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Analysing Intervention Programmes:
Barriers and Success Factors.
A Systematic Review

Work package 1 – Deliverable 1.2

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CHANSE.

REMEDIS

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1.   Executive summary

The analyses of research into media literacy and digital skills (ML&DS) interventions presented in this report, offer valuable insights into the characteristics, challenges, and factors of success for these interventions in diverse contexts and for a range of outcomes.

Many studies had no clear theoretical underpinning. Those who did, drew on a broad range of **theoretical frameworks**, reflecting the diversity of interventions and methodologies applied.

Most studies **focussed on formal educational settings**, including schools and universities, with **minimal representation of other settings** like homes, libraries, or social media.

Teachers and researchers were the primary intervention providers, and formal courses often made up the intervention context. Many studies focussed on interventions around (pre-service) **teachers' ML&DS.** Delivery of content also took place through **representatives** of other non-profit organisations (e.g., educational NGOs and professional associations) and through **self-study**.

The **REMEDIS target groups** (disadvantaged youth (NEETs), carers, long-term unemployed, migrants, prospective teachers, and individuals from lower socioeconomic backgrounds) were underrepresented in the literature on interventions, with (pre-service) **teachers** being the most frequent target for interventions.

Interventions predominantly took the form of online and face-to-face **courses or workshops**, other, **non-conventional formats** like campaigns (i.e., targeted messaging to encourage people to develop ML&DS) or setting up networks (i.e., partnerships between educational institutions or community organisations to provide ML&DS training) were less common.

Overall, there was a **strong emphasis on basic information activities and literacy**, such as accessing, searching, finding, and navigating content. Dealing with misinformation, disinformation, health and nutrition issues featured prominently. **Technical and operational skills** also featured in the interventions studied.

Skills related to **active participation**, such as digital interactions and communication and content creation, received less attention in studied interventions, nor did critical literacy-related subjects, such as cyberbullying, online privacy, and safety.

Most interventions aimed to achieve **educational outcomes**, even when addressing other social aspects within school-based interventions. Interventions that extended beyond educational outcomes encompassed various social benefits, including **economic** and **employment**, **civic participation**, and **social well-being** outcomes. Physical and psychological **wellbeing outcomes** were underexplored in the interventions reviewed, despite the presence of health and nutrition topics.

Funding sources were only reported on in 40% of the studies, and primarily included government agencies, universities, and research institutes. A lack of information made it hard to evaluate funding influence on understanding intervention impact.

Active participant involvement, tailored intervention design, and appropriate trainer capacitation emerged as influential **factors for success**.

In terms of **evaluation design,** inviting external experts, longer intervention durations, diverse data collection methods, large measurement and control groups, peer-to-peer and group methodologies, and integrating theoretical factors and frameworks were also **advantageous**.

Overlooking individual participant characteristics, software or hardware issues, and limited access to quality devices and services were identified as **potential barriers** to successful delivery of ML&DS interventions.

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1 Introduction

1.1 The REMEDIS project

The REMEDIS (Rethinking Media Literacy and Digital Skills) project is funded by the European Union's CHANSE (Collaboration of Humanities and Social Sciences in Europe) programme. The consortium involves 7 academic partners from 6 countries, along with 14 non-academic cooperation partners. REMEDIS seeks to develop evidence-based approaches to develop and evaluate initiatives that foster media literacy and digital skills (ML&DS) to understand what the impacts of ML&DS interventions in different life domains are in terms of positive outcomes.

REMEDIS adopts an innovative research strategy that first aims to identify and quantify the differentiating factors (moderators and mediators of intervention effects) for ML&DS from a lifelong perspective, and to synthesise the existing evidence concerning the effectiveness of existing test-based interventions fostering ML&DS. REMEDIS will pay special attention to target groups, including disadvantaged youths (NEETs or Not in Education, Employment, or Training), the unemployed, refugees, people with lower SES (Socio-Economic Status), carers of NEETs, and (future) teachers.

To achieve its aim, the REMEDIS project has four research objectives.

1. To improve existing theoretical knowledge about the actual outcomes of interventions.
2. To improve and enhance existing ML&DS intervention strategies based on existing and emerging evidence.
3. To adopt advanced methods, and to develop and validate instruments for evaluating intervention strategies.
4. To produce evidence-based policy recommendations and develop a user-friendly, customisable evaluation toolkit.

This report contributes to achieving the first objective of REMEDIS by developing an evidence-based synthesis through a systematic review of success factors and barriers associated with ML&DS interventions. The ultimate goal is to discern the characteristics of ML&DS intervention programmes that lead to positive outcomes.

1.2 Introduction to this report

The results presented in the following section will feed into the next phases of the REMEDIS project, which include the design of a framework for and the co-development of Media Literacy and Digital Skills (ML&DS) interventions as well as the systematic evaluation of ML&DS interventions with REMEDIS target groups in six European countries.

2 Methodology

A systematic evidence review was conducted to build an evidence base of the drivers and outcomes of ML&DS interventions and of characteristics of ML&DS intervention programmes that lead to positive outcomes. A systematic evidence review is a rigorous and comprehensive method to summarise and evaluate existing scientific knowledge and evidence on a particular topic, and it involves a systematic and robust search, appraisal, and synthesis of the research evidence (Grant & Booth, 2009). By compiling and disentangling multiple research findings from quantitative, qualitative, or mixed-methods studies, systematic evidence reviews also allow researchers to clarify empirical evidence and identify knowledge gaps (Allen, Kim, & Jimerson, 2023). Transparent reporting of systematic evidence review methods, such as the search strategy, eligibility criteria, and exclusions made, allows for unbiased reporting on the available knowledge about the topic and has the potential for replication (Grant & Booth, 2009).

2.1 Search protocol

The search protocol for this systematic evidence review was developed in November and December 2022. A consultation of the literature on ML&DS interventions and discussions within the team led to a first version of the search protocol. During a consultation with a research librarian specialising in systematic evidence reviews at KU Leuven, this initial search protocol was further developed. Next, this search protocol underwent multiple rounds of testing and subsequent finetuning: the search query was entered into the selected databases, and the first search results were inspected for adequacy for our research purposes. If too many search results were considered irrelevant to the current research, adjustments to the search terms were required. While testing and fine-tuning the search query, attention was paid to the fact that the search query needed to be comprehensive (i.e., capture the literature on ML&DS interventions, and drivers and outcomes of these interventions) and, at the same time, efficient (i.e., minimising the number of irrelevant search results).

Different sets of search terms were needed to build an evidence base of the drivers and outcomes of ML&DS interventions and the characteristics of ML&DS intervention programmes that lead to positive outcomes.

- The first set of search terms needed to identify articles about ML&DS. Based on a previous systematic evidence review on the antecedents and outcomes of gaining digital skills (Haddon et al., 2020), sets of terms capturing the "media" or "digital" dimension on the one hand and the "literacy" or "skills" dimension, on the other hand, were determined. These "media" or "digital" terms were "media", "digital", "mobile", "internet", "online", "technology", "computer", "ICT", and "web-based". The "literacy" or "skills" dimensions were captured by the terms "skill", "competence", "literacy", "proficiency", and "capability". Next, combinations of each "media" or "digital" terms with each "literacy" or "skills" terms were made to cover the entire research literature and yield as many relevant search results as possible.
- The second set of search terms needed to identify articles about interventions.
- The third set of search terms needed to identify articles using quantitative methods, preferably experimental or quasi-experimental, to test the effectiveness of the intervention.

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- The final set of search terms was added as a not-term to exclude articles that are not relevant to our research. During the testing of the search terms, many studies related to medical trials or STEM and particularly engineering research came up, which are outside of the scope of the current research. Therefore, it was decided that a NOT-term should be added to the search query to specify the types of research that should be excluded from the search results.

The final search query resulted in four sets of search terms. This search query was entered in exactly the same way in each of the databases that were included in this review.

- **Set 1: on media literacy and digital skills**: "media skill*" OR "media competen*" OR "media literac*" OR "media literate" OR "media proficien*" OR "media capab*" OR "digital* skill*" OR "digital* competen*" OR "digital* literac*" OR "digital* literate" OR "digital* proficien*" OR "digital* capab*" OR "mobile skill*" OR "mobile competen*" OR "mobile literac*" OR "mobile literate" OR "mobile proficien*" OR "mobile capab*" OR "internet skill*" OR "internet competen*" OR "internet literac*" OR "internet literate" OR "internet proficien*" OR "internet capab*" OR "online skill*" OR "online competen*" OR "online literac*" OR "online literate" OR "online proficien*" OR "online capab*" OR "technolog* skill*" OR "technolog* competen*" OR "technolog* literac*" OR "technolog* literate" OR "technolog* proficien*" OR "technolog* capab*" OR "comput* skill*" OR "comput* competen*" OR "comput* literac*" OR "comput* literate" OR "comput* proficien*" OR "comput* capab*" OR "ICT skill*" OR "ICT competen*" OR "ICT literac*" OR "ICT literate" OR "ICT proficien*" OR "ICT capab*" OR "web-based skill*" OR "web-based competen*" OR "web-based literac*" OR "web-based literate" OR "web-based proficien*" OR "web-based capab*"
- **AND Set 2: on interventions**: "intervention*" OR "curricul*" OR "program*" OR "training*" OR "preparation*"
- **AND Set 3: on methodology**: "experiment*" OR "RCT" OR "randomised control* trial" OR "case control" OR "control group" OR "quantitative" OR "evaluat*"
- **NOT Set 4: excluding medical and STEM/engineering papers**: "medic*" OR "disease*" OR "clinic*" OR "industry*" OR "engineer*" OR "robot*"

In each database, this search string was supplemented with the requirements that the research had to be published in the past ten years (between 2012 and 2022), that the article was published in English, and that the research was peer-reviewed.

2.2 Databases

Drawing on the experience of team members and through consultations with a research librarian specialising in systematic reviews at KU Leuven, a selection of three large database aggregators was made, as these would offer the most sources. The three database aggregators that were included in this systematic evidence review are Web of Science, Scopus, and ProQuest. In Web of Science, we specifically searched the Social Sciences Citation Index (SSCI), the Conference Proceedings Citation Index – Social Sciences and Humanities (CPCI-SSH), the Book Citation Index – Social Sciences and Humanities (BKCI-SSH), and the Arts & Humanities Citation Index (A&HCI) databases. Through ProQuest, we searched the Education, Psychology, Social Science, Arts & Humanities, and Sociology databases. Additionally, this was supplemented with two specialised databases: Communication & Mass Media Complete (CMMC) and Education Resources Information Center (ERIC), which were both accessed via EBSCO.

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2.3 Search results

The search was performed on December 6th, 2022. The total number of search results across the databases was 5,890. All studies with their bibliographical information were exported from their databases and uploaded into a Zotero library to facilitate the screening process for duplicates. This screening was done in two steps. First, each database export was screened for duplicates. Six duplicates were detected within the Scopus export, resulting in 2,470 instead of 2,476 unique studies exported from Scopus. The four remaining database exports did not contain any duplicates. Second, all studies across databases were combined within one library to be screened for duplicates between the databases. At this point, a Zotero notification indicated that three studies in this library had been retracted. After checking each retraction notice, these three studies were excluded, resulting in a total of 5,881 exported studies. This set of studies was then screened for duplicates. After removing the duplicates (N = 1,003), this resulted in 4,878 unique search results that moved on to the eligibility screening stage. Table 1 contains an overview of the search results.

Table 1.	Search results	
Database	**Database description**	**Number of search results**
Web of Science Core Collection *(SSCI, CPCI-SSH, BKCI-SSH, A&HCI)*	A large database aggregator providing access to multiple databases that contain peer-reviewed, high-quality publications from scholarly journals, conference proceedings, and books.	1,608
Scopus	A large database aggregator covering a large number of abstracts and citations of peer-reviewed literature from scholarly journals, books, and conference proceedings.	2,476
ProQuest *(Education, Psychology, Social Science, Arts & Humanities, Sociology)*	A large database aggregator providing access to dissertations, theses, scholarly journal articles and other research outputs from multiple disciplines and from across the world.	498
Communication & Mass Media Complete (CMMC; via EBSCO)	A communication studies database containing research outputs from high-quality communication journals and covering all related disciplines.	105
Education Resources Information Centre (ERIC; via EBSCO)	A comprehensive database containing full-text research outputs and other resources from the field of education.	1,203
	Total search results	5,884
	Duplicates	1,009
	Retracted studies	3
	Final search results	4,878

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2.4 Eligibility screening and quality appraisal

The screening of the final 4,878 search results occurred in two stages. In the first stage, a first set of eligibility criteria was applied to the titles and abstracts of the studies. Next, an extended list of eligibility criteria was used to screen the full text of the studies. In each stage, the eligibility criteria were formulated based on how well the content of the study, on the one hand, and its methodology, on the other hand, resonated with the goals of the systematic evidence review.

In the first stage of title and abstracts screening, exclusions were made based on the following criteria:

- The study had to be **about media literacy and/or digital skills**: If the study was only about, for instance, media uses, or about different types of skills than digital skills, the study had to be excluded from the systematic evidence review. ML&DS could be interpreted as very broad, as a wide range of more general skills, or very specific, such as the ability to evaluate the credibility of online information.
- The study had to be about **ML&DS interventions and their outcomes**. If a study was not about an intervention that aimed to develop or stimulate ML&DS, it had to be excluded from the systematic evidence review. An intervention could be understood as a wide range of activities or initiatives aiming to teach ML&DS, such as a class at school, a workshop, or an educational game. Outcomes referred to specific life outcomes such as shifts in online behaviour, knowledge acquisition, attitudinal changes, academic performance, and increased feelings of empowerment among participants.
- The study had to employ **quantitative methods**: an experiment, a quasi–experiment, or a survey (if it tested the outcomes of the intervention). Only quantitative findings would allow for robust comparisons between studies based on quantitative data, such as effect size, in a later stage.

For the full-text screening stage, these screening criteria were supplemented with additional, more specific criteria that were not adequate for title and abstract screening due to the limited amount of information in abstracts. Additionally, criteria for the quality appraisal of the studies were added as well to avoid including low-quality research in the review. These quality appraisal criteria were inspired by the Weight of Evidence (WoE) framework by Gough (2007). As many of Gough's (2007) original proposed criteria were already included in the existing criteria from the title and abstract screening, a separate weight of evidence screening was not conducted. Instead, we opted to add the remaining quality appraisal criteria to the full-text screening framework.

The final set of screening criteria again consisted of both content-related and methods-related criteria and was composed as follows:

- The study had to be **about ML and/or DS**. Following the WoE framework to evaluate the relevance of the study to the current research, the study needed to contain a clear definition of ML&DS, a clear measure of ML&DS and a clear theoretical base or model of ML&DS for it to be included in the review.
- The study had to be **about ML&DS interventions and their outcomes** (i.e., specific life outcomes such as shifts in online behaviour, knowledge acquisition, attitudinal changes, academic performance, and increased feelings of empowerment among participants). If the study was not about an intervention, it had to be excluded from the

review. During full-text screening, special attention was given to whether the description of the intervention was fairly in-depth, and whether the discussion of the effectiveness of the intervention was fairly in-depth.

- The study had to employ **quantitative methods**: an experiment, a quasi-experiment, or a survey (if it tested the outcomes of the intervention).
- The **methodology and the procedures of the research had to be described in some detail**. The following elements had to be described in the methodology section for a study to be included: fair effort to limit selection bias, study includes statistical significance testing, study includes relevant control variables, study has a clear research aim, research questions and/or hypotheses, and clear links between methods and findings.
- The study reports on the **main research findings**, and the effect size or at least the statistical data for calculating the effect is present.

Both in the title and abstract screening and in the full-text screening stages, these criteria were applied in a cascading fashion. Each study was checked against the first criterion, and it could only move on to the second criterion if it passed the first criterion. Studies that did not pass the first criterion were immediately marked as excluded, as these studies would not be relevant to the current review without checking them against the following criteria. During the title and abstract screening stage, if information to make a decision about a criterion was insufficient, the study was retained for full-text screening, where more information to judge the study on the criteria would be available in the text.

Throughout the whole screening process, notes were kept about the reasons to include or exclude studies, which would be informative in the next stages of the review. Team members could always mark a study as include, exclude, or unsure. Studies marked as unsure would be further discussed during team meetings to arrive at a final decision to include or exclude the study from the further stages of the review.

After title and abstract screening, 678 studies were retained. We were unable to get access to the full texts of 55 articles. As these articles could not be screened, they were excluded from the research. After the full-text screening, a final set of 248 studies was retained for coding and analysis.

2.5 Reliability of screening: Intercoder reliability

Intercoder reliability was calculated for both title and abstract level, and full-text level screening inclusion-exclusion decisions. The screening was performed by the six REMEDIS country teams and their respective members for pair-wise decisions, i.e., each abstract or article was screened by two non-unique raters. The abstracts and articles were chosen randomly from the pool of eligible articles. Fleiss' kappa (κ) was calculated with JASP (version 0.17.1) (JASP Team, 2023).

For the title and abstract level, three rounds of screening were completed to reach substantial agreement between coders (Fleiss' κ = 0.63) according to Landis and Koch's criteria (1977). After each round of screening, the differences were discussed thoroughly, and consensus was reached. For the final round, 451 articles were screened on the title and abstract level,

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constituting approximately 9.2% of the total number of screened abstracts (N = 4878). After the third round, all remaining abstracts were screened to decide whether they should be included in the full-text screening.

To calculate intercoder reliability at the full-text level, 72 articles were screened, constituting approximately 10.6% of the total number of screened articles (N = 678). The intercoder agreement was substantial (Fleiss' κ = 0.79) for the first round of screening. After all differences were thoroughly discussed and consensus was reached, full-text screening was conducted on all remaining studies.

2.6 Coding of results

The final remaining 248 studies were coded and analysed using a coding framework. This coding framework was developed based on consultations of the literature and the observations made during full-text screening.

The coding framework consisted of five main sections. The first section concerned the article information, such as the authors, the title of the study, the name of the publication, and the quality of the study and publication. Next, the second section was related to the intervention characterisation, where data on the targeted skills, the target group of the intervention, the procedure of the intervention, and other relevant elements were gathered. The third section aimed to collect information on the methodology that was used to test the outcomes of the interventions, through data such as data collection methods, sample size, and use of experimental conditions. The fourth section was the largest and aimed to capture the outcomes of the interventions that were measured in the studies. For each outcome, the type of effect (within group, between groups, or interaction) was considered, along with the statistical information necessary to evaluate the effect size. The final section concentrated on potential barriers as well as factors contributing to the success of the intervention effects, considering the role of both mediators and moderators. The necessary statistical information required for the calculation and evaluation of effect sizes was gathered. A more detailed overview of the coding framework can be found in the Coding Framework, to be found on the Remedis page on Zenodo.

The coding of the articles based on this framework was done using Qualtrics, a proprietary online platform used to design surveys and other experience management tools. A questionnaire containing questions to capture the information required in the framework was set up and filled in for each study. A dataset containing the completed coding was exported to SPSS and Microsoft Excel formats for further analysis.

In some cases, it was not possible to code certain fields given the lack of clarity or absence of information in the publications retrieved. For the complete PRISMA protocol of the systematic evidence review, we refer the reader to 'Report on the Results of a Systematic Review of the Individual and Social Driving Factors and Outcomes of Media Literacy and Digital Skills (D1.1)[1].

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[1] See Vissenberg, J., Puusepp, M., Edisherashvili, N., Tomczyk, L., Opozda-Suder, S., Sepielak, D., Hietajarvi, L., Maksniemi, E., Pedaste, M., & d'Haenens, L. (2023). *Report on the Results of a Systematic Review of the Individual and Social Differentiating Factors and Outcomes of Media Literacy and Digital Skills.* KU Leuven, Leuven: REMEDIS.

3 Results

The rest of this report describes the results of the review of the academic literature looking at Media Literacy and Digital Skills (ML&DS) interventions. The report describes the findings ranging from the theoretical frameworks adopted, the characteristics and the outcomes of the interventions, to the enablers of and barriers to the effectiveness of these interventions. These analyses permit us to understand how ML&DS interventions are represented in the academic literature and what the gaps are in the studies that evaluate them.

3.1 Theoretical frameworks underpinning intervention studies

As part of coding the 248 articles containing information about the ML&DS interventions, the team of coders was tasked to identify the theoretical frameworks underpinning each study. Overall, almost one-third of articles (n = 82) lacked clarity related to theoretical frameworks or did not provide sufficient information to enable coders to identify leading theories. The analysis of the remaining 166 articles revealed considerable heterogeneity in the theoretical approaches used for research investigating ML&DS interventions. The theories or theoretical frameworks that were referred to in these articles were diverse in terms of specificity, background and purpose.

Table 2 shows the variety of theoretical approaches guiding intervention studies. It provides the number of articles that, according to coded data, mention the use of a particular theoretical framework or guiding theory for intervention studies. The specificity of some of the theories is indicated by the finding some theories were mentioned in only two (n = 18) or one (n = 61) articles. That is, 79 articles referred to theories mentioned in less than 1% of studies.

Table 2.	Theoretical frameworks
	Mentions
Media literacy	29
Technological pedagogical content knowledge (TPACK) model	14
Message Interpretation Process model	10
Digital literacy	8
Theory of planned behaviour	7
Constructivist theory	6
Social Cognitive theory	5
Inoculation theory	5
Digital storytelling	4
Social learning theory	4
Integration of ICT into teaching and learning processes	4
Advertising literacy	3
Blended learning	3
Digital divide	3
Self-regulated learning	3
Instructional design	3
Inquiry-based learning	3
Other theoretical frameworks*	79
No theoretical framework identified	82

 * Theoretical frameworks mentioned in less than 1% of publications

Note: It was possible to indicate multiple theories or frameworks in one publication.

Concepts of media literacy (n = 29) or digital literacy (n = 8) were theorised in 37 articles (see Table 2. When specific theoretical frameworks were referred to beyond this, educational and learning-focused theoretical frameworks were mentioned most often. The authors of these articles referred to theories such as TPACK (n=14), constructivist theory (n=6), social cognitive theory (n=5), social learning theory (n=4), ICT integration into teaching and learning (n=4), blended learning (n=3), self-regulated learning (n=3), instructional design (n=3), and inquiry-based learning (n=3). Several articles (n=10) made reference to the message interpretation process (MIP) model, which was the only frequently mentioned framework from the field of media and communication studies.

In summary, intervention studies included in the review often lacked a specific theoretical framework or leading theory. When coders could identify a particular guiding theory, theories

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from educational science dominated. Another trend found was that intervention studies tend to rely on authors who discuss media literacy or digital literacy, but often without explicitly applying a specific theoretical framework around these concepts. Therefore, findings indicate a need for novel theoretical frameworks that would integrate theories based on both educational and media studies to support researchers and education practitioners in implementing and analysing ML&DS interventions addressing the realities of a rapidly evolving digital media landscape.

More detailed information about theoretical frameworks identified in our research can be found in Vissenberg et al. (2023).[2]

3.2 Description of interventions

This section describes the results of the descriptive analyses of the main characteristics of the interventions reported on, such as the intervention areas, the different target groups addressed, the types of initiatives and the skills targeted. In this section, we use the term study to describe the articles analysed, which all reported on the results of the evaluation of one intervention.

3.2.1 Intervention areas

Intervention areas or the topics of the articles were open-coded (see Table 3).

The predominant topic of the articles pertained to basic information-related activities, encompassing tasks such as accessing, searching, finding, and navigating the internet to get information or content (40% of interventions). Second in prominence was more advanced information navigation and evaluation-related activities, such as detecting misinformation or disinformation (18%). Health and nutrition issues related to aspects such as mitigating the impact of advertising or use of social media, were also prevalent (19%). Teacher media literacy was the fourth most common area tackled (18%). Classical media literacy interventions dealing with understanding how media works were the subject of 16% of articles. Digital exclusion was the topic in 10% of articles.

Online safety is placed in seventh place (7%), followed by computational literacy (6%), democratic participation and fundamental rights (4%) and digital literacy (4%). Meanwhile, privacy, cyberbullying, online harassment, extremism, scams, and other safety-related actions were paid the least attention, representing less than 3% of the total.

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[2] Please note that the review of theoretical frameworks in Vissenberg et al. (2023) (REMEDIS report D1.1). was conducted in a slightly different fashion, which explains why numbers of theoretical frameworks mentioned, vary minimally.

Table 3.	Intervention topics	
INTERVENTION TOPICS	**Frequency of mentions**	**Percent of the total number of studies**
Access, find, search, navigate content	100	40
Health and nutrition	48	19
Teacher media literacy	46	18
Mis/disinformation	45	18
How media work	40	16
Digital inclusion/exclusion	24	10
Online safety and security	17	7
Computational Literacy	16	6
Democratic participation and fundamental rights	10	4
Digital Literacy	9	4
Privacy	7	3
Creativity	4	2
Cyberbullying, online harassment	3	1
Student's media literacy	3	1
Anti-violence media literacy	3	1
Attitude ICT use	2	1
Others: extremism, scams, business apps	7	3
TOTAL	384	

Note: It was possible to indicate multiple options, so the total percentage is over 100. Total number of studies N=248.

In summary, issues high on the public agenda generating much public concern, such as cyberbullying; privacy and online safety, were underreported in our review of publications evaluating media literacy and digital skills interventions.

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3.2.2 Target groups

The REMEDIS project a-priori identified the following target groups as potentially deriving particular benefit from ML&DS interventions: disadvantaged youth (NEETs or Not in Education, Employment or Training), unemployed, refugees, people with lower SES, carers of NEETs, and (future) teachers. In applying the initial REMEDIS framework for target groups, it became apparent that roughly two-thirds of the examined articles were not explicitly designed for any of the predefined REMEDIS groups. It is important to note that we did not aim to create an exhaustive classification of target groups; rather, we put forth a selection of specific target groups for in-depth examination of intervention effects. Consequently, in order to discern any underlying patterns within these interventions, an analysis of the open-ended answers was conducted, aiming to establish a classification for the target groups associated with them (Table 4).

Approximately two out of three of the articles reviewed were not focused on any of the REMEDIS target groups (see Table 4). Amongst those who did, there was an overrepresentation of interventions targeted towards (future) teachers involved in formal education (21% of studies), followed by disadvantaged youth (including NEETs) with 9% of studies. Socio-economically disadvantaged groups are included in only 4% of the studies reported on in the academic literature, while interventions with carers of NEETs and refugees are paid even less attention.

Table 4.		Target groups in intervention studies
	Frequency	**Percent**
OCCUPATION/SES		
Teachers, Future teachers (REMEDIS)	52	21
University students	47	19
Secondary students	32	13
Primary students	25	10
Disadvantaged youth, incl NEETs (REMEDIS)	22	9
Middle school students	13	5
Low SES (REMEDIS)	10	4
Carers of NEETs (REMEDIS)	1	1
AGE		
Youth	10	4
Adults	7	3

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Table 4.	Target groups in intervention studies		
Young adults	6	2	
Older adults	6	2	
HOUSEHOLD COMPOSITION			
Families with children/adolescents	5	2	
CITIZENSHIP STATUS			
General public	8	3	
Refugees (REMEDIS)	2	1	
Others	2	1	
TOTAL	248	100	

Note: The qualification *(*REMEDIS) indicates that this group is one of the original pre-defined target groups that the project focuses on.

Among the identified target groups, teachers and future teachers are still the ones most studies focus on (21%). They are closely followed by different groups of students. In general, the older the group, the more studies are focused on them: university (19%), secondary (13%), and primary (10%). Middle schoolers (5%) are paid less attention, but this number needs to be interpreted with caution as this school level is not present in many EU countries and joins upper primary and lower secondary students. Disadvantaged youth, including NEETs, are the second most focussed on REMEDIS group in 9% of studies, and less economically favoured groups are prevalent in 4% of the studies.

However, when analysing age groups (without mention of specific occupation target groups, such as teachers, students, and disadvantaged youth), it becomes challenging to identify a clear pattern, because the studies often lack clearly defined boundaries between these groups. Nevertheless, it seems that youth (4%) who were the target of interventions not exclusively taking place in schools (not coded as students or NEET) receive slightly more attention than young adults 2%, adults 3%, or older adults (2%). Even less attention is paid to families with children (2%). Lastly, carers of NEETs and refugees receive minimal emphasis within the studies analysed.

In summary, vulnerable groups as defined by REMEDIS are paid comparatively little attention in contrast to other less disadvantaged, non-REMEDIS target groups and mostly represent students- who seem to be easier to access for the interventions.

3.2.3 Types of initiatives

This section focuses on the types of initiatives evaluated in the reviewed studies. There is a broad range of initiatives organised around different categories. Distinctions were made based on delivery format and mechanisms. Formats consisted of: *Offline training* refers to face-to-face teaching sessions, often following a formal course format. *Online courses* are the courses that beneficiaries access through online platforms, either self-guided or with tutors online.

Workshops consist of specific activities with active attendee participation in order to discuss or improve specific skills, guided by the providers (online or in person). *Networks* refer to the creation of online environments to promote collaborative learning and online communities. *Campaigns* are initiatives focused on using different communication strategies to create awareness about the importance of ML&DS. Mechanisms for delivery include: *Educational material* or the development of different teaching resources to be used in school or university environments afterwards. *Content* refers to interventions that create other types of audiovisual material aimed at contributing to ML&DS. And *resource* delivery consists mostly of the provision of digital devices are those initiatives that supply the necessary equipment for people to access the Internet, such as laptops or smartphones.

Regarding the type of initiatives analysed (Table 5), the most common format is offline training (48%) while online courses comprise 26% of the initiatives. Other initiative formats like workshops (21%) are also common while collaborative learning networks (3%) and awareness campaigns (3%) or interventions based on case study and projects (1%) are far less common in our selection of studies. Regarding the mechanisms for delivery, 36% are focused on educational materials 21% are AV content providers and just 1% providing digital devices.

Table 5.	Types of initiatives	
	Frequency	**Percent of total number of studies**
DELIVERY FORMAT		
Offline training	119	48
Online course	64	26
Workshop(s)	51	21
Collaborative learning networks	8	3
Awareness campaigns	8	3
Others	5	2
MECHANISMS		
Educational material	90	36
AV Content provision	52	21
Providing digital devices	3	1

Note: It was possible to indicate multiple options, so the total percentage is over 100. Total number of studies (N=248).

The result suggests that most of the initiatives are related to the education sector, be it formal or informal, as illustrated by the dominance of interventions by means of offline training, online courses and workshops and providing educational material. In contrast, some other types of

initiates that are more bottom-up or beneficiary-led – such as collaborative networks or awareness campaigns, are still uncommon in the studies reviewed.

3.2.4 Approaches to learning

The coding framework used to analyse the selected articles included six approaches to learning: buddy systems, collaborative learning, games, one-to-one or either formal or informal learning. Table 6 contains the frequencies of each type of approach to learning reported on in the articles in this review. The most common approach to learning among the studies analysed is formal learning (61%), followed at some distance by informal (29%) and collaborative learning (22%). Whereas other approaches are relatively scarce: games (8%), one-to-one (4%) and buddy systems (1%).

Table 7.	Approach to learning	
	Frequency	**Percent of total number of studies**
Formal learning	152	61
Informal learning	72	29
Collaborative learning	55	22
Games	20	8
One-to-one	9	4
Buddy systems	2	1
Other	25	10
TOTAL	335	

Note: It was possible to indicate multiple options, so the total percentage is over 100. Total number of studies (N=248).

Among the studies analysed, the approaches to learning seem quite traditional, as the majority of interventions is delivered through formal or informal learning initiatives. Even though collaborative learning can be considered more innovative, some other approaches using gamification or buddy systems, seem to be quite scarce.

3.2.5 Targeted skills

This section contains the digital skills targeted by the ML&DS interventions studied in this review. The definition of each of the skills reflected in Table 7 is based on the categorisation of digital literacy established in the yDSI (Youth Digital Skills Indicator) (Helsper et al., 2020), as well as in the DigComp 2.2 framework (Vuorikari et al., 2022).

Taking into account the yDSI instrument, the first five skills domains adopted in the coding framework were defined as follows:

- Technical and operational skills refer to the ability to operate different digital technologies, being aware and able to manage the different technical features and options of devices, platforms and applications.
- Information skills refer to the ability to search for information online, selecting reliable sources in an analytical and critical way.
- Communication and interaction skills are those abilities required to effectively use different digital media in order to establish communication and interact with other individuals and bodies, making use of appropriate communication codes according to the circumstances, while critically evaluating the potential implications that the personal behaviour online might have on other people.
- Content creation skills refer to the ability to create (quality) digital content and understand how it is produced and published and how it generates impact.
- Programming skills refer to the skills needed to use different programming languages in order to create websites and software. They are often considered an advanced form of technical and/or content creation skill.

On the other hand, digital knowledge refers to the individual's critical understanding of ICT and knowledge related to the different digital skills domains mentioned above. All skills therefore have both functional (ability to manage technical functionalities and features) and critical (understanding how and why devices and content are produced in certain ways) aspects.

Online safety (from DigComp) is defined as the set of abilities that permit individuals to protect their identities and privacy with the aim of preventing negative outcomes. Online problem solving (also DigComp) refers to the ability to use digital skills to achieve positive outcomes and solve problems related to ICT. Although online safety skills can be seen as converging with the different dimensions of the yDSI, they refer more specifically to the individual's ability to protect devices, content, personal data and privacy in digital environments. It was coded as a separate category because they were explicitly mentioned in the studies explored in the initial stages of the literature review.

Among the targeted skills in the studies, information skills are the most frequently addressed (60%), while technical-operational skills hold second place with 39%. Interaction skills are targeted in 28% of the total and 25% of articles focus on content creation and digital knowledge. Online safety and programming skills rate much lower, with 9% and 6% of articles, respectively (though note that they are often operationalised through other skills).

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Table 7.	Targeted skills	
Skills	**Frequency**	**Percent of total number of studies**
Information skills	149	60
Technical-operational skills	96	39
Communication and Interaction skills	70	28
Content creation skills	61	25
Digital knowledge	61	25
Online safety	23	9
Programming skills	15	6
Other	32	13
TOTAL	507	

Note: It was possible to indicate multiple options, so the total percentage is over 100. Total number of studies (N=248).

In summary, instrumental, technical skills related to individual engagement were more dominant in interventions evaluated than more social and creative skills related to production of content and positive interactions, and more critical understandings of how the digital world works.

3.2.6 Activities

The types of activities that were organised in the ML&DS interventions in this review were predefined in the coding framework based on the activities found in the initial stages of the review. The most frequent activity that the participants in these interventions engaged in, concerned formal courses (e.g., media literacy as part of curriculum), being found in almost three quarters of the interventions (see table 8). Secondly, evaluating information (e.g. judging whether something is fake news) was the second most frequent activity, which is coherent with the key role that information skills played. Other activities related to creativity were also reported, such as creating content, essay writing, and designing platforms. Moreover, 37 interventions could not be categorised among the pre-defined activities in the coding framework, and ranged from discussions and discussion groups, to games, diaries, programming, theatre, simulations or other alternative educational approaches, such as project-based learning or flipped classroom.

Table 8.	Types of activities	
Type of activity	**Frequency**	**Percent of studies**
Course	184	74
Evaluating information	79	32
Creating content	65	26
Scenario building	18	7
Essay writing	14	6
Designing platforms	9	4
Not clear	6	2
Other	37	15
Total	412	

Note: It was possible to indicate multiple options, so the total percentage is over 100. Total number of studies (N=248).

Furthermore, 44% of the articles reported a combination of multiple types of activities, and 5% of studies reported between four to six different types of activities as part of the intervention (see Table 9).

Table 9.	Number of activities per intervention	
Number of types	**Frequency**	**Percent of studies**
One	132	53
Two	75	30
Three	22	9
Four to Six	13	5
Not clear	6	2
Total	248	

In summary, interventions are often composed of a variety of learning activities relating mostly to formal course work and information evaluation, but there is also a reasonable representation of less formal activities such as content creation.

3.2.7 Location of intervention

The location of the intervention refers to the place, either physical or virtual, where the intervention takes place. In the articles studied, the location is closely related to the type of activity and the approach, often taking the shape of school-based courses. Table 10 summarises the frequencies of categories defined in the coding framework, and illustrates that school-based environments are the most common for ML&DS interventions (57%). Online courses (27%) and organisation-based interventions (16%) were the second and third options, respectively. Even when universities were not a pre-defined category in the coding framework, they were mentioned as intervention locations in 19 studies (8%). At-home and family-based locations were the least mentioned with 4% and 3% of the studies, whereas no clear description of the location was found in six cases (2%). Other locations (14%), not pre-defined in our coding framework, included universities, government offices, public libraries, and digital platforms identified through open coding.

Table 10.	Location of intervention	
Locations	**Frequency**	**Percent of studies**
School-based	140	57
Digital/Online	68	27
At organisation	40	16
University-based	19	8
At home/family context	17	7
Not clear	6	2
Other	15	6
Total	305	

Note: It was possible to indicate multiple options, so the total percentage is over 100. Total number of studies (N=248).

A great majority of studies (76%) reported using one type of location only, 21% two locations, and only 1% reported having combined three different locations for the same study.

In summary, interventions are focussed on delivery in formal educational settings, alongside digital learning environments and rarely deliver their learning in more informal settings where most media and digital engagement takes place.

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3.2.8 People and institutions delivering the interventions

Given the nature of the interventions as predominantly part of school and university environments, teachers (understood as all teaching body staff such as lecturers, teaching assistants and professors) emerged as the most frequent actors delivering interventions (see Table 11). Someone from the organisation (either a professional trainer or a volunteer) conducting the intervention (and not a teacher in a formal educational setting) delivered 28% of the reviewed interventions, while independent learning made up 11% of the studies. Peers (2%) and parents (1%) were the least mentioned as intermediaries. Another 13% of papers analysed were classified as 'Others'. The latter proportion was higher but after reviewing responses, the emergent category of researchers and paper authors was created (12%). The rest was composed of other roles such as experts hired for the intervention purpose, librarians, community leaders, students, therapists or actors.

Independent learning refers to online and self-embedded interventions such as campaigns, educational material or online courses in which no tutors or facilitators are involved. Finally, peers (2%) and parents (1%) were the least frequent actors delivering interventions.

Table 11.	Who delivers the intervention	
	Frequency	Percent of studies
Teacher	103	42
Someone from the organisation	69	28
Independent learning	27	11
Researchers/Authors of the paper	30	12
Peer(s)	6	2
Parent	2	1
Other	31	13
Total	268	

Note: It was possible to indicate multiple options, so the total percentage is over 100. Total number of studies (N=248).

The majority of articles (N=161) mentioned whether people delivering the interventions had received previous training or not before carrying out the intervention. In a third (30%) of interventions evaluated, the person delivering the intervention did receive training, whereas in a quarter (24%) they did not receive any training at all, and in a tenth of studies (11%) they received partial training or only in some specific cases. For instance, when teachers were in

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charge of an intervention, some treatment groups received further training to deliver the course, and others only received the educational materials.

Table 12.	Prior training of intervention provider	
	Frequency	Percent of studies
Yes	75	30
No	59	24
Other	27	11
No data provided	87	33
Total	248	

In summary, most of those delivering were trained professionals, mostly teachers but also others such as volunteers, who have received formal training. When no formal training was received this was partly because the person delivering the intervention was the one who had designed the intervention. There was little peer-to-peer or close other delivery, suggesting that not much bottom-up collaborative learning was taking place. And the lack of information on the capacitation of trainers in many studies makes it difficult to evaluate the impact of human resources on the effectiveness of interventions.

Along those same lines, Universities represent the great majority of organisations providing interventions (79%), either as courses for their students or as part of research projects (see Table 13). Public services (e.g., libraries) made up 5% of the studies (13 interventions), followed by non-profits (e.g., charities) (4%), government agencies (e.g., ministries) (3%), and private organisations (e.g., telecom companies, banks) (2%). Healthcare professionals, joint partnerships and individual researchers were examples of other providers mentioned, all of these were mentioned in fewer than 1 percent of studies.

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Table 13	Types of intervention providers	
	Frequency	**Percent**
University/academia	196	79
Public services	13	5
Non-profit	9	4
Government	7	3
Private, for-profit organisation	5	2
Other	6	2
Not reported	12	5
Total	248	100

It is likely that as part of the evaluation of interventions funded by research bodies and conducted by academic institutions, there is a requirement to publish in academic journals. It is thus more likely that our review has captured these. There is no such obligation for commercial research or evaluations conducted by non-profit organisations.

Further coding related to whether the organisation carrying out the intervention had previous experience with similar types of ML&DS interventions. Researchers and intervention providers in 103 out of the 248 studies (42%) reported to have had previous experience in similar interventions, whereas in 16 studies (7%) the organisations delivering the intervention were new to the field. The remaining 129 studies (52%) made no reference to whether the organisations delivering interventions had experience in the field or not. In other words, there is a considerable lack of reporting on the experience and capacity of those organisations delivering the interventions.

3.2.9 Length of the intervention

The information collected on the interventions' length was hard to categorise. Some articles reported length in terms of weeks and months (period), whereas others provided details on total time in hours or activities (duration). For other formats, such as open courses, it would not be possible to define with precision how long the users take to complete the interventions. Accordingly, three *ad hoc* categories were proposed to differentiate interventions that reported duration and/or period (see Table 14). The first group concerned one-off session interventions, ranging from 32 seconds to three hours in duration. The second group, ("Short intervention") was comprised of interventions with more than one session that lasted 20 hours or less in total, or took place over a period of one month or less. Finally, the last group ("Long intervention") consisted of interventions with a duration longer than 20 hours in total or

covering a period of more than one month. Ultimately, the length of the interventions could be estimated for 216 articles, leaving 32 studies that provided unclear or no data related to length.

Table 14.	Intervention length	
	Frequency	Percent
One off session	29	12
Short intervention	91	37
Long intervention	96	39
Not reported or unclear	32	13
Total	248	100

Other aspects explored during the coding and analysis of the studies in this review were whether the interventions were part of larger projects (see Table 15). In this case, the majority of studies (64%) were reported to be a stand-alone initiative, whilst 25% of initiatives were part of a larger project. No information was found about the broader context of the intervention in 27 studies (11%).

Table 15.	Interventions as stand-alone projects or part of a larger project	
	Frequency	Percent of studies
Stand-alone initiative	158	64
Part of a larger project	63	25
Not reported	27	11
Total	248	100

In summary, most interventions evaluated in academic publications are isolated programmes with a more extensive range of activities distributed over more than one session or a period of time, rather than one-off sessions which are less likely to be effective.

3.2.10 Intervention funders

Information about how the interventions were funded was rare among the studies reviewed. Only 107 out of the total of 248 studies reported on the ways in which the interventions were funded. Within this set of studies, we identified five broad types of research funders (see Table 16). Government bodies, such as ministries and local councils, were identified as funders in 40

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studies (16%), followed by universities (12%). In the latter case, funding consisted of research grants or financial support to run the research as part of teaching formal courses. Other intergovernmental bodies and research institutions, such as the European Commission, funded 28 interventions (11%). Charities and community-based organisations were mentioned as funders in 10 studies (4%). Private funding was even less often behind intervention support (3%), either as CSR (Corporate Social Responsibility) projects or because the intervention related to their official targets. Nevertheless, a majority of 141 interventions (57%) did not provide any information related to funders.

Table 16.	Intervention funders	
	Frequency	Percent of studies
Government agencies	40	16
Universities	30	12
Intergovernmental bodies and research institutions	28	11
Charities	10	4
Private companies	7	3
No funding source provided	141	57
Total	256	

Note: It was possible to indicate multiple options, so the total percentage is over 100. Total number of studies (N=248).

In summary, ML&DS interventions that are evaluated in published in academic articles are most often funded through public funds and third and commercial sector stakeholders are less likely to be involved in supporting this type of work. More importantly, funding is very often not reported on.

3.2.11 Types of outcomes

The most frequently evaluated outcome was ML&DS itself (73% of the studies) (see Table 17). Education or learning-related outcomes were evaluated in 29% of the studies. Such interventions were mostly part of school or university courses, and the outcomes were measured in terms of grades at the end of the course. The following three outcomes for which the impact of interventions was evaluated related to wellbeing: psychological (16%), socio-cultural (e.g. belonging, identity) (10%) and physical (7%) wellbeing. Civic and participatory (3%) and economic outcomes (1%) were reported on least frequently. Another 12 studies (5%) reported outcomes such as parental mediation, general knowledge, or combinations of the other outcome categories through composite indexes (See REMEDIS report D1.2; Vissenberg et al., 2023), whereas 21 studies (5%) did not report any outcomes measured.

Table 17.	Outcome domains	
	Frequency	**Percent of studies**
Media literacy & digital skills	181	73
Educational/ Learning	73	29
Psychological wellbeing	39	16
Socio-cultural wellbeing	24	10
Physical wellbeing	17	7
Civic/Participatory	7	3
Economic/Employment	3	1
Others	12	5
Total	356	

Note: It was possible to indicate multiple options, so the total percentage is over 100. Total number of studies (N=248).

In summary, it remains rather rare for ML&DS interventions to evaluate the impact of these interventions on non-literacy or skills-related outcomes, which means we lack an understanding of whether people's lives are improved in terms of their economic, social and cultural well-being.

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3.3 Factors enabling and hindering success

The two final sections of this report aim to analyse specific factors facilitating successful implementation of and achievement of outcomes in interventions, as well as the obstacles that these interventions faced that might have prevented successful achievement of outcomes. These were open-coded categories with qualitative narrative descriptions of enablers and barriers to success; these narrative codes are described below.

3.3.1 Success factors

Altogether, 76 studies reported on specific factors or characteristics that contributed to successful outcomes of the interventions. Based on the common elements of these factors, two main groups of enablers can be identified. The first one addresses the set of characteristics related to the role of the participants in the different phases of the study, design, and implementation of an intervention. The second group encompasses common elements referring to factors related to the design, the intervention methodology, and its implementation phases.

First, the importance given to the role of the participant in the different interventions in order to achieve positive results is significant. Results emphasise the need to consider the participant as a central and active part of the design phase of the intervention activities. Related to this, the need to group participants based on their specific needs and characteristics is emphasised when designing and adapting interventions. Thus, the socioeconomic level of the participants, their cultural context, and the characteristics of the country where the program is going to be implemented are some of the elements that should be considered to achieve successful outcomes.

As far as the development of intervention activities is concerned, especially in the large number of studies in educational settings (teachers or students), there is an insistence on establishing learning approaches based on "peer-to-peer" and group methodologies. Similarly, the need to establish a "starting point" to define the participants' previous skill levels and digital literacy is highlighted, pointing out the "survey" as the most effective method for establishing such criteria.

The second group of success factors among the studies analysed is related to the characteristics of the interventions, mainly focused on the intervention phases. The length of the intervention is pointed out as a factor for success. Hence, longer interventions are considered more effective, highlighting the effect of time (in terms of duration and frequency) as an element that directly influences the development of participants' digital skills. Thus, most of the studies insist on the need to establish a follow-up plan for all the activities carried out in order to ensure that the implementation process will have the expected effects and to make them sustainable over time.

Other success factors relate to the insights from external organisations such as NGOs or Universities. Participation and advice from external experts are recommended to improve the programs through effective evaluation methods and to avoid (failed) repetitions of previous practices in the same field. The expertise level of those who deliver the intervention is also addressed as a success factor. Many studies propose instructors' training is needed based on

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participants' specific needs, with the aim to deliver the content effectively and better guide participants.

When it comes to design, experimental designs with control groups, as well as observation methods, are addressed as important for success in terms of evaluation. The integration of theoretical factors and empirically tested theoretical frameworks were also considered important design characteristics for successful interventions.

3.3.2 Barriers to success

A total of 75 studies mention specific factors or characteristics that prevented successful outcomes of the interventions. As happened with success enablers, the barriers can be classified into two different categories. The first group share an emphasis on the importance of the characteristics of participants as potential factors leading to interventions not achieving their goals. The second group of barriers point towards factors or characteristics related to study design and implementation phases of the intervention as potential barriers to success of interventions.

Participants' characteristics can interfere with the results of the intervention in many ways. First, the participants' digital skills and their media literacy must be taken into account to be in accordance with the contents to be delivered in the intervention. Several studies point out that an imbalanced level of digital skills and media literacy of participants in relation to the tasks or content delivered in the intervention can act as a barrier to advancing knowledge and skill. Resistance to relevant training, difficulties in forming comprehensive ideas about using these competencies, lack of motivation, inability to establish an independent learning process or boredom are some of the barriers to successful interventions mentioned resulting from low levels of digital skills or media literacy of participants. Conversely, some studies also describe how very media or digitally literate participants cannot be adequately challenged and may become disinterested during the intervention.

Overlooking personal or individual characteristics of participants, such as age, level of education or nationality, when designing and implementing the intervention are also pointed to as barriers to success. Some of the undesirable outcomes addressed resulting from overlooking such characteristics are feelings of anxiety and helplessness in using technologies during the learning process.

The second group of barriers addressed in the studies are those related to the different phases of the intervention (study design and intervention implementation). There is consistency among different studies in reporting technical issues as barriers affecting the development of the intervention programs, such as the lack of access to updated digital equipment (software or hardware) or the failure of Internet connections. In addition, participants' lack of access to digital devices – outside the intervention context - is also addressed as a barrier to maintaining the skills they acquired.

The characteristics of the location where the intervention takes place can be a barrier to success. Among the articles under review in this report, school-based interventions were the most common (see section 3.2.7). Perhaps unsurprisingly, certain characteristics of the school environment were also frequently mentioned as barriers to success. Above all, interventions in

school contexts should ensure that the room size is appropriate. Disruptions from other school events can be another barrier. The cultural context (e.g., religion) of the school should also be considered before delivering any content that might be inappropriate in this context. In addition, participants' schedules, usually due to a lack of consensus on the timings, are also addressed as an important barrier to success.

Regarding the persons who deliver the intervention, insufficient "hands-on" practice and personal support for the participants are reported in different studies as a factor leading to the failure of the intervention. Trainers and other persons delivering the intervention are advised to set clear personalised objectives and guidance for the participants at the beginning of the intervention, as well as incorporate entertaining and meaningful learning activities by using attractive and up-to-date digital resources to avoid undesirable situations such as boredom, drop-out and lack of interest that would lead to a failure to achieve the desired outcomes.

Most of the studies also claim the length of the intervention is one of the most common barriers to evaluating the success of interventions. A short length of the interventions does not allow for behavioural changes and learning improvements to take hold, and therefore it complicates the measurement of and gaining insights into the lasting impact of ML&DS interventions. Thus, including longitudinal design with follow-ups on interventions is recommended to assess the level of knowledge, application of the skills and their impact on a variety of outcomes.

Regarding the design of the study and the methodology, results show that research conditions might represent a barrier to success. The lack of a control group or a weak manipulation between the control and treatment conditions presents considerable limitations in measuring the effectiveness of an intervention. Self-reports as evaluation methods without a pre and post-design are also reported as a barrier due to social desirability biases. Furthermore, a large gap between administering the intervention and measuring the outcomes is pointed out as a barrier to success. Several studies report small sample sizes as a barrier. This condition limits the generalisations of studies and does not allow for differentiation of the effects of individual intervention components.

4. Conclusions

This report presents a review of studies evaluating the design and effectiveness of Media Literacy and Digital Skills (ML&DS) interventions published in the academic literature. These studies were coded and analysed using pre-defined and newly emergent categories. The wide variety in publication formats and details in reporting made this a difficult exercise, but the report, nevertheless, gives a good indication of gaps and prevalent trends in the evaluation of ML&DS interventions.

One of the most evident patterns among the interventions studied is that most of them are related to educational settings like schools or universities, which explains the skills targeted, locations, the types of people and institutions delivering the intervention and funders. This also results in the improvement of educational outcomes being the most prominent goal of ML&DS interventions. In contrast, issues commonly debated in public discourse generating much public concern, such as cyberbullying; privacy and online safety, were not often the subject of the interventions evaluated.

It is likely that, because most of these published studies are supported by (internal) academic funds and government institutions and conducted by universities, there is a requirement to publish in academic journals. It is thus more likely that this review has captured these. There is no such obligation for research or evaluations conducted by industry or non-profit organisations. There might be evaluation happening in this space that is either presented in the grey literature or not accessible for public scrutiny. Important to note is that reporting on the origin of funding was something deemed of least relevance by authors to explaining the relative impact of the interventions studied.

Since the interventions evaluated were designed from different perspectives and different objectives, researchers made use of frameworks common to their disciplines. The dominance of formal education-based studies explains why learning and educational frameworks were prominent among selected studies. The findings suggest that new theoretical approaches are needed that integrate educational theories with theories derived from media studies to help practitioners and researchers implement and analyse ML&DS interventions in ways that are appropriate to address the challenges posed by the rapidly changing digital media environments.

Information navigation and evaluation skills and activities, such as accessing, searching, finding and navigating content, were frequently the subject of interventions. However, while health and nutrition issues were also often the topic of the intervention material, general well-being outcomes were less frequently measured as outcomes of intervention. Indeed, it remains rather rare for ML&DS interventions to evaluate the impact of these interventions on non-literacy or skills related outcomes which means we lack an understanding of whether people's lives are improved in terms of their economic, social and cultural wellbeing.

The more functional skills related to individual engagement and development were more dominant in interventions evaluated than skills social and creative skills related to production of content and positive interactions related to more active participation in media and digital environments. More critical knowledge about how the digital world works and how media

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content is created was also underrepresented. Though, interventions are often composed of a variety of learning activities relating mostly to formal course work and information evaluation, but there was also a reasonable representation of less formal activities such as content creation.

Accordingly, the types of initiatives were related to activities carried out at schools and universities for formal learning, such as online and face-to-face courses or workshops, while other non-conventional formats, like campaigns or networks, were rarely applied. Likewise, approaches different from those applied in educational institutions (e.g., one-to-one and buddy systems) were used in fewer studies. Teachers, as well as researchers, made up the majority of intervention providers. As a consequence, most of those delivering interventions were trained professionals, (teachers or trainers from organisations). However, the lack of information on the capacitation of those delivering interventions makes it difficult to evaluate whether they are equipped to do so and the extent to which this may have impacted the effectiveness of interventions.

(Pre-service) teachers were also the most likely beneficiaries of interventions evaluated. This means, that vulnerable groups were paid comparatively little attention, with more easily accessible students being the most frequent beneficiaries of ML&DS interventions evaluated in the academic literature. Studies mention the overlooking of personal or individual characteristics of participants such as age, level of education, or nationality, as potential barriers to success when designing and implementing the intervention. Nevertheless, the target groups of the interventions were defined in quite narrow ways, and information was often missing on the characteristics of the participants.

It is interesting to note that studies emphasised the significance of actively engaging participants during the design phase cultural and contextual factors when designing effective interventions. Nevertheless, the analyses show that the peer-to-peer and collaborative intervention types and methodologies that were highlighted as particularly promising, such as peer-to-peer and collaborative strategies, were actually used less frequently in practice. Likewise, the interventions were predominantly conducted either online or at the premises of the host organisations. Interestingly, locations like people's homes and public access venues, such as libraries, were rarely considered in the reviewed studies. This contradicts the factors that the authors of these publications suggested would be conducive to the success of the interventions.

This should be done keeping in mind that (a lack of) resources of the individual or the organisation leading on the intervention were still indicated to be key factors in determining the success of interventions. Frequent software or hardware failures while interventions were carried out or participants' limited access to quality devices and services hindered the acquisition of ML&DS. However, very few interventions provided these resources.

One of the positive findings was that most interventions evaluated in academic publications were focussed programmes with a broad number of activities and distributed over several sessions rather than one-off sessions, which are less likely to be effective. They were not

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embedded within broader agendas it seems which might be an issue in terms of trying to achieve outcomes other than improving ML&DS or (short term) educational outcomes.

For researchers and evaluators, the importance of mixing data collection methods was pointed out, as well as the opportunity for large-sized measurement and control groups to get more robust and generalisable findings. The instruments used should incorporate other data sources, different from self-reports, to avoid the risk of social desirability or confirmation bias.

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5. Recommendations for practitioners and researchers

Drawing on the analysis of the literature, we recommend interventions to:
- Establish clear theoretical frameworks with the aim of building on educational and media and communications theories as well as have methodological theoretical frameworks around how to design for and evaluate change.
- Take into consideration what the intersection of the personal characteristics (age, gender, education level, digital skill level) of the beneficiaries might mean for the effectiveness of the intervention and design material and location of delivery around these. Resistance, motivation issues, and difficulties in independent learning are common challenges.
- Take interventions outside of the formal educational context to reach people where they are using digital and traditional media. This is especially important in order to broaden the scope of the evaluation of interventions to more vulnerable groups, such as those identified by REMEDIS. Insufficient "hands-on" practice and personal support for participants can result in disinterest and dropouts.
- Persons delivering the intervention should receive proper training to respond to the participants' specific needs. In the same vein, involving external experts is recommended to improve the programs through effective evaluation methods.
- Integrate the provision of digital resources to the participants and centres participating in the intervention where needed.
- Longer-term interventions with several activities distributed over longer periods of time are likely to be more effective.
- Design interventions around and evaluate outcomes beyond those related to ML&DS. There is little attention to the potential outcomes beyond ML&DS that the interventions could have achieved. For instance, economic/employment and civic/participatory outcomes were barely evaluated, in contrast to learning and education ones.

The analyses also lead to the following recommendations for those evaluating interventions:
- More research should focus on interventions that support disadvantaged or under-resourced groups. Most of the studies found prioritised school or university students, whereas other less privileged social groups are often missing. For example, NEETs, people with disabilities, the long-term unemployed, or ethnic minorities.
- Characteristics of the participants should be incorporated as important factors in the design of studies and in analyses around what has made an intervention successful.
- More experimental or control trial research is needed, using observational as well as self-report and task-based methods. With clear theoretical frameworks guiding design and analysis, this will help researchers to develop evaluation instruments more coherently and be clearer on to what extent the findings confirm or contest previous studies.

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- Starting with a baseline assessment of participants' digital skills and literacy is essential for designing effective interventions, often conducted through surveys. Follow-up evaluation after the intervention should also be built in.
- Researchers should focus more on organisational barriers in evaluating the success of interventions rather than purely on the content and delivery of the interventions. As part of this reporting on funding structures is both practically and ethically important. In addition, research should indicate what the capacitation process was for those delivering the interventions.

Acknowledgements

REMEDIS

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