A Generational Approach to Fight Fake News: In Search of Effective Media Literacy Training and Interventions

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Abstract. The rise of Internet and the pervasiveness of communication and information technologies have allowed many societies to successfully reduce inequalities in access to information. However, the spread of fake news endangers the value and trustworthiness of the information being accessed. Although the dominant approach to reduce the spread of fake news includes legal measures and technological innovations (e.g., automatic fact-checking applications), Media Literacy Training and Interventions are also ways to empower people to fight fake news. The present scoping literature review examines the Media Literacy Training and Intervention options available, offering an overview of the extent to which they include an explicit fake news component, whether they are evidence based and the social groups (including different generations) for which they were tailored. We found that students and educators were the main target groups, almost wholly to the exclusion of other groups; that they took place mainly in educational settings; and that, at least in the case of the training sessions, they were not evidence based, which meant that neither the long-term nor short-term efficacy could be tested. Such findings shed light on the relatively poor reliability of the available training and interventions, and on their limited effectiveness in the target groups.

Keywords: Fake news · Media literacy training · Media literacy interventions · Generational approach · Evidence-based instruments

1 Introduction

To achieve equal opportunities in our society, access to credible information [1, 2] is of crucial importance. Fake news endangers the accessibility of information for all citizens, younger and older [3]. In this context, two compelling questions arise – how can we fight fake news and how can we do so in a more generationally inclusive manner?

One approach to fighting fake news is through legal measures that push tech platforms such as Google, Facebook and Twitter to institute self-regulatory controls. In June 2020, the EU requested these platforms to provide monthly reports

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on their fight against disinformation (https://reut.rs/3o19Kg8). As part of these self-regulatory measures, Facebook and Google committed to a more stringent policing of the content that is tolerated on their platforms (https://about.fb.com/news/2020/04/covid-19-misinfo-update/, https://blog.google/outreach-initiatives/google-news-initiative/news-brief-april-2021-updates-google-news-initiative/). And Twitter stated: "As the global community faces the COVID-19 pandemic together, Twitter is helping people find reliable information, connect with others, and follow what's happening in real time (…)" (https://blog.twitter.com/en_us/topics/company/2020/covid-19#protecting). See also [4, 5].

Another initiative launched by the EU was the introduction of a code of principles: "This code of principles is for organizations that regularly publish nonpartisan reports on the accuracy of statements by public figures, major institutions, and other widely circulated claims of interest to society. It is the result of consultations among fact-checkers from around the world and offers conscientious practitioners' principles to aspire to in their everyday work" (https://ifcncodeofprinciples.poynter.org/know-more). In 2019, evaluation of this code of principles showed, on the one hand, that it had indeed triggered various positive changes in platform policies (https://ec.europa.eu/digital-single-market/en/news/study-assessment-implementation-code-practice-disinformation) (p. 3), but, on the other hand, that criticism remained: "The main criticism of the Code relates to its self-regulatory nature, lack of uniformity of implementation – evidenced by the unevenness of progress made under the specific Pillar – monitoring, and lack of clarity around its scope and some of the key concepts" (https://ec.europa.eu/digital-single-market/en/news/study-assessment-implementation-code-practice-disinformation) (p. 4). In short, the extent to which a legal approach using self-regulation and a code of principles really works to fight fake news remains unclear. See also Duke's Reporters LAB (https://reporterslab.org/fact-checking/) and the International Fact-Checking network fact-checkers' code of principles: "The International Fact-Checking Network has seven counselors who represent the geographical diversity of the network. They are pioneers in the development and implementation of fact-checking in their countries and regions. All board members are unpaid. The pool of assessors is a group of journalism and media experts who know the fact-checking context in their countries, and they act as the first filter for each application received" (https://www.poynter.org/ifcn-fact-checkers-code-of-principles). Meanwhile, Google has already started using labels to fact-check articles in Google News (https://blog.google/outreach-initiatives/google-news-initiative/labeling-fact-check-articles-google-news/), while Facebook recently introduced an oversight board (an international committee of judges, journalists and academics) that will help steer the company's policy on freedom of expression (https://www.oversightboard.com/).

Another approach is technological and uses automatic fake news detection [e.g., 6, 7]. Innovative technological detection might help to fight fake news to some extent, but it can never provide a full solution. Apart from technical feasibility - fake news will become more and more sophisticated and harder (if not impossible) to detect - there is an even more fundamental issue. Who is going to decide on the criteria for determining the trustworthiness of online information: the state, the platform companies, or the press? Giving sophisticated tools to withhold certain news from citizens could in the

end threaten their information access, which eventually erodes democracy. Access to (digital) information about services and products is of prime importance [8]. Van den Hoven [9], referring to Rawls [10], goes so far as to refer to accessible information as a "primary good", as all citizens have an equal right to access to information. Research on digital inequalities shows that individuals from socially disadvantaged backgrounds are less skilled in the use of digital means which could considerably improve their lives [11]. Bovens [12] and Bovens & Loos [13] even advocate granting citizens information rights, next to the classic (freedom) rights. Fake news [14] endangers the access to information by younger and older citizens [3]. The question is how we can fight fake news, so that all generations continue to have access to credible information.

We argue that a more durable solution is to empower citizens so that they themselves are able to establish the trustworthiness of news. An educational approach using media literacy [15, 16] is an intervention that can be used in schools and in other institutions and community centers as well. Media literacy should not only focus on people's ability to use certain devices and technologies, but also on promoting a deep understanding of modern forms of media, how these work and how they produce and use news items, all of which may be attained through systematic media education programs [17]. It is not only important to investigate the feasibility of interventions at an early age to empower young citizens such that they are able to establish the trustworthiness of news. It is also essential to involve other generations as due to the paucity of studies in this field, it would be naive to assume that they are not vulnerable to fake news.

In our paper, we therefore explore the Media Literacy Training and Intervention landscape, to gain insight into how evidence based such training activities are and the extent to which they include a fake news component. We pay especial attention to the design of such training activities and to the target groups for which they have been developed. We examine whether different age groups are considered and how evidence-based the instruments are. When determining whether or not the studies were evidence-based, we examined whether scientific data was used to structure the activities and tasks. We focused on effectiveness, which we assessed based on the criterion of whether or not the studies tested for long term and short-term effects on the target groups.

First, we underline the importance of empowering citizens of different social categories to fight fake news, through the use of educational means. We then analyze the characteristics of the current Media Literacy Training and Intervention landscape, based on a systematic literature review previously conducted by Eisemann and Pimmer and complement this with a review of the types of training and interventions found in large-scale European projects and small-scale interventions.

A literature review is the starting point of our inquiry. We first present an overview of group differences relative to the vulnerability to fake news. We use Brites et al. [18] to gain insight into generational perspectives on EU Documents tackling disinformation, as well as Loos & Nijenhuis [3]. In addition, we will refer to the systematic literature review on educational approaches to address fake news conducted by Eisemann & Pimmer [19]. Furthermore, we will present evidence of fake news interventions, based on a scoping literature review of studies selected in an exploratory manner using Google Scholar, on Media Literacy Interventions designed to reduce individuals' vulnerability to fake news. Also, we will add a case study on interventions in studies referenced in

the US-based Center for Media Literacy's online Reading Room and Media & Values Archive (https://www.medialit.org/how-teach-media-literacy). The results from the case study will be compared with those of the systematic literature review by Eisemann & Pimmer [19] and with the overview of the media literacy projects conducted in the EU 28 countries – The European Council report: "Mapping of media literacy practices and actions in EU-28" [20]. Finally, conclusions will be drawn about the extent to which training and interventions can be used as evidence-based methods to fight fake news in an effective and inclusive way.

2 Literature Review

The term fake news is commonly used today as a collective term to refer to any kind of inaccurate information, from journalistic errors to automated amplification techniques. Disinformation alludes, more specifically, to misleading information that is shared with the intention of causing harm or for profit, while misinformation is simply false information that is disseminated without malicious intent [21]. In this paper, we use the term fake news to refer to any kind of misleading information that could mistakenly be considered accurate, regardless of the mechanisms that led to its propagation.

2.1 A More Inclusive Perspective on Fighting Fake News

Brites et al. [18] analyzed the following five EU key documents to gain insight into the extent to which the EU addresses disinformation from a generational-driven perspective:

- European Commission. A multi-dimensional approach to disinformation: Report of the independent High Level Group on fake news and online disinformation (2018) [21]
- European Commission. Commission Recommendation of 14.2.2018 on enhancing the European nature and efficient conduct of the 2019 elections to the European Parliament. European Commission: Brussels (2018) [22]
- European Commission. EU Code of Practice on Disinformation. European Commission: Brussels (2018) (https://bit.ly/3EQRZGo)
- European Commission. Tackling online disinformation: a European Approach. European Commission, Brussels (2018) (https://bit.ly/3u8k5rD)
- European Commission. Fake News and Disinformation Online. Flash Eurobarometer 464. European Commission, Brussels (2018) (https://bit.ly/39AQtJW)

The documents all date from 2018. That was the year the EU tackled disinformation, as "for political reasons, 2018 was a strategic year to engage citizens in the democratic process anticipating EU parliament elections" [18] (p. 353).

The researchers concluded that two recurring weak generational imageries – on the one hand, adults, and on the other hand, children and young people – are created through an unspecific identification of citizens and that no significant efforts were made to identify different generational groups and their needs. The authors show that the intergenerational perspective is only mentioned in relation to lifelong learning. They explain that viewing

"adulthood" as a homogeneous group, instead of recognizing the heterogeneity of the different generational groups precludes any understanding of the different generations' specific needs and their learning opportunities arising from community public policies that consider European citizens attending at the macro level and the various micro-levels [18]. Generalizing adult individuals into a generic age group without taking into consideration the specificity of their needs in their different life stages reinforces the nescience regarding fake news and the need for media literacy.

The conclusions drawn by Brites et al. [18] are in line with the findings from a study by Loos & Nijenhuis [3], who show that generational differences relating to the consumption of fake news have been virtually ignored in the edited volume Detecting fake news on social media [23], as well as in The Handbook of Research on Deception, Fake News, and Misinformation Online [24], and in the Reuters Institute digital news report 2017 [25]. They note the dearth of research in this area: "a Google Scholar search (01.02.2020) using the key words 'social media' AND 'fake news' AND 'generation' OR 'Age' OR 'young' OR 'old' also failed to return any hits for scientific papers on this topic" [3]. Closing the gap in the study of fake news and how different age groups consume fake news, the ways they experience its effects, and their media literacy needs would bring relevant insights into discussion, potentially offering a new perspective on the ways fake news could be tackled.

Media Literacy Training and Interventions, the focus of this chapter, should therefore not be limited to young people only; these activities should also be targeted at other age groups, including older adults. Moreover, they should also take into consideration the vulnerability of different ethnic and socio-cultural groups to fake news, as media content is often accessed in the native languages of these different groups – an aspect that is overlooked in the current EU initiatives to fight fake news.

2.2 Characteristics of Current Media Literacy Training and Interventions

In order to have a structured overview of the media literacy initiatives and to better understand the types and the effectiveness of the training and interventions currently being deployed, we turned to the systematic literature review recently produced by Eisemann and Pimmer [19]. These two authors screened 995 articles spanning a period of twenty years (2000–2020), obtained through a database search (ERIC, OVID Medline, APA PsycInfo and PsycARTICLES) for media literacy training and interventions. After reviewing the corpus, fourteen articles were found that met the criteria of including training or interventions that contained an explicit fake news component; were evidence based; boasted a solid methodology; and reported outcomes (the effectiveness of the intervention was checked). The authors added five more articles found on Google Scholar, ending with a final corpus of nineteen articles, three of which fell into more than one training category. Three types of training were distinguished: (1) reactive training targeted at a fact-based correction of misinformation (nine articles); (2) proactive training in a specific fake news detection method (eleven articles); and (3) training to develop a critical understanding of the media system (four articles).

In nine of the articles resulting from the systematic analysis of Eisemann and Pimmer [19], the interventions examined were of the first type, i.e. aimed at correcting existing

misconceptions about what is right and what is wrong in a fact-based manner. A typical example would be the current vaccination debate and the selective views towards the media information provided about this issue. In these studies, various strategies for addressing such situations were tested, ranging from the provision of information about the lack of scientific evidence to the recital of dramatic narratives – going from strategies following the central route to strategies following the peripheral route of information processing (see [26] for describing the ELM – a two-way mode of information processing). Although some strategies were more effective than others, generally speaking their efficacy was limited and tended to fade over time. Their efficacy is, moreover, difficult to generalize beyond the specificity of the tasks and the groups in which they were used.

The second type of training and interventions distinguished by Eisemann and Pimmer [19], consisting of a proactive approach aimed at improving people's abilities to detect fake news, was found in eleven articles. We refer to this approach as explicit fake news training. It involved equipping the participants with a set of tools, ranging from guidelines and regulations to technical tools such as fact-checkers, cross-checking and inverse image search, that can serve to improve their ability to detect fake news. It also included observational guidelines, such as looking at the author's style or performing a reactive search to check the truthfulness of some content (asking questions of the author). The effectiveness of such training proved to be higher and more constant over time in comparison with the first intervention category. Nonetheless, the success of this approach should not be taken for granted. Additional factors may also play a role in reducing its efficacy, such as (1) the educational context – such training proved to be less effective in higher educational contexts; and (2) the prior attitudes of the participants: it was found that a type of confirmation bias (see [27] for an analysis of the concept) might occur, with such training being more effective if this is consistent with people's attitudes and beliefs.

The third approach identified by Eisemann and Pimmer [19], found in four articles, was directed at the development of a critical understanding of the media system, helping people to critically reflect on media content and the way such content is created and re-created. Although this category has been dominant in the scientific literature for the past 20 years (as Eisemann and Pimmer showed), it has produced limited evidence of effectiveness, features a rather inconsistent methodology and a poor research design.

Inspired by the work of Eisemann and Pimmer [19], we used Google Scholar to investigate, in an exploratory way, articles spanning the period from 2010 to 2020 on research studies that included interventions aiming to reduce people's vulnerability to fake news. The selection of articles on fake news interventions was initially triggered by the project "Fighting Fake News: A New Literacies Approach for Young People", coordinated by Eugène Loos at Utrecht University. In our project, we aimed to use a game as a form of intervention to understand how school pupils could be trained to decode fake news about climate change. We first used the search term "fake news interventions" to identify potential articles that could serve as a starting point, using Google Scholar (2010–2020). This yielded 20,000 hits, from which we then selected the review articles only (1400 hits). We focused on the contributions in which a game was used and in which the interventions targeted issues of climate change. In the next step, we selected articles which had a research component designed explicitly to improve the ability to

fight fake news and included a clear description of the results. Our aim was to evaluate the value of such interventions in helping people to better detect/recognize fake news. We discarded all articles that did not report the outcome of the intervention as well as those that did not present a research methodology. Also, we selected studies with a unique methodology; of the studies employing similar methodologies on similar groups of participants (e.g., students), only one was selected. Many of the interventions were Media Literacy Interventions that did not focus on improving people's ability to avoid or detect fake news. We selected only articles in which the object of the intervention was to help people learn to detect/recognize fake news. Table 1 presents an overview of the nine articles we identified and coded using the following coding scheme: (1) country where the intervention was conducted; (2) type of intervention (large-scale or small-scale) and the intended results; (3) the target group(s); (4) methodology and (5) the effects, if any, of the intervention on the target group.

The interventions analyzed in Table 1 proposed either a gamified method [28–32], a news evaluation approach [16, 34, 35], or a combination of the two [33]. Most of the technical innovations used in the studies mentioned in Table 1 were designed for online use but could also be adapted for in-person settings at various locations specific to different social groups, from classrooms to workshop spaces. A noteworthy aspect that could have important implications for the results of this analysis is the rather less diverse localization of the studies, as the majority were conducted in the US, the UK or The Netherlands.

Roozenbeek & van der Linden [28, 29, 31] extensively researched the efficacy of specific gamified approaches to fighting fake news through online games like The Bad News Game or Harmony Square. The Bad News Game, an online game the authors created in collaboration with the Dutch media platform DROG (https://politi.co/2Y6aGFq) was the instrument on which several studies, including the only intervention identified in our online search process that studied the mid-term and long-term effectiveness of active inoculation on identifying and resisting fake news [30], were based. The results of this research showed that inoculation interventions using The Bad News Game or similar instruments helped against misinformation over time, with regular assessment having a positive impact on the longevity of the effect. Other inoculation interventions used gamified methods [31, 32] and had results that suggested that this type of educational activity could be feasible in equipping people with cognitive assets for withstanding fake news.

The news evaluation approaches summarized in Table 1 were effective in proving the urgent need for instruments to support individuals in distinguishing between real news and disinformation and were, with one exception, evidence based. However, the studies did not test the effectiveness of the interventions in consolidating fake news resistance. The studies exclusively included younger participants, from school children to college undergraduates and were mainly focused on the importance of media literacy in students at different educational stages.

Another study [33] proposed a method that combined the two approaches. Factitious is an online game that requires participants to assess various types of news and indicate which of the items they consider to be unreliable. Similar in structure to Tinder, a popular dating app, Factitious presents news evaluation in an interactive manner. The study was

Table 1. Overview of research studies which included interventions to empower people to fight fake news

Authors	Country	Type of intervention/intended results	Target Group(s)	Methodology	Effects on the target group
Roozenbeek & van der Linden (2019a) [28]	UK	Large-scale evaluation of *The Bad News Game*	N = 15.000 Age groups: under 18, 19–29, 30–49, 50+	Evaluation of the game in a pre-post game design. Players learn about six fake news techniques: impersonation, emotional language, polarization, conspiracy theories, discrediting opponents, trolling	The results offer positive initial evidence about people's ability to identify fake news regardless of education, age, political ideology, or cognitive style
Roozenbeek & van der Linden (2019b) [29]	The Netherlands	Pilot intervention seeking to test the effectiveness of *The Bad News Game* in improving students' ability to recognize and resist fake news	N = 95 16- to 19-year-olds	Players were placed in groups and were asked to produce a news article impersonating one of four characters – the denier, the alarmist, the clickbait monger, or the conspiracy theorist. The group choosing the most correct answers won	The results suggest that the inoculation used in the study reduced the perceived reliability of fake news articles
Maertens, Roozenbeek, Basol & van der Linden (2020) [30]	UK	Intervention testing the long-term effectiveness of active inoculation in building resistance to disinformation	N = 515 19–66	Participants played either Bad News (inoculation group) or Tetris (gamified control group) and rated the reliability of news headlines that did or did not use a disinformation technique. The experiment took place again after four weeks and after eight weeks	The results suggested that regular exposure to weakened doses of fake news could reinstate the inoculation effect, and that the inoculation effect decays over the course of two months

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Table 1. (*continued*)

Authors	Country	Type of intervention/intended results	Target Group(s)	Methodology	Effects on the target group
Roozenbeek & van der Linden (2020) [31]	US & International	Intervention using the *Harmony Square* with the purpose of probing the game's effects on students' media literacy skills	N = 681 41,4% 18- to 24- year-olds	2 (treatment vs. control) × 2 (pre vs. post) mixed design measuring perceived reliability of disinformation social media posts before and after the intervention. The treatment group played Harmony Square, while the control group played Tetris for 10 min	The results show that people playing the *Harmony Square* game find fake news less reliable and are more confident in their fake news assessment skills
Chang et al. (2020) [32]	US	Evaluation of the *Lamboozled!* -card game's efficiency in enhancing students' news literacy skills	N = 76 middle school and high school students and N = 11 teachers	Players took part in *Lamboozled!*, where they tried to acquire the best hand of cards, each of which contained clues about the veracity of a specific story. After the game, the students created their own cards about a fake and a true story and offered feedback about the game. The authors interviewed 11 teachers after they implemented the game in the classroom	The authors found the game to be effective in practicing media literacy skills and transfer media literacy strategies to real life contexts. The efficiency was shown to depend on the teachers' level of preparation

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Table 1. (*continued*)

Authors	Country	Type of intervention/intended results	Target Group(s)	Methodology	Effects on the target group
Grace & Hone (2019) [33]	N/A	Study investigating the utility of the *Factitious* game in measuring news literacy skills	N = 45.000 All ages	Large-scale online study. Participants played *Factitious*, an online game where they evaluated several news stories, then swiped to the right if they thought the story was real or to the left if they perceived the story as fake. Answers were scored depending on correctness	Findings indicate that older participants generally outperformed younger participants. Younger participants tended to make their decision faster, people with higher education levels (PhD) completed the game in less time
Bråten & Strømsø (2010) [34]	Norway	Intervention examining students' understanding of texts in different task conditions	N = 184 Mean age: 22.6 years old	Participants read seven texts about climate change in three task conditions: argument, summary, and global understanding. Tests and measures used in the study were: word decoding test, prior knowledge measure, personal epistemology measure, and measure of multiple-text understanding	Intervention findings suggest that students' prior beliefs and the task instructions matter in their text understanding abilities
Loos, Ivan & Leu (2018) [16]	The Netherlands	Intervention examining schoolchildren's ability to identify a hoax website as being fake	N = 27 11–12 years old	The participants accessed a hoax website and completed a questionnaire. Those willing to sign a petition to save the animal presented by the site were considered to trust the source. A new media literacies training and a debriefing followed	Only 2 of the 27 (4%) schoolchildren recognized the source as being a hoax and explained why

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Table 1. (*continued*)

Authors	Country	Type of intervention/intended results	Target Group(s)	Methodology	Effects on the target group
McGrew, Ortega, Breakstone & Wineburg (2017) [35]	US	Intervention testing students' ability to distinguish between reliable sources and disinformation sources	N = 7.804 Middle and high school students	The authors administered 56 tasks to students, measuring participants' ability to (1) identify the real source of the information presented (2) evaluate the evidence presented, and (3) investigate other sources on the subject	Close to 70% of the high school students failed to identify the unreliable news pieces. They proved to be attracted by interesting visuals when assessing the material

not evidence based; the authors sought to identify a news literacy improvement tool and did not test the effectiveness of the game. Nevertheless, we consider the intervention to be relevant, as it could be a useful method to fight fake news, mainly because of its simple play instructions that could be easily understood by individuals of all ages.

Only a few of the studies that touched on the efficacy of interventions in building fake news recognition [28, 30, 33] also included different age groups in their research (19–66; under 18 to 50+; 0–9 to 70–79 and over 79). However, these were large-scale studies that concentrated on presenting extensive results, and not necessarily on approaching the subject from a generational perspective.

In line with the findings of similar studies, the effectiveness of gamified inoculation interventions appears encouraging [19, 36]. These interventions offer the potential to become valuable instruments in fighting fake news, and the majority are evidence-based. Moreover, some of the game-based studies discussed included multiple age groups in their research [28, 30, 33], with one study even suggesting that older adults were better than younger participants at identifying fake news [33]. Such a gamification approach could form the starting point for future studies to identify or formulate tools to help build resistance to fake news.

3 Large-Scale Projects and Small-Scale Interventions

The European Council Report "Mapping of media literacy practices and actions in EU-28" [20] offers an overview of some of the most significant media literacy projects undertaken at the national or regional level between 2010 and 2016 in all 28 member states of the EU. The report is part of the European Audiovisual Observatory (EAO). Data were collected retrospectively, in April 2016, using a questionnaire which was addressed to experts in each of the 28 EU member states. The experts were asked to list 20 media literacy projects in their countries and to provide an overview of the five most significant of these projects. The responses were then double-checked with the

EU Media Literacy Expert Group (MLEG) to increase the validity of the data. In this particular report, the following details of each project were recorded: (1) the stakeholders; (2) type of engagement of each stakeholder (i.e., academia, public institutions, media regulatory authorities); (3) type of project; (4) type of media literacy aimed for; (5) the magnitude of the project and its duration; (6) the significance of each project. The latter - the significance of each project - is particularly relevant for the present article. Significance was described as: the size of the target group; the total budget; success in terms of outcomes; the level of public awareness of the project, and the level of engagement of the targeted groups. Note that the report did not check whether the Media Literacy Interventions were evidence based, nor did it verify the effectiveness of these interventions (in terms of measured effect on the target groups).

The above-mentioned European Council Report [20] gathered data on 547 projects, spanning a period of six years, on media literacy at the EU level. The majority of these projects (409) were national projects; 95 were regional and 43 projects targeted all the countries in the EU zone.

None of the projects in the report included a specific, clearly-stated component designed to reduce people's vulnerability to fake news. Also, most of the projects fell into the categories of "Resources" and "End-user engagement", which meant they were intended to equip people with the media skills and competencies they need in daily life and to teach them how to engage more with different media. None of the projects described as "Policy Development" featured a component on defusing fake news or enabling people to recognize and avoid fake media content. Instead, the "Policy Development" projects aimed more to increase cooperation between different stakeholders or countries.

Some of these projects were labeled as research projects by the experts involved (78) – meaning that they were qualitative or quantitative research projects that explored on an aspect of media literacy that had previously been investigated in the scientific literature. Among the 78 projects, 20 were considered significant enough to be extensively analyzed in the report. Only one Swedish project (https://www.niemanlab.org/2014/12/in-sweden-traditional-tabloid-rivals-are-taking-their-battle-to-viral-sites/) had an explicit fake news component. The Viral Eye project (Viralgranskaren), which won an award in 2014 in Sweden for its contribution to journalism, aimed to help Swedish journalists to detect fake news and to raise their awareness of what can happen when distributing different types of content through social media (for example, sharing a link). Although targeted at journalists - the project examined how some unreliable stories go viral and how important it is for journalists to be critical of their information sources - it eventually percolated through to a larger audience than media professionals alone. The project itself was an initiative of a newspaper (Metro publisher) and to our knowledge it was never replicated in other countries. This is in line with the conclusion of the European Council Report, which noted that many of the media literacy projects undertaken at the EU level were relatively small-scale (mainly national or regional), one-off initiatives with little impact and no long-term vision.

Many of the projects that ran at the EU level aimed to develop the critical thinking skills of the target groups to improve media literacy, while others sought to promote the capability to master different media, including the ability to develop creative media

content. Little attention was paid to the risks and vulnerabilities confronting people on being exposed to content in various media formats.

In terms of the target groups, the EU projects on media literacy were mainly directed at teenagers and students (81 projects) and professionals (76 projects). Other targeted audiences were parents (41 projects) and children (51 projects). Some 34 projects were addressed at the general public, while seven of the 409 projects analyzed in the report focused on older adults, all in the 5 European countries of Belgium, Estonia, Greece, Luxembourg, and Spain. Older people appear indeed to have been a neglected category in media literacy projects (at least in the period 2010–2016), and were perceived to be the less media savvy and less skilled group in critically analyzing media content.

What is probably even more important when analyzing the magnitude of these projects at the EU level is their relatively small scale. The total budget for the majority of the initiatives presented in the report was between €10,000 and €20,000, implying these were relatively limited in scope and activities.

Taking this report as our starting point, we then investigated the articles on small-scale training courses and interventions available in the US-based Center for Media Literacy's online Reading Room and Media & Values Archive (https://www.medialit.org/how-teach-media-literacy). We located a total of 54 articles and reports at the Center for Media Literacy. These were subsequently analyzed and the items with an educational training design aimed at improving media literacy, were selected. Unavailable online pages and articles approaching media literacy from a theoretical point of view, as well as articles explaining the design of the intervention without applying this or with an unclear design were excluded, resulting in six relevant educational items that are further analyzed in the present paper.

Table 2. Overview of Media Literacy Training and Interventions from the Center for Media Literacy (https://www.medialit.org/how-teach-media-literacy)

Authors	Topic/Country	Type of training/intended results	Target groups	Methodology	Evidence based
Anderson (2005) [37]	Food advertisements/US	Three-week pilot media literacy/nutrition program/improve media literacy	N = 19 Middle-schoolers	Learning experience was tested using role play (experimental/vs control group)	Yes
Tripp (2017) [38]	Education/US & Canada	Practical ideas for the classroom/ **improve media literacy**	Teachers, graduates/specialists	Video presentations, discussions, and role-playing (theory driven)	No
Tripp (2000) [39]	Education/US& Japan	Practical ideas to be used in the teaching activities/ **improve media literacy**	N = 15 Teachers (all grades)	Presentations, lively discussions, role-playing activities and brainstorming sessions)	No

(*continued*)

Table 2. (*continued*)

Authors	Topic/Country	Type of training/intended results	Target groups	Methodology	Evidence based
Tripp (n.a) [40]	Education/ US & Japan	Experience how media literacy supports learning skills in class/**improve media literacy**	Teachers (primary and secondary school)	Analysing movie ads – discussing how women appearing as less defined, highly sexualized and subordinate to men	No
Hobbs (1996) [41]	Education/US	Teachers using small-scale interventions in class/ **raise the awareness of the ways ads and media use emotions to reach a certain audience**	Teachers (primary and secondary school)	Examples and discussion/ experiential learning	No
Phillips (2012) [42]	Media, ads, politics/US	Four classroom activities that could help students become savvy media consumers/**critical views on media content**	Students	Experiential learning & debates	No

When analyzing types of training and interventions on media literacy (ML), using those referenced by the Center for Media Literacy (https://www.medialit.org/how-teach-media-literacy) as typical examples, we identified a number of aspects of these training courses that called for further discussion. First, as Table 2 shows, all of these interventions are in English, with no thought for the possible needs of different ethnic groups. Indeed, the Center for Media Literacy is located in the US, mainly targeting the audience in the US. Nonetheless, many cultural groups (also those living in the US) are exposed to media information in their native language and consequently susceptible to fake news.

Second, although some of these training courses and interventions touched on the risks of exposure to media messages, they did not explicitly address the actual problem of fake news, i.e., the inability to recognize misinformation and non-reliable sources of information. The goal of these initiatives was not to teach people to check the trustworthiness of media information or to doubt the accuracy of the messages distributed by various types of media. Nor was the term "fake news" used as such, either in the presentation of the trainings or in the description of the sessions or the results.

Third, the training courses we analyzed were not evidence based. Except for one course, scientific data on media literacy and media literacy components [e.g., 43, 44] played no part in these initiatives. Instead, these tended to be more experiential in nature, with participants learning by doing while reflecting on the experience itself. Most of the training courses and interventions consisted of interactive tasks, such as role-playing, projective activities (in which people have to imagine certain situations), brainstorming sessions and debates. Others were more mixed, combining classic presentations

and examples (including video materials) with more interactive tasks when critically analyzing media content.

Fourth, the main targets were usually students at different levels of education, and teachers. Not only did these training courses and interventions not tackle the issue of fake news, but they tended to remain a rather isolated learning experience, associated with the process of learning in schools. But the fake news phenomenon does not affect only people enrolled in the formal education; it affects people from different generations and socio-economic backgrounds. It is true that such initiatives start from the assumption that by improving our media literacy, we will be more critical of the media content we are exposed to and, consequently we will be better equipped to fight fake news. However, this is hard to do if the sessions are not targeted at a large audience or the general public and are not evidence based.

Last but not the least, the training initiatives and interventions in the articles we analyzed did not follow a particular methodology, nor were the results evaluated. In only one case [37] (see Table 1) was the starting point scientific evidence and had the effectiveness of the training been tested using an experimental design. This was done by comparing individuals who had taken part in the training session (the experimental group) with a control group who had not participated in the training session. We strongly endorse the practice of testing the efficiency of Media Literacy Training in general and of sessions dedicated to fake news, in particular. However, it is a practice that remains rarely encountered.

The analysis conducted by Eisemann and Pimmer [19] indicated that proactive training and interventions aimed at improving the ability to detect fake news have the greatest effect. They are also the most prevalent type of interventions found in the scientific literature to fight fake news. Still, in practice, as our examples from the Center for Media Literacy show, many of these courses did not fall into this category; they were neither based on scientific evidence nor was their effectiveness checked by assessing the results. Also, one thing that needs to be considered is the fact that the analysis of Eisemann and Pimmer [19] turned up only a relatively small number of articles from the past twenty years (19 out of 955 screened articles), all based on evidence produced in educational settings, using students as participants. We found similar results in our literature review search (10 articles on interventions to empower people to fight fake news, over the past 10 years – using Google Scholar as a searching platform). We took note of the fact that Eisemann and Pimmer [19] showed that a higher educational context could be a variable that impacts the efficiency of such interventions. Also, a serious limitation of this type of training and interventions might well be the fact that their audience tends to be a homogeneous one (often school children and students). The possibility of more diverse groups of people should be considered, as the effectiveness of these interventions may differ among different social groups.

4 Conclusions

When we embarked on this study, we sought to answer two questions: how to fight fake news and how to do this in a more generationally inclusive manner?

In the fight against fake news, the strategies employed to strengthen resistance to such news commonly include technical innovations such as fact-checking apps. However,

more consideration should be given to educational approaches using training courses and interventions that empower people to distinguish between what is reliable media content and what is not. Such an approach might be more generally accessible to a larger audience and could be tailored for groups with various levels of media skills.

Yet many of the training programs and interventions described in the research conducted over the past ten years still favor the technical approach. Studies incorporating a clear fake news intervention are scarce. Instead, the majority of studies that included interventions to increase the ability to fight fake news were far more focused on enhancing the critical thinking skills of individuals exposed to various types of media content.

When searching for initiatives that fight fake news in a more generationally inclusive manner, we found that the majority of the research studies, but also small-scale and large-scale initiatives in the media literacy (training and interventions) targeted younger participants, mainly students at different educational stages. Some targeted professionals, such as educators and journalists. It is important for researchers and practitioners to consider a more inclusive audience for training and interventions of this kind consisting of different socio and cultural groups: people from different generations, with different socio-economic and cultural background. In many cases, access to media content is facilitated by other languages than the official language of a country, an aspect that has hitherto been wholly disregarded in the current initiatives.

Moreover, the majority of the studies in which news evaluation interventions or training were included took place in a formal environment – usually a classroom. This setting excludes individuals who are not part of the formal education system but could also potentially bias the participants through the authority of the space and/or the teachers present [45, 46], thus influencing the results of studies scrutinizing individuals' reactions to certain fake news related tasks or situations.

Most of the interventions, regardless of their specificity, only measured the short-term effectiveness of the instrument they proposed, but they generally report positive results. However, the training courses analyzed in this study for the most part failed to evaluate the results. Furthermore, with little exception, the trainings were not evidence based. An interesting, evidence-based approach was seen in several of the gamified intervention studies. This could arguably be a more inclusive, pressure free, but relevant method for supporting individuals in fighting fake news.

Probably the most important finding is the lack of continuity of most of the training courses and interventions discussed in this manuscript: many were too small to influence the target group in a significant way and the level of replication or cross-cultural collaboration is low. Interventions and training to empower people to fight fake news that have only small budgets and are organized more like one-off events lack long-term efficacy. Even interventions aiming to develop critical thinking skills in individuals exposed to media content lack long-time perspective and continuity. This was evident, not only in the small-scale initiatives in the articles at the Media Literacy Center (here considered as a typical case), but also in the European projects on Media Literacy conducted in the EU-28 countries [20].

5 Limitations

When referring to the current study, several limitations should be kept in mind. First, it is not claimed to be an exhaustive analysis, but an exploration of existing Media Literacy Interventions and Training initiatives, with a focus on interventions featuring a gamification component. Also, as we looked particularly at interventions in which climate change issues were taken as the starting point, our conclusions may not simply be generalized to other types of training. Still, we have no reason to believe that the patterns we have identified in the current manuscript are necessarily different from the types of training used to address other issues. In fact, the systematic literature review by Eisemann and Pimmer, discussed extensively here, appears to indicate as much. Hence, there could be more than a few studies that fall within the scope of this paper, but were not included, even though their findings could be relevant. Also, as we focused mainly on interventions with a gamification component, this limited our conclusions on other types of interventions (e.g., fact-checking interventions). Using Google Scholar to search for articles that discuss interventions and training in the field of fake news might have introduced some limitations regarding the articles we found, as the output of a Google Scholar search process is dependent on the search history of a particular device. However, the current research is exploratory in nature. It provides an overview of the way interventions and training incorporating an explicit fake news component are approached in the literature. For such purposes, Google Scholar is useful as it aggregates the data from different scientific databases. Second, most of the studies we discussed were conducted in the US, the UK and The Netherlands, thus the rather limited localization of the papers could possibly affect the results of the analysis. Third, the studies suggested as potentially efficient educational instruments for fighting fake news have their own limitations that should be considered when trying to replicate them, or when integrating the instruments they propose into education curriculums.

6 Implications for Future Research

Future studies could take note of the instruments analyzed in this paper and test their effectiveness in various educational environments, while also including different age groups in their research (e.g., https://www.stopcoronafakenews.com/toolkit/, http://smart-toolkit.eu/). An interesting perspective in fighting fake news could be gamification, as shown by some of the discussed studies. Gamification might offer a useful option for instruments used in interventions with participants of various ages, especially since the relaxed, less formal format of the method could possibly help in potential polemic contexts, for example when addressing political subjects. Future studies might also undertake to compare the effectiveness of the different types of available training [37–42] and interventions [28–35]. Finally, we recommend that future studies focus on an evidence-based approach, and that they adopt a longitudinal approach to measure whether the training and interventions deployed retain their effectiveness after a certain period of time.

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