychologist*, *27*(2): 76–85. doi: 10.1027/1016-9040/a000478	To integrate literature on young people's online resilence, digital literacy and wellbeing in the context of negative online	Systematic evidence review of 30 empirical studies that examine the links between online resilience and digital literacy.

		experiences, along with their associations.	
24	D6.3 Vissenberg, J., Spurava, G., Terčová, N., Morávková, H., Bedrošova, M., Bossens, E., Macháčková, H., Kotilainen, S., & d'Haenens, L. (2022). *Report on the role of critical information skills in recognising mis- and disinformation*. KU Leuven, ySKILLS. https://doi.org/10.5281/zenodo.7373177	To determine how children understand and engage with online news, along with what role digital skills play in discerning fact from fiction.	Multimethod participant surveys, performance tests and focus groups conducted across Belgium, the Czech Republic and Finland. Particpants were children aged 12–15.
25	Baptista, R. & Ponte, C (2023). Observations from a co-design jam in Portugal. Unpublished. KU Leuven, ySKILLS.	To pilot a co-design workship with children in Portugal.	Co-design workshop and observation with children aged 16–17.
26	Georgiou, M. & d'Haenens, L. (forthcoming). *The digital skills of refugee teens.* KU Leuven, ySKILLS.	To examine how young refugees use digital technologies to navigate transnational life, and how they develop age-related skills and manage risks.	Interviews with young refugees (aged 14–18) in Belgium, Greece and the UK, and asset-mapping workshops to identify digital needs, risks and resources for wellbeing.
27	Smahel, D., Mascheroni, G., Livingstone, S., Helsper, E., van Deursen, A.J.A.M., Tercova, N., Stoilova, M., Georgiou, M.A., Machackova, H., & Alho, K. (2023). *Theoretical integration of ySKILLS: Towards a new model of digital literacy.* KU Leuven, ySKILLS. https://zenodo.org/doi/10.5281/zenodo.10090716	To integrate theoretically ySKILLS findings and develop a new model of digital literacy.	Theoretical integration.
28	De Coninck, D., Waechter, N., & d'Haenens, L. (2023). Predicting self-reported depression and health among adolescents: Time spent online mediated by digital skills and digital activities. *Cyberpsychology, Behavior, and Social Networking*, *26*(10): 747–54. doi: 10.1089/cyber.2023.0079.	To understand how depression and health are affected by the time spent online and the role of skills.	Two-wave longitudinal online survey among 3,942 adolescents aged 12–17 in six European countries (Estonia, Finland, Germany, Italy, Poland, Portugal).

Appendix 2: Methods of mapping ySKILLS evidence onto child rights principles

Figure 5: ySKILLS workshop mapping evidence onto children's rights

We organised several workshops with ySKILLS researchers to map the ySKILLS evidence onto child rights principles, following an iterative, reflexive process that aimed to:

1. Consider different models of child rights frameworks and select the approach best suited for the purposes of ySKILLS. As a result, we chose to combine the child rights into different principles, selected which ySKILLS findings would be used, and collated resources and evidence across the wide range of methods used in ySKILLS, including a longitudinal survey, practice tests, fMRI, qualitative research with vulnerable groups, secondary data analysis, systematic review of the evidence, etc.) and EU Kids Online comparative survey findings.

2. Deliberate on how well the ySKILLS evidence relates to children's rights and their interdependencies. Different child rights principles were workshopped by the ySKILLS researchers who suggested links to different types of evidence. This produced a model for mapping the evidence (see Figure 5).

3. Test the proposed model for mapping the evidence and the child rights framework using two principles and some emerging findings. This helped to finalise the mapping model and reflect on possible areas of difficulty, such as accuracy of represented findings and consistency across ySKILLS outputs. Measures to mitigate these were put in place.

4. Verify the mapping in terms of accuracy, consistency and gaps. The completed mapping was checked by the ySKILLS network during a specially designed workshop. Some gaps were identified, and more evidence was suggested based on most recent analyses. Some corrections were also made (i.e., in relation to early project findings that were later refuted by the analysis of the full dataset; superseded findings were removed) (see Figure 6).

5. This mapping process (as well as all outputs from the final stages of the project) was supported by regular meetings of a working group of selected ySKILLS researchers representing the empirical, theoretical and synthesis/output strands of the project and working on Work Package 7.

Figure 6: Workshop to verify the mapping of the ySKILLS evidence with children's rights

Appendix 3: Relating international and European rights to the 11 children's rights principles

	Mapping of international and European rights instruments ***Note: Purple text relates to digital literacy, green text to children, and blue text is human rights not specific to children.***					
***Child Rights by Design* principles** (Digital Futures Commission)	***UN Convention on the Rights of the Child*** (Articles) ***All provisions are specific to children; none relate to digital literacy***	***General comment No. 25 on children's rights in relation to the digital environment*** (selected paragraphs quoted by number) ***All provisions are specific to children; some relate to digital literacy***	***EU Charter of Fundamental Rights*** ***Only Article 24 is specific to children; no provisions relate to digital literacy***	***Strategy on the rights of the child*** (thematic areas quoted by number) ***All provisions are specific to children; some relate to digital literacy***	***European strategy for a Better Internet for Kids (BIK+)*** (three pillars quoted by number) ***All provisions are specific to children; many relate to digital literacy***	***European Declaration on Digital Rights and Principles*** ***Only Chapter 5, Articles 20–22 are specific to children; some provisions relate to digital literacy***
1. Equity and diversity Be inclusive, treat everyone fairly and provide for diverse needs and circumstances	Non-discrimination (2) Separation from parents (9) Family reunification (10) Parental responsibilities and state assistance (18) Children unable to live with their family (20) Adoption (21) Refugee children (22) Children with a disability (23) Review of treatment in care (25)	Non-discrimination (9–11) Preventing discrimination on the basis of sex, disability, socioeconomic background, ethnic or national origin, language or any other grounds (11) Family environment and alternative care (87) Administration of child justice (ensure children are not excluded or penalised by the criminal justice system) (117–22)	Children's right to regular contact and relationship with both parents (24, para. 2) Education and teaching in conformity with own religious, philosophical and pedagogical convictions (14, para. 3) Equality before the law (20) Non-discrimination (21) Cultural, religious and linguistic diversity (22) Equality between	Socioeconomic inclusion, adequate standard of living (2) Inclusive and child-friendly societies, health and education systems (2) Combating child poverty and fostering equal opportunities (2.1) Child-friendly justice (4) Global empowerment of children including	A diverse, inclusive, non-discriminatory and free of stereotypes digital environment Supporting all children, supporting diversity and sex and gender awareness (via information, awareness of professionals, positive role models) Equal opportunities for all irrespective of gender, disabilities or vulnerability Reliable and affordable internet connection, and	Putting people at the centre of the digital transformation (Chapter 1) Solidarity and inclusion (Chapter 2) A fair digital environment (Chapter 3)

	Children from minority or Indigenous groups (30) Inhumane treatment and detention (37) War and armed conflicts (38) Juvenile justice (40)		women and men (23) Integration of persons with disabilities (26)	during crisis and conflict (6) In addition, many of the areas include discussion of inequalities and vulnerable groups of children, children with disabilities and from disadvantaged groups	suitable digital devices Careful attention to children with special or specific needs, or from disadvantaged and vulnerable backgrounds	
2. Best interests Embed children's best interests in product development, design and policy	Best interests of the child (3)	Best interests of the child (12–13) Family environment and alternative care (88) (digital provision to be balanced with protecting children from family members posing risk)	Best interests of the child (24, para. 2)	Best interests of the child (Introduction; 3; 4)	Respect children's best interests (Pillar 1)	
3. Consultation Engage and listen to the views of children in product development, design and policy	Respect for the views of the child (12)	Respect for the views of the child (16–18) *'The use of digital technologies can help to realize children's participation at the local, national and international levels'* (16) *'... involve all children, listen to their needs and give due weight to their views' (17)*	Respect the views of the child (24, para. 1)	Embedding a child perspective in all EU actions (7)	Giving children a say in the digital environment, more child-led activities (Pillar 3) *'... including children's opinions in shaping the Digital Decade' (5.3)*	Involving children in the development of digital policies that concern them (Chapter 5e)

4. Age appropriate Develop policies and products that are age appropriate by design and consider using age assurance	Parental guidance and a child's evolving capacities (5) Parental responsibilities and state assistance (18)	Evolving capacities (1–21) *'... respect the evolving capacities of the child as an enabling principle that addresses the process of their gradual acquisition of competencies, understanding and agency' (19)* *'... take into account the changing position of children and their agency in the modern world, children's competence and understanding, which develop unevenly across areas of skill and activity, and the diverse nature of the risks involved' (20)* Right to life, survival and development (15) *'... pay specific attention to the effects of technology in the earliest years of life' (15)* Family environment and alternative care (84–8)		Professionals interacting and communicating with children in an age-appropriate way (4) Age-appropriate information, reporting and support services, judicial systems (4) Access to age-appropriate content in digital products and services by design and by default (5)	A safe, age-appropriate digital environment including age-appropriate information, support and gaming (Pillar 1) Effective age verification (Pillar 1) *'A comprehensive EU code of conduct on age-appropriate design, building on the new rules in the DSA and in line with the AVMSD and GDPR'*	Age-appropriate and safe digital environment for children (Chapter 5, para. 22b) Age-appropriate materials and services (to improve children's experiences, wellbeing and participation in the digital environment) (Chapter 5, para. 21)
5. Responsible Comply with legal frameworks, provide remedies as needed and conduct a Child Rights Impact Assessment	Implementation of the UNCRC (4) Parental responsibilities and state assistance (18) Respect for higher national standards (41) Knowledge of rights (42)	States should implement the UNCRC in relation to the digital environment (7) General measures of implementation by States (22–49) Right to culture, leisure and play (111)	Right to good administration (41) Scope and interpretation of rights and principles (52) Level of protection (53) Prohibition of abuse of rights (54)	Throughout, all areas end with a discussion of key actions by the EU and by member states Area 5 on the digital and information society addresses responsibilities of ICT companies	Each pillar specifies what the EU, member states and industry should do. Section 6: international outreach and cooperation *'Everybody has the responsibility to listen to children and to act now'*	Throughout the text references to different actors, including industry *'... responsible and diligent action by all actors, public and private, in the digital environment' (Chapter 1, para. 1c)*

					'Industry carries a significant responsibility'	
6. Participation Enable children's participation, expression and access to information	Birth registration, name, nationality, care (7) Protection and preservation of identity (8) Freedom of expression (13) Freedom of thought, belief and religion (14) Freedom of association (15) Access to information from the media (17)	Meaningful access (4) *'Meaningful access to digital technologies can support children to realize the full range of their civil, political, cultural, economic and social rights' (4)* Access to information and protection from harmful content (50–7) Freedom of expression (58–61) *'Children's right to freedom of expression includes the freedom to seek, receive and impart information and ideas of all kinds, using any media of their choice' (58)* Freedom of association and peaceful assembly (64–6)	Freedom of thought, conscience and religion (10) Freedom of expression and information (11) Freedom of assembly and of association (12) Workers' right to information and consultation within the undertaking (27) Right of access to documents (42) Freedom of movement and of residence (45)	Participation in political and democratic life, empowering children to be active citizens (1) Children harnessing safely the opportunities of the digital environment (5) Involving children in design of digital products and services (5) Promoting inclusive and systemic participation of children at the local, national and EU levels (1)	Supporting children in developing and practising citizenship skills (5.3) Digital empowerment (Pillar 2) and active participation (Pillar 3) Right to assembly and association via online social platforms (5.3)	Enable children to *'navigate and engage in the digital environment actively, safely and to make informed choices' (Chapter 5, para. 22a)* Freedom of expression and information in the digital environment (para. 13) Freedom of assembly and of association the digital environment (para. 13) *'... best use of digital technologies to stimulate people's engagement and democratic participation' (Chapter 4, para. 15b)*
7. Privacy Embed privacy-by-design and data protection in policies and product development and use	Right to privacy (16)	Right to privacy; personal data protection (67–78) *Interference with a child's privacy should 'be provided for by law, intended to serve a legitimate purpose, uphold the principle of data minimization, be proportionate and designed to observe the best interests of the child' (69)*	Respect for private and family life (7) Protection of personal data (8)	Addressed only marginally Privacy policies for digital services and applications understandable for children (5) Mitigate AI risks to rights related to privacy, safety and	Safe digital experiences (5.1) *'... ensure the privacy, safety and security of children when using digital products and services' (page 3)* *'... methods to prove age in a privacy-*	Protection of children against illegal tracking, profiling and targeting (Chapter 5, para. 22d) Privacy and individual control over data (Chapter 5)

				security (5)	*preserving and secure manner' (page 10)*	
8. Safety Embed safety-by-design in policies and product development and use	Abduction and non-return of children (11) Protection from violence, abuse and neglect (19) Protection from sexual exploitation (34) Prevention from abduction, sale and trafficking (35) Inhumane treatment and detention (37) War and armed conflicts (38) Recovery from trauma and reintegration (39) Juvenile justice (40)	Right to life, survival and development (14) *'Risks relating to content, contact, conduct and contract encompass, among other things, violent and sexual content, cyberaggression and harassment, gambling, exploitation and abuse, including sexual exploitation and abuse, and the promotion of or incitement to suicide or life-threatening activities, including by criminals or armed groups designated as terrorist or violent extremist' (14)* Violence against children (80–3) *'... regular review, updating and enforcement of robust legislative, regulatory and institutional frameworks that protect children from recognized and emerging risks of all forms of violence in the digital environment' (82)* Special protection measures (112–16)	Children's right to protection and care necessary for their wellbeing (24, para. 1) Right to liberty and security (6) Right to asylum (18) Protection in the event of removal, expulsion or extradition (19) Right to an effective remedy and to a fair trial (47) Presumption of innocence and right of defence (48) Principles of legality and proportionality of criminal offences and penalties (49) Right not to be tried or punished twice in criminal proceedings for the same criminal offence (50)	Protection from violence, support of victims and witnesses of violence (3) Child-friendly justice and protection of suspects (4) Use of viable and effective non-custodial measures, use of detention only as a last resort and for the shortest appropriate time (4) Protection from sexual abuse online (5) Voluntary reporting of sexual abuse by ICT companies (5)	Safe digital experiences and protection from harmful and illegal online content, conduct, contact and consumer risks (Pillar 1) Among the risks mentioned are the sharing of non-consensual intimate images, adult content and cyberbullying	Protection of children from *'all crimes committed via or facilitated through digital technologies' (Chapter 5, para. 22)* Protection of children from *'harmful and illegal content, exploitation, manipulation and abuse online' (Chapter 5, para. 22c)* Safety, security and empowerment (Chapter 5) Protection against disinformation, information manipulation and harmful content (including harassment and gender-based violence) (Chapter 4, para. 15d)
9. Wellbeing Enhance and do not harm the health and	Life, survival and development (6) Birth registration, name, nationality, care	Children with disabilities and assistive and protective measures (89–92) *'States parties should … take steps to prevent the creation of*	Children's right to regular contact and relationship with both parents (24, para. 2)	Right to healthcare, (refers to vaccination, cancer, physical and mental health,	Enhanced measures for children's digital wellbeing (through a safe, age-appropriate digital	Improving children's experiences and wellbeing in the digital environment (through age-appropriate

wellbeing of children, including through the use of inclusive design	(7) Separation from parents (9) Family reunification (10) Children unable to live with their family (20) Adoption (21) Refugee children (22) Children with a disability (23) Health and health services (24) Review of treatment in care (25) Social security (26) Adequate standard of living (27) Drug abuse (33) Recovery from trauma and reintegration (39)	*new barriers and to remove existing barriers faced by children with disabilities in relation to the digital environment' (89)* *'Children with disabilities may be more exposed to risks, including cyberaggression and sexual exploitation and abuse, in the digital environment' (92)* Health and welfare (93–8) *'... safe, secure and confidential access to trustworthy health information and services, including psychological counselling services' (94)*	Human dignity (1) Right to life (2) Right to the (physical and mental) integrity of the person (3) Free and informed consent (3, para. 2a) Right to marry and right to found a family (9) Fair and just working conditions (31) Family and professional life (33) Social security and social assistance (34) Health care (35) Access to services of general economic interest (36) Environmental protection (37)	nutrition and healthy diet) (2.2) Targeted medicinal products for children (2.2) Building self-esteem, self-acceptance, confidence and self-worth (2.2) Prevention of unnecessary family separation (4)	environment) (Pillar 1) *'Keeping an up-to-date knowledge base and monitoring the impact of the digital transformation on children's well-being is essential for this and future generations of children in the EU' (page 12)*	materials and services) (Chapter 5, para. 21) Disconnecting and safeguarding work–life balance (Chapter 2, para. 6a) Protection from physical and mental health risks (specifically for workers) (Chapter 2, para. 6b) Access to digital public services (health and care services, electronic health records (Chapter 2, para. 7c) AI for wellbeing (Chapter 3, para. 8)
10. Development Enable children's learning, free play, sociability and belonging, and their fullest development	Life, survival and development (6) Right to education (28) Goals of education (29) Children from minority or Indigenous groups (30) Leisure, play and	Importance of digital literacy (104–5) *'States parties should ensure that digital literacy is taught in schools, as part of basic education curricula, from the preschool level and throughout all school years, and that such pedagogies are assessed on the basis of their results. Curricula*	Consideration of children's age and maturity (24, para. 1) Freedom of the arts and sciences (13) Right to education (14)	Support the development of children's digital competences (5) Effective equal access to digital tools and high-speed internet connection (5)	Digital literacy is discussed substantially Creating a high-performing digital education ecosystem and enhancing digital skills and competences of children (and	Enabling children to acquire skills and competences, including media literacy and critical thinking (Chapter 5, para. 22a) Right to education, training, and lifelong learning (for everyone) (Chapter 2)

	culture (31)	*should include the knowledge and skills to safely handle a wide range of digital tools and resources, including those relating to content, creation, collaboration, participation, socialization and civic engagement. Curricula should also include critical understanding, guidance on how to find trusted sources of information and to identify misinformation and other forms of biased or false content, including on sexual and reproductive health issues, human rights, including the rights of the child in the digital environment, and available forms of support and remedy' (104)* Right to education (99–103) Right to culture, leisure, rest and play (106–11)		Accessible online educational material and education tools (5) Support media literacy, develop children's ability to critically evaluate online content, and detect disinformation and abusive material (5) Right to inclusive, quality education (2.3) Right to develop key competences and talents in formal and non-formal settings (2.3)	teachers and educators) (page 4) Improved media literacy and online safety education for children in schools (page 8) Empowering children to acquire the necessary skills and competences to make sound choices online (Pillar 2) *'Age-appropriate online gaming can support constructive educational and participatory activities online, develop digital skills and competences, and bring other societal benefits (e.g., therapy and culture)' (page 7)* An inclusive environment for all, children with disabilities should be able to play, learn and interact online	Media literacy, digital skills, critical thinking (Chapter 2, para. 4b), up-skilling and re-skilling (Chapter 2, para. 4d) (for everyone) Empowering children to make safe and informed choices and express their creativity in the digital environment (Chapter 5, para. 20)
11. Agency Support child users' decision making and	Freedom of thought, belief and religion (14) Child labour (32)	Commercial advertising and marketing (40–2) *'States parties should prohibit by law the profiling or targeting of*	Prohibition of child labour and protection of young people at work (32)	Prohibition of child labour (6)	Protection from consumer risks (Pillar 1)	Protection and empowerment of children and young people in the digital

reduce exploitative features and business models that harm their agency	Drug abuse (33) Protection from sexual exploitation (34) Prevention from abduction, sale and trafficking (35) Other forms of exploitation (36)	*children of any age for commercial purposes on the basis of a digital record of their actual or inferred characteristics, including group or collective data, targeting by association or affinity profiling. Practices that rely on neuromarketing, emotional analytics, immersive advertising and advertising in virtual and augmented reality environments to promote products, applications and services should also be prohibited from engagement directly or indirectly with children' (42)* Freedom of thought, conscience and religion (62–3) Right to culture, leisure and play (110) Protection from economic exploitation (112)	Prohibition of slavery and forced labour (5) Freedom to choose an occupation and right to engage in work (15) Right of collective bargaining and action (28) Protection in the event of unjustified dismissal (30) Consumer protection (38) European Ombudsman (43) Right to petition (44)	Protection from sexual exploitation and trafficking (6) Gender-based violence, child marriage, female genital mutilation (6) Begging and neglect (6) Inappropriate commercial communication (6)	Enforcement of consumer law in respect of children (page 11) Researching the impact of neuromarketing and how commercial influencing techniques may be unfair on children (page 11)	environment (Chapter 5) Fair, just, healthy and safe working conditions (Chapter 2), protection against unlawful and unjustified surveillance (Chapter 2, para. 6c), transparent AI use (Chapter 2, para. 6d) and human oversight over important decisions (Chapter 2, para. 6e) AI not to pre-empt choices (e.g., in health, education, employment and their private life) (Chapter 3, para. 9d) Empowering free choice, limiting the exploitation of vulnerabilities and biases (e.g., through targeted advertising) (Chapter 4, para. 15f)