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Show or tell? A systematic review of media and information literacy measurements

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Editorial Board

ABSTRACT

Media and information literacy (MIL) is a key concept in several research fields and measuring the levels of MIL is considered valuable for policy stakeholders. However, the concept is complex, and few systematic reviews of research on measuring MIL levels have been conducted. This article draws on a systematic review of peer-reviewed studies measuring MIL between 2000 and 2021. Out of a total of 4008 publications, 236 were included in the analysis, and 87 were analysed in depth. A key finding was that several studies applied broad understandings of MIL, often based on initiatives by international organisations such as UNESCO, Ofcom, and EAVI. The main measuring methods in the studies were self-evaluations, knowledge claims, and demonstrated skills, all with associated possibilities and challenges. Few studies have been systematically replicated, and few have mapped larger population groups, while socio-demographic aspects have often been underestimated.

Keywords: *media and information literacy, media literacy, systematic review, mapping, measurement.*

INTRODUCTION

Several current global situations, such as the Ukraine conflict, the climate crisis, and the recent corona pandemic with the associated "infodemic", have highlighted how important it is to know about the levels of citizens' abilities to critically evaluate information and understand how, for example, social media algorithms work and influence our thinking and decision making.

In this context, the globally accepted concept of *media and information literacy* (MIL) is important. MIL is often seen as an umbrella concept related to empowering people to search for, critically evaluate, use, and produce information and media content with different devices and in different forms (La Rue, 2016). MIL is seen as relevant in many contexts (Tibaldo, 2022), and at the policy level it has long been expressed as a goal to develop established methods and instruments for measuring MIL (Moeller et al., 2011; Nordisk samarbeid, 2020). Thus, we see MIL as a highly relevant term also in the context of *media literacy education* (Al Zou'bi, 2022).

However, some pertinent questions remain: How much do we really know about people's MIL skills and competences, and how can these be measured? Only a few studies have earlier reviewed and synthesised existing research studies on the measurement of MIL. We therefore argue that it was timely to perform a systematic review that specifically focuses on the measurement of people's levels of MIL.

We conducted a systematic review aiming to analyse different conceptual frameworks and indicators that have been used for measuring levels of people's MIL, and further discuss possibilities and challenges with the different ways of measuring MIL. We analysed peer-reviewed studies that measured MIL, limited to publications between 2000 and 2021, guided by the following research questions:

1) What conceptual frameworks and indicators are used to measure people's MIL levels in the research corpus?
2) What methodologies have been used to measure people's MIL levels in the research corpus?

This article presents the most important findings and discusses the strengths and weaknesses of the different measurements found in the systematic review.

Previous research

In the initial phase, we conducted a literature search to find out if there existed previously published studies that had similar aims to ours. In this phase, we found several quantitative surveys that mapped the *media practices* of groups of people, including studies of *media use* and *time spent* on different media devices (Lopes et al., 2018). Surveys done by EU Kids Online (2014), the Norwegian Media Authorities (Medietilsynet, 2021), and the Swedish Media Council (Statens Medieråd, 2021) are examples of such mappings. We also found quite a lot of conceptual and theoretical publications, often focusing on critical discussions of theoretical frameworks and conceptualisations, such as digital literacy and media literacy (e.g. Buckingham, 2005; Livingstone et al., 2005).

However, we found few peer-reviewed literature studies that have explicitly synthesised measurements or evaluations of areas of competence related to media and information. However, the systematic reviews of Siddiq et al. (2016) and Haddon et al. (2020) are exceptions, as they analysed existing research literature for the measurement of ICT literacy and digital skills, respectively. Siddiq et al. (2016) did a systematic review of the existing research literature on the measurement of ICT literacy, and particularly discusses the framework *DigComp*, which is designed for measuring digital literacy. Haddon et al. (2020) similarly conducted a systematic review concerning children's and young people's digital skills, including a discussion of how different studies have measured or aimed to measure digital skills. We also found Hobbs' (2017) study relevant to our research, as she discusses opportunities and challenges related to measuring skills associated with MIL.

The concept of media and information literacy

Measuring competences related to MIL presents many challenges. Some of the most crucial questions are what indicators and conceptual frameworks are applied and how to collect reliable data. Further, the diversity of concepts in use, such as *media literacy*, *information literacy*, and *digital literacy*, causes some complexities. For example, the concepts of media literacy and information literacy have different roots: media literacy has traditionally been used in the context of audio-visual media, whereas information literacy has been developed in relation to digital information systems (Livingstone & Van Couvering, 2008). Nonetheless, the concepts of

media literacy and information literacy have lately often been pieced together, especially in the global context of UNESCO. In fact, the UNESCO MIL Curriculum and Competency Framework (UNESCO, 2021) combines the three terms: media literacy, information literacy, and digital literacy. Most often, MIL is understood as a collection of individual knowledge, skills, and attitudes that develop in line with the media development and go beyond a more instrumental or tool-based understanding of digital skills or digital literacy (Sanchez et al., 2019).

UNESCO (2013, p. 29) defines MIL as

> a set of competencies that empowers citizens to access, retrieve, understand, evaluate, and use, to create as well as share information and media content in all formats, using various tools, in a critical, ethical, and effective way, to participate and engage in personal, professional, and societal activities.

The skills and competences associated with MIL vary considerably in different theoretical and pedagogical approaches, which could be confusing. For example, the UNESCO MIL framework (UNESCO, 2021) includes over 20 skills and attitudes. Potter (2022) found 249 skills associated with the concept of media literacy in an analysis of articles published in the Journal of Media Literacy Education between 2009 and 2020. The great number of skills associated with MIL indicates that the concept of MIL is highly complex and includes a great diversity of meanings. Haider and Sundin (2022) argue that whereas media literacy emphasises access to media, production, and, usually, competencies related to critical reflection, information literacy is oriented towards the infrastructure of information and works as a "glue for understanding how media and user data circulate in a culture whose sociality is increasingly shaped by algorithmic, mostly commercial information systems" (Haider & Sundin, 2022, p. 12). In the case of our study, applying MIL has made it possible to map the kinds of conceptual frameworks and indicators that have been used in empirical studies aimed at measuring people's skills and competencies in media and information environments.

METHOD AND DESIGN

The main method applied in this study is a systematic review of peer-reviewed research publications that aim to measure MIL. Following Green et al. (2015), we have aimed to collate all empirical evidence fitting pre-specified eligibility criteria to answer a specific research question, we have used explicit, systematic methods to minimize bias, and by that aiming to provide reliable findings.

More specifically, we have been inspired by a procedure defined by Gough et al. (2017), which recommends the following steps in a systematic review study:

1) formulation of specific research questions
2) performing searches in recognised and relevant databases
3) analysis of the studies according to specified inclusion and exclusion criteria
4) description of the studies' characteristics
5) broad and 'rich' assessment
6) synthesis.

We developed a search protocol as a tool to ensure that we found recent and updated research in areas focused on the measurement of MIL. We delimited the scope to the last 20 years, primarily because any measurement developed earlier was deemed obsolete due to media and technological developments. The search was done using what are considered recognised databases. To some extent, the searches overlapped (i.e., some of the databases delivered the same results).

Figure 1 shows the flowchart of the review process; the search in databases, journals, network, and grey literature gave a total of 4008 relevant findings. After a screening of titles and abstracts, 3772 were excluded, leaving 236 publications for analysis with full reading. As Figure 1 illustrates, a further 149 publications were excluded after assessing the publications' relevance, quality, genre, and conceptual similarity. This meant that 87 publications were finally analysed in depth and form the basis for our conclusions.

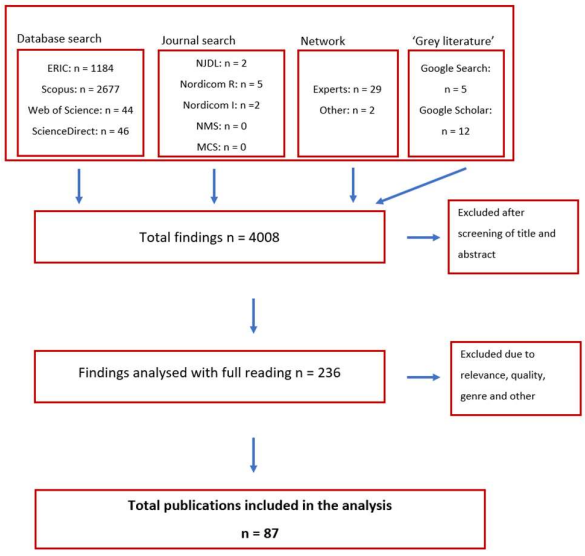

Figure 1. *Flowchart of the search process*

Databases. We included the following databases in our study: ERIC, Scopus, Web of Science, and ScienceDirect, selected because they cover a broad range of research in social sciences, humanities, and interdisciplinary studies.

- *ERIC*: Large database related to education.
- *Scopus* and *Web of Science*: Comprehensive databases covering social sciences, technology, and humanities.
- *ScienceDirect*: Publications in social sciences and humanities from Elsevier's scientific server.

Searches were made in both English and Nordic languages (Norwegian, Swedish, and Danish). We also combined all keywords with synonyms, as described later.

Selected search strings. The databases required us to develop several different search strings to cover MIL, due to the databases' different requirements for conducting searches. Terms such as digital literacy, media literacy, and information literacy were covered using synonyms in the searches. We used truncation for some keywords to capture the different grammatical forms of the words, as such:

> Media and information litera*; Media Litera*; Information litera*; Media competen*; Information competen*; Media and information competen*; Media litera*; Information litera*; Media and information litera*; Digital competen*; Digital litera*; Digital skills

The searches were done using the OR operator between synonyms and AND between different keywords, for example, *media OR digital AND literacy OR literacy.* We found English synonyms in the Oxford English Dictionary (Oxford Dictionaries, n.d.). The searches were conducted during different periods between August 2020 and March 2021. The same search requests were made in the different databases, but the number of keywords the databases accepted varied during the same search; therefore, the searches were in some cases divided into different sub-searches. The following keywords were crucial in our research in the databases:

> "media literacy" OR "information literacy" OR "media and information literacy" OR "media comp*" OR "information comp*"

We limited the searches to peer-reviewed publications, and to publications from *after* 2000, with the formulation PUBYEAR < 2000. We further delimited our search to deal primarily with the *measurement* of *media literacy and/or information literacy* and *measurement*. In English, the most commonly used synonyms for *measure* were *assess, evaluate, map*, and *survey.* Using an asterisk, we therefore included several forms of these words. After the initial searches in Scopus, we made some revisions to our searches in the subsequent databases, which meant that we reduced the number of 'open' results in these. Following this, we conducted an analysis of the publications' abstracts to *exclude* publications that were not relevant to our study.

In this phase, we *included* studies that had one or more of the following characteristics and excluded studies that did not have any of them:

- referred to studies of measurement of MIL or similar concepts
- referred to the development of indexes and/or indicators for measuring MIL
- published in peer-reviewed publication channels
- referred to studies with a minimum of 200 participants or that could potentially be used with samples of over 200 people
- based on quantitative studies
- discussed methodological aspects of measuring MIL or similar terms.

The following were the main *exclusion* criteria:

- measurement in very specific occupational groups and/or with a very narrow focus
- measurement of information literacy defined as information processing
- theoretical or conceptual studies
- small qualitative studies
- practice-orientated studies
- studies that defined measurement as assessment or grading in school and education.

RESULTS

Overall, we included 87 publications in the final review, which we analysed in detail. Of these, 25 are selected to be included in this article as examples of particularly relevant publications and which have been analysed, as shown in Table 1. We considered these to be particularly well-designed studies that specifically addressed MIL or comparable conceptualisations. The research question was the most important guideline for the analysis.

Inspired by other literature reviews (Haddon et al., 2020; Siddiq et al., 2016) we included the following

elements in the first step of the systematic analysis: names of authors, year of publication, year of data collection, place of data collection, sample size, methodology and design, theoretical and conceptual framework, specific indicators, types of findings, age groups, and socio-demographic variables. The selected publications are analyses according to these factors, as shown in Table 1.

Conceptual MIL frameworks. The studies used different frameworks for measuring MIL or related areas of literacy. We took into account conceptualisations with similarities to MIL, such as digital literacy, media literacy, and information literacy. We found that many of the surveys developed their own conceptual frameworks and indicators, similar to what Haddon et al. (2020) found in their review. Original frameworks can contribute to a study's uniqueness, but over time, it can be problematic if studies do not build on each other and develop the field of research. Although several of the frameworks can be described as original, most of the studies we analysed were more or less based on some of the known frameworks of media literacy or MIL. The frameworks that were referred to most often were UNESCO's framework (n = 11), Ofcom[1] (n = 6), EAVI (n = 5), and DigComp (n = 3), as well as concepts developed by Livingstone et al. (2005; n = 14) and Buckingham (2005; n = 11). The most comprehensive and broad frameworks are those of UNESCO, DigComp, and EAVI. All of these can typically be called 'consensus concepts', which are developed over time as a result of larger processes in which the major international actors are important stakeholders, such as the European Union (EAVI and DigComp) and UNESCO. DigComp (The European Digital Competence Framework) is a framework for digital literacy initiated by the European Commission related to ICT literacy and associated areas of competence (Siddiq et al., 2016). DigComp is oriented around the individual sub-competencies related to *technical-operational, safety, information, communication, content-production,* and *problem solving.* The framework EAVI (European Association for Viewers Interests) is also initiated by the EU Commission (Celot, 2015) with the goal of mapping both media literacy and media and information literacy. The EAVI framework is designed for multilevel assessments and consists of both individual and environmental factors. The main individual dimensions are called *use*, *critical understanding,* and *communicative abilities*, whereas the environmental factors are about *media availability* and *media literacy context*. The UNESCO framework is as mentioned above, comprehensive, and aims to measure MIL by the three main components *access, evaluation,* and *creation,* each of which consists of four subcategories with associated indicators. In the studies in our review, typically only parts of these frameworks were applied; it was often argued that they were too comprehensive for a single study.

Methodologies for measuring MIL. Methodologically, we found that the publications mainly used quantitative questionnaires but different *types of questions* (self-reporting, self-perception, etc.) were asked. Some studies applied different types of tasks or tests (e.g., reflective tests related to understanding specific media content). We found different approaches to measuring different aspects of MIL that could mainly be divided into three groups: (1) *self-evaluations* of 'experienced' MIL, including media literacy, information literacy, MIL, and digital literacy/digital skills; (2) *knowledge claims* (with answer options); and (3) *demonstrated skills* from different tests. This is in line with what Haddon et al. (2020) found in their review of research on digital skills in children and adolescents. Most of the 25 example studies collected data from self-reporting (n = 15). The most common questions concerned the evaluation of one's own knowledge, skills, attitudes, and behaviours. Self-reporting can be considered a type of *indirect* measure that primarily captures a participant's self-concept or self-esteem (see also Siddiq et al., 2016). As such, self-reporting can be a useful and practical methodology; it can provide insight into what people think and believe about their own literacy, but it is not a direct measure of abilities or knowledge (see also Hobbs, 2017). Hence, from self-reporting, a researcher primarily gains insight into the participants' *perceived literacy*. Bias is also a potential weakness in self-reporting. 8 of our selected studies included demonstrated skills from different types of tests. Proficiency tests can potentially capture MIL levels through tasks similar to everyday practices involving communication, media use, analysis, or creation of media content in the real world. Researchers (e.g., Hobbs, 2017; Siddiq et al., 2016) have defined such tests as a kind of 'gold standard' regarding measuring literacy, providing more credible knowledge about people's media literacy than self-reporting questions.

[1] Office of Communication; official UK organization.

Table 1. *Selected publications*

Authors (pub. year)	Year of data coll.	Sample size (selection)	Method and design	Framework	Indicators	Assessment of validity and reliability	Socio-demographic variables[a]
Ainley et al. (2016)	2013	> 60.000 (8th graders)	Tests, self-reporting questions and tasks, also interviews with school management	Computer and Information Literacy Index with two strands, with three and four sub-dimensions respectively	Based on ICILS. 83 items with four levels,	Average Cronbach's alpha: (=0.76)	1,2,3,4,5,10,11,12,13,14
Ashley et al. (2013)	2010	Project part 1: 244, project part 2: 338	Survey, likert scale (1-7)	Conceptual model with three domains; 1) sender and audience, 2) message and meaning, 3) representation and reality	'News media literacy scale' with 102 items.	Validated by pilot study. Cronbach's alpha: 'high internal validity. On average: (a=0.901).	1,2,12
Crawford-Visbal et al. (2020)	2017	229	Case study: survey, focus group- and individual interviews	DigComp	Levels related to access, use, content production, search, and development in digital skills, related to DigComp	N/A	1,2,3
Dornaletechе et al. (2015)	2010-2011	1506	Performance test and survey with three modules, with 45 items	Online Digital Literacy test	3 modules: 1) socio-demographic variables, 2) 45 items regarding use and knowledge of digital tools, 3) 2 meta-reflective questions	Cronbach's alpha (=0.961)	1,2,3,12
Douglas et al. (2020)	2015	1603 (students)	Self-reporting	"Self-directed information literacy (SIL)"	SIL subfactors: (*Recognize*, *Seek*, *Evaluate*, *Apply*, *Document*, and *Reflect*)	High inner consistency (a=0.92)	1,2,3,6,7
Eristi and Erdem (2017)	2015-2016	322	Online survey, self-reporting	Media literacy skills scale	Based on access, analyse, evaluate, communicate.	Validated by «item discrimination», and cronbach alpha (a= 0.919).	1,2,3
Hajduová et al. (2020)	2018	343 (students)	Self-reporting, survey	ICT and information competences	Original overview of competences; "ICT competences" (skills) and "information competences" (reflection)	Cronbach's alpha (a= 0.973).	1,2,3,8
Holma et al. (2014)	2014	23 (pilot)	Case study: survey, focus group interviews and individual interviews, surveys, and practical tasks	Based on UNESCO MIL	Access, evaluate and create, measured in four levels	N/A	1,2,3,8,9,10
Ihme et al. (2017)	2013	11850 participants (8th graders)	Uses data from ICILS	From ICILS 2013; with two "strands": 1) collecting and managing information, and 2) using computers for thinking, producing and communication.	Compares information-based response tasks, simulation tasks, and authoring tasks	Regression analysis	1,4,10,11

Authors (pub. year)	Year of data coll.	Sample size (selection)	Method and design	Framework	Indicators	Assessment of validity and reliability	Socio-demographic variables[a]
Jin et al. (2020)	2018-2019	Tot: 1989 (three groups: 715, 705, 569)	Digital Literacy-test analysed by means of item response theory (IRT)	DIGCOMP 2.1.	1. Information, 2. Communication, 3. Content-creation, 4. Safety, 5. Problem solving	Validated through concept validity test.	1,2,3,9
Khlaisang and Koraneekij (2019)	-	2300 students	Three phases: 1) developing conceptual model, 2) developing online test, 3) testing the quality of the tests	Information Literacy Scope, with 6 dimensions and 49 items, Media Literacy Scope with 6 dimensions and 63 items, and ICT literacy with 6 dimensions and 69 items	Levels on three types of literacy; Information literacy, media literacy and ICT literacy, scores on 5 levels	Cronbach's alpha (a= not stated, but "good"). Also, exploratory factor analysis and confirmation factor analysis	-
Koc and Barut (2016)	N/A	1226	Survey, self-reporting	NML (New Media Literacy)	Functional Consumption, Critical Consumption, Functional Prosumption, and Critical Prosumption, with 35 items	Validated by factor analysis	1,2,3
Lee et al. (2015)	2011	574	Online survey, self-reporting	NML	Measures skills, productivity, criticality, and sociality, 12 dimensions with 4 – 13 items	Validity and reliability are measured, all indicators are revised after assessment from expert group. Pilot study is conducted.	2,3
Literat (2014)	N/A	327	Online survey, self-reporting	Scale based on Jenkins' (2006) New Media Skills	Media literacy levels according to New Media Literacy scale; 12 skills with 5 items each, 60 in total	Factor analysis	1,2,3,6,7,10
Lopes et al. (2018)	2018	Ca. 500	Survey, self-reporting, Multiple-choice tests, and practical tasks	Original framework for MIL, based on Item Response Theory (IRT)	Main dimensions 1) cognitive and critical, 2) creative	Validated according to margins of error and potential measure errors, but procedure is not explicated.	1,2,3
Maksl et al. (2015)	N/A	508	Phone survey, self-reporting	Scale based on Potter's (2004) cognitive media literacy model	Potter's (2004) model with 5 'basic structures'; knowledge of 1) media content, 2) media industry, 3) media effects, 4) the 'real world', and 5) the self.	Analysed by two-step 'cluster analysis'	1,2,4,6
Okeji et al. (2020)	2019	1350 (students)	Self-reporting, survey	N/A	Items related to students' knowledge and level of evaluation of information	N/A	1,5
Pereira and Moura (2019)	-	679 students	Online survey, self-reporting	Media Literacy model with 2 main dimensions (critical understanding and production & participation) with 6 sub-dimensions.	Media literacy levels, 26 questions, scale from 0-100	N/A	1,2,3,4,5,8,9,10

Authors (pub. year)	Year of data coll.	Sample size (selection)	Method and design	Framework	Indicators	Assessment of validity and reliability	Socio-demographic variables[a]
Pérez-Rodríguez et al. (2019)	2015-2016	672 students	'Ad hoc' survey, self-reporting	Media Literacy model based on Ferrés (2007)	Self-evaluating competence scale from 1-3	Validated with 'Delphi technique' (15 peers follow the process), pre-test was conducted. Cronbach's alpha all items over 0.7.	1,2,3,5,9
Primack et al. (2006)	N/A	1211	Survey, self-reporting	Originally developed media literacy framework based on psychometry.	1) sender and receiver, 2) message and meaning, 3) representation and reality	Factor analysis and (a=0.87)	1,2,4,6
Rosman et al. (2015)	N/A	82	Combination of self-reporting and performance test	1) Self- reported information literacy, 2) Information search tasks, and 3) Information literacy test	1) 'SES-IB-16' scale with 16 items three tasks with increasing difficulty, measured by a 'PIKE-P test'	Multiple regression analysis, Cronbach's alpha 'acceptable'	1,2,3,9
Sanchez et al. (2019)	N/A	167	Online survey, self-reporting	Based on UNESCO MIL	a) media access and use, b) language and critical understanding, c) production and programming, d) transformation through communication	Cronbach's alpha varies and indicates a need for revision	1,2,3,5,6,9
Vraga et al. (2015)	2015	Study 1: 1481, study 2: 330	Online survey, self-reporting	"News media literacy" by two scales: SPML (self-perceived media literacy) and VML (value of media literacy)	Study 1: Media literacy scale (SPML + VML), study 2: Scale with 4 components: News Media Knowledge, Current Events Knowledge, News Media Skepticism and News Media Literacy Measures	Validated by factor analysis and Cronbach's alpha (between 0.77 and 0.91).	1,2,3,6,15
Xu et al. (2019)	N/A	746 (students; 557 women, 189 men)	Survey in three parts: (demography, SMCS, DCS), self-reporting	Individual levels of 'social media competence scale' (SMCS) and 'Digital Citizenship scale' (DCS)	Social media literacy scale and digital citizenship scale.	Cronbach's alpha between 0.66 and 0.98	1,2,3
Young (2015)	N/A	311 (161 students, 150 teachers)	Survey with 'quiz' genre	Scale based on Literat's (2014) and Jenkins' (2006) New Media Skills	Media literacy scale with 12 skills with 5 items each, 60 in total	Cronbach's alpha (=0.917)	1,2,6,8,9,12

[a] Socio-demographic variables, coded from 1-15: 1: gender, 2: age,3: education level, 4: parents' education level, 5: place of residence, 6: ethnicity, 7: language level, 8: career path, 9: type of education, 10: economic status, 11: cultural status, 12: media use, 13: ICT resources at home, 14: ICT resources at school, 15: political orientation.

When studies compare findings from self-reporting and proficiency tests, a large discrepancy is sometimes found. Studies that have compared self-reporting of people's literacy skills with their tested literacy skills have merely showed a low correlation (Hobbs, 2017; Siddiq et al., 2016). However, proficiency tests are also encumbered with some challenges, for instance, due to the rapidly changing media environment that makes it difficult to create proficiency tests based on the current media landscape. This is especially challenging if the aim is to measure and compare a population's MIL over time.

Samples. We found that most of the studies were single (not comparative) studies and were based on relatively small samples (from $n = 167$ to $n = 2300$), and relatively few studies had representative samples of the entire population, especially in terms of age. However, two studies had larger samples ($n > 60{,}000$ and $n = 11{,}850$), both of them used data available from the larger International Computer and Information Literacy Study (ICILS). These studies had both breadth and prevalence; the study from Ainley et al. (2016) had a sample of over 60,000 participants from more than 20 countries. Nevertheless, as the study was based on ICILS, which only tests 8th graders, the age range was very narrow. We did however find some studies that measured large sections of a population, such as that of Dornaleteche et al. (2015), which measured digital literacy in a population with an age range of 15-99 years, in a study with over 1500 participants. Most studies ($n = 21$), however, measured specific age groups within the population. The most common groups were students ($n = 10$) and children and young people ($n = 9$). A few studies mapped adults ($n = 2$), and some addressed larger age ranges ($n = 3$), such as that of Holma et al. (2014), which mapped the 25-62 age group, but this was a pilot with only a few participants. Of the larger studies, Lopes et al. (2018) studied MIL through a sample of people aged 18-81 ($n = 500$), and Dornaleteche et al. (2015) ($n = 1506$) researched media literacy in a group aged 15-99. Thus, relatively few of the studies in our review researched a representative sample of the entire population. There were, therefore, few studies that could inform about, for instance, the validity of MIL indicators in different age groups. This may, in particular, apply to possible practical tests or questions related to specific media content or skills, whereby the media preferences of different ages are very different.

Socio-demographic aspects. We are left with the impression that several studies have paid too little attention to socio-demographic aspects, and they were often scaled down, seemingly for pragmatic reasons. Both the UNESCO and EAVI frameworks have included socio-demographic indicators, which are potentially important contextual, social, and environmental prerequisites for MIL. Hence, we argue that most studies have not sufficiently weighed MIL levels against socio-demographic factors, such as family, gender, age, ethnicity, and economic status. However, all included studies had some of this data type, of which age, gender, and level of education were the most common factors. A mapping of MIL without a range of contextual indicators misses a potentially important basis for comparison. In one of the few studies that quite comprehensively analysed socio-demographic factors related to MIL, Ihme et al. (2017) in fact found that information-based tasks are particularly dependent on socioeconomic status. They found that students with highly educated parents benefitted particularly from access to digital tools and greater parental support, and generally had more opportunities to use and experience 'success' with digital tools and to develop knowledge and skills. Because MIL may vary greatly in accordance with social, cultural, and personal conditions, researchers, for instance Stald et al. (2015), have advocated for a broad collection of socio-demographic data when studying MIL. There is a general limitation in quantitative research, in that the comprehensiveness of surveys and tests most often needs to be delimited both in terms of scope and the time participants can spend on the research.

Scope. Our findings suggest that the scope of the design is critical for the measurement of MIL. Broad and narrow studies each have their weaknesses and strengths. A narrow, focused mapping of MIL could result in clear, and quite accurate findings, whereas the strength in broader, more multidimensional approaches is that they embrace the increasing complexity in the media's different types of content and forms of communication (see also Vraga et al., 2015).

Quality assessments. There were great variations in how the different studies measured, assessed, and documented quality aspects. One reason for this may be that the studies in some cases were in very different phases; some reported on a pilot study, whereas others reported on a later project phase accounting more generally for a more comprehensive process. Most studies discussed the research *reliability* and *validity*, but how detailed this was done varied considerably. Aspects such as sample size and whether the survey was based on an explicit conceptual framework were also important in the quality assessment of empirical studies.

We assessed the included studies to be of acceptable quality. The most common reliability measure was Cronbach's alpha, which was reported as generally acceptable in the studies that applied it. However, the measures of reliability and validity varied too much for them to be comparable across studies. In most of the studies, we considered that the assessment of quality was not particularly well documented. To make a valid assessment and possible statistical analysis of the validity of the various existing indicators, access to the entire dataset of relevant surveys is needed. We did not have that type of access in this case, and thus we did not have the opportunity to independently assess the studies' validity or reliability.

DISCUSSION

This review provides a relatively weak basis for concluding what are the clear strengths and weaknesses of studies that have aimed to measure levels of MIL in larger population groups. We found relatively few studies with both large samples and a broad age composition. MIL is generally defined very broadly, and the field is still dominated by so-called policy documents and theoretical publications, while relatively few research publications analyse empirical measurements of MIL.

Methodological considerations

One of the most crucial discussions in our review deals with whether the surveys collected data from self-reporting, from different practical or proficiency tests or a combination thereof. The various sub-competences assumably require correspondingly different measurement methods. However, Siddiq et al. (2016), Hobbs (2017), and Haddon et al. (2020) all emphasised that both proficiency and practical tests probably provides a better measurement of 'practical' literacy aspects than self-reporting. These types of tests are, for example, common in the fields of reading comprehension and critical reading research. Rosman et al. (2015, p. 751) argued strongly that assessments of literacy skills should not be based on self-reporting alone, claiming that standardized tests have a much higher predictive value than self-reporting surveys. However, we argue that test-based measurement of MIL also has challenges. Designing the tests and validating indicators is demanding in terms of time, costs, and resources, and performing the tests is also time-consuming. Furthermore, for applicability in larger population groups, the tests need to be focused on a limited set of skills, and they need to be designed separately for each age and social group; from our perspective, there cannot be any 'one size fits for all' measurement for MIL. For example, children and elderly people live in quite different media environments. Hence, although studies that include method triangulation are methodologically stronger, only a few studies in our review triangulated their methods. Studies in other contexts - for instance, the EU Kids Online (2014; Smahel et al., 2020) studies confirm that triangulation strengthens the studies' validity and reliability, as well as their 'social impact'. We argue in line with Dezuanni (2017) that knowledge and skills are functional in practice, and should be seen as reflexive and critical actions that are particularly difficult to 'translate' and articulate in words and sentences.

Our study shows that the goal of measuring the 'entire' MIL area seems to be quite ambitious and challenging. As Bulger (2012, p. 91) commented in her comprehensive assessment of frameworks for measuring media literacy, significant scientific challenges emerge when researchers move from a theoretical concept to operationalising it and then implementing a measurement. This can also be challenging when trying to measure MIL and related concepts. Some of the conceptualisations of MIL are developed based on broad literature reviews and the voices of many actors, such as policy documents and reports from international actors, like the European Commission and UNESCO. There were only a few studies that built on or replicated other studies. Siddiq et al. (2016) argued that structured processes whereby researchers build on the experiences of others who have used the same framework can contribute to a gradual strengthening of both the theoretical and methodological quality related to the mapping of, for instance, competencies. However, there are significant challenges associated with such a gradual development of the mapping of dynamic and complex concepts and phenomena, such as MIL. It will not always be possible to build directly on other research, as measuring MIL is strongly dependent on context, time, user behaviours, technological development, and other factors.

Critical perspectives

Although MIL is a very broad concept, there are still aspects that are perhaps underestimated in the studies aiming to measure different aspects of MIL. This applies to, for instance, democratic participation and an

understanding of democracy**,** which are key aspects of MIL that, in many ways, point beyond the media context and into other disciplines and areas of literacy. Many researchers, practitioners, and those in the political field are, for instance, interested in the relationship between news, MIL, and democracy. Nevertheless, there were few studies in our review that focused specifically on measuring such aspects of MIL. This applies particularly to indicators related to the *critical dimension* of MIL, which also Haddon et al. (2020) found in their study. Considering the development of media use and technology in recent years, this is an observed weakness of the studies. There are many issues that can be highlighted in this respect, including data security, privacy, and copyright, as well as 'harmful' media content and use, including sharing of illegal data material, online risk behaviour, datafication, content producing, artificial intelligence, content moderating algorithms, and surveillance. The study of Vraga et al. (2015) is to some extent an exception, as they emphasise so-called 'value based media literacy'.

Further, skills related to creativity, communication, and interactivity are seemingly both underestimated and difficult to capture in quantitative research. These are usually included in the frameworks but seldom given much emphasis in the studies (see also Luque et al., 2014). We found that several of the studies in our review placed less emphasis on the creative dimension of MIL than on understanding and basic use. Even though social media is increasingly important in today's media culture, we found that some of the surveys, to some extent, still reflect a 'mass media' society. This illustrates that today's highly dynamic media development and continuously changing practices entail several challenges regarding the measurement of MIL (see also Eristi & Erdem, 2017). A scale developed 10-15 years ago can potentially have major limitations today. For example, the smartphone was uncommon in 2007, whereas today, it is definitely the most used media device worldwide. Surveys that aim to map MIL over time clearly need to take swift technology development into account.

Challenges of measuring MIL

Researchers that aim to map levels of MIL, will, in any case, need to delimit specifically which aspects of MIL they want to measure. A complete examination of MIL in all its breadth will not be possible, regardless of which framework or design is chosen. As scholars in this field have argued earlier (Buckingham, 2005; Bulger, 2012; Livingstone et al., 2005), there are some possible difficulties associated with measuring MIL, because it is so intertwined with our everyday routines, actions, and attitudes (Bulger, 2012).

Our review indicates, in accordance with Haddon et al. (2020) and Hobbs (2017), that practical tests and proficiency tests probably are more valid for measuring levels of MIL than self-reporting questions. The challenge with such tests is that they can be demanding to develop, and there are also significant challenges associated with designing tests suitable for measurements across different age groups. Self-reporting is easier to design and is effective in that a single survey can include a relatively large number of self-evaluating questions. In summary, we find that if researchers aim to measure MIL, it is probably a strength to include both various proficiency tests *and* a variety of self-reporting questions. Siddiq et al. (2016) and Hobbs (2017) pointed out that combining these could strengthen the measurement of specific competencies and provide opportunities for comparison, and thus strengthen the validity of individual indicators and the study in general.

As mentioned, MIL is complex, and most of the frameworks we reviewed are comprehensive; thus, it is challenging to fully embrace them in an individual study. A key issue is the scope of the studies: the focus on a narrower and more pragmatic set of concepts has limitations in that important aspects of MIL might be missed, whereas the most comprehensive established MIL frameworks are perhaps too ambitious and wide. The question is whether it is sufficient to measure certain key indicators of MIL to capture the 'essence' of some main dimensions (for example, access/use, understanding, participation/creativity and critical competence).

CONCLUSIONS AND IMPLICATIONS

Our review shows that few of the studies can draw a full, holistic picture of the complexity of MIL, and most studies have considerably narrowed down the MIL concept. However, there is reason to warn against sharply reducing the scope of MIL. Our review indicates that there may be good reasons for continuing to define MIL as a broad concept and to apply a complex and multidimensional methodology. MIL is intertwined with complex social practices; thus, researchers should probably be careful about introducing a reductive or instrumental approach to measuring MIL levels among the population. Part of the key to understanding MIL and

other areas of competence is precisely related to capturing how the various sub-competences or dimensions are connected to different sociocultural contexts in insoluble ways.

Based on our review we can conclude that researchers, practitioners, and anyone who wants to know about people's MIL, will need to gain insight into a large range of research, as one study alone will in any case not be able to provide a complete picture. Also, the contextual and cultural aspects of MIL are of crucial importance; knowledge of individuals' MIL levels will give an insight into the micro level, but less about important contextual issues, such as the education system, the media industry, political level, network, and family.

We did not find any comparative, long-term studies on the measurement of MIL, which means that only a few models and indicators have been validated over time. Therefore, there is generally a need for more research in this field.

Limitations

MIL is obviously a very dynamic construct, and the media technological context is also highly transformative. A review of research in this area will therefore always be limited. Similar reviews will therefore have to be repeated. This study can be replicated, or similar studies can build on our conclusions and in this way create continuity and contribute to developing a knowledge base.

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