



# Digital and media literacy in pre-service teacher education

*A case study from Switzerland.*

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## Abstract

In the age of digitalization, Digital and Media Literacy (DML) has gained increasing attention in European compulsory education, blending insights and experiences from the media education and digital literacy domains. Teacher education, starting from pre-service education, is central for the actual integration of DML education in classroom practice. This article discusses the case study of a two-credit introductory course to DML education for pre-service pre-primary and primary school teachers in Switzerland. The course, partially co-designed with its participants, intentionally explored many topics (as opposed to the in-depth analysis of a few) and focused on hands-on experimentation and reflection. The data collected with a pre/post survey and follow-up interviews offer insights on the evolution of pre-service teachers' approach to DML, on their perceived role as teachers in this domain, on self-efficacy, and on potential enablers and obstacles to implementing DML activities in class. The case study suggests that, despite the limited space in the curriculum and resources available, even a short course can make a difference and enable teachers to integrate DML in their profession.

## Keywords

Digital and media literacy, teacher education, pre-service teachers, primary education, pre-primary education

## Introduction

In the age of the digital revolution, Digital and Media Literacy (DML) has become a priority in compulsory education in Europe and internationally (EU Council, 2006; UNESCO, 2011; Johnson, Adams & Haywood, 2011; EU Commission, 2016; Carretero, Vuorikari & Punie, 2017), as many countries are updating their national school programs to integrate digital skills or digital competences (Guitert, Romeu & Baztàn 2017; Kozma, 2008). The rationale in many official documents is that our society is undergoing a technology-driven transformation: the job market is asking for new digital professions, and our school system should prepare tomorrow's citizens. The awareness that *digital natives* (as defined by Prensky, 2001) cannot be expected to have *per se* digital competences (Schulmeister, 2008; Bullen, Morgan & Qayyum, 2011), along with the increasing number of news reports on the "dark side" of the Internet (from the Deep Web to cyberbullying), have made the issue even more dense.

The promotion of an early start in DML education, from as early as primary school (Share, 2015), is part of a picture in which pre-service teacher education (TE) plays a key role. This article presents the case study of an introductory course to DML education for

pre-primary and primary school pre-service teachers in Switzerland. The course was partially co-designed with its 26 participants, and implements a specific instructional approach. Through the data collected before and after the course (including follow-up interviews), the case provides insights on the impact of a general and relatively short introductory course, and on its value for prospective teachers. After a discussion of the concept of DML and of the research on DLM pre-service TE, this article presents the course design, illustrates the data collection methodology, and eventually discusses the key results.

## Digital and media literacy

The discussion around DML education should be framed within the ongoing debate about the definition of DML itself as a subject matter or body of knowledge – a debate that has been more and more articulated with the complexification of the media environment that digitalization is bringing about. Our understanding of DML depends on our definition of *media*, which changes rapidly under the impulse of technological and commercial developments, of *literacy*, and on the *purpose* that we assign to learning in such a domain (Potter, 2010). In order to put our understanding of DML into a critical perspective, I would like to trace the two major roots that nurtured the contemporary discourse about DML.

The first root is the tradition of Media Education (ME), which defined *media literacy* as “the ability of a citizen to access, analyze, and produce information for specific outcomes” (Aufderheide, 1993, p. 6). This definition emphasizes its critical nature, and puts forward the skills required to access messages, critically understand them, and to actively use a variety of instruments and formats for generating original messages. Critical understanding in this domain means learning about (a) the audiovisual languages that the different media use; (b) how media represent realities and the relationship between fact and fiction in the media; (c) the production processes of media messages and (d) the relationship between the media and audiences (Buckingham, 2019). While these ideas can be traced back to Len Mastermann’s seminal work *Teaching the Media* (1985), many later authors built on that basis in the following decades. Nonetheless, “questions remain about how far, and in what ways, media education needs to be adapted or extended” (Buckingham, 2019, p. 44) to tackle the challenges of the contemporary digital media environment.

The second strand that contributed to the development of the contemporary idea of DML has to do with technologies. In the early 90s with the diffusion of the web, and then at the turn of the century with the spread of social media and mobile devices, the technology landscape began a still-ongoing transformation. This raised many issues in terms of employment opportunities and democratic participation, so that states put *digital skills* high on their agendas, and promoted programs to support the development of functional skills, like the European Computer Driving License (ECDL) (Ferrari, Punie & Redecker, 2012). Further developments in this domain came to define *digital competences* frameworks, like the European DigComp (Carretero, Vuorikari, & Punie, 2017) or JISC (2014). Digital literacy education is supported by *ad hoc* educational environments and tools for coding (e.g. Scratch<sup>1</sup> or AppInventor<sup>2</sup>) and educational robotics (e.g. Thymio<sup>3</sup>). The recent emergence of the concept of *computational thinking* (Wing, 2006), which originated in the area of technical sciences and engineering, echoes the stance for critical understanding proper

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1. [www.scratch.mit.edu](http://www.scratch.mit.edu)

2. <http://appinventor.mit.edu/>

3. <https://www.thymio.org/>

of media education. Computational thinking is “thinking (...) about how humans solve problems in a way that can be operationalized with and on computers” (Hoppe & Werneburg, 2019, p. 14), and expresses the need to move from a functional to a broad cultural approach in digital literacy education, underlining the importance of *understanding* digital technologies in order to use them effectively, safely and in an active citizenship perspective.

In both traditions, the term *literacy* connects to the idea that understanding the media is a key or basic competence (like reading and writing), and that it has to do with texts, that is, cultural artefacts, extending their definition to the audiovisual domain (Buckingham, 2015). While such an assumption seems straightforward in the media domain, where it is easy to identify specific media texts, it still requires proper argumentation in relation to digital literacy. Nonetheless, whether emphasizing the *media* or the *digital* aspects, and focusing more on *skills*, *competences* or *literacy*, today’s DML approaches build on such heritage, which needs to be constantly reinterpreted to tackle the current challenges of digital communications and devices (Livingstone, 2004; Hobbs, 2010; Buckingham, 2019). The discussion is far from being settled: DML advocates claim for a definition that goes beyond a merely functional set of skills, geared towards a rapid integration in the job market, and they call for the development of a critical understanding that also embraces the often invisible processes and actors of today’s platform capitalism (Srnicek, 2017).

These two traditions also inform pre-service TE (Hendrix-Soto & Mosley Wetzel, 2018). While they are the main sources of what we understand as the content of DML, Dezuanni (2015) claims that they do not adequately explain how students develop media knowledge in practice, and proposes a four-building-blocks non-hierarchical and non-sequential model for the design of DML curricula: (a) Digital materials, that is, concretely working with hardware, software and media tools; (b) Media analysis; (c) Media Production; and (d) Conceptual understandings. This model can be used to interpret the course and the outcomes presented in this article.

DML is today intended as a complex set of interconnected literacies related to different media (visual, aural, textual, film, etc., or to technology as such), and high-level competences and practices in transversal domains (e.g. communication, learning and scholarship, citizenship, the professions, etc.). Hobbs (2010) defines DML as “a constellation of life skills that are necessary for full participation in our media-saturated, information-rich society” (p. vii). This definition will inform the following of this case study, and will be used to frame the design of the course presented. The author identifies five competences that “constitute core competencies of citizenship in the digital age” (p. viii). They are tightly interrelated and form a sort of cycle as they build on each other:

1. Make responsible choices and access information by locating and sharing materials and comprehending information and ideas;
2. Analyze messages in a variety of forms by identifying the author, purpose and point of view, and evaluating the quality and credibility of the content;
3. Create content in a variety of forms, making use of language, images, sound, and new digital tools and technologies;
4. Reflect on one’s own conduct and communication behavior by applying social responsibility and ethical principles;
5. Take social action by working individually and collaboratively to share knowledge and solve problems in the family, workplace and community, and by participating as a member of a community.

## Digital and media literacy education

### Teaching approaches to DML

How can teachers and educators support children and young people in developing DML? Historically, scholars and practitioners have identified various approaches to media literacy education (Hobbs, 1998; Potter, 2010), which can be extended to embrace digital literacy as well (Livingstone, 2004), and lead to distinctive program designs.

1. The *protective or preventive approach*, intended to keep children safe from generic harm or inappropriate content or situations, mainly limiting access: DML education “comes to be seen as a kind of antidote to [the media’s] harmful effects” (Buckingham, 2019, p. 26). This approach dates back to the first reactions to the diffusion of TV sets, when mass media were perceived as an “evil” from which to protect the young ones (Kellner & Share, 2005; who reference Postman, 1985; 1992).
2. The *critical approach* focuses on teaching children to critically “read” and understand media content in terms of media languages, representation, production, and audiences (Buckingham, 2019, p. 16). This approach was further elaborated in conjunction with the development of critical cultural studies, and also connected with issues of media representation and stereotyping in relation to gender, ethnicity, etc. (Mastermann, 1985; Share, 2015).
3. The *creative or expressive approach* considers digital media as tools and outlets for creativity, in a process aimed at “finding a voice” and empowerment. This approach sets the focus on production, and is common where media and technologies are taught together with the arts. The development of expressive and potentially vocational competences is central, and objects of learning are films video games or media artifacts in general (cf. the activities presented in Bennet & McDougall, 2016; Botturi, Geronimi & Kamanda, 2018).
4. The *civic engagement approach* understands (digital) media as a tool for social communications and actions, so that DML education is seen as “a basic prerequisite for contemporary citizenship” (Buckingham, 2019, p. 16). It prompts children and young people to get involved as actors, problem solvers and change agents in their community through the media, for example working on community issues (as in the FOTO Colombia project: Spring, Thomson & Eagleson, 2018) or implementing episodes of service learning (Hobbs, 2010; Domine, 2011).
5. The *functional approach* is about using media and technologies as tools for learning or problem solving, and focuses on basic digital skills and tools (the computer, search engines, office programs, etc.). Examples are the abovementioned ECDL and similar programs, that were diffused throughout Europe under the broad label of “Informatics” in the late 80s and the 90s.

Of course, individual DML programs might blend elements from the different approaches, and so do DML teaching aids, learning materials or education kits. In the practice, the most widely documented and established traditions of media literacy education, which underpinned the development of curricula in many countries, are *critical reading* and *media production* (Dezuanni, 2015; Buckingham & Domaille, 2009). Critical reading is about students’ ability to analyze media in order to become critically reflective, discerning and ethical media users (Masterman, 1990); supporters of the production tradition argue that media literacy requires insight into the constructed nature of media, which can be better achieved through experience (Buckingham, 2007).

## DML in Teacher Education

The existence of a reference framework, of standards, and even of effective and usable learning materials are only pre-conditions for actual teaching and learning to happen. The catalysts that can activate such resources are teachers (OECD, 2015; Torres & Mercado, 2006). This also holds for DML, whose future “depends on the development of long-term, rigorous, and intellectually demanding educational work with classroom teachers as essential, even primary, partners in implementing media literacy in schools” (Hobbs, 2008, p. 28).

DML is a rather marginal topic in most TE programs (Tiede, Grafe & Hobbs, 2015; Chien, Chang, Yeh & Chang, 2012), which face the challenge of including it into already packed curricula and tight schedules. On the other hand, research indicates that prospective teachers generally have a positive attitude towards DML and believe in its importance for their pupils (Gretter & Yadav, 2018), and consequently formulate high expectations (Ranieri & Bruni, 2018). DML education also seem to have a transformative value for teachers (Flores-Koulish et al., 2011), and a positive impact on self-efficacy, both related to ICT use in the classroom (Gudmundsdottir & Hatlevik, 2018) and to the profession in general (Fanni et al., 2010).

What should teachers learn in order to teach DML? Scholars agree that merely functional training is not enough (Buckingham, 2006; Ottestad, Kelentrič & Guðmundsdóttir, 2014; Lund, Furberg, Bakken & Engelién, 2014), as mastery of digital tools (from word processors to blogs) does not imply their appropriation as professional and pedagogical tools (Instefjord, 2014). ICT “functionings” do not automatically correspond to actual uses of digital literacy for positive change (McDougall, Readman and Wilkinson, 2018). Of course, teachers should be media literate (Simons, Meeus & T’Sas, 2017), but that does not seem to be enough: today’s prospective teachers already live in a mediated and digitized world, but a gap between personal competences and professional practice is still observable (Røkenes & Krumsvik, 2014). The TPACK model (Mishra & Koehler, 2006) provides a framework for the integration of technical, content and pedagogical knowledge, suggesting the idea that teachers need specific competences in order to transfer their DML into DML education for their pupils. The European Joint Research Centre released a competence framework known as *DigCompEdu* (Redecker, 2017). Digital competences are here related to (a) professional engagement; (b) selection, production and use of digital resources; (c) online teaching; (d) assessment, (e) learners’ empowerment, and eventually (f) facilitating learners’ digital competence. Beyond the definition of competences, the actual implementation of DML also depends on the teacher’s perceived role in this domain (Burnett, 2011): is DML part of her mission or duty? Should the teacher become an expert in digital tools or in media? Some studies indicate a progressive transformation of the teacher perceived role (or professional identity) throughout DML TE (Instefjord, 2014).

Some reports (such as the one presented in Schwarz, 2011) indicate that DML in pre-service TE happens under different institutional constraints and in different fashions, from academic courses, to full weeks, to special projects and internships (Hagood, 2000; Marci-Boehncke & Vogel, 2018). Hobbs et al. (2011) present an effective model of school-university partnership, where pre-service teachers work side-by-side with in-service teachers on media literacy programs. Another form of school-university partnership is based on in-service teachers learning together with media students in a peer-to-peer exchange (Berger & Wolling, 2018). Research indicates that even short interventions – like the one presented in this article – can be effective (Scull & Kupersmidt, 2011), provided that they are structured and provide concrete guidelines and tools (Ranieri & Bruni, 2018). Role-modeling (Røkenes & Krumsvik, 2014) and meta-cognition (or reflective practice; Lund, Furberg, Bakken & Engelién, 2014) seem to be key strategies for the development of teachers’ com-

petences, and also for capitalizing on their personal set of digital skills through reflection and awareness-raising. The contact with real-world situations is also paramount: Cervetti, Damico and Pearson (2006) conclude that teachers should learn to observe literacy where it happens, “in their own lives and the lives of their students” (p.381), so that they actually bring to class relevant personal experiences (Helsper & Eynon, 2010). In this respect, the use of popular media in class – a tenet of the critical reading tradition – is often mentioned as a challenge in TE, which is bound to official curricula (Guy, 2007; Hobbs, 2008). On the other hand, working with everyday-life texts is a way to engage teachers with otherwise challenging theories (Joanou, 2017).

The relationship of DML with disciplines and the curricula is important for the acceptance and actual integration of DML in class. On the one hand, teachers are more open to integrate new elements that support and expand what they already have to teach (Scheibe, 2009; Carmody Hagood, 2011); on the other, some scholars observe that this might result in a fragmented approach, jeopardizing the possibility for a consistent and structured form of *education* for all pupils (Buckingham, 2019).

## A case study in DML teacher education

This article presents a case study in primary TE in Ticino, the Italian-speaking and southernmost Swiss canton, with the purpose of providing a contribution on DML pre-service TE, and also about what impact can be reasonably expected in terms of change of approach, role perception and readiness to implement DML activities. The course presented here is a short one (24 contact hours, 2 credits), and one simple question was: is it worth it? Can a short course actually bring about some actual learning in such a complex and challenging domain as DML? This was operationalized in the following research questions:

1. Did teachers change or broaden their approach to DML education?
2. Did the course impact upon their role perception and self-efficacy in DML education?
3. Did teachers fill the gap between academia and the profession and actually implement DML activities in the classroom?

Before presenting the course design and the methodology of the study, the next section briefly illustrates the current DML education scenario in Switzerland and in Ticino.

### Context information: DML education in Switzerland

Education in Switzerland is the responsibility of each of its 23 cantons, which decided in 2009 to “harmonize” the compulsory education curricula with an inter-cantonal agreement called *HarmoS* (EDK, n.d.). New school curricula for each linguistic region (German, French, Italian) were developed and published between 2014 and 2015, and are progressively being implemented in schools and in TE. They include *Media and Informatics*, a domain which broadly covers the DML dimensions discussed above. Due to internal political and cultural reasons, its implementation differs across regions. In the German and French curricula, *Media and Informatics* is a new subject, with one weekly hour in most compulsory grades, but only the German curriculum includes a graded certification. In the Ticino (Italian) curriculum, the domain is labeled *Tecnologie e media* and it is presented under “general education”, that is, as a relevant topic which is not covered by a single subject but is transversal to many subjects. In a curriculum document of over 300 pages, 1.5 pages outline the contents of *Tecnologie e media*, but no specific learning objectives, target competences or evaluation rubrics are given. The message that the curriculum sends is that

DML belongs in school education, but it is not central to it. Teachers are *invited* to do something (and the curriculum offers some advice), but they are not obliged to, and they will not be assessed in relation to their outcomes in teaching DML. The same message is sent through the yearly catalogue of continuing education courses, which offers a variety of courses, but only a few options on DML-related topics.

On the other hand, the Ministry of Education in 2015 created a new cantonal unit, *Centrorisorse didattiche e digitali*, whose goals include the improvement of schools' digital infrastructure (devices and networks), the promotion of digital teaching and learning, and the diffusion of good practices in ICT literacy. At the time of publishing this article, a DML competence framework is under development as an integration of the official school curriculum.

The results of this study should therefore be interpreted within the framework of a school system that is not *against* DML education, but does not promote it *actively*, as it is also the case in other countries.

### The course design

This case study reports the design and implementation of a specific 2-credit face-to-face course on DML education for pre-service primary and pre-primary schoolteachers. The *Tecnologie e media digitali* course was part of the optional course offer, was given by the author and was attended by 26 third year Bachelor students, 10 in pre-primary and 16 in primary TE. At the time of the course, most of them were working half-time as teachers, or had equivalent class practice (placement) hours every week. The course was scheduled in Spring semester 2017 (February to June), over 12 two-hour sessions.

The course outline was co-designed with the students in two steps. They were surveyed four weeks before the course began, in order to select between two options: an overview of different issues/methods/experiences, or an in-depth exploration of one or two issues/methods/experiences. All respondents indicated a preference for the former option, and provided indications about what topics they desired to cover. Such macro-level co-design was complemented with class-to-class fine-tuning: at the end of each session, students were asked how much more time they were willing to spend on the topic at hand, and if they wanted to suggest other topics. This resulted in a flexible yet articulated syllabus (Table 1), covering all of the five key competences discussed above from (Hobbs, 2010).

**Table 1**

Unit	Topic	Dimensions (Hobbs, 2010)
1	Media and technologies: how the Internet works	(1) Access information
2	A web of information	(1) Access information
3	Coding (expert guest presenting Scratch)	(3) Create content
4	Educational robotics	(3) Create content
5	Visual literacy	(2) Analyse media
6	Audio, music and the radio	(2) Analyse media/(3) Create content
7	We in the media: social media	(4) Behaviour and ethics
8	Watching movies (expert guest on movies for kids)	(2) Analyse media
9	Cyberbullying (expert guest on prevention programs)	(4) Behaviour and ethics
10	Media addiction	(4) Behaviour and ethics
11	Digital storytelling	(3) Create content
12	Social media & safety (discussion of a case study)	(5) Take social action

In the design of single units, it was taken into account that, in the pre-course survey, students clearly expressed a preference for hands-on experiences “to use the next day” in class. The four-building-blocks approach (Dezuanni, 2015) was then intentionally skewed to *first*, promote the exploration of different practices working with digital materials and producing media, and *then*, build conceptual understandings through discussion and reflection. Each topic was presented in class through a fifteen-minute contextualization activity (“Why is this topic relevant for your pupils and for you?”) usually based on everyday materials or situations, followed by a hands-on activity to try out and then to adapt for children (about forty-five minutes). A short presentation of key concepts from the literature (“What are the key elements to understand the issue at stake?”) would take place before or after the activity, and a moment of discussion concluded each unit, in order to foster reflective practice (Lund, Furberg, Bakken & Engelién, 2014). In three sessions, external speakers active in out-of-school DML initiatives were invited to present specific topics (using films in class, cyberbullying and coding). All course materials and course-related interactions were documented and made available via the official university Moodle space.

### Methodology

The study collected evidence of the course impact both in the short term and in the medium term. The data was collected in three steps: (a) a pre-course survey for all participants, in January 2017, completed by 18 respondents; (b) a post-course survey, in September 2017, completed by 11 respondents; and (c) four follow-up interviews conducted in December 2017, that is, four months after the participants started working full-time (the end of August 2017).

The pre- and post-course surveys contained the same key items:

1. Three items investigated their approach to DML, and asked respondents to:
  - a. Position their perceived role as teachers in teaching DML among the five approaches discussed above (protective, critical, creative, civic engagement, functional; Likert scale);
  - b. Indicate the most important goals they would pursue in teaching digital media (open text);
  - c. Characterize their role as DML teachers (multiple choice item; values: expert, model of effective or safe use, a reference person to ask when questions or problems arise).
2. One item was about their perception of the responsibilities connected to the development of pupils’ DML skills, if it was more up to school or families (Likert scale)
3. One item was an assessment of their self-efficacy, as a single item response to the statement “I feel I’m able to conduct DML activities with my pupils” (Likert scale).
4. Finally, some open response items explored their perception of enablers and obstacles for the actual implementation of DML activities in their classes.

The pre-course survey also included items designed to collect co-design-related information (see above), while the post-course survey included items for confirmative evaluation (Morrison, Ross & Kemp, 2004).

One year after the course, four individual follow-up interviews were conducted, with four teachers (two male and two female, all Swiss nationals) who agreed to participate in this latter part of the study. Interviews were conducted in Italian, recorded, partially transcribed and analyzed, in order to track the development of the participants’ approach, self-efficacy, and role perception over time, and also to collect information about the actual



implementation of DML activities in class. The semi-structured interview protocol included questions about the reasons why they signed up for the course, what they learned, how important they thought DML was for their current class, if they did any DML-related activity over the course of the year, and if they changed their views in terms of DML education approach and perceived teacher role. The teacher trainer's perspective was integrated through the notes taken during the course itself.

Given the small sample and the nature of the data, no statistical analysis was conducted. The pre- and post-surveys were analyzed comparatively, that is, comparing the figures of the two situations. The qualitative data from the interviews, which represent the richest source, was examined at first through the categories of the main five approaches to DML education (cf. above), and through the lens of the perceived teacher role in DML. As a second step, additional patterns or themes were identified through a process of open coding (Corbin & Strauss, 2008), namely: the personal/professional gap (Joanou, 2017; Burnett, 2011; Instefjord, 2014); self-efficacy (Fanni, Tardini, Rega, Cantoni & Van Zyl, 2010; Gudmundsdottir & Hatlevik, 2018); working with popular media (Guy, 2007); responsibility for DML, and obstacles/enablers.

In the following analysis and discussion, no attempt is made to generalize beyond this case study, which is intended to document a specific context and course in order to provide elements for a discussion of the approaches, forms and impact of DML education in pre-service TE.

## Results

### Broadening the approach: from safety to critical literacy

The data collected confirmed that pre-service teachers believe in the importance of DML for their profession and for their pupils (Gretter & Yadav, 2018). But what purpose would they assign to DML, that is, what approach would they take up? Before the course, nine participants expected to learn ways to “protect children from inappropriate or dangerous messages” or “inoculate them against commercial, racist, violent or extremist messages”, (the *protective/inoculation* approach); five to “make them able to read media messages critically” (the *critical* approach), and four to “help them grow up as adults that use digital technologies to create a better world” (the *engagement* approach). This was clearly voiced during the first class, when the discussion quickly turned to the teachers' worries about screen addiction, inappropriate content, or social media risks for their pupils – all themes indeed rather frequent in the popular discourse. From the trainer's point of view, this could jeopardize the course, narrowing its focus to that of prevention, rather than opening venues for a broader view on DML.

As indicated above, the course did not directly present DML contents and approaches, but proposed a mix of hands-on activities that supported discussions and conceptual understandings. After the course, only two participants chose the protective/inoculation approach, while the majority leaned towards critical literacy. Without the need for explicit theoretical discussion, critical media literacy came to the foreground, indicating a new awareness of their children's learning needs, and of what they can achieve as teachers, and possibly, a move one step away from tabloid-style discourse. Such a shift also emerges from follow-up interviews, where interviewees discussed their DML goals as “changing your ways of thinking [about digital media]” and “being curious about technologies [as opposed to just texting]”.

Teachers seemed to enjoy working with popular media (Guy, 2007; Hobbs, 2008), and provided positive feedback when the trainer brought examples to the class. This was also

echoed in the interviews, when they confronted the challenge of “learning to be critical of what we read online”, also referring to fake news, or “helping [children] to not only watch trash online”. The emphasis on safety online did not vanish: teachers also mentioned “security issues”, “awareness raising, for example in relation to pornography”, and so on, but as a secondary focus.

### Teachers as role models

The role of teachers in promoting DML was often discussed in class. In many cases, the participants commented on the limits of their own digital skills; in other cases, they wondered if they were responsible for discussing complex topics like screen addiction or pornography, indicating an issue connected to their perceived role (or professional identity), which in many cases functioned as a filter on their personal, non-academic experience (Burnett, 2011). In the interview, one of the most geeky participants said: “before the course, I never thought that I had a role as a teacher in DML education”.

In both the pre- and post-course surveys, teachers indicated “being a model for aware use of technologies” as the most appropriate teacher role in this domain. On the one hand, this reinforced their refusal to become computer experts or geeks, just like they teach math but are not mathematicians, or teach history but are not historians. On the other hand, it clearly indicates that they seem to privilege an approach where they use technologies *with* their pupils, rather than a scenario where they explain technologies *to* them. They are aware that children will learn most DML practices by imitation, rather than through declarative knowledge or even exercises. This supports the view of an all-round DML education for teachers, in which they learn *about*, *through* and *with* technologies (Johannesen, Øgrim & Giæver, 2014; Rivoltella, 2001), and create a bridge between personal and professional expertise (Cervetti, Damico & Pearson, 2006).

The first step for DML is welcoming pupils’ digital experiences in class, as things that can be shared and discussed, as opposed to purely private experiences. During the interview, one teacher said “It’s important we just talk about technologies with children, otherwise technologies simply remain *out of the class*, as if they were somewhere else”. One teacher said: “I leave space for children to ask about the Internet and how they use computers and smartphones. Sometimes they do it in class, or during recess, but I also created a box where they can write their questions to me, so that they can ask anonymously. I then answer and discuss the questions with the whole class.”

Two teachers tell stories about their first use of digital devices in class, which were explicit modeling moments. The former brought for the first time a tablet in class: “when I took it out, the children started to chat and they said I was going to play games, because this is what a tablet is to them. I had to explain that we could use it for learning as well.” Later on in the interview, the teacher reprises the same story to make the point: “It is important that we break the equation *screen = game*. (...) Some children asked me ‘Can you also use your smartphone for working?’, that is, not for playing.” The latter teacher used a smartphone to set up an alarm during physical education, “and the children said to me ‘You should not answer calls’, so I had to tell them that I was using it in order to make their work easier”. Other modeling examples come from searching for information online (“children see how I search”), or using simple programs.

Role-modeling was a key theme in the trainer’s preparation of the course, as he was aware that he would function as a role model for the participants. The co-design offered a first stimulus for reflection: DML can be planned in response to actual needs (and not only as an implementation of a ready-made curriculum) and should consider the participants’

experiences. The selection of popular media texts for the analysis also reflected the trainer's experience and tastes, and this also conveyed the message that personal experiences can play a role in DML education.

### Self-efficacy and the personal/professional gap

The last item in the survey assessed self-efficacy: "If you were to propose DML activities in class, do you feel prepared?" The average score saw a remarkable increase, moving from 2.42 to 3.55 on a 1-to-5 scale. This is a reason for hope, as it clearly says that even a short 24-hour course can make a difference.

Why do teachers feel more confident? The first element emerging from the interviews is that teachers seemed to make sense of their personal experience and competences in the perspective of their profession (Joanou, 2017), thus revealing appropriation (Insefjord, 2014). "I could already use digital technologies, but I did not know how to do it as a teacher"; "I have an interest in digital technologies, but I was curious about how to use them in class". This was in part a challenge for the trainer, who had to accommodate a very varied class, composed by experts and novices with different interests (video games, social media, film, etc.), but was indeed rewarding, because it resonated with his personal experience.

Secondly, teachers found a wealth of inspiration in the hands-on activities, and in specific learning materials tried out in class and then made available on the course online space. As mentioned above, the course design was oriented towards hands-on activities in response to the needs that emerged in the co-design activities. Of course, this could mean debatably a small amount of theory for an academic course. In this case, it provided everyone with a few ideas and tools that somehow resonated with him/her, and that were possible concrete starting points: it fostered a healthy dialogue with the ongoing professional practice, making it "stick" for the participants.

Finally, one teacher commented on "the ethical dimension and how we teachers should protect ourselves [from using social media with the pupils], as emerged from the case study [in session 12]", indicating that the course also provided indications about how to handle potentially risky or unclear situations (Hobbs, 2013).

### The connection with families and experts

Digital devices are mostly used after school: parents, and not teachers, buy smartphones and flat-rate plans for their children. As smartphones are usually not permitted on school grounds, teachers often leave DML education to families. Families, on the other hand, expect teachers to provide competences for safe and useful digital media use. Such tension emerged several times during the course, and also in the data analysis.

In the pre-course survey, students tended to assign responsibility for children's digital education mostly to families (average score 2.53, where 1 was "family" and 5 was "school"): after all, they would prefer to have a class of already tech-savvy and digitally-aware pupils. Some perceived DML activities at school as a sort of "back-up" in case families could not do their job properly. At the end of the course, their perception changed, and they assigned equal responsibility between family and school (average score 3), indicating that DML education is a shared task (e.g. UNESCO, 2006; Suter, Waller, Genner, Opplinger, Willemse, Schwarz & Süß, 2015). Consistently, the enabler factor "collaboration with families" was selected by the large majority of the students at the end of the course.

In the interviews, families are mentioned when discussing the need for DML education. Teachers report children telling that "Mom has one as well" when they see the teacher's

smartphone, or suggest the teacher to “go to YouTube and get that music” to sing along with, or talk about their favorite video games – so that it is clear that most children encounter digital devices and the Internet at home, even if “they do not talk about it with their parents”. One fifth-grade teacher reported the case of pupils who told her that they browse the Internet on their own, and that they had already encountered pornographic content. Interviewed teachers also talked about the positive reactions of families to their DML activities, which they presented at parents’ evenings. Prospective teachers are generally aware that the work they do in class can only bear fruit if it is shared and somehow continued out of school.

#### Enablers and obstacles: school equipment, curriculum and resources

“The first thing is having computers [available in class]”, said one participant in the first session of the course. Actually, in the pre-course survey, contextual elements like having “well-defined target competences or learning goals” and “technologies available in the classroom” were indicated as key pre-conditions for any DML activity. While the course progressed, teachers had an opportunity to try out different activities and became aware that they can do a lot just with one teacher-controlled computer, or even without computers at all.

Of the four teachers that participated in the follow-up interviews, two worked in schools with no Internet connection (or only available for special projects), no computer lab and no laptops or tablets. One of them privately bought a laptop, a hotspot and a projector in order to be able to use them in class. Another teacher has a WiFi connection in class, and can use his own laptop but has no computers for the pupils, while the fourth one works with different classes as substitute teacher, so the conditions vary from time to time. All of them stressed in any case the idea that “having computers in class is paramount”, as it would allow a seamless integration into teaching, and consistent role-modeling opportunities. Nonetheless, they are aware that they can start doing something without computers, or even using just one device, even a smartphone, for example when it comes to discussing safety or online information searches, or when it comes to working on media languages. This was just one of the main changes in the perception of obstacles and enablers for DML education. While before the course curricular guidance emerged as very important, after the course teachers seemed able to set their own goals. On the other hand, the perceived need of time in which to implement DML grew stronger. As one teacher puts it: “we would need more hours, as working on DML takes time”.

The connection with experts was also more appreciated after the course, possibly because they had met some during the course itself, and had an idea of the added value that they can bring to the class. Teachers also indicated that inspirational materials and lessons plans are important, because, as one teacher put it, “they support the motivation of the individual teacher”.

#### After all, do they bring it to the class?

What was the actual impact of the change in approach, perceived role and in self-efficacy discussed above? Did the teachers actually plan and implement DML activities? Elements to answer this question come from the interviews, which were conducted after the first four months in the school year.

All four interviewed teachers answered positively. One of them, teaching fourth grade, brought up the topic of digital media as being very important with the class, as he noticed that “many of my pupils spend a considerable amount of time online and some are gamers”,

and even enrolled in a digital maps project. Two others, teaching in first and third grades, proposed short activities within other subjects (science, music), and indicated that they “plan to introduce progressively more activities in the next months”. The fourth one, who works as substitute teacher and is also attending a master’s program, did some activities on occasion, but had no opportunity to develop any consistent plan. A few months later, during the writing of this article, two of them also enrolled in a continuing education course on coding.

In this respect, differences across the grades seem to be relevant. During the interviews, when asked about the future, all of them answered, “it depends on the class”. In general, teachers think that DML is more appropriate in higher grades (mainly grade 3 and above), because pupils have more basic literacy competences (e.g. reading and writing). While this is certainly true, it also contrasts with authors that claim for the early introduction of DML (e.g. Share, 2015) and see visual literacy as a domain accessible from the first day at school. Interviewed teachers found that pupils start asking the first questions about digital technologies when they are in higher grades, because they tend to get individual access to digital devices at that age (which is actually only partially confirmed by national and international figures: cf. Waller et al., 2016; Suter, et al., 2015; OECD, 2015).

## Discussion

This article began with an exploration of the concept of DML and a discussion of the main approaches to DML education, in order to outline the relevance and issues connected to pre-service DML TE. It then presented a case study in pre-service primary and pre-primary teacher education at a Swiss professional university: the design of a 2-credit course was illustrated, and both quantitative pre/post survey data and qualitative follow-up interviews were analyzed. The course was partially co-designed with the participants, and followed the four-building-blocks approach (Dezuanni, 2015). The case provides insights on the short-term and medium-term impact of the course design, and is focused on the participants’ approach, on their perceived role, on self-efficacy, and on the actual implementation of DML activities in class.

In general, the results confirm pre-service teachers’ interest in DML, and suggest that even they might have a rather naïve view. A change in approach is possible even through a short course (Scull & Kupersmidt, 2011), supporting the view that literacy development is incremental (Hendrix-Soto & Mosley Wetzel, 2018). Throughout the course, teachers maintained a description of their role as a model of competent digital behavior, different from that of an expert or reference person. The course experience led pre-service teachers to identify the enablers and obstacles in implementing DML education activities, shifting the focus away from the availability of devices and the official curriculum to finding time in the daily schedule to do what they deemed important, possibly as an expansion of other disciplinary activities (Carmody Hagood, 2011). Collaboration with both families and experts, also in the out-of-school domain, was introduced. Finally, self-efficacy improved and teachers were able to bridge their personal experience and competences with their professional narrative (Joanou, 2017), in a process of appropriation (Insefjord, 2014). In the medium term (6 months after the course ended), all interviewed teachers had brought some DML activities to their classes. The case study should be interpreted within its context: a school system that only recently introduced curricular elements related to DML, and that was not yet actively promoting this domain in primary and pre-primary education.

This case study provides reasons for hope. The *Tecnologie e media digitali* course was not a perfect course: it was limited in time, and provided a rather shallow presentation of many topics rather than an in-depth exploration; also, it did not offer a discussion of the theoretical underpinnings of DML. If anything, it was a drop in the ocean. Nonetheless, what this case study says is that action is possible even with limited resources, and that even a short course can make a difference: it can be enough to have teachers actually bring DML to their classrooms. Teachers would of course be more prepared, effective and keen on keeping up-to-date if they had a full 6-credit course as part of their core curriculum, if they acquired a sound and consistent theoretical framework, or if DML tasks were part of their placements. In many places, despite the societal demand for the development of DML competences, this is currently not the case, and DML TE is given only minor spaces. The good news is that little space can be enough to bring about a transformative action (Flores-Koulish et al., 2011), and to give teachers a few tools and the required self-efficacy to trust themselves in tackling the topic of digital media with their pupils, as also reported by Share (2015).

This article only discusses a single case study, with limited data. The low number of participants does not allow the drawing of any conclusive element, or generalization. My intention was to use both quantitative and qualitative data as evidence to make sense of the course experience and learn from it. From the point of view of research, its insights can simply point to directions worthy of further exploration. Broader studies, supported by comprehensive data on wider samples, or longitudinal studies (Burnett, 2011), would shed more light on the issues at stake here. Differences in teaching grades and disciplines should also be taken into account.

Also – and this is true of many domains in education – the documentation and comparison of DML TE approaches and strategies, along with that of related course designs, would bring valuable contributions to the discussion.

One section in this article was devoted to information about the specific school context in which this case study was conducted. The same experience in another context would probably generate different outcomes, or make no sense at all. While digitalization is a global phenomenon, its impact is mediated by local economic, social and cultural differences and is set in different school and teacher education systems. The discussion on DML, DML education and TE should become more context-sensitive, and investigate cultural differences and the relationship with national curricula (an analysis of some European curricula is in Guitert, Romeu & Baztàn, 2017).

I hope that this case study provides useful insights in setting up effective DML activities for TE, a task which becomes every day more necessary to meet our society's and families' expressed needs for education.

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