

## An online toolkit to support the development of teachers' digital competences.

## Un toolkit online per supportare lo sviluppo delle competenze digitali degli insegnanti.

Alice Roffi, Gabriele Biagini, Ilaria Ancillotti, Maria Ranieri Università degli Studi di Firenze;

### ABSTRACT ITALIANO

La competenza digitale dei docenti si configura come uno dei bisogni formativi crescenti, presente anche prima dell'avvento della pandemia da Covid-19, con particolare riferimento all'utilizzo delle TIC per l'insegnamento. Per affrontare questa richiesta, il progetto Europeo DETECT ha sviluppato strumenti e attività con l'obiettivo di supportare lo sviluppo delle competenze digitali di docenti e studenti. In questo articolo, ci focalizzeremo sulla progettazione collaborativa e implementazione di un toolkit online che aggrega risorse educative aperte e pratiche didattiche sui temi delle competenze digitali, utile sia per lo sviluppo professionale degli insegnanti che come materiale didattico. Dai risultati del progetto emerge come possa essere rilevante per i docenti essere coinvolti direttamente nella progettazione attraverso la produzione collaborativa di strumenti, risorse e attività di apprendimento.

### ENGLISH ABSTRACT

Teachers' digital competence is considered as one of the growing training needs of the Italian school system, even before the Covid-19 pandemic, particularly referring to the use of ICTs for teaching and learning. To face this request the European project DETECT has developed a series of tools and activities to support the promotion of critical digital skills of teachers and students. In this paper, we focus on the collaborative design and implementation of an online toolkit that aggregates open educational resources and teaching practices on digital skills issues, useful both for professional development and teaching. From the results of the project it emerged how it may be relevant for teachers being directly involved in the design through the collaborative production of tools, resources and learning activities.

### Background

Over the last years, the promotion of teachers' digital competences has been one of the growing needs for teacher's training in our societies (Ranieri, 2022). OECD data from the *Teaching and Learning International Survey (TALIS)*, referring to the pre-Covid-19 period (OECD, 2019; OECD, 2020), shows that in Italy 17% of teachers in lower secondary school indicated a high need for professional training on ICT for teaching consistently with the average percentage of OECD countries (18%) (see also Ranieri, Menichetti & Kaschny Borges, 2018).

Subsequently, the beginning of the pandemic period and the transition to distance learning highlighted teachers' unpreparedness at digital level, not only in terms of abilities to the use of ICT but also from the point of view of their integration into the teaching practices (Diz-Otero et al., 2023; Gomez-Gomez et al., 2022; Carretero Gomez et al., 2021; INDIRE, 2020; Ranieri, Gaggioli & Kaschny Borges, 2020; SIRD, 2020).

At the same time, however, many teachers were forced to self-training on the use of new digital tools (such as those for the production of video lessons or the use of videoconferencing platforms), gaining greater awareness of the importance of integrating ICT in daily teaching practices (Carretero Gomez et al., 2021; Roffi, Ranieri, & Bruni, 2020). According to Ranieri (2022), while some teachers filled the digital competence gaps from a technical point of view, what was - and is - still missing is the educational dimension of the digital competence, requiring proper training and models for teaching practices.

An effective approach emerged from the literature (Luo et al., 2020) for the improvement of these competences, namely teachers' involvement into the co-design of the open educational resources (OERs). Indeed, their engagement in the process as both users and producers of OERs and the open exchange of practices around those resources make teachers develop greater awareness of teaching with ICTs (Fini, 2012).

Previous experiences in the field such as the Italian project AMELIS (Ranieri, 2012), allowed teachers and researchers to identify the benefits of teachers' commitment into the OER's production process, especially in terms of training based on reciprocal learning, the sharing of practices and the adoption of good ideas. A key aspect of this approach is that teachers in a community of peers move from the sharing of common problems, linked to their professional experiences, to the sharing of common solutions which contributes to their professional growth (Ranieri, 2019). This is consistent with the assumptions of those learning theories which recognise the value of social aspects at the ground of effective learning processes like, for instance, the idea of community of practices (Lave, & Wenger, 1991) or the notion of network of practice (Brown, & Duguid, 2000) or also the construct of collective (Dron, & Anderson, 2014).

Grounding on these premises, in this paper we present the main results of DETECT (Developing Teachers' Critical Digital Literacies, 2019-2022), an European project aimed at supporting the development of critical digital skills of teachers and students, leading to the creation of a corpus of educational products released as OERs

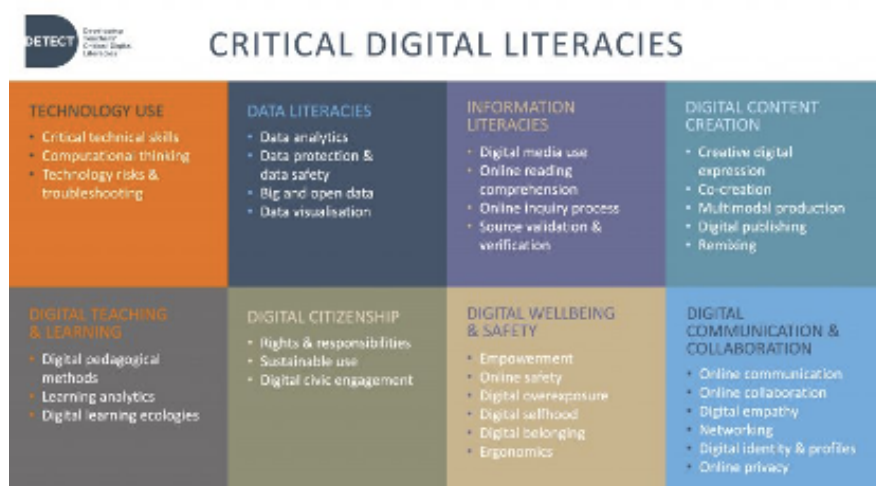
### **The DETECT framework**

DETECT is an Erasmus+ project led by the University of Hull (UK) and involving universities and schools from 4 countries, including Finland, Italy, Spain and the United Kingdom. During the project, the partnership undertook different activities to promote teachers' digital competence among which the design and implementation of an online toolkit. This was pursued to aggregate educational resources and teaching practices, briefly a series of OERs (Hylén et al., 2012; Luo et al., 2020), in the area of digital literacy education, to generate an open tool, useful both for the professional development of teachers and as teaching materials (Huang et al., 2020).

At the background of the tool, there was the DETECT theoretical framework for critical digital literacy, elaborated by Gouseti and colleagues (2021, 2023) and including 8 main dimensions (Fig 1):

- *Technology Use*: it is related to understanding digitalization and its significant technical skills.
- *Data literacy*: it involves skills not only in processing data, but also for analyzing them and considering their potential implications on our lives.
- *Information literacy*: it encompasses the ability to locate and assess information critically, taking into account how it was created and used to produce new knowledge.
- *Digital content creation*: refers to the competences required to create something using computers and digital tools.
- *Digital communication and collaboration*: it is related to the use of digital technologies, such as social media and other web-based platforms and tools, to communicate and collaborate online.
- *Digital well-being and safety*: they focus on the impact of digital technologies on individual and group users, and cover areas and issues related to their use.
- *Digital citizenship*: it entails various aspects that require individuals to think critically about their responsible engagement in social spaces, including interactions with communities, organizations, and governmental entities.
- *Digital teaching and learning*: they concern the impact of digital technologies on education and emphasize the need to promote their use, particularly for teaching and learning.

Each dimension is articulated into sub-dimensions (Figure 2) that have been identified as relevant for each area of digital literacy (Gouseti et al., 2021, 2023). Although the sub-dimensions are specifically focused on one peculiar aspect, there may be some overlap among them due to the conceptual closeness of certain categories within the digital land. Therefore, the sub-dimensions may fit into two different categories, without being considered “distinctive” from one another. The main function of the sub-dimensions is to capture a more comprehensive and complex understanding of critical digital literacies, as well as the intricacies of the educational practices in this field. Essentially, the critical digital literacies framework is an attempt to depict the multifaceted nature of digital literacy and education. The Figure 1 below outlines the sub-dimensions for each dimension.



**FIG. 1 - THE DIMENSIONS AND SUB-DIMENSIONS OF THE CRITICAL DIGITAL LITERACIES FRAMEWORK (GOUSETI ET AL., 2021)**

### The DETECT toolkit

Overall, the toolkit was designed to support the teaching practices of primary and secondary school teachers, as well as to nurture, directly through specific material, or indirectly suggesting innovative work paths to be implemented in the classroom, the professional development of teachers themselves.

As an aggregator, the toolkit collects not only resources already available on the web but also original content, produced through the collaborative activities of teachers and researchers within the life of the DETECT project. In particular, it encompasses:

- digital resources such as presentations, videos, infographics, online tools for quizzes;
- educational scenarios, proposing approaches and strategies for teaching critical digital skills, which can be adapted and reused for different contexts.

Resources and scenarios can be searched within the toolkit through a search mask that allows the user to filter the results by free keywords, target, framework and language. In addition to the direct link, a brief description of the resource is provided, also indicating the type of multimedia material of which it is composed, authors and rights of use. As far as the educational scenarios are concerned, the form indicates the objectives, the general structure of the teaching units, and then develops the description of each individual unit (with information on specific objectives, pedagogical approaches, evaluation, technological support, the learning activities).

Being based on the DETEC framework, the toolkit provides schools and teachers with examples of best practices for the different dimensions of critical digital literacy, paying attention both to educational purposes and to teachers' professional development.

To sum up, the toolkit offers a detailed description form and the links to the resources or educational scenarios classified according to the 8 dimensions and sub-dimensions of the framework. Furthermore, the toolkit is searchable either through items under one of the eight dimensions or narrowing the selection by sub-dimensions. As a searchable tool, it is an internal search engine of the DETECT website, where the indexed resources can be freed and navigated without any registration.

As it was structured, the toolkit can be used by querying the database with plain text and keywords or selecting one or more labels, each resulting article is presented with the date of its update, a brief abstract, the type of resource (documentary, presentation, lesson plan, etc.) and its format (mp4/mp3/pdf /pptx), reporting its authors and usage rights, and finally with the download link or the external resource link. This result is possible by inserting "meta" tags that are invisible to the user and classifying the article according to additional dimensions. Therefore, together with the values mentioned above, each article is also labeled with the language (among the 5 languages available in the project i.e. English Italian Catalan Finnish and Spanish), with the reference target (professional development for teachers or primary, lower and upper secondary education). Finally, the article can be inserted within the DETECT dimensions by choosing one or more labels (e.g., data literacies, information literacies, digital content creation). This taxonomy was made possible through the adaptation of some plugins available in the backend of the web site with the function of adding custom post types to the classic tags included in wordpress (GitHub repo: <https://github.com/WebDevStudios/custom-post-type-ui>).

Even not registered users can propose training contents which, subject to moderation, will populate and further enrich the database of internal resources. This choice was made thinking of the growing popularity of OERs and to keep the database alive with constantly updated resources, which was particularly significant to the dynamism of the field.

### **Teachers' involvement with the toolkit**

In the DETECT project, training activities addressed to the teachers involved in the project (namely Learning, Teaching and Training Activity, LTTA) were organized. During the last LTTA of the project, teachers from the partner schools have been engaged in both the implementation process of the toolkit and the subsequent testing phase to assess its usability and structure.

In particular, the final DETECT training event was conducted online in November 2021, including a dedicated session to the toolkit's activities. On that occasion, teachers were invited to utilize the toolkit and provide feedback on its usability and functionality.

To facilitate this process, the participants (N=10) were divided into 3 virtual rooms, forming a convenience sample that was not probabilistic or representative of the entire reference population.

Each group was given access to the toolkit and encouraged to explore its features. To capture their assessments, a user test was conducted with each group, employing an evaluation grid focusing on two key elements:

- *usability*, asking teachers to evaluate the ease of use of toolkit interface for resources searching, the self-explanatory characteristics of the list of the search results and the graphic layout of the learning object;
- *content*, asking teachers to evaluate the completeness of the description of the resource, the appropriateness of the length of the description (i.e. not too short or too long), the exhaustivity of resource description.

For each aspect, teachers had to assign a score from 1 (lower score) to 5 (higher score) based on their perceptions. By utilizing this scoring system, a quantitative assessment of the toolkit's usability and completeness and appropriateness of the content was obtained.

Regarding the toolkit use, a form of support was provided through the usage situation designed by the leader of the toolkit development (the team of University of Florence). Some examples of usage situation for toolkit tests are:

- *Usage situation 1*: a teacher is searching for materials for self-training about the different aspects of Critical Digital Literacy, since she/he is not familiar with the topic and she/he wants to know more in order to face it during future lessons;
- *Usage situation 2*: a teacher is searching for some materials related to the topic of the Fake News and, more generally, about the Information Literacy for designing one or two lessons with students of the upper secondary schools.

According to teachers' evaluation, the toolkit reached the following scores (Table 1)

**TAB. 1 - MEAN AND STANDARD DEVIATION (ST DV) OF THE TOOLKIT SCORES OF ALL GROUPS OF TEACHERS ACCORDING TO THE GRID**

Usability		
Aspect	Score	Relevant comments
Ease of use of toolkit interface	Mean 3,33 St Dv 0,82	Could the text in the other button be less technical and better describe what you get when you click it (“Please download the pdf here” -> “Open the detailed description”, etc.). <b>(C1, Gr. 2)</b>  What is the difference between educational resources and educational scenarios? Do we need to highlight what this difference is? <b>(C2, Gr. 3)</b>
The list of the search results is self-explanatory	Mean 3,33 St Dv 0,52	If I press “Submit” without choosing anything, I actually get quite a clear and concise list of resources with links “Continue reading”, and then I get the page including full abstract, buttons and the list of sub-dimensions. This looks good. <b>(C3, Gr. 2)</b>
The graphic layout of the learning object	Mean 3,50 St Dv 1,38	We might want to be clear about how the information is going to be presented on the initial page e.g. provide an understanding that some will be downloads and others will be links. <b>(C4, Gr. 3)</b>
Content		
Completeness of the description of the resource	Mean 3,17 St Dv 0,75	One possibility is to show only those options (e.g. user rights) in the form that concern this material and delete the others; it would be easier for users to read. I often get results that are too broad and it's not clear how these link to a particular dimension or sub-dimension <b>(C5, Gr. 2)</b>
Appropriateness of the length of the description (i.e. not too short or too long)	Mean 4,33 St Dv 0,52	Generally clear and short enough to capture the essence of the resource. <b>(C6, Gr. 3)</b>
The description helps to give first information on the resource's content	Mean 3,00 St Dv 0,63	One case description included the mention of “technology H5P” in the first sentence, which is not familiar to me. Is it relevant to mention this technical concept? If yes, it should be explained. I would start the description with pedagogical issues in the abstract. Is it possible to have the form describing the material also in these resources? <b>(C7, Gr. 1)</b>

The inclusion of these usage situations allowed for a diverse range of evaluations, encompassing different pedagogical needs and instructional contexts.

In summary, involving the active participation of teachers in the project's training activities, facilitated the evaluation of the toolkit's usability and structure. Teachers' feedback, obtained through discussions and user tests, provided valuable insights into the strengths and weaknesses of the toolkit.

The flexibility in resource exploration, either freely or within specific usage situations, ensured a comprehensive assessment of its practicality and relevance

The feedback provided by the teachers was useful to improve the toolkit, especially regarding the technical and communication aspects. For example, the comments (C1, C5) led to the restyling of the search mask and the insertion of some clarifying tooltips for end users, improving the accessibility of the educational content.

The event represented not only an opportunity to finalize the production of the toolkit exploiting the experience of the final users of this tool, but also an important training moment on how to use online applications to support teaching practices.

## Conclusion

The paper reported the experience of design and implementation of an online toolkit for promoting the critical digital competences of teachers and students, in the context of the Erasmus+ project DETECT. The toolkit includes resources and educational scenarios based on the themes of the Critical Digital Literacies framework and is freely available as OER. One of the notable strengths of this toolkit lies in its participatory approach, involving teachers as the final users in its development and testing process.

By actively engaging teachers as co-creators and participants, this research recognizes their expertise and experiences, making the toolkit more relevant and authentic to their specific needs and challenges. Furthermore, this participatory involvement of teachers can be seen as a training moment in itself, aligning with existing literature that highlights how the opportunity to share experiences, discuss teaching practices, and work together on common solutions leads to professional growth.

The potential impact of this research extends beyond the immediate classroom setting. By disseminating the toolkit and its associated findings, we aim to initiate a broader conversation within the scientific community on the significance of critical digital competences in contemporary education. This research seeks to inspire further dialogue, collaborations, and research endeavors that will collectively advance the understanding and application of digital literacy in educational contexts. Additionally, by incorporating resources based on the Critical Digital Literacies framework, this research offers a valuable contribution to the field, furthermore, the dissemination of the toolkit as open educational resources (OER) enhances its accessibility and promotes widespread utilization among educators. This availability facilitates the sharing of best practices and fosters a culture of collaboration within the scientific community. As a result, the impact of this research extends beyond the immediate context, stimulating further discussions, collaborations, and advancements in the field of critical digital competences.

However, it is essential to acknowledge the limitations inherent in this work. While the toolkit demonstrates promising potential, further research is necessary to assess its effectiveness in different educational settings and cultural contexts.



Understanding the nuances and adapting the resources to diverse learning environments will strengthen its applicability and ensure its continued relevance. Additionally, exploring strategies for long-term implementation, scalability, and sustainability will be crucial for maximizing the toolkit's impact and ensuring its continuous evolution.

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