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Gouseti, Anastasia; Bruni, Isabella; Ilomäki, Liisa; Lakkala, Minna; Mundy, Darren ...

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DETECT

Developing Teachers' Critical Digital Literacies

Critical Digital Literacies framework for educators

DETECT project report 1

Authors: Anastasia Gouseti, Isabella Bruni, Liisa Ilomäki, Minna Lakkala, Darren Mundy, Juliana Raffaghelli, Maria Ranieri, Alice Roffi, Marc Romero, Teresa Romeu

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Title: Critical Digital Literacies framework for educators

DETECT project report 1

Authors:
Anastasia Gouseti, University of Hull
Isabella Bruni, University of Florence
Liisa Ilomäki, University of Helsinki
Minna Lakkala, University of Helsinki
Darren Mundy, University of Hull
Juliana Raffaghelli, Open University of Catalonia (UOC)
Maria Ranieri, University of Florence
Alice Roffi, University of Florence
Marc Romero, Open University of Catalonia (UOC)
Teresa Romeu, Open University of Catalonia (UOC)

Design
humandesign.co.uk

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Introduction

Increased access to digital technologies and social media has created new opportunities and challenges for education. New tools are used by schools to support teaching, learning and interaction (Rosenberg et al., 2018), facilitate teachers' professional development (Lantz-Andersson et al., 2018) and promote online school-related conversations with parents and other audiences (Kimmons et al., 2018). Despite these educational and other opportunities, the increased use of such digital technologies challenges existing pedagogical models and raises questions in relation to educators' digital literacies. Some of these challenges include ensuring that digital technologies are used in pedagogically informed meaningful ways to support teaching, learning, communication, and collaboration. Furthermore, although acquiring technical skills is often prioritised, enhancing teachers' critical disposition and critical digital literacies is equally significant since these competences are transferable across digital contexts and, therefore more relevant to the fast-paced realities of everyday digital practices (Pangrazio, 2016). At the same time there is a pressing need to support students with developing critical digital literacies needed for learning, communicating and participating in digital words within and outside school contexts.

Against this background, the three-year DETECT project (2019-2021) funded by Erasmus+ KA2 focuses on supporting educators with developing critical digital literacies through a range of activities and intellectual outputs. In particular, DETECT comprises a consortium of four Higher Education Institutions and one research institute with expertise in the fields of digital literacies, teacher training and e-learning, as well as four partner schools who have been active adopters of a range of digital technologies, and are looking to enhance their understanding and competences in relation to critical digital literacies. The next section will now go on to outline the rationale of the DETECT project and present the aims of this report in more detail.

Aims and Objectives

The project's rationale is aligned with a range of policies that focus on the importance of digital literacy at national and supranational level. To this end a range of frameworks have been created such as UNESCO's Digital Literacy Global Framework (Law et al., 2018) for assessing, monitoring and developing digital skills in adult populations and the European Framework for the Digital Competence of Educators (DigCompEdu) that provides a general reference frame for the development of educator-specific digital competences (Redecker, 2017). While these two frameworks are respectively directed towards adult populations and educators at all levels of education and across a range of learning contexts, DETECT aims to focus exclusively on supporting primary and secondary school teachers in developing their own and their students' critical digital literacies. This involves reconceptualising the notion of digital literacies in order to look beyond basic technical ICT skills, such as internet use for information search and retrieval, and to encompass instead a richer set of critical digital literacies that are tailored specifically to educators' personal and professional needs within a school context. In addition, we aim to take into account novel and emerging issues with respect to digital literacies which are seldom discussed in education. In particular, the project objectives focus on the following:

- developing an understanding of teachers' needs in relation to critical digital literacies within a school context;
- raising educators' awareness regarding the complexity of using digital technologies and social media for educational and institutional purposes as well as for professional development and lifelong learning;
- empowering educators so that they can take informed decisions regarding digital technologies and social media use and what they share online within the context of the school setting;
- providing training to educators so that they can make pedagogically meaningful and safe use of digital technologies;
- creating and user-testing in collaboration with educators a range of intellectual outputs and resources on the topic of critical digital literacies (e.g. MOOC and toolkit).

In light of the above context, this first project report will present the Critical Digital Literacies framework that has been created as part of the project's Intellectual Output 1 . This new framework is not intended to replace other national or international efforts aimed towards assessing and developing digital literacies but rather to complement these and contribute to the ongoing debate in this fast-changing field. More specifically, it aims to bring together the various dimensions of other literacies, such as digital literacy, information literacy, media literacy and data literacy that have been identified in the literature, and policy-making, and synthesise these into a comprehensive framework that will allow teachers to reflect upon, assess and further develop their critical digital literacies.

Methodology

This framework is the result of collaborative work across all project partners and has been informed by a range of research and other activities. These included: i) a systematic literature review in the area of critical digital literacies, ii) empirical research conducted across our four primary and secondary EU school partners, and iii) expert panel meetings at various stages that helped to refine and finalise the framework. More specifically, the systematic literature review consisted of searches from databases Web of Science and Ebsco. Altogether 234 articles were found relevant for the framework, and 553 various terms were identified. Additionally, several policy-related documents and frameworks were analysed.

The preliminary results revealed that apart from basic ICT competencies as well as information literacy practices and media understanding, schools and teachers should also pay attention amongst others to the following: safety issues, such as risky content or contacts, privacy and sharing of personal information; ethical issues, such as online bullying, respect for others in digital communication, copyright, and equality in access to the digital world and skill learning; development of a critical attitude to technology and understanding the computational thinking, including algorithms and data usage and abilities to analyse and judge media messages and fake news.

Furthermore, the systematic literature review findings suggest that many of the articles focused on negative issues and only a few on the positive possibilities, such as enjoying gaming or creative digital expression, which can often play an important part in young peoples' lives. These results were then reviewed and integrated through six meetings adopting the 'Panel Experts' method (Coulter et al., 2016). When revising the framework, the researchers highlighted some emerging issues, such as digital well-being and digital activism and also identified positive issues. The framework design and the creation of the various sub-dimensions were also informed by empirical research which consisted of semi-structured, focus group interviews conducted with teachers from the four participating schools in Finland, Italy, Spain and the UK. These allowed the DETECT team (researchers and teachers) to develop an in-depth understanding of current pedagogical practices and future needs in relation to critical digital literacies within a school context. The empirical findings from the focus group interview are outlined in a different project report (Gouseti et al. 2021).

Overview of the CDL framework

The new CDL framework for schools presented in this report includes the following main dimensions of digital literacies: *Technology Use, Data Literacies, Information Literacies, Digital Knowledge Creation, Digital Communication and Collaboration, Digital Well-being and Safety, Digital Citizenship and Digital Teaching and Learning*. These are presented in Figure 1 below. Figure 2 provides an overview of the different sub-dimensions that have been identified as relevant for each area of digital literacy and these are presented in detail in the next section of the report. It should be noted that the structure of the sub-dimensions is naturally somewhat artificial and there is potential overlap since some of the sub-dimensions could fall under two different dimensions. As such, the eight dimensions identified below should not be seen as 'distinctive' but instead aim to capture the bigger and more complex picture of critical digital literacies as well the complexity of educational practice in relation to this area.

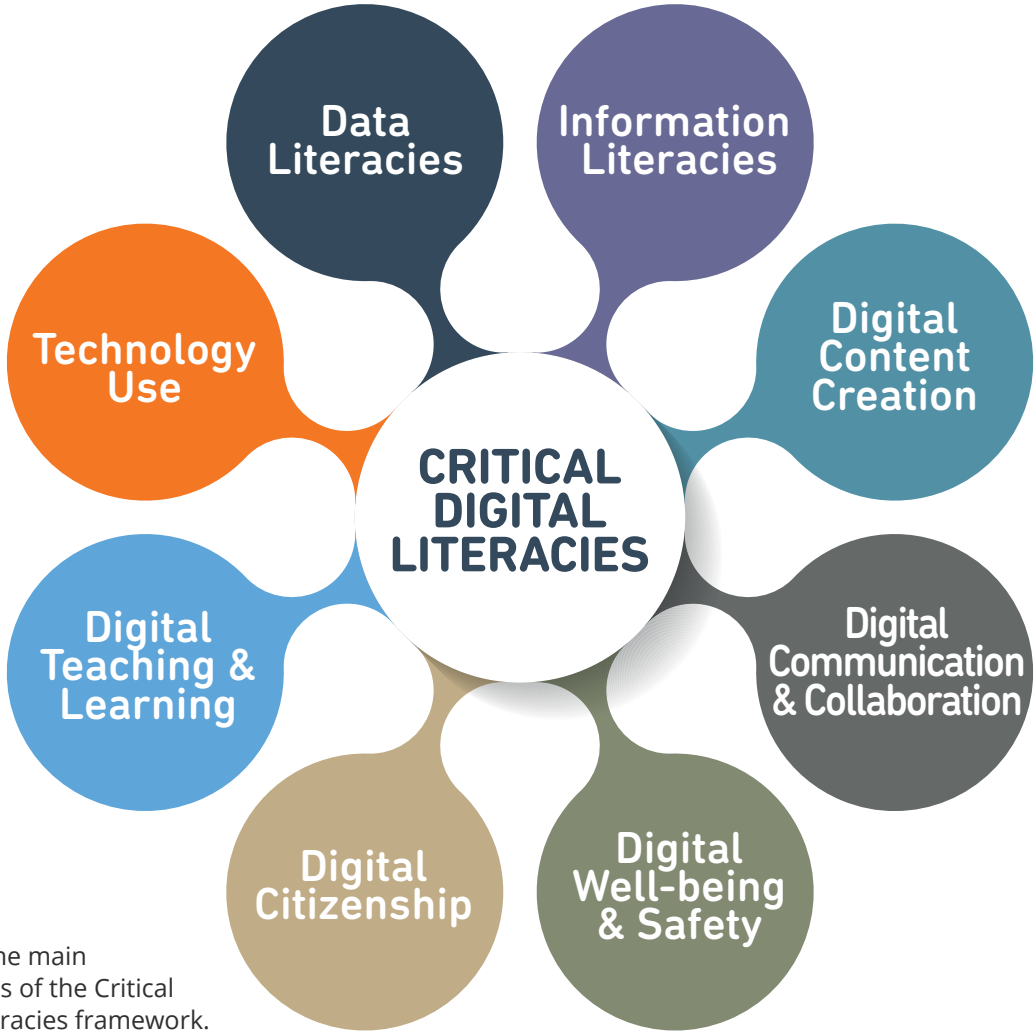


Figure 1: The main dimensions of the Critical Digital Literacies framework.

Critical Digital Literacies

TECHNOLOGY USE
- Critical technical skills
- Computational thinking
- Technology risks & troubleshooting

DATA LITERACIES
- Data analytics
- Data protection & data safety
- Big and open data
- Data visualisation

INFORMATION LITERACIES
- Digital media use
- Online reading comprehension
- Online inquiry process
- Source validation & verification

DIGITAL CONTENT CREATION
- Creative digital expression
- Co-creation
- Multimodal production
- Digital publishing
- Remixing

DIGITAL TEACHING & LEARNING
- Digital pedagogical methods
- Learning analytics
- Digital learning ecologies

DIGITAL CITIZENSHIP
- Rights & responsibilities
- Sustainable use
- Digital civic engagement

DIGITAL WELLBEING & SAFETY
- Empowerment
- Online safety
- Digital overexposure
- Digital selfhood
- Digital belonging
- Ergonomics

DIGITAL COMMUNICATION & COLLABORATION
- Online communication
- Online collaboration
- Digital empathy
- Networking
- Digital identity & profiles
- Online privacy

Figure 2: The dimensions and sub-dimensions of the Critical Digital Literacies framework.



The CDL framework in detail

This section focuses on the various sub-dimensions of Critical Digital Literacies included in the framework. In particular, it aims to explain in brief what these different sub-dimensions entail and highlight why and how these are relevant for educators and students alike.

Technology use

Technology use is naturally one of the basis for critical digital literacy. Various technical skills are significant for understanding digitalisation in general, and all people should have relevant competence in using digital technology for their daily life, for studies and work.

We can regard digital competence as a critical and necessary condition for wider competence of critical digital literacy but some basic technical skills are not sufficient. For this framework, we have focused on three sub dimensions in technology use: Critical technical skills, Computational thinking and Technology risks and troubleshooting.

1. Critical technical skills

Liisa Ilomäki

Relevant technical skills include skills of using digital technology and applications which are needed for everyday life, work and studies in a meaningful way. Technical skills are significant for understanding digitalisation in general, and, for example, the other elements of this framework.

Because digital technology is in constant change, similar to daily life and expectations for work and studies, it is not sensible to create lists or models of the necessary technical skills in detail. The level of technical skills vary from very basic skills to the use of a computer, tablet or some applications to develop a real mastery of digital technology. For learning technical skills, one should learn to understand the principles of digital technology, not only to mechanically repeat some basic operations of using digital tools or applications. It is widely accepted, and promoted on international policy level, that digital skills are one of the key competencies and it is essential that every citizen should master these. Technical skills also include innovative and meaningful use of ICT which requires sufficient technical competence.

At school, an effective way of learning technical skills is to embed them in learning assignments, e.g., learning writing with a computer embedded in writing tasks or learning to use a presentation application embedded in doing a presentation about a topic. In different countries the national strategies vary in how much schools themselves can decide about teaching technical skills. If this decision making is at school level, teachers should have joint agreements on how to teach technical skills

and how and when to use them. From a critical perspective, one of the key items is understanding when and how to use the skills developed, and understanding how the tools can solve problems and provide creative input to particular situations.

2. Computational thinking

Anastasia Gouseti

This refers to: i) understanding the basic/ fundamental principles and concepts of computing, coding and programming (e.g. understanding what algorithms are, creating and debugging simple programmes, using logical reasoning to explain how simple algorithms work and detect and correct errors). ii) designing tasks and activities for students to develop and enhance their computational thinking skills (required in UK curriculum).

3. Technology risks and troubleshooting

Anastasia Gouseti

This sub-dimension refers to the ability to identify and mitigate technical risks associated with hardware viruses and security risks (e.g. spyware and adware) as well as the ability to overcome technical issues and engage in effective troubleshooting. In particular, within a school context this can involve: identifying and solving technical problems when using digital platforms and tools to facilitate teaching and learning; developing strategies for creating strong, secure passwords and keeping these safe; supporting students and families with resolving technical issues; developing students' awareness of technical risks when operating devices and participating in online environments, and thus reducing their exposure to such risks; and last, using the school's software and hardware technologies in a responsible ways.

Data literacies

Data literacy relates to an intertwined group of skills including not only the techniques to process data but also the ability to analyse data as a social and cultural phenomenon with implications for our personal lives. With the unprecedented evolution of digital systems and environments, digital data from users can be collected, shared, or simply extracted. This situation has a social impact, based on both enthusiastic and cautious discourses around data in society.
At the school level, it is important to go beyond students' understanding and practice relating to producing data. A critical perspective around data includes diversified areas of practice such as considering the beneficial potential of data on democracy and social innovation when shared as open, public knowledge; interpreting critically graphs and or numbers used in informational contexts aimed at specific targets; understanding how personal data or data shared through social media can be used to feed algorithms supporting intelligent systems (like the recommendations or nudges in mobile web apps) which can modulate users' behavior. The subdimensions explore these ideas, and are Data analytics, Data protection and data safety, Big and open data usage, and Data visualisation.

1. Data analytics

Juliana Raffaghelli

Data analytics refer to a new phenomena of massive digital data collection, elaboration and representation through dynamic/ interactive graphs (also called dashboards) and text across the internet, mobile apps and other connected digital devices (like the Internet of Things). While this could generate innovations in digital products and services, it has also been argued that data tracking by some few big companies allow them to extract high value from the behavioral, emotional and cognitive patterns observed through data, processed through specific algorithms (automatic instructions based over data to generate outputs like texts, graphs or further actions within digital systems). Particularly, personal information represented through interactive dashboards relate to a phenomenon that has been called "the quantified self". In this scenario, it appears that the users are increasingly attracted by the quantification of all sorts of information (political, social, economic, etc.). When aligned with forms of personalised communication, where data is translated into automatic recommendations and dashboards, with specific impacts over the life of individuals, this creates a critical side of data analytics.

As a matter of fact an outcome that is under debate relates to the fact that data analytics have become an exchange value, of which not all users are aware or in the position to control. Recently coined concepts as "data slavery" (the personal freedom constrained by the algorithms built over our interaction with the techno-structure) and "dataveillance" (the continuing tracking of our wired lives with personal data) highlight the fact that the users are paying a high price in the digital interaction.

Educational interventions at school should deal with awareness and some initial technical skills supporting students' agency in relation to data analytics. Some activities could cover understanding the business models behind social media platforms; the way personal data is extracted and used; what algorithms mean and how they are used in recommender systems. This would entail a deeper debate over the effects (including social inequalities) entailed by "surveillance capitalism". Moreover, a debate around the addictive impact of the recommending systems, digital alerts and dashboards, should also be a focus of work at school, in connection with the data analytics implemented within platforms used daily by the students.

2. Data protection and data safety

Darren Mundy

Data protection in simple terms covers who has the right to access data about individuals and how they store and use it. Data protection is covered by laws such as the General Data Protection Regulations (GDPR) at a pan-European level. However, the key critical aspects are not just how organisations structure themselves to protect our data in line with legislation, but how we as citizens develop an understanding of the data we are sharing, and how it is being used - how we develop our own sense of agency regarding our data and own its use. Concerns related to the use of data can impact on the safety of citizens not just to result in financial penalty, but also personal safety issues about the sharing of location data etc. Therefore at school level the key issues to engage with are developing an understanding of the data that each individual student shares, understanding who they share it with, the risks associated with this, and understanding the structures that are there to help us protect our data, including proactive decisions about not using particular applications or websites.

3. Big and open data

Juliana Raffaghelli

Big data refers to the massive amount of digital data that can be collected and analysed in relatively short timeframes and at low cost. Big data is created upon the data trace, namely, the collection and storage of digital data generated by the users upon their interactions with digital and smart environments. There is controversy regarding the positive and negative issues relating to the usage of big data, processed through several Artificial Intelligence techniques (See the term "data analytics"). Some of the negative effects are connected to the usage of private data extracted from social media or other digital platforms; addressing users' attention to commercial products or services through the data mined; profiling of users (understanding their likes and dislikes) and usage of such information for social, political and market decision making.

The positive perspective over data usages can be connected to a movement based on the usage of public data like Open Government Data and OpenResearch Data. In fact, there are groups of citizens and small companies which could strongly benefit by creating services through the usage of such open data.

However, the big and open data usages require advanced technical skills and civic engagement that go well beyond the actual opportunities of less educated collectives. Moreover, the most refined training offered by massive open online courses, continuing training and higher education, have mostly addressed the technical side of data engagement, encompassing business oriented, positivist approaches, as it has been documented through the analysis of data literacy models. Educational interventions should go beyond technical skills (like data collection, statistical processing, computational treatment and graphic elaboration). Instead a political and ethical vision of data usages in the society has to go hand in hand with such technical requirements. At school, simple forms of open data can be used as open educational resources, through critical and interdisciplinary lenses. For example, topics belonging to the sphere of health, environment or social care could be supported by the search of open datasets at public open data repositories; the data could be treated using basic statistics and algorithmic procedures (entailing computational thinking) and lead to the development of infographics/visualizations. This information would be the base to promote further debate about civic engagement and participation.

4. Data visualization

Juliana Raffaghelli

Data visualisation has been portrayed recently as the ability to understand the data arranged through graphical means. This is not a new practice (data has been used by governments and businesses to support discourses, strategies and campaigns) but the recent computational and graphic technological developments have encompassed new attractive forms of visual representations. These new approaches include the possibility of dynamic visualisations where the data can be arranged according to the user queries over a dataset, but most importantly, artwork.

In terms of education and training, data visualisation has evolved from the ability to read data to the ability to generate engaging, colorful and original visualisations of data embedded into infographics. However, a critical vision of data visualisation entails also the development of a capacity to understand the several layers of meaning in a visualisation, through the lens of semiotics (the art and science of interpretation, which has been applied to other mass and digital media).

The design or the ability to read visualisations requires, in addition to technical statistical and programming skills, a contextualized and contextualizing

approach, seeking not what is new, or what others define as “useful”, but what may be relevant and aesthetically “equitable” for the human group who has created a representation to whoever reads it.

There are several types of visualisations: those generated from a more traditional statistic to deal with socio-demographic aspects; the graphics used for scientific communication; infographics and other data representations adopted by journalism; as well as interactive visualisations within apps and platforms (also called dashboards), which might have impacts on human attention and behaviour. Each of these visualisations can be the object of reading and deconstruction across educational activities.



Information literacies

The dimension of information literacies is essential because information is a critical topic when we talk about the internet, social media, fake news and overload of information in our new media landscape. In particular, information literacy can refer to the ability to locate and evaluate information, think critically about how it has been created and understand how it can be used to create new knowledge. Within the CDL framework, Information literacy encompasses the four sub-dimensions of Online reading comprehension, Online inquiry process, Source validation and verification, and Digital media use.

1. Digital media use

Alice Roffi

The increasingly pervasive and frequent presence of digital technologies in everyday life to mediate social relationships and to provide access and use of various digital media (such as journals, news, social media), leading to a substantial impact on a person's life. Thus, it is of considerable importance to promote conscious use of these media by adults and young people and also their relationship with social media, in order to exploit the positive potential of the platforms for growth and participation in society, and also for their use in their educational development.

In particular, it is essential to have a critical understanding of digital media, which are not free online services, but the most advanced form of a new model of business that could be named "digital capitalism". The famous quote "if it's free, you are the product" summarizes the importance of overcoming a superficial vision of the media to understand instead its deep dynamics and the power it can exert on our own choices, and also on our political and social behaviors. In addition, it is also necessary to understand how to use digital media in the educational field for teaching and learning.

2. Online reading comprehension

Liisa Ilomäki

Online reading comprehension refers to the competence of understanding the content published on the Web. The reading of Web based articles is a different process compared to reading printed documents: the printed document is generally complete in itself, and comprehension consists of technical understanding (reading skills), and such other issues as understanding the underlying message and having an understanding about meta-information (such as the length of the text, the meaning of the titles, or the table of contents). Comprehension of an online document includes, of course, also the technical competence of reading, but also the following skills: the technical use of the application (how to start, how to proceed, how to use a mouse etc.), understanding the meaning and use of internal and external links, the multimodality of the "text" (besides text and pictures, there can also be videos, music, simulations etc.). Online literacy is in a process of constant change, and the information is strongly related to its background.

Moreover, online literacy consists of different types of "products": blogs, vlogs, emails, online journals and e-books, online articles etc.

In a school context, it is important that students work with different types of digital material and that they also produce these themselves. Students usually learn during leisure time to work with some digital materials, but at school they should learn online reading competence in a systematic way by frequently working through a variety of different subjects and types of resources in assignments at all levels of primary and secondary education.

3. Online inquiry process

Liisa Ilomäki

Online inquiry means the process of successfully seeking information for open questions and challenges using sources from the Internet. As such, online inquiry consists of similar steps as any inquiry: to set goals for the inquiry, plan the process, create meaningful search terms, search for information, to evaluate its relevance and credibility, to synthesise the results, and finally to present the results.

Searching information from the Internet is a demanding activity for students, at all levels. First, there has to be enough background knowledge about the topic for creating search terms and other search options. Second, to evaluate relevance and credibility of the findings requires understanding the principles of truthful information. Students need to understand, e.g., the nature of fake news. At school, students learn online inquiry skills best if they can practice these skills during school years, starting from small-scale inquiry activities. The teachers' task is to create the inquiry assignments, support and scaffold the process, but let the students take the responsibility of managing the inquiry task involving all stages.

4. Source validation and verification

Isabella Bruni

The great amount of information available on the web can be considered to be a substantial benefit, but at the same time it requires the ability to search, select and evaluate information reliability and a source's credibility. On the web, everyone can publish digital contents (through social media platforms and other user generated websites), without any standards or quality requirements: incorrect or misleading news (fake news), could be published intentionally, while the sharing practices facilitate their dissemination without control. Children and young adults are increasingly exposed to the negative implications derived from the quantity and quality of digital information, due to their role as consumers and to their lower risk perception than adults. In this context, it is necessary to train young people in online inquiry (as detailed above), on evaluation of information according to its reliability and credibility, and on how to creatively use the information found. Nevertheless, some

scholars have pointed out that education paths for information literacy cannot be the only answer to the problem of fake news, and that regulatory intervention on platforms may be the most appropriate way forward.

Digital content creation

The dimension of digital content creation means practices and related competencies where people create something using computers and digital tools. Content creation can be done individually or collaboratively with others. The basic practices to create all kinds of materials like reports, videos, or pictures digitally are familiar for everyone and also common activities in schools. The sub-dimensions of digital content creation that our Critical Digital Literacy framework highlights are such that require more advanced skills, or are not so common or they include issues that require some kind of critical attitude. The sub-dimensions are: Creative digital expression, Co-creation, Multimodal production, Digital publishing and Remixing.

1. Creative digital expression

Liisa Ilomäki

Digitality is one more tool for creative expression, and there is a wide variety of digital art and other creative outcomes as well as artists who use digitality as a starting point for their artistic work. In creative digital expression, technology is not just a tool (e.g. as word processing is a tool for writing stories, or poems, and a digital piano for playing music), but it has an independent role in the artistic outcome. For instance, a computer produces a combination of music and pictures randomly, of course based on the design of the artist. Digitality also offers new possibilities for "old" forms of art which changes the previous outcomes; e.g. animations using digitality. It is expected that creative digital expressions will have many more forms with application of other technological innovations, such as artificial intelligence.

Within a school context, creative digital expression can offer students opportunities for such activities, which, similarly as any artistic activity, help them to understand the world and themselves. In addition, digitality is often a natural world for students and motivates them as such. These creative activities offer possibilities for natural integrations with music, visual arts, technology education and maker-culture in general.

2. Co-creation

Minna Lakkala

Co-creation can be defined to mean practices in which two or more people interact with each other to produce something together. Co-creation can relate to items such as, designing and developing new goods and services, authoring texts and media products for publishing, developing solutions to joint problems, and to creating artistic compositions. Web-based digital tools, such as cloud services and interactive platforms have vitally changed the possibilities for co-creation, because they enable the sharing and modifying of digital knowledge artefacts together in ways that have not been possible before: sharing the joint artefact and working with it online, and even at the same time. Participation in digital co-creation requires skills to manage so-called socio-material practices, which include engagement in social interaction, coordination of activities, modification of artefacts as well as application of digital tools for mediating the joint efforts. In educational settings, co-creational activities can be used as a group work method to support students' learning of some content, but they are also important to provide students with opportunities to learn important competencies for digital co-creation and socio-material practices.

3. Multimodal production

Darren Mundy

Multi-modality involves the production of works which contain two or more different forms of engagement e.g. the combination of text, image, video and sound. An example in physical form would be a picture book, the combination of visuals and text, and sometimes objects to touch and feel. In digital forms, it could be for example, the inclusion of video content within a news item, or the addition of an animal sound to an article about animals. Digital artefacts offer opportunities to take advantage of the affordances of the platform, and enhance traditional experiences. In a school based context, this can often be explored through the development of digital news articles about particular items, enabling students to combine materials that they discover from multi-modes into a singular news piece. This could enable the notion of 'digital authoring' and the ways in which children create multi-modal, digital media texts to be explored. In addition, items such as games and hypermedia texts can be constructed which enable individuals to traverse or combine together multiple modes of consumption.

4. Digital publishing

Darren Mundy

When we think about digital publishing, we are generally thinking about how we either transform existing content from their existing forms into digital versions (e.g. print to digital), or how we capture

content straight to digital platforms. Digital Publishing brings with it a range of issues that we need to continue to consider and develop responses to. For example, Intellectual Property Rights; funding and licensing models (e.g. Open Access licensing); interoperability, access and archival issues; curation; capitalising on the affordances of digital forms. In a school based context the focus will fall on both the creative aspects of Digital Publishing, how we design and deliver digital content; and on discussion of the issues linked to it.

5. Remixing

Minna Lakkala

Remixing means to take cultural artifacts, like stories, videos, pieces of artwork, or photographs, and modify or combine them into new kinds of products. Digitalization has made remixing easy and it provides a popular way to create new digital artefacts or media products by altering and combining existing ones. Digital remixing is a modern way of producing knowledge, and it also relates to building identities and participating in digital cultural practices. Remix literacies include mastering relevant digital techniques but also understanding media representations and cultural practices of remixing as well as respecting copyright principles and the ethical aspects related to remixing.



Digital communication and collaboration

The dimension of digital communication and collaboration refers to using digital technologies such as social media and other web-based platforms and tools for communicating and collaborating online. Although this is not a new phenomenon it has gained popularity with the increased use of mobile technologies and the recent move to remote education during the pandemic. The dimension of digital communication and collaboration included in the Critical Digital Literacies framework emphasises the need to develop a more critical stance and develop an in-depth understanding of the opportunities and challenges associated with online communicative and collaborative practices. The sub-dimensions are: Online communication, Online collaboration, Digital empathy, Networking, Digital identity and profiles, and Online privacy.

1. Online communication

Anastasia Gouseti

This refers to the ability to use a range of digital platforms and tools to communicate effectively online with students, parents, colleagues and other educational stakeholders on a one-to-one basis as well as in groups. This is particularly relevant as new forms of platformised education are rapidly proliferating across education settings and the use of online platforms and social media has become central to interaction and participation in schools. Online communication competences are essential for using VLEs and other digital tools to disseminate information, resources etc. to students and parents as well as for providing feedback or responding promptly to questions and queries. Within the CDL framework online communication also refers to being able to achieve the following: i) select appropriate digital communication tools and approaches for different audiences and purposes, ii) ensure privacy in private communications, iii) identify and deal with fraudulent and suspicious digital communications (e.g. phishing) and iv) demonstrate cultural sensitivity when performing communication online (e.g. being aware of cultural diversity and respecting the norms of other cultures). Within a school context it is important that students develop an understanding of a relevant netiquette for online communication and this is discussed below.

2. Online collaboration

Anastasia Gouseti

Online collaboration refers to a range of different competences and practices and is multidimensional. In particular within a school context, it can involve:

i) The use of digital technologies to engage in professional networks and collaborate with others in order to share knowledge, exchange good practices and produce educational or professional development resources. (e.g. collaborate within the school with colleagues, on eTwinning projects etc).
ii) The use of digital technologies to facilitate student collaboration within the classroom (e.g. as part of collaborative tasks and assignments, peer-learning etc) or outside the classroom (e.g. as part of collaborative activities in the context of a collaborative project with other schools).

3. Digital empathy

Anastasia Gouseti

The concept of digital empathy is multifaceted and can take different shapes and forms. First, digital empathy is seen as having a deep awareness and consideration in relation to one's access to digital infrastructure, internet connectivity and digital competences. This means that teachers are attuned and responsive to students' needs in relation to digital technology use and they recognise and address that students have diverse online experiences, digital access and competences. They are aware of and respond to potential issues of accessibility when planning their lessons and homework tasks and ensure that all students have access to the digital resources, virtual learning environments etc. used for teaching and learning. Second, digital empathy is also associated with one's ability to understand and respect the feelings of others within an online environment. It is important both for teachers and students to develop an awareness of how private and public online actions (often hiding behind online anonymity) can have a significant negative impact on the well-being of others.

4. Networking

Maria Ranieri

Social networking refers to a social structure involving individuals or organizations sharing similar interests. They are supported by web services allowing users to create a public or semi-public profile, to generate lists of friends and to traverse their list of connections, forming a public online network community. The exchange within social networks produces what is called 'social capital', that is the overall amount of actual, or potential resources available in a durable network. There are two types of social capital relating to the different forms of connections/ties linking the members of a network, that is the bridging social capital based on weak ties mainly characterised by strengthening the capacity for information exchange, and the bonding social capital based on strong ties associated with the provision of mutual support and affective benefits.

5. Digital identity and profiles

Isabella Bruni

The construction of digital identity is one of the main themes related to the way we are online. On the internet, identity is a representation of oneself that emerges from every kind of content published on websites and blogs, or shared on social networks: this process could be summarized in the famous expression of the scholar Danah Boyd "writing identity into being" (2006). Digital identity is usually expressed through the creation of a personal profile inside an online service or platform: that is why we can say that giving shape to one's own identity through iconic and textual representations is the essential prerequisite for building oneself as an active subject of digital communication. The profile construction is obviously

pre-determined by the service itself and the fields provided during the registration phase, but is also the result of a complex process of self-reflection and impression management in order to translate our private self into a public representation. The concept of digital identity is strictly connected to a social dimension, as our expected audience, and possible overlapping between different contexts of our real life, could influence our online representation. Being related to our online agency and participation, the construction of digital identity is necessary to promote awareness about benefits (from personal, educational and professional perspective) and drawbacks (related to risks and implication of sharing personal information), together with technical and communication competences to manage them. In this context, it is essential to acquire the ability to choose the contents to share and to select contacts and followers online.

6. Online privacy

Darren Mundy

Online privacy covers what information we share when we are using Internet based platforms, including mobile technologies. It covers who has access to our data everything from browser data, through online purchases, to our personally identifiable information. It covers what structures are available to help us limit access to our data and covers the value organisations place on our data, so individuals can get a better understanding of why organisations wish to track us. In a school based context, the focus is likely to be on two elements, creating an awareness of the data we are generating when we are browsing and conducting activities on the web/our mobile devices, and producing an understanding of how we can better manage the privacy around our activities e.g. through monitoring our privacy settings and choosing wisely who we share our data with.

Digital well-being and safety

Digital well-being and safety relates to those areas and issues presented which impact broadly on the individual and groups of users. In school based contexts these are important to consider to ensure that we are safeguarding our children from the harm which can be presented within digital environments. With the continually expanding use of digital technologies this dimension is critical to develop and explore with young people, such that they develop mechanisms to support their responses to the issues presented in this area. The sub-dimensions covered are: Empowerment, Online safety, Digital overexposure, Digital selfhood, Digital belonging and Ergonomics.

1. Empowerment

Darren Mundy

Empowerment is manifested as a process which can impact on individuals, groups, organisations, and other entities. The process involves movement from positions of limited power and control, through to the development of self-efficacy in achieving particular tasks and activities. Entities can be at different levels of empowerment dependent on the action(s) to be achieved. Empowerment can be enhanced through items such as: the sharing of power (e.g. by giving learners more self-autonomy in the classroom), access to and the sharing of cultural digital knowledge (e.g. by helping learners to understand themselves and others); and the development of skills (e.g. knowledge retrieval skills on the web).

2. Online safety

Anastasia Gouseti

Online safety or else known as e-safety, or internet safety, is a multifaceted sub-dimension of CDL. Predominantly, it refers to the ability to understand the risks associated with participating in digital environments and being able to mitigate these. More specifically, this includes: identifying, reporting and protecting oneself and others from cyberbullying and other harmful, intolerant, sexual or violent content online; understanding safety and security measures and protecting personal information when using different digital tools (e.g. by managing privacy settings in apps and social media); developing an awareness of how digital participation can negatively impact physical and mental well-being and to empower oneself and others to manage such risks. Also, schools need to collaborate with parents and carers in order to raise their awareness regarding these issues and provide them with relevant knowledge and tools to support children's online safety at home.

This sub-dimension is interconnected with digital overexposure described below.

3. Digital overexposure

Alice Roffi

The use of interactive screens have been linked to several problems, such as child obesity, sleep problems, adolescent depression and aggressive behavior,

and increased symptoms of attention deficit disorder. The digital overexposure refers to the possible implication related to the overuse of both interactive screens and devices content, that could lead to the development of addictive behaviour, such as smartphone, internet or video game addictions. These negative implications impact on the social, physical, cognitive and emotional dimensions of children's life.

The overuse of interactive screens is only a part of the problem of these addictions, in fact other factors may come into play. For example, the design of an app could provide a pathway towards smartphone addiction, or, as for video game addiction, the social strategy developed by an individual, used to escape from adverse emotions or real-life problems. From an educational perspective, a significant debate is emerging in the literature with researchers looking to provide guidelines on how to balance educational opportunities with the students' well-being.

4. Digital selfhood

Darren Mundy

"On the Internet, nobody knows you are a dog" is an often used adage and can be used to outline the notion that individuals can have a range of identities and exhibit a range of behaviours across different platforms. Like in the physical world all of these different elements make up something of who we are. Digital selfhood in essence relates to understanding who you are online and understanding how this fits into your wider sense of self. The Internet offers many opportunities to do things that individuals may not normally do in a physical world (e.g. experiment with different kinds of behaviours and pretend to be someone else), digital selfhood is about understanding how individuals may do some of these things safely, whilst also understanding the impact of particular behaviours on representations of who you are as an individual.

In a school based context some of the key critical considerations are: how online behaviours impact on your own and others interpretations of self .e.g. if individuals behave nastily online the impact that this can have on their own interpretations of who they are; how to represent yourself online; and the impact of data trails on digital self hood (e.g. our historical record of interactions online is readily available through the search engine). Schools may also wish to critically engage students with recent legislation around the 'right to be forgotten' as increasingly this will impact on individuals.

5. Digital belonging

Anastasia Gouseti

Digital technologies and social media have created new opportunities for engagement and participation in various online environments and communities. This allows individuals to find new ways of socialisation and a new sense of belonging in a digitalised society. WIthin the CDL framework this sub-dimension

is used to refer to how teachers and students negotiate issues of belonging within professional communities and friendship or interest-driven, peer networks. This can include negotiating issues of status, engaging in reputation building, constructing online identities as well as moving between different networks and re-negotiating their online identity and sense of belonging. It is also important for teachers to develop awareness that lack of digital access or other barriers can limit students' sense of belonging and may result in feelings of detachment (e.g. from belonging to online student communities).



6. Ergonomics

Minna Lakkala

Ergonomics is a field of study that focuses on improving people's working conditions concerning workplace arrangements and tool design. The goal of ergonomic principles and recommendations is to reduce strain, fatigue, and injuries caused by unhealthy postures and working practices. Heavy use of computers with poor ergonomics can, for example, create problems with posture, cause back and neck pain, interfere with circulation and create vision problems, but it can also affect the user's mood and the level of productivity.

Increased use of computers in studying and spare time requires that computer economics of teachers and students must be taken care of both in schools and at home. An effective way to anticipate problems is to provide teachers and students with adequate knowledge and specific guidelines about issues related to computer ergonomics, such as arranging the equipment, taking care of one's posture, or having enough breaks.

Digital citizenship

Digital Citizenship refers to a range of elements which require individuals to think critically about how they engage responsibly within societal spaces, including engagements with communities, with organisations and with governmental entities. Guiding effective participation within societal spaces is something which we need to introduce to learners at all levels, with schools and colleges providing effective environments within which to teach responsible physical and digital citizenship. The sub-dimensions covered within this core dimension of the CDL framework are as follows: Rights and responsibilities; Sustainable use; and Digital civic engagement.

1. Rights and responsibilities

Anastasia Gouseti

A range of rights and responsibilities are associated with accessing and participating in digital environments. It should be noted that this is a particularly complex dimension with various social and political implications, and that it is not possible to explore all aspects in depth here. Within the context of the CDL framework this sub-dimension refers to understanding and being able to exercise the rights and responsibilities that go with being a citizen of the digital world. In particular, this includes but is not limited to the right to digital access, the right to online privacy and freedom of speech, the right to copyright for one's online work and content. Digital responsibility refers to the ability to exercise these rights in a respectful, legal and ethical manner. For example, responsible use of and participation in digital environments for teachers alludes to understanding how to use, and share, their personal information, as well as their students' identifiable information online, using and managing digital content responsibly, acknowledging copyright and intellectual property rules or open access alternatives (e.g. creative commons) when adopting or modifying the work of others', and empowering their learners to become responsible digital citizens. At schools, students can learn their responsibilities e.g., by not damaging the school's technical infrastructure and handling their passwords in a safe manner.

2. Sustainable use

Anastasia Gouseti

This refers to developing awareness and understanding of how digital technology use impacts the natural environment and how it contributes to digital pollution. This includes: i) understanding how digital technology use contributes to energy consumption and greenhouse gas emissions (e.g. the impact of online video streaming and data centres), ii) understanding the environmental contamination and pollution caused by the inappropriate disposal of digital devices, iii) considering how educational technology use can be made more sustainable within the school, iv) developing awareness about how digital technology use at personal level can be more sustainable (e.g. responsible digital usage and cutting down your environment digital footprint).

3. Digital civic engagement

Maria Ranieri

Digital civic engagement: concerns the new forms of civic engagement and active citizenship, enabled by the use of new digital media, in particular the so-called web 2.0 tools, and inspired by the principles of participatory culture theorized by Henry Jenkins (see http://henryjenkins.org/). A participatory culture is characterized by the absence (or low number) of obstacles to artistic expression and civic engagement, and by the strong support for sharing one's creations in environments supported by forms of informal mentorship. It can result in forms of digital activism where people utilize the digital tools to make their voices heard.

Digital teaching and learning

Given the impact of digital technologies in education and the need to promote its innovative use during teaching and learning, the roles of students and teachers have significantly changed, giving to the first one a more active approach. In order to make that possible, three concepts gained relevance during the last years, forming the subdimensions of the Digital teaching and learning dimension: Digital pedagogical methods, Learning analytics and Digital learning ecologies..

1. Digital pedagogical methods

Marc Romero, Teresa Romeu

Nowadays there are many methodologies that are used to promote students' learning, and if we think about digital settings, the possibilities are exponentially increased. Digital technologies provide the perfect tools and spaces to promote students' active role in their own learning because it allows them to express themselves in ways that were previously impossible. Teachers can take advantage of these possibilities by applying active methodologies in which students are the center of the learning process such as gamification, the flipped classroom, project-based learning, design thinking or collaborative learning. The application of these methods allow students to learn to use technology embedded in authentic settings, and to use it in a responsible way (see also Rights and responsibilities). In addition, these methods promote learning based on not only content but also the skills and competencies needed later in their studies.

2. Learning analytics

Teresa Romeu, Marc Romero, Juliana Raffaghelli

Learning analytics are digital analytics based on advanced data processing modalities, in some cases Big Data, arising from educational environments, or extracted from learning activities across digital platforms.

The purpose of educational data mining is the translation of educational data into information which can be presented in the form of reports or visual dashboards, and can be used to aid students' learning journeys. The ultimate goal is to guide the teacher or the educational organisation in making decisions regarding the complexity represented by their pedagogical activity. Learning analytics are not only used to diagnose to help the teacher to understand a student or class situation, but are also used through predictive modelling to anticipate students' risk or success behaviors. Eventually the learning analytics can be presented from the student's side, supporting self-regulation and more efficient engagement with the learning activities. Welcomed with strong initial enthusiasm, its detractors are not lacking today. In fact, learning analytics can be of great help in the teaching task, providing the teacher with information about student activity within a digital platform. However, the problem is to define sound metrics facilitating pedagogical reflection or decision taking. Usually, pedagogical constructs are not easy to grasp and what the analytics can capture are simple metrics from students' behavioural interaction with the digital platform. A good example is the definition of systems supporting collaborative learning: while it's easy to inform whether a student has consulted a video or downloaded a resource, it's not easy to inform to which extent a student is engaging in collaborative knowledge building. The way data can be appraised, arranged, and analyzed; the patterns that can be detected in the data, and to what extent these can be used to deploy a teaching strategy that ensures individualized monitoring of student learning, are still open challenges.

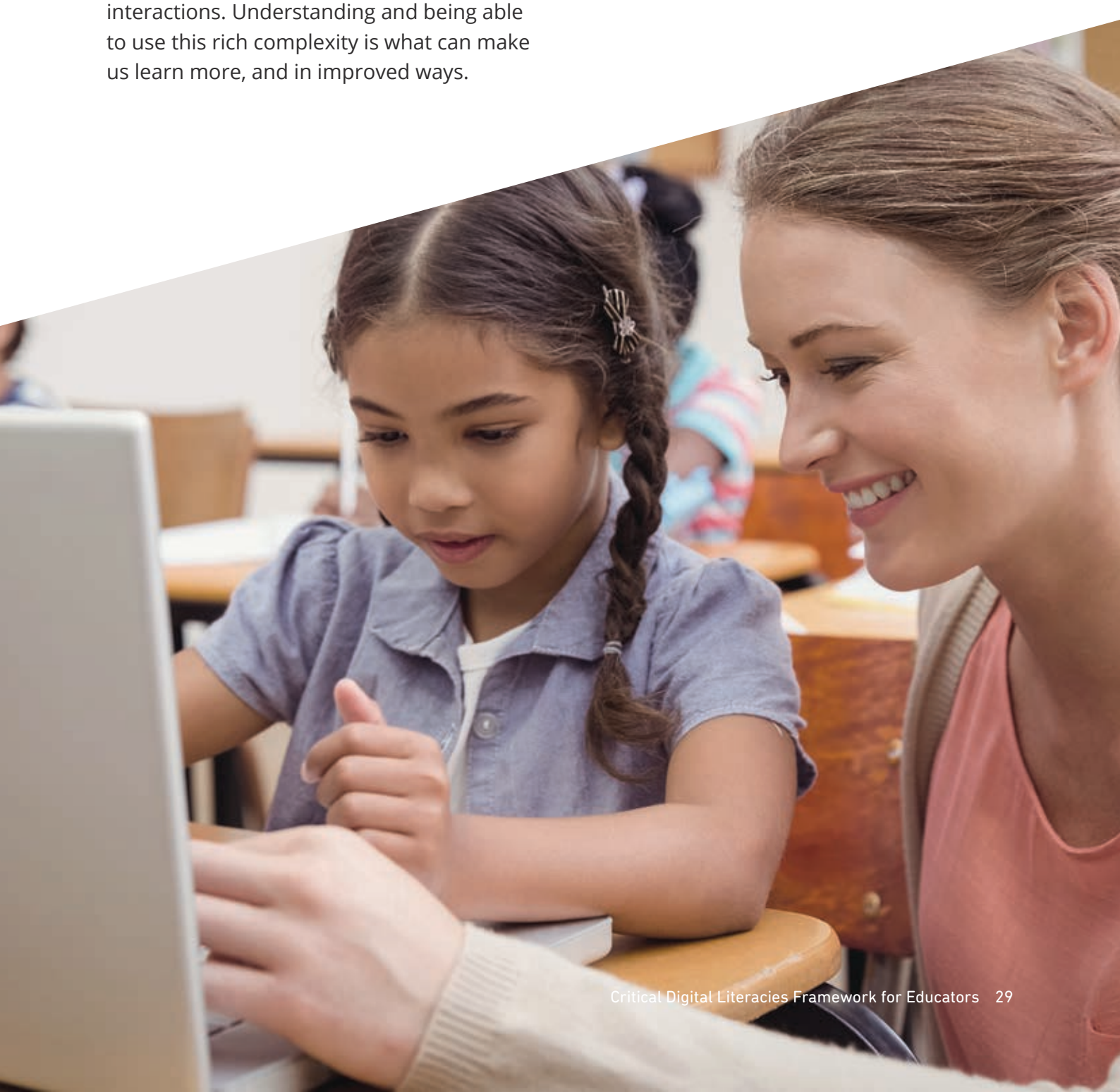
3. Digital learning ecologies

Teresa Romeu, Marc Romero, Juliana Raffaghelli

Digital learning ecologies (DLE) can be defined as the set of contexts of activities, resources and relationships that students and teachers have at their disposal and that can be activated, thus generating new learning opportunities. This concept provides students and teachers with an individual asset for their learning and professional development, but also points out the relevance of relationships with the families, colleagues and students that can be boosted by ICT. Many students (or students' families) use personal technologies that enable them to be fluent in several areas of school learning. As for the teachers, many of them use the potential offered by technology and social media to be professionally updated and to

be aware about new trends on using ICT for educational practices that can make their teaching more attractive for their students. Learning opportunities generated by DLE can be found in different contexts: formal, but also, and above all, non-formal and informal, just as we can find them in face-to-face, mixed or completely virtual interactions. Understanding and being able to use this rich complexity is what can make us learn more, and in improved ways.

In the school context, for digital learning ecologies it is essential to ensure that all students have an equal access to digital resources which is important for students who have no possibilities to use, and learn to use, digital technologies during their leisure time.



Policy implications

The Critical Digital Literacies framework presented above has policy implications at local, regional, national and international levels as detailed below.

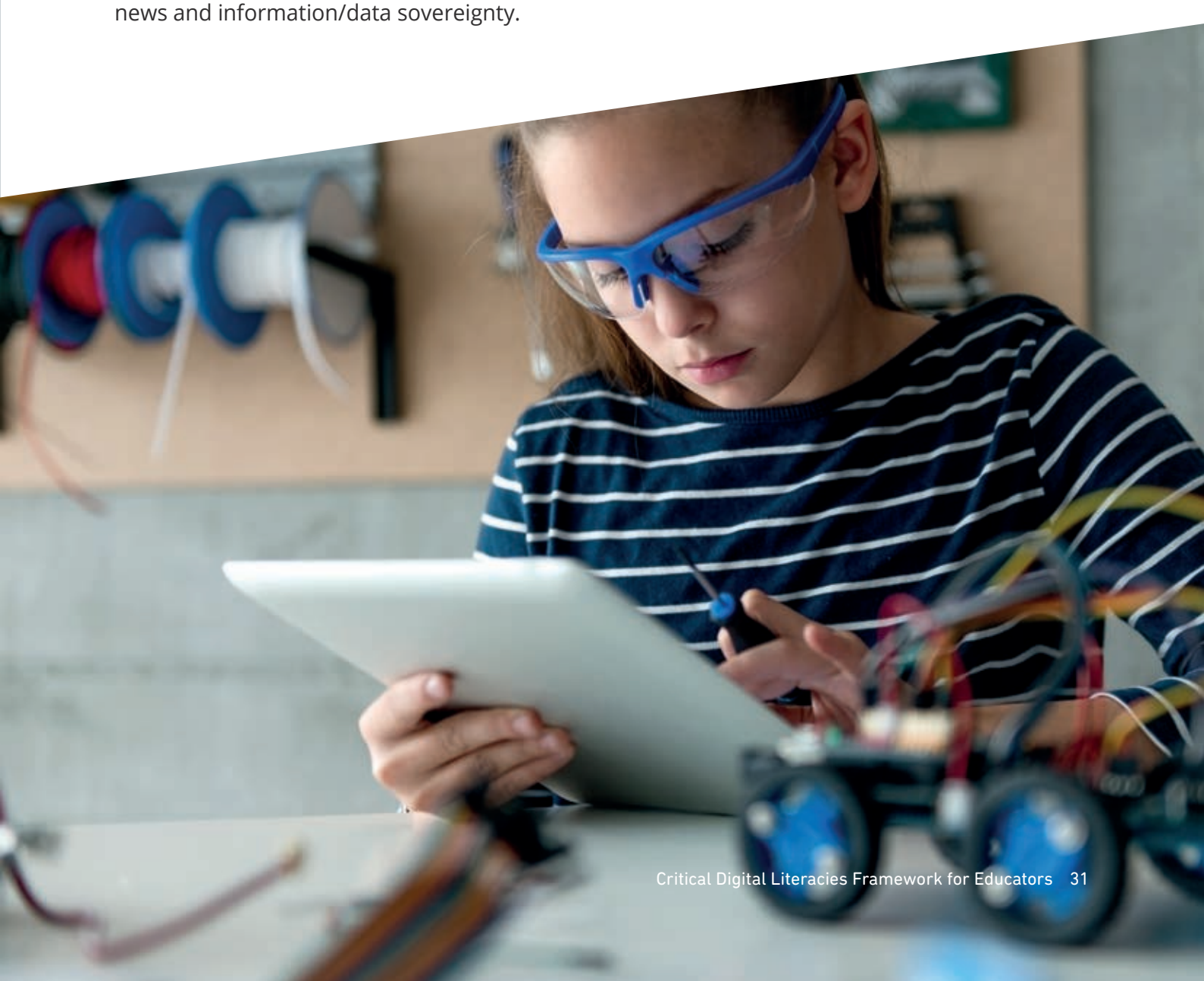
At a local level the framework offers opportunities for school educators to think through whether teachers are equipped with the knowledge required to engage learners with the range of items covered by the dimensions and sub-dimensions of the framework. In addition, the framework offers opportunities for individuals to consider the different levels of engagement with the skills, knowledge and concerns covered. For example, the online enquiry process can move from a basic understanding of how to use a web browser through to more complex mechanisms of search enquiry and specific search tools for browsing specialist areas of interest. In addition, at a local level schools and other educational establishments may wish to consider how best to technically facilitate engagement with many of the items captured. Additionally, school educators may wish to consider which principles and practices linked into the framework can be used to supplement existing approaches or may lead to a complete replacement of practice.

At a regional and national level, countries may wish to consider whether their regional/national curriculum is constructed in a way which can aid learners in gaining a critical understanding of the areas covered in the framework. Overarching administrations may select to target particular critical digital literacies; for example, countries may choose to invest in the promotion of Creative digital expression or may target the development of knowledge of Data literacy. Many of the dimensions of critical digital literacies can have an impact on improving young peoples' future opportunities and could lead to improvements in the quality of life. Moreover, through the basis of the literature review and the following debates, we claim that CDL will become crucial at the time of developing future new civic, social and cultural activities or to generate more balanced perspectives on businesses. Indeed, if we consider the role of Artificial Intelligence as technological mediation, and the fast pace of its recent development with its ethical implications, we will grasp the relevance of a more holistic approach to technology in our societies. A quick look at national educational policies let us see that the debate on basic and advanced technological education is clearly spotting the need of advancing on the ergonomics, ethics, social implications and business models of the technologies adopted, particularly in the pandemic aftermath. Therefore, the CDL might provide structured support to face the challenge of incorporating specific modules, cultivating projects or supporting pilots to develop critical digital literacies as key for social, economic and cultural development.

At a transnational level, and particularly in the EU context, comparative approaches might strengthen awareness and advance on the evidence supporting new agendas

for educational technology policies. Internationally, policy may focus on how different countries are supporting the development of critical digital literacies, providing opportunities for comparing and contrasting different governmental approaches to their integration in educational practice. The framework also presents questions regarding what critical infrastructure needs to be put in place to support international collaboration, and questions regarding different international concerns which need a policy response like current concerns over fake news and information/data sovereignty.

The framework will be a useful tool for international cooperation within emerging economies. Though these last imply contexts which differ substantially from the original contexts where the framework was developed, the international literature screened ensures the topics' coverage for an international audience. Nevertheless, in both the global North and South, beyond the EU, the CDL might be tested to explore contextual diversity as well as universal implications for teaching and learning practice.



Conclusion

This initial report has presented the work towards the development of a Critical Digital Literacies framework for educators at primary and secondary school level. The objectives, methodology and detailed breakdown of the dimensions and sub-dimensions have been described and an understanding of impact on policy provided.

Whilst the framework represents a response to a substantive analysis of current research within the area and the application of this research in the context of school level education, our understanding of critical digital literacies will continue to evolve and will be shaped by future developments within this fast-changing area. To this end, the framework has the flexibility to adapt over time to include further changes and can be revised to encompass digital phenomena and practices that will emerge in the future. Still, this new framework has identified a range of new and emerging dimensions and sub-dimensions that have so far been overlooked by policymaking and offers the opportunity for educators to think carefully through the implications of these new areas on their education approach in their local contexts. At the same time, the framework can help to determine how students can become equipped with the critical skills necessary in future years to engage with the challenges and respond creatively in the development of new skills, ideas and products.

Whilst there are contextual and cultural differences in the integration of digital literacies within school contexts reflected at the different national curricula and the teachers' practices, the framework offers an opportunity to think carefully how the various dimensions and sub-dimensions covered may be built into curricular responses as well as Initial Teacher Education provision. In addition, institutions may consider whether particular dimensions of the framework offer opportunities for their young learners' to enhance their critical digital literacies and equip them with life-long skills for using digital technologies creatively and critically. The framework also offers an opportunity for international groups of teachers to engage in constructive conversation and the sharing of different practices and scenarios to support the development of knowledge and skills of learners in the classroom environment. All in all, the framework can be seen as a useful tool that can contribute to the ongoing debate in the area of critical digital literacies and can be used as a reference point for educators at primary and secondary school level.

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