

Youth digital skills: Insights from the ySKILLS project

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Children Online:
Research and Evidence

Youth digital skills: Insights from the ySKILLS project

CO:RE Short Report Series on Key Topics



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The CO:RE Project is a Coordination and Support Action within the Horizon 2020 framework, which aims to build an international knowledge base on the impact of technological transformations on children and youth. Part of the knowledge base is a series of short reports on relevant topics that provide an overview of the state of research. This part is coordinated by Veronika Kalmus (University of Tartu, Estonia).

For all reports, updates, insights, as well as full details of all CO:RE consortium members and CO:RE national partners throughout Europe and beyond, please visit core-evidence.eu.



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Key insights

- The ySKILLS (Youth Skills) project examines how digital skills mediate the risks and opportunities related to ICT use by young people aged 12 to 17 years in Europe (see www.ySKILLS.eu). In ySKILLS we understand **digital skills** in a broad sense as **a diverse set of technical/operational, information navigation, communication and interaction, and content creation and production skills**, which are unequally distributed and influenced by individual, social and country characteristics.
- Digital skills are important because they provide opportunities for personal and professional development as well as civic participation. **Lacking digital skills or failing to ‘upgrade’ them seriously limits one’s chances for personal and professional development and active participation in society.**
- Despite their importance, **we know little about how these skills are acquired and how to foster them. We know even less about the positive outcomes of digital skills**, for instance, on children and young people’s wellbeing, social participation or in helping them build (online) resilience.
- Currently, the quality of digital education provision depends to a great extent on formal education, especially on the capacities and initiatives of individual teachers and schools. **More coherent strategies to foster digital skills in formal education are needed, as well as stronger collaboration and concerted efforts with stakeholders beyond education.**
- **It is essential to have a shared understanding of digital skills, adequate conceptualisations, and good indicators to measure them.** Without this common ground, it is difficult to develop effective evidence-based interventions or inform policies in meaningful ways.

What are digital skills, and why do they matter?

We want children and young people to be digitally skilled, but we also know that in increasingly digitalised societies these skills are sharply unequally distributed. Digital skills are necessary for pretty much everything these days. We need them for (remote) work, to learn, to check the news or the weather forecast, to keep in touch with friends, family, and colleagues, for online banking, and increasingly for ordinary chores such as looking for a recipe online, making a doctor's appointment or simply checking one's local bus timetable.

Digital skills are currently conceived as basic competences that everybody must possess regardless of age or socio-economic status. Digital skills are necessary because they provide opportunities for personal and professional development as well as for civic participation. **Lacking digital skills or failing to keep them up to date seriously limits one's chances for personal and professional growth, employability, and active participation in society.**

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 1, Poland)

In order to understand what digital skills are, we need shared conceptualisations and terminology, as well as adequate indicators to measure them. The underdevelopment of sound measures and methodologies to assess the skills that allow young people to interact with digital technologies creatively, critically, and safely is problematic. Inspired by the need for a deeper understanding and better measurements of digital skills, the ySKILLS project aims to help bridge the existing knowledge gap in this area.

The ySKILLS project

The Youth Skills (ySKILLS) project seeks to acquire extensive knowledge and **improved measurement of digital skills** to contribute to building an evidence-based policy. We also aim to **explain the uneven distribution of digital skills through a**

model that identifies the **actors and factors and the pathways** that lead to the acquisition of digital skills and their complex impact on children's cognitive, physical and social wellbeing. The ySKILLS project is funded by the European Union's (EU) Horizon 2020 programme. It involves 15 partners from 13 countries.

In **ySKILLS**, we understand **digital skills** as a *diverse set of technical/operational, information navigation, communication and interaction, and content creation and production skills*, which are **unequally distributed** and **influenced by individual, social and country characteristics**. ySKILLS focuses on the **role of digital skills** as a possible **buffer** against potentially negative outcomes or as a **reinforcement** of the positive outcomes of the use of digital technologies ([d'Haenens, 2021](#)). Because digital skills lie at the core of our project, in its first two years, ySKILLS carried out various activities to obtain a better understanding of current conceptualisations and ways of measuring and fostering digital skills. A systematic review of evidence, interviews with experts from the education sector and the labour market, and roundtables with young people from various European countries offer interesting insights into these topics and highlight the need for further research. One of the milestones of our project has been the development of a robust, cross-culturally validated measurement instrument: The youth Digital Skills Indicator (yDSI; [Helsper et al., 2020](#)).

The ySKILLS project set out to address some critical questions that we want to discuss in this short report: *What do we know about the digital skills of children and young people? How are digital skills conceptualised and measured? How can digital skills be fostered? And what are the implications for policymakers?* This report brings a synopsis of the knowledge gained from three tasks performed in the first year of the ySKILLS project: a systematic evidence review ([Haddon et al., 2020](#)), interviews with experts from education and the labour market ([Donoso et al., 2020](#)), and roundtable discussions with children and young people. The lessons learned from these tasks led to an inventory of actors and factors ([Donoso et al., 2021](#)). All these reports are also available on the [ySKILLS website](#).

What are we talking about when we talk about digital skills?

To date, there are various definitions, terminology and frameworks which attempt to conceptualise digital skills (e.g., [EU DigComp](#), [UNESCO MIL](#)). In the academic literature, different conceptions of digital skills are used, with some researchers conceiving of multiple dimensions of digital skills and others focusing on particular skills (e.g., information literacy or computer programming; [Haddon et al., 2020](#)). Moreover, terms and concepts that are usually distinguished by academics, such as digital skills, competences, and literacies, are in practice often used interchangeably by practitioners, policymakers and the wider public. **However, because the definition of digital skills is not much discussed, it is difficult for the field to come to a consensus** ([Haddon et al., 2020](#)).

Despite the diversity of existing frameworks and terminology, **there is agreement that we can no longer conceptualise digital skills as mere operational or technological competences**. For instance, the ySKILLS project, the EU DigComp and the UNESCO MIL framework consider aspects such as creativity and content creation, communication, and critical assessment of information as key aspects of digital skills.

We are progressively, it seems to me, in Europe and in each country reaching a kind of consensus, maybe not on the competences' breakdown, but on the dimensions that need to be covered in the digital world. (Divina Frau-Meigs, ySKILLS webinar on Thursday, 25 February 2021)

The lack of a common understanding, the plethora of definitions in use (e.g., digital skills, digital competences, digital literacy) and **the lack of comprehensive evaluation frameworks make it difficult to assess the effectiveness of initiatives to boost digital skills**. In other words, despite numerous efforts to promote and develop digital skills, to date, we know very little about which types of programmes and initiatives are most effective for children and young people to acquire and continue upscaling their digital skills.

What do we know about the digital skills of children and young people?

Several studies have been conducted all over the world to study different aspects of digital skills. To identify what is known about youth digital skills and examine the evidence on the antecedents (or factors influencing the acquisition) of digital skills and the consequences of possessing those skills, ySKILLS embarked on a systematic evidence review ([Haddon et al., 2020](#)). This review was informed by the International Telecommunication Union's (ITU) definition of digital skills: "the ability to use ICTs in ways that help individuals to achieve beneficial, high-quality outcomes in everyday life for themselves and others" and to "reduce potential harm associated with more negative aspects of digital engagement" (ITU, 2018, p. 23). Because relatively little research on digital skills was published in the early years of mass internet use (2000–2009), the systematic evidence review encompassed all research published between 2010 and 2020. In total, 110 studies were analysed and scrutinised, representing the majority of available studies. Although the studies included were conducted in 64 different countries, most existing research has been generated in the USA and Europe. We summarise the key findings below.

How are youth digital skills conceptualised and measured?

As observed in the studies analysed, **digital skills are conceptualised and measured in different ways; for instance, through demonstrated or claimed digital skills or through measures of digital self-efficacy**. Demonstrated or claimed digital skills are revealed through performance tests or self-report surveys that ask direct and factual questions, as opposed to self-efficacy, which is subject to social desirability biases (e.g., "I am good at..." or "I am confident about..."). In some cases, studies do not measure digital skills directly. Instead, they are *inferred* from digital uses or activities, which may considerably limit the validity of the research results. Consequently, the ySKILLS systematic evidence review placed less weight on

studies focused on self-efficacy and excluded studies that do not measure digital skills directly.

Most of the studies analysed used self-report surveys, but some (almost one-third) conducted performance tests involving some form of task-based assessment. Interestingly, most performance tests were used to examine the antecedents rather than the consequences of digital skills. In other words, **most knowledge produced so far has aimed to better understand how digital skills are acquired rather than to explore the impact of digital skills on the lives of children and young people.**

What affects the acquisition of youth digital skills?

- There is strong evidence that **children’s digital skills improve with age**. This means that older children tend to possess better digital skills than younger ones.
 - Children from higher socio-economic status (SES) households are found to have higher digital skills in around half of the studies that examine this relationship.
 - Although boys appear to claim better digital skills than girls, these differences disappear when performance tests are used. Therefore, **although boys appear more confident about their digital skills, both boys and girls can excel in different types of skills.**
 - Only a few studies examine **ethnicity** as a **potential source of digital inequality**, and the results are inconclusive.
 - A few studies suggest that **better cognitive skills are associated with better digital skills**. Others point out that the higher a **child’s academic achievement, the better their digital skills**. Motivation also plays a role and possibly, also learning style.
 - Children with **positive attitudes towards information and communication technology (ICT)** have higher digital skills.
- When parents practise **restrictive mediation** – (e.g., setting rules, time limits, and bans on online activities or contents) (see Livingstone et al., 2017), this is linked to lower digital skills in their children. By contrast, **enabling mediation** (i.e., when parents support children’s agency in their internet and social media use) (Kuldass et al., 2021) **is generally associated with better digital skills.**
 - **When ICT is more available in schools, children’s digital skills tend to be better.** Also, those with **earlier or broader access to ICT, including at home**, have better digital skills. However, most of these studies do not examine possible underlying causes (such as household SES).
 - Some findings suggest that **peers can have a positive impact on children’s ability to use technology**. For instance, children who co-use technology with their friends and communicate with friends about technology use have a higher chance of improving their digital skills.

What are the consequences of youth digital skills?

Studies of the consequences of youth digital skills are **less common** than studies of the factors that may lead to better skills. Nonetheless, the ySKILLS systematic evidence review revealed some interesting findings:

- **Few studies examined whether digital skills improve wellbeing**, and even fewer found that they do. For instance, there is some indication that digital skills can have positive effects on body image or experiences of peer victimisation. Still, the research evidence is very limited.
- There is some evidence that **greater digital skills are linked to better learning outcomes for children**, but the evidence base is small, and the diversity of measures used (for both digital skills and learning outcomes) makes it impossible to draw strong conclusions.
- Only a few studies explored the relationship between digital skills and offline youth civic and

political engagement. All these studies found **that some digital skills are associated with different forms of offline engagement**, but others are not. Hence, it is crucial to further study which digital skills have the greatest impact on this type of outcome.

- Children with higher levels of digital skills seem to be better able to protect their **privacy online**.
- Despite existing evidence showing that **better digital skills are linked to more online risk**, better digital skills are not necessarily linked to more **harm**. On the contrary, **better digital skills may help reduce harm**, possibly because children with better digital skills appear better able to cope with online risks. Once again, caution in interpreting these findings is required because the data on the relationship between skills and harm is limited.
- Interestingly, the analysed evidence suggests that **different types of skills could impact outcomes in different ways**. For instance, creative engagement is predicted in one study through social and creative skills and informational skills in another study. Therefore, **more research is needed that examines the differential effect of distinct skill types on different sets of online opportunities** ([Haddon et al., 2020](#), p. 96).

Researching digital skills is not straightforward

Only twelve studies of the 110 included in the analysis used more complex statistical modelling techniques to study the relationship between the antecedents and consequences of youth digital skills. Their findings are complex and bear careful investigation. In general, these studies show that more simple statistical analyses fail to adequately explain the variation in children's experiences of the internet ([Haddon et al., 2020](#)). The analysed studies conclude that:

- The association between better digital skills and more online risk is complex because although **better skills are linked to more online opportunities, online opportunities, in turn, are linked to more risk**.

- Regarding digital inclusion, evidence suggests that digital skills can, at least partially, mediate between pre-existing social inequalities and positive outcomes of digital engagement. In other words, **while social and structural inequalities determine to a great extent variations in the outcomes of children's internet use, digital skills can reduce or compensate for a portion of such disadvantage**.
- Finally, an important conclusion drawn from these studies is "the acknowledgement that specific kinds of skills predict digital engagement or mediate the effect of other antecedents on digital engagement in distinctive ways. So, it is worth examining the pathways from antecedents to consequences for different sets of digital skills and explaining how such distinctive sets of skills relate to each other" ([Haddon et al., 2020](#), p. 109).

What are the views of experts, practitioners, and young people about digital skills?

For gaining a deeper understanding of how stakeholders beyond academia perceive digital skills and to explore how, in their view, these skills should be fostered, ySKILLS conducted 34 individual interviews with experts from the education sector and labour market in six European countries (Estonia, Finland, Germany, Italy, Poland and Portugal). In addition, because young people's insights are also valuable and particularly because their experiences and opinions can differ from those of adults, ySKILLS also conducted six roundtable discussions with 46 children aged 12–18 in Belgium, Finland, and Portugal.

What have we learned from education and labour market experts?

- The experts agreed that **with digital technologies being more and more embedded in our daily lives, digital skills have become indispensable** not only for successful integration into the working world but also for many other aspects of life, including social and political participation. Labour market experts believe that advancing digitalisation and developments such as automation and the use of artificial intelligence will lead to an even greater role of digital technologies in our future working lives.
- Both education and labour market experts shared a similar understanding of digital skills and stressed that **being ‘digitally skilled’ means more than possessing technical know-how**. As a matter of fact, most experts regard digital social interaction skills, such as ‘collaborating’ and ‘interacting’ through digital technologies, and critical thinking skills as more important than technical, operational skills.
- **Experts were sceptical regarding the existence of a ‘digital native’ generation**. Instead, in their experience, many young people are not as tech-savvy as adults or the young people themselves tend to believe. Therefore, younger generations need to be actively supported in acquiring digital skills.

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 5-year-old and saying: go ahead and drive. (Labour market expert, Finland)

- The experts highlighted those digital skills **were relevant not only for children or the workforce**. Instead, every citizen needs to be offered enough opportunities to acquire and improve their digital skills throughout their lives.
- **The experts voiced concern about the risk of exacerbating existing social and digital inequalities** and observed that certain fractions

of society, such as children from socio-economically disadvantaged back-grounds, remain excluded from access to digital technologies and good quality education and training. The experts feared that, because of the digital divide, these children might not only be left behind in the labour market but will also lack opportunities for social and political participation. Apart from socio-economic disadvantages, inequalities along the lines of age and gender were also mentioned.

- The formal education sector was identified as having a key role in the development of digital skills since it is in a unique position to reach most children and their families. However, both labour market and education experts criticised the current state of digital skills education in schools. In their view, **the education system has been and remains slow to adapt to digital developments, and school curricula appear to be out of touch with children’s reality outside of school**. In particular, the labour market experts feel that students are not being well-equipped with the skills in demand in today’s job markets.

The current programmes offered in school and university education are often not adequate. The digital world follows logics that are not those of classical education. (Labour market expert, Italy)

- **The education experts** were more outspoken on the positive aspects of digital skills development in the formal education system. They **particularly stressed the motivation, openness, and interest of teachers in digital technologies** and their creative incorporation in teaching-learning experiences, especially when the Covid-19 pandemic hit the world.
- Although the formal education sector has a key role in fostering digital skills, the experts agreed that it should not bear the sole responsibility for it. Consequently, cooperation between the formal education sector, the private economic sector and the research community should be promoted to ensure that everyone has access to both the necessary infrastructure and good quality education that ensures a good level of digital skills.

What have we learned from children and young people?

The 46 adolescents who participated in the ySKILLS roundtables provided deep, personal insights into the impact of digital technologies in their lives. They openly shared their views about their digital media consumption, forms of engagement, and creative experiences, but also the difficulties and frustrations they encounter in the online platforms they use every day. The main findings from these roundtables are summarised below:

- **Mastering digital skills was perceived by adolescents as essential in increasingly digitalising societies.** However, as opposed to the views of adults, **youngsters highlighted the importance of acquiring (basic) technical and operational skills** and of being able to use computers and work-related software. In their view, this will be vital for their future professional lives. Information retrieval and interaction, and communication skills are also valued, but to a lesser extent.

It is important to know how to work with Excel/Word/PowerPoint, because it will be important in the future, for college and work. And the other digital competence that is important is sending an email because it is most used professionally. (Teenager, Portugal)

- Surprisingly, **“traditional” means of communication such as talking with someone face-to-face, calling someone on the phone or sending text messages were highly valued among teenagers** and were chosen as their preferred option for sharing more intimate and personal information with their peers and families.
- **Adolescents referred to a wide range of concerns related to their online experiences.** These included excessive social media use, increasing pressure to be constantly online and the fear of missing out (FOMO). They also referred to online aggression, such as cyberbullying or hate speech, and to a lesser extent, to privacy and commercial-related types of risks.

- **Many teenagers referred to the deficient digital skills of elderly people.** Young people considered elderly people as the least digitally skilled. In fact, most participants referred to one or both of their grandparents as an example of the “least digitally skilled” person they knew. Some teenagers also referred to (some of) their teachers as lacking digital skills. This coincided with the views expressed by education experts who also felt that more professional development opportunities for teachers are needed. **Only a few adolescents indicated that their parents lacked digital skills**, while several acknowledged that their parents helped them solve technical or other types of problems encountered online.

I would like to add my grandparents. They are also old, of course. But because they didn't get it, they can't work with it [...], they didn't grow up with it, I think these people really are the example of the least digitally skilled. (Teenager, Belgium)

Conclusions and recommendations

Given the importance of digital skills and literacies for young people's lives and the increasing reliance on digital technologies for learning, employment, and civic life, in this last section, we provide some recommendations for the continued enhancement of existing knowledge and fostering digital skills.

Academic research community

- **There is great variety, and probably even confusion, in understanding what digital skills mean.** The academic community can play an important role in helping to clarify this by providing clear definitions and measurement indicators of digital skills. The lack of a common understanding increases the difficulty of designing an overarching, systematic strategy to develop digital skills.
- While studies suggest that better skills bring benefits to children's learning, participation, and

other outcomes (e.g., wellbeing), **more research in general, as well as longitudinal research in particular, is needed to examine these relationships** and to establish more clearly which digital skills are worth promoting in relation to which positive outcomes.

- While the internet is increasingly available worldwide, most research available has been conducted in the minority world (i.e., the countries where a minority of the world population lives). **More research in the majority world (where most of the population lives) should be promoted and funded.**

Policymakers and regulators

- Research suggests that **improving digital skills can help mitigate, at least to some extent, the impact of social inequalities. Therefore, more opportunities must be provided for all children, especially for those in vulnerable situations**, to develop these skills beyond school (e.g., in libraries, youth centres). This requires sufficient opportunities for professional development for teachers and other professionals working with children (e.g., librarians, youth workers).
- Currently, the quality of digital education provision depends to a great extent on the capacities and initiatives of individual schools and teachers. Consequently, **more coherent strategies to foster digital skills in formal education are needed, as well as stronger collaboration and concerted efforts with stakeholders beyond education.**
- Although most young people in the EU possess some form of digital equipment and connectivity, there are still groups who only have limited or no access to these technologies. The latter face growing digital and social exclusion as digital technologies become an indispensable part of their lives. **Stronger, coordinated efforts are required to minimise digital inequalities.**
- The digital skills children need, both as members of society and as future members of the labour market, are becoming increasingly

complex. **Comprehensive digital education programmes covering a wide range of skills, and not just technical ones, are necessary** (e.g., social interaction, communication, collaboration, content creation). Equally, skills such as problem-solving and critical thinking need to be fostered from a young age.

Educators

- **Schools and teachers need to stay up to date with technological innovations and trends concerning young people's digital uses.** Therefore, good quality training resources and enough opportunities for teachers to update and enhance their own knowledge and digital skills throughout their careers are crucial.
- As research suggests, peers can have a positive impact on children's ability to use technology. Therefore, **it is worth promoting ways for children to co-use technology with their friends at school and in other educational settings.**

Labour market and tech industry

- **The tech industry should cooperate more closely with the education sector and thereby support schools in preparing young people for their entry into the labour market.** However, it is crucial that these partnerships take place within an ethical, non-commercial framework which fully respects children's rights.

Families and carers

- Different styles of parental mediation have different impacts on children's online opportunities and consequently on their digital skills. **Hence, parents need to be supported so that they are better equipped to mediate their children's engagement with digital technologies.**
- **Parents and caregivers should show interest in the digital activities of their**

children. They should also communicate openly about the potential risks and benefits of these technologies and be supportive when their children encounter negative online experiences. This will allow them to be in a better position to offer effective and appropriate guidance to use digital tools.

- **Adults need to be aware that they are role models for children, also in the use of digital technologies.** Therefore, they should reflect on their own usage patterns and potential problematic aspects that could negatively impact their children's engagement with digital technologies.

Children and young people

- **Children** can play an active role in their own education. To this end, they **must be given more opportunities to help shape the development and implementation of digital education in their schools and beyond**, for instance, by consulting them when educational resources are developed or when curricular decisions in this area are made.

Media outlets/journalists

- The media sector can be a key partner in supporting education efforts. Especially if the sector takes on a more active role in informing the broader public in a balanced way about the positive and negative effects of digital technologies, but also by helping citizens to become more critical consumers of digital technologies and content (e.g., by raising awareness of phenomena such as fake news).

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