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Publication Status as a Common Inclusion Criterion in Systematic Reviews

On the Use of Digital Media in the Context of Teaching Pupils with SEN in Inclusive, Integrative or Segregated Settings

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Abstract

This paper critically discusses the use of publication status as a common inclusion criterion for systematic reviews, a method adopted from the field of medicine into education and media-related education studies. Two systematic reviews exploring the use of digital media in inclusive, integrative or segregated teaching settings are compared. By adding peer-reviewed grey and non-peer reviewed literature in a second review, the initial corpus of 15 studies (articles in journals with peer review) was increased by another 19 studies (without peer review). The advantages and disadvantages of including research articles with a different publication status in systematic reviews is discussed based on the comparison of both reviews. Overall, in both reviews, the focus was on individual support with digital media while teaching, especially within technology-based learning classes, mostly from a quantitative perspective. Both reviews revealed a didactic focus (learning with digital media) and hardly any study dealt with learning about digitalization.

Der Publikationsstatus als gängiges Einschlusskriterium in systematischen Übersichtsarbeiten. Über den Einsatz digitaler Medien in inklusiven, integrativen und exkludierenden Unterrichtssettings für Schüler:innen mit sonderpädagogischem oder zusätzlichem Förderbedarf

Zusammenfassung

Der Beitrag setzt sich kritisch mit der Nutzung von Publikationsmodi als Einschlusskriterium aus der Medizin für systematische Übersichtsarbeiten in der (Medien-) Pädagogik auseinander. Es werden zwei systematische Übersichtsarbeiten zum Einsatz digitaler Me-

*dien in inklusiven, integrativen oder exkludierenden Settings verglichen. Durch die Hinzu-
nahme peer-reviewter grauer und nicht peer-reviewter weisser Literatur in einem zweiten
Review wurde der ursprüngliche Korpus von 15 Studien (Forschungsartikel in Fachzeit-
schriften mit Peer Review) um weitere 19 Studien (ohne Peer Review) erweitert. Insgesamt
lag bei beiden Studientypen der Fokus auf der individuellen Unterstützung mit digitalen
Medien im Unterricht – insbesondere im Rahmen von technologiebasiertem Unterricht,
meist aus einer quantitativen Perspektive. Beide Übersichtsarbeiten zeigten einen didak-
tischen Fokus (Lernen mit digitalen Medien) und kaum eine Studie beschäftigte sich mit
dem Lernen über Medien.*

1. Introduction¹

Systematic reviews identify, evaluate and summarize findings according to pre-spec-
ified criteria in order to answer a research question. They originate from the medi-
cal discipline and aim to minimize bias by using explicit, systematic methods docu-
mented *a priori* with an operationalizable research concept of the research question
and methods used – including search strategy, selection and evaluation criteria
(documented in a protocol) (Gough, James and Sandy 2012). The method thus tries
to strive for systematic reproducible research strategies so that, ideally, all empiri-
cal studies that meet the inclusion criteria are identified via the search string. It
tries to give a quick and objective overview on the ever-growing amount of literature
available on specific research topics (Pollock et al. 2022).

A key feature that distinguishes systematic reviews from literature reviews is the
pre-established list of criteria for inclusion and exclusion of literature into the cor-
pus (McKenzie et al. 2022; Haddaway et al. 2015). These criteria must be so transpar-
ent and consistent that the review could be replicated or updated at any time. Aside
from the PICO elements – PICO stands for Population, Intervention, Comparison,
and Outcomes (Higgings and Green 2013) – a common inclusion criterion is based
on publication status. Although most guidelines on systematic reviews stress the
importance of including results reported in all types of publications to reduce bias
(cf. Cochrane, chapter 7), grey literature and research published without peer review
are often excluded in the research body (i.e. La Paro and Pianta 2000; Hartling et
al. 2017; Haddaway and Bayliss 2015). In library and information science, the term
«grey literature» refers to academic information that is not commercially published
and often not widely disseminated like government documents or unpublished re-
ports (Haddaway and Bayliss 2015). It is typically not peer-reviewed, but there may
be some exceptions (i.e. conference proceedings and dissertations). Grey literature
can provide valuable information, particularly in fields where traditional journal

1 The authors wish to thank Melissa Bond for her valuable feedback and comments on the article.

publication is uncommon. In contrast, «white literature» refers to commercially published and widely disseminated scientific information, including peer-reviewed and non-peer-reviewed journal articles, monographs, and book chapters (Tab. 1).

	Peer review	No peer review
White literature	Research articles in journals with external peer review system	Journal articles, monographs, book chapters in edited volumes
Grey literature	Dissertations	Working reports, unpublished research reports

Tab. 1: Examples of grey/white literature (table based on Schulte and Zimmer, unpublished).

Beyond the challenges of finding grey literature and non-peer reviewed studies, it is often argued that journal articles published with peer review are generally of the highest quality standard. However, including only those publications is controversially discussed by what is called «non-reporting biases» (Page, Higgins, and Sterne 2022). Non-reporting bias refers to the phenomenon of not reporting or publishing certain findings due to lack of significance or unexpected results. Common guidelines for systematic reviews, like the Cochrane Handbook, also strongly recommend including grey literature.

For the field of education and media education studies, another problem arises if only peer reviewed studies are included, as the discipline may rely more heavily on grey and non-peer reviewed white literature than others (Birukou et al. 2011; Shaw, Phillips and Gutiérrez 2022). Excluding this type of literature in systematic reviews in the field may lead to a lack of representation and understanding of a research field (Birukou et al. 2011; Schulte and Zimmer unpublished). This article therefore explores how the output of systematic reviews differs if grey and non-peer reviewed research is included, by investigating and comparing two systematic reviews undertaken by the research team. The topic of these reviews was the use of digital media² for pupils with additional or special educational needs in inclusive, integrative or segregated teaching settings. When conducting the systematic reviews, the question arose of whether the criterion of peer review, stemming from the natural sciences such as medicine with a strong focus on evidence-based intervention studies, was 1:1 transferrable to education sciences with their more explorative approach to science (Birukou et al. 2011). In the end, it was decided to split the research process into two parts: review one would include only journal articles with peer review and review two would only include grey or non-peer reviewed studies to allow for a systematic comparison of the inclusion criterion. The research questions of this article can therefore be summarized as follows:

² We use the term «digital media» throughout the text knowing that terms vary culturally. In the German-speaking context the term goes beyond «digital tools». We refer to «digital tools» as well as to digital learning and to critical thinking about media etc.

- Is peer review in journal articles a valid and appropriate inclusion criterion in systematic reviews to comprehensively synthesise the research in education studies?
- How do the results of two systematic reviews differ when using an identical research string, when one review only includes journal articles with peer review and the other includes all types of literature?

2. Selection criteria in systematic reviews

The systematic selection of literature is carried out in a systematic review consistently, according to clearly determined rules, which must be defined in advance based on the research question and based on the theoretical-conceptual references. The determination of these criteria is part of the scientific process to concentrate the screening of scientific texts on the set topic and must therefore also be presented in the paper as transparently as possible. The list of inclusion criteria describes the characteristics that a study should fulfill in order to be included into the results (Stern, Jordan and McArthur 2014). The exclusion criteria describe the characteristics that lead to the exclusion of publications (ibid.). A balance must be found between selection rules that are too narrow and too specific (with the risk of excluding relevant studies) and criteria that are too broad (which would lead to the inclusion of too many irrelevant studies). During the search process, these criteria may be refined; however, adaptations must be protocolled. A change in criteria usually occurs when the search string delivers hits that are excessive, insufficient, or irrelevant to the research topic.

One of the main advantages of using clear and specific selection criteria in educational systematic reviews is that they help to minimize biases in the process (McKenzie et al. 2022; Haddaway and Bayliss 2015). Biases can occur when studies that do not meet the established criteria are included in a review, or when studies that meet the criteria are excluded. Using selection criteria also helps to ensure that the studies included in the review have similar characteristics and that the intervention, or for example the teaching method being evaluated, is the same across all studies (Cherry and Dickson 2014). This increases the internal validity of the systematic review, which means that the results of the review can more confidently be attributed to the subject being evaluated, rather than to other factors.

Common selection criteria in educational systematic reviews involve the use of the PICO framework (Brunton et al. 2017). Other common selection criteria refer to language, publication date, study design, type of publication (i.e. only original studies) and publication status (McKenzie et al. 2022). The latter refers to the selection rule of whether only peer reviewed journal articles or also studies with different publication modi are included. Since peer review by independent field-specific

and methodological experts commonly serves as a control for journal articles to achieve the highest possible quality through review and helps editors to judge the relevance of scientific manuscripts for high-impact scientific professional journals (Müller 2009), peer review is a frequently used and widely accepted inclusion criterion (Hartling et al. 2017). Its aim is to «ensure the validity of research, opinions regarding the reliability, thoroughness, and appropriateness of reports on research findings» (Hall et al. 2019: 295; cf. Katzav and Vaesen 2017; cf. Jukola 2017). All in all, the aim of peer review is a «check for accuracy, appropriate methodology, novelty, and relevance to the journal» (Rowley and Saffi 2018: 644; cf. Hall et al. 2019). To put it in other words, it is a system designed to decide whether manuscripts are qualified for publication and to detect potential flaws that those manuscripts might still have (Kirman, Simon and Hays 2019). It exists to ensure the accuracy of information as well as the quality of presentation and writing (Horbach and Halfman 2018), and it shall identify fraud (Mulligan, Hall and Raphael 2013). Messy articles shall be cleaned up and reorganized, and «invalid articles» rejected (ibid.). As Lee et al. (2013) summarize, it is a tool for the world of science to take social responsibilities seriously and to make science a self-regulated and normatively driven field.

For systematic reviews, the inclusion of peer reviewed journal articles is a common selection rule because the publications have undergone a rigorous and external process of review and quality control, which increases the likelihood that the information is accurate and reliable (Horbach and Halfman 2018). Aside from quality reasons, excluding grey and non-peer reviewed literature from systematic reviews can also help to reduce the number of sources to be reviewed, making the process more feasible. Additionally, peer reviewed literature is often indexed in databases, making it easier to locate and to include it in a systematic review. However, excluding non-peer reviewed from a systematic review can have several disadvantages (McKenzie et al. 2022; Chow and Eckholm 2018). Firstly, grey and non-peer reviewed literature may contain important information that is not found in peer reviewed literature. For example, government reports, conference proceedings, and theses may contain data and findings that have not yet been published in a peer reviewed journal. Excluding this information can lead to a biased or incomplete understanding of a research question. Secondly, grey or non-peer reviewed literature may be published by smaller or less well-known organizations, which may be overlooked in a search process that focuses solely on peer reviewed literature. This can lead to the exclusion of valuable information that may be relevant for the research question. Thirdly, by only including peer reviewed journal articles, evidence selection bias – referring to the phenomenon where certain studies or data are selectively included or excluded from a review or meta-analysis based on their results or conclusions (Drucker, Fleming and Chan 2016) – might be increased. Researchers may miss important studies that have not yet been published, that were rejected by peer

reviewed journals but still contain valuable information for a systematic review. Studies might have been refused in the review process due to some kind of bias or «publication code» inside the field and then they may potentially be published without peer review as a second step (i.e. Bond 2018).

In order not to lose these insights, systematic reviews profit from a complete overview of the research field. Critics argue, inter alia, that possible inadequacies of reviews may be due to a lack of training which may potentially lead to unnecessarily harsh criticism or a rejection of innovative results (Ferguson 2020). Peer review is also controversially discussed with reference to racial bias (Hojat, Gonnella and Caelleigh 2003), language bias and specialty bias (Armstrong 1997; Goldbeck-Wood 1999). Using peer review and bibliometrics (e.g. citation counts and impact factors) as quality indicators of research could threaten small and highly specialized research (Henderson, Shurville and Fernstrom 2009). Aside from this, according to the Matthew Effect, people give disproportionate credit to those researchers who are already well known and highly cited (Heesen and Bright 2021). There are several studies suggesting a gender bias favouring male researchers (e.g. Birukou et al. 2011), although there does not seem to be a consensus in the current state of research (Hojat, Gonnella and Caelleigh 2003).

Grey literature may also be more accessible to specific communities, such as studies that were conducted in low-income countries, where peer reviewed journals may not be as prevalent (Salager-Meyer 2008). Excluding these sources can lead to a lack of representation and diversity in the results of the systematic review. Finally, the argument that valuable findings might be lost seems to be even more relevant in the humanities, because – as Johnson and Hermanowicz (2017) critically claim, «perceptions of truth vary more in the humanities than in the sciences, and thus it is more problematic to study peer review» (p. 516). For the field of education and ICT education studies, another problem arises: Not every piece of research is published as a journal article and even then, not all journals have established a peer review process for quality control yet. For example, Kuhberg-Lasson, Singleton and Sondergeld (2014) showed that between 1995 and 2008, over 50% of the outputs generated in education studies were published without peer review. The key position of non-peer reviewed articles in education studies was also confirmed in a survey (n=643) by Bambey (2016). Although peer reviewed journals were rated as important for academic work by 93% of respondents, a large proportion (60.51%) also attributed high relevance to non-peer reviewed journals. Taken together with the problem of publication bias, the question arises if peer reviewed white literature is a valid and appropriate inclusion criterion in systematic reviews to comprehensively capture the state of research in education studies.

Apart from this, an important decision must be made according to whether the systematic review is conducted in the field of media education or not. Historically, peer review is the most common instrument for quality control of scientific manuscripts in STEM³ disciplines and is also often considered as an important standard of good scientific practice in the SSH⁴ fields. It can be defined as a process in which an author's research is being assessed and evaluated by field-specific and methodological experts (peers). The reviewees are thereby encouraged to meet the recognised high standards of their discipline. The underlying paradigm is rather developmental (in the sense of improvement) than controlling and is meant to promote knowledge-transfer between experts. The STEM disciplines seem to have almost universal and consistent standards while the former seem to have varying evaluation procedures. Taken together with the problem of publication bias and publication culture, the question arises if peer reviewed white literature is a valid and appropriate inclusion criterion in systematic reviews to comprehensively capture the state of research in education studies. This will be part of the following analysis.

3. Comparison of two systematic reviews with/without the inclusion criterion «peer review journal article» on media education for pupils with additional or special educational needs in inclusive, integrative or segregated teaching settings

The above-mentioned blind spot of scientific research on the impact of including grey and non-peer reviewed literature in educational systematic reviews shall be enlightened by the study at hand – comparing two systematic reviews using an identical search string for the database search, the only difference being that one analysis focussed on empirical articles with peer review and the other one focussed on non-peer reviewed and grey studies. The theoretical framework shall be introduced before descriptively outlining and discussing the methodology and results of the systematic reviews with regard to research question, search strategy, selection rules and a comparison of findings.

The two systematic reviews at hand aggregate empirical research on the use of digital media in the context of teaching pupils with special educational needs (SEN) in inclusive, integrative or self-contained settings. From a normative point of view, the curricular basis for integrating digital media in German schools are two papers published by the Standing Conference of the Ministers of Education and Cultural Affairs (KMK 2017 and 2021) stating that pupils shall acquire media competence throughout their school career. The documents emphasize learning *about* media and the demand for integrating digital teaching concepts and materials in school

3 Science, technology, engineering, mathematics.

4 Social sciences and humanities.

(learning *with* media). The assumption is that media have positive effects and offer the chance of individualization (cf. Kamin and Schluchter 2018) on condition that technologies and educational goals fit well together (Irion and Scheiter 2018: 10). The inclusive use of digital media can provide social participation and empower pupils with SEN.

Participation shall be created on three levels (cf. Bosse et al. 2019):

- participation in media (representation of all groups in media),
- participation at media (free access to media content – e.g. via assistive technology or because the principles of the universal design for learning (www.cast.org) are respected) and
- participation through/via media (via media competence).

Considering the state of the art concerning teaching *with/about* media in schools, we find that the results of the scientific research are unclear (cf. Herzig 2014; Schaumburg 2019), especially for students with additional and/or special educational needs. There are some studies on the computer-based learning of students with «low to average» level of disability (Fitzgerald, Kourey, and Mitchem 2008). Some studies focus on computer-assisted instruction for autistic students (Pennington 2010). Some meta-analyses and systematic reviews do exist on the international level, as e.g. the review by Sánchez-Serrano et al. (2020), who examined the use of ICT for learners with disabilities in 96 studies from 2009 to 2019 or the meta-analysis by Aspiranti, Larwin, and Schade (2020). Yet, all in all, it must be said that the potential of digital media for inclusion has not been sufficiently dealt with in scientific research. The existing studies either focus on a limited spectrum of SEN-areas (e.g. autism) and/or on a hardware-oriented perspective. This led us to the conclusion that a review on the research on the studies published in German was due – both *with* and *without* peer review.

4. Methodology used in our systematic reviews

To compare how the inclusion criterion «peer reviewed journal articles» impacts the output generated in a systematic review in the context of media-related education studies, two systematic reviews on digital learning in teaching students in inclusive and special educational contexts were conducted based on the criteria of the PRISMA group (Preferred Reporting Items for Systematic reviews and Meta-Analyses) established by Moher et al. (2009) and guided by the Cochrane guidelines for conducting and evaluating systematic reviews (Higgins et al. 2019). The research

question, search string⁵, inclusion criteria and the research team were identical in both reviews, the only difference being the inclusion criterion «articles with peer review» (research period: 15.09.-25.11.2020) and «articles without peer review and grey literature» (research period: 07.12.-18.03.2021). The search string was developed for the FIS database and then adapted, with eight national and international databases relevant to education studies searched with a pre-defined search string. The databases were FIS, ERIC, PubPsych, Education Source, PsychINFO, PsychARTICLES, Psychology & Behavior, and the Web of Science. For the second review, databases that specialize in grey literature were added, namely Pedocs, BASE, Open Grey and OpenDissertations.

While the former databases are generally known, the databases for the second review shall be briefly described in terms of their range and thematic focus. PEDOCS⁶ is a database for educational literature operated by the Leibniz Institute for Educational Research and Educational Information. PEDOCS contains several thousand documents, mainly from the fields of educational sciences, educational psychology, social sciences and educational research (pedocs, n. d.). The documents include dissertations, theses, post-doctoral theses, conference papers and reports. PEDOCS has a thematic focus on Germany and Europe, but there are also international documents in the database. BASE⁷ (Bielefeld Academic Search Engine) is one of the largest and most widely used search engines for grey literature (University of Wolverhampton n. d.). It is operated by Bielefeld University and contains over 100 million documents from various sources such as repositories, libraries and publishers. BASE has a broad thematic focus and covers many subject areas, including science, technology, medicine, social sciences, humanities and more. Documents in BASE include various types of materials such as scholarly articles, books, conference papers, dissertations, reports and more. OpenGrey⁸ is a database of grey literature in Europe run by the European Commission's Joint Research Centre (JRC) (University of Wolverhampton n. d.). OpenDissertations⁹ is a database that provides

5 (DIGITAL* OR MEDIEN* OR TECHNOLO* OR VIRTUELLE OR COMPUTER* OR MULTIMEDIA* OR TABLET OR APP OR LERNPLATTFORM OR INTERNET* OR SOFTWARE OR MOBILE OR CYBER OR GAME) AND (SCHUELER OR UNTERRICHT OR LERN* OR LEHR* OR SCHUL*) AND (SONDERPAED* OR FOERDERPAED* OR SONDERSCHUL*OR BEEINTRAECHTIG* OR HANDICAP* OR BEHIND* OR «GEISTIGE BEHINDERUNG» OR KOERPERBEHIND* OR LERNBEHINDERUNG OR «EMOTIONALE ENTWICKLUNG» OR «SOZIALE ENTWICKLUNG» OR ESE OR ADHS OR ADS OR AUTIS* OR «GEISTIGE ENTWICKLUNG» OR «KOERPERLICHE ENTWICKLUNG» OR «MOTORISCHE ENTWICKLUNG» OR SCHWERHOERIG* OR GEHOERLOS* OR HOERSCHAED* OR TAUB* OR BLIND* OR INKLUSI* OR BARRIERE* OR HETEROGEN* OR TEILHABE OR PARTIZIPATION).

6 <http://pedocs.de>.

7 <https://www.base-search.net>.

8 <https://opengrey.eu>.

9 <https://biblioboard.com/opendissertations/>.

free access to electronic versions of dissertations and theses submitted to accredited universities in the US. It is operated by the non-profit organisation EBSCOhost (EBESCO 2023).

The studies were evaluated according to seven inclusion criteria, namely, (1) publication and data collection between 2010 and 2020, (2) German language, (3) original empirical studies with peer review published in journals (review I) and original empirical studies without peer review published in journals or as (part of) a doctoral thesis or in a conference manual (review II). (4) The considered population were students of a general or vocational school or of a school for special education needs and the (5) intervention was school education *with* and/or *about* digital media. (6) The outcome should refer to additional or special educational needs and (7) the type of study should be empirical studies (quantitative, qualitative or mixed methods).

Using the same search string, a total of 5.565 original studies were identified in review I. In review II 9.186 records were found (see Figure 1). After removal of duplicates and screening, 181 articles with peer review and 77 articles without peer review were assessed on the basis of full texts. Finally, 15 studies with peer review and 19 studies without peer review were selected for data extraction in the reviews. For each included publication, basic information was extracted with a coding strategy adapted to the research question (Mertens and Quenzer Alfred et al. 2022; Quenzer-Alfred and Mertens et al. 2023). A quality assessment was conducted for studies that had not been peer reviewed. Quantitative studies were assessed according to the quality criteria of the Cochrane Collaboration (Higgins et al. 2019) and qualitative studies were reviewed for research design, sampling, data collection, data analysis, reporting, ethics, documentation and reflexivity and neutrality, taking the Spencer et al. (2003) assessment framework for qualitative studies into account.

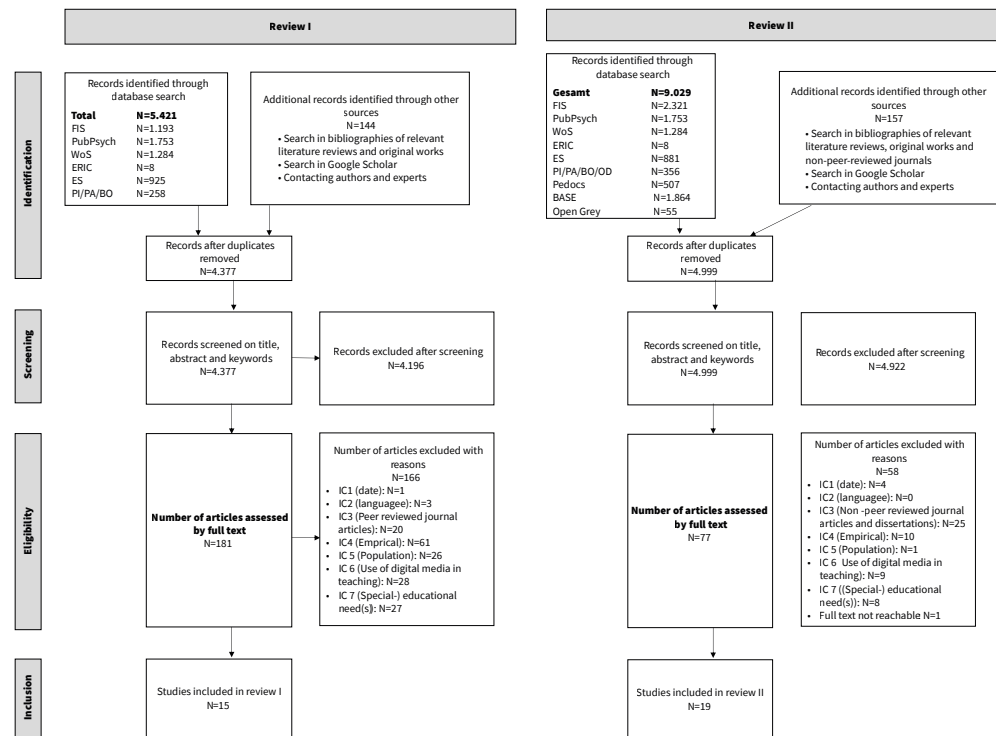


Fig. 1: PRISMA Flow-chart.

5. Results of the two systematic reviews

In total, 34 studies were found between the two systematic reviews. 31 studies were conducted in Germany, one in Austria and two in Switzerland. Between 2010 and 2020 there was no increase in publications. So, the first conclusion to be drawn is from a quantitative perspective: Not having taken the journal articles without peer review and dissertations into account, more than half of the findings would have been missed. Hence, to get a comprehensive view of the research field, screening studies with and without peer review as well as grey literature seems to be obligatory. Interestingly, most studies in both reviews used quantitative research methods, whereas just two studies used qualitative methods in review I and 5 studies in review II (see Figure 2).

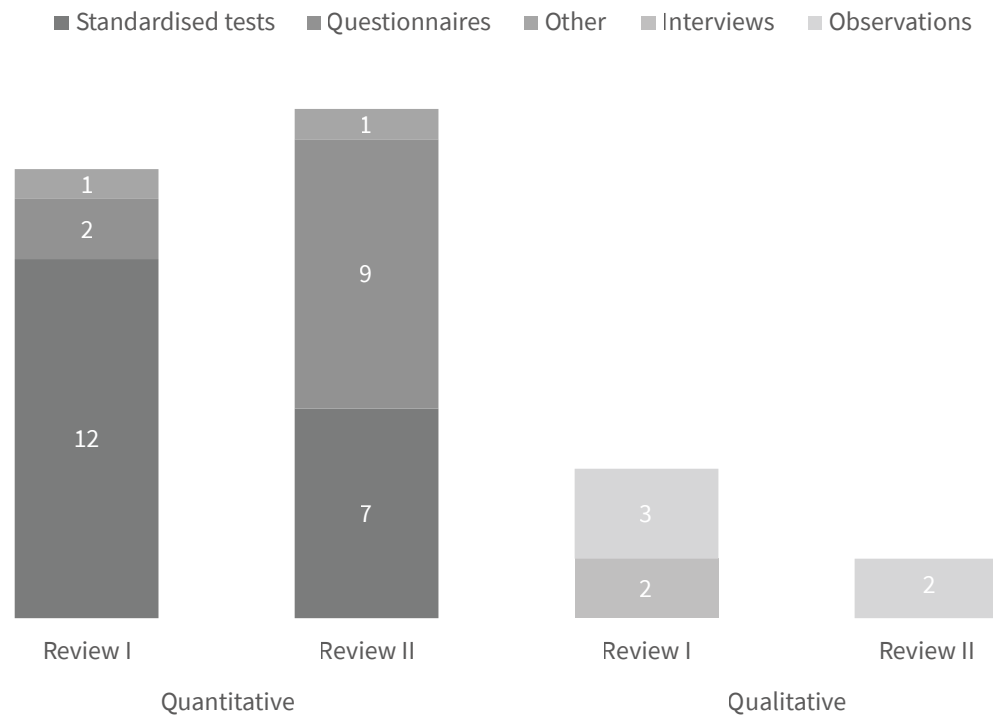


Fig. 2: Comparison of methods used in systematic review I and II.

The research methods which were used ranged from standardized tests, to questionnaires, interviews, observations and other research methods. In review I twelve studies were found using standardized instruments whereas in review II there were slightly more studies based on questionnaires (9), whereas only 7 studies used standardized instruments. In total, 27 quantitative studies, six qualitative studies and one mixed methods study were identified. However, generalisations cannot be made on such a narrow corpus basis.

As far as the type of schools is concerned, the whole range of school types was addressed except for vocational school (see Figure 3). Considerably more studies in special needs schools (11) were found in review II, in comparison to only four special needs school studies with peer review. It can be said that in both reviews, the emphasis was on individual learning to compensate for deficits, rather than on group learning with a common topic.

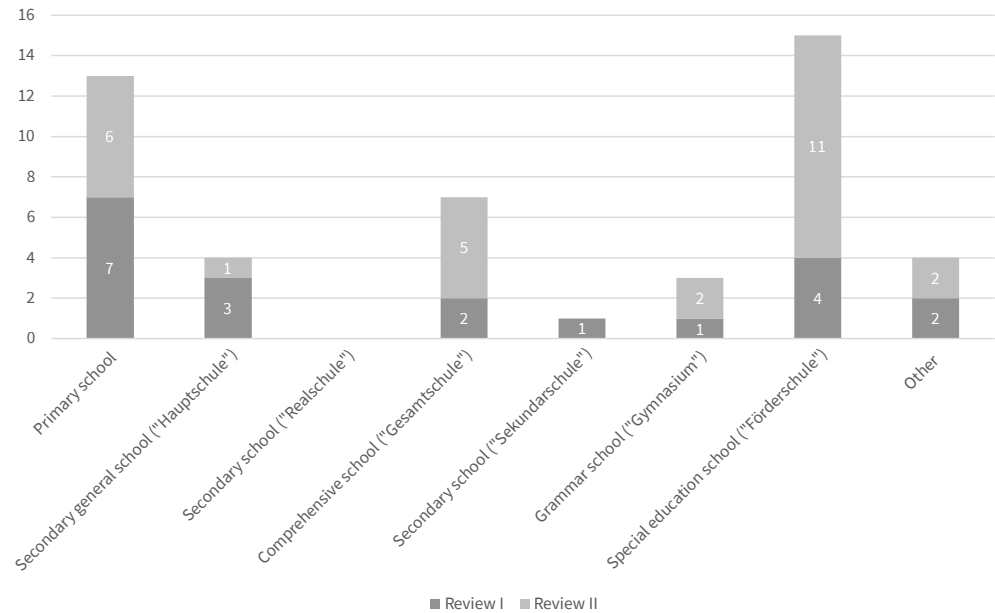


Fig. 3: Distribution of school types.

Screening the included studies according to whether the context of the study was inclusive, integrative or segregating it can be summarized that only nine studies took place in inclusive settings, whereas the context was integrative in thirteen studies and segregating in twelve studies (see Figure 4). Journal articles with peer review focussed on integrative settings, while articles without peer review and grey literature had more records for segregating but also inclusive settings.

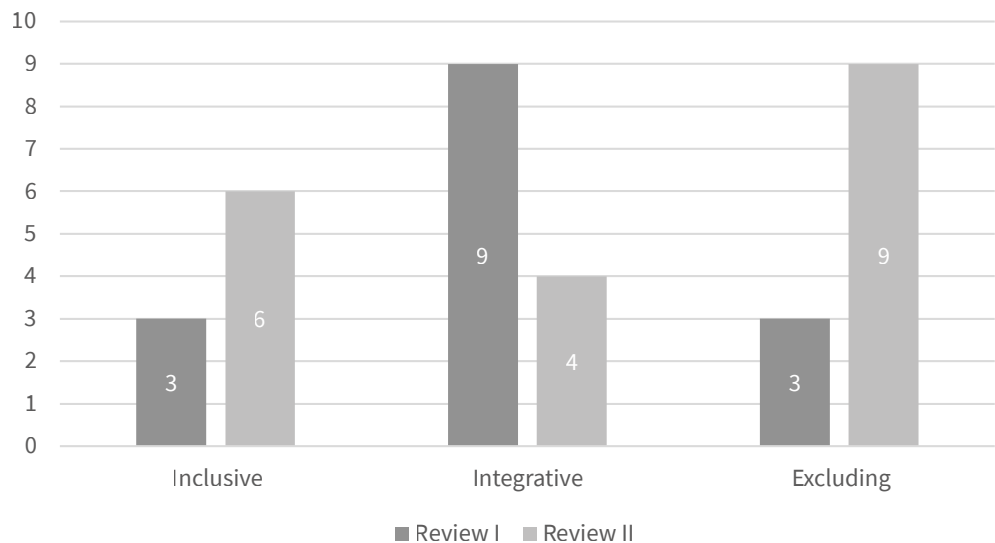


Fig. 4: Distribution of teaching settings.

A clear focus on evaluating training programs for the individual support of pupils can be found. The use of assistive technologies, as well as measures to improve accessibility, were considered very rarely, although more records were still found in articles without peer review and dissertations (see Figure 5).

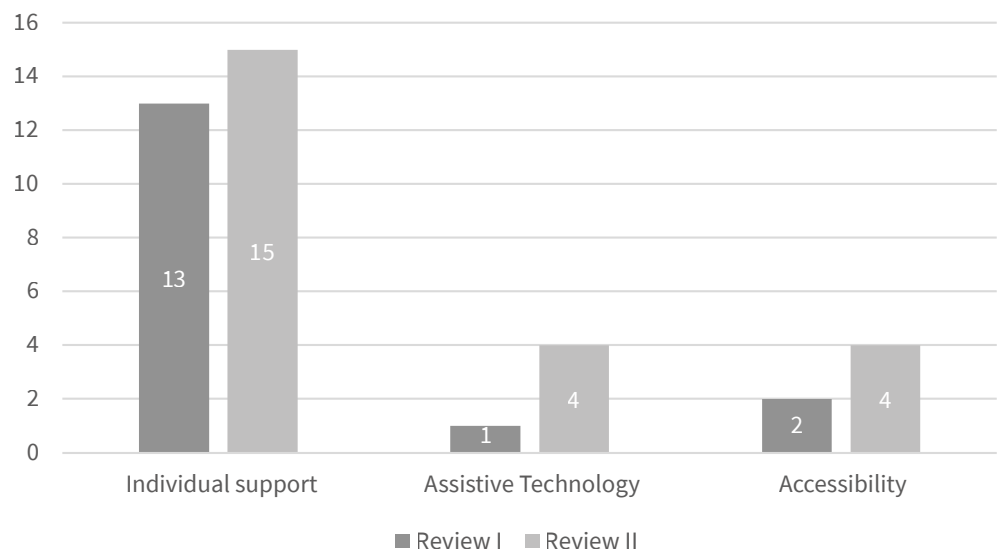


Fig. 5: Special educational function of digital media.

With regard to participation *in*, *at* and *through* media, the focus of empirical studies is on participation *through* media – regardless of publication status (figure 6).

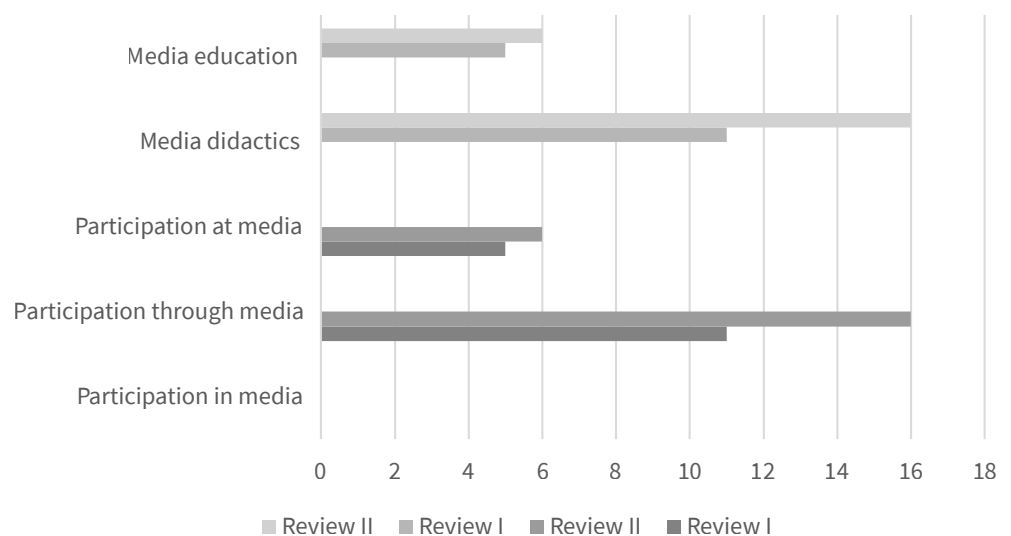


Fig. 6: Participation in, at and through media in the reviews.

Studies that examine the use of digital media for participation *at* media are underrepresented in both reviews. No study on participation *in* media could be identified at all. Hence, the focus of German-language research on the use of digital media for pupils with an additional or special educational focus is on the compensatory use of digital media. In other words, digital media are used to compensate for deficits in the treatment of special needs. In addition, it can be concluded for German-speaking research that there are only a few studies on learning *through/via* media and that, in consequence, there is a very clear research desideratum with regard to the acquisition of media competence in the context of special educational needs and inclusion (see Figure 6). A necessary interconnection between the didactic use of digital media and media competence acquisition is also missing in both reviews. Instead, the main research interest of the literature lies in learning *with or through* media, i.e. the use of digital media.

Looking at different learning and support areas, the majority of studies addressed performance deficits in reading, numeric skills and writing (n=14) (see Figure 7). Comparing the two reviews it can be seen that articles without peer review and dissertations (review II) were more likely to address the area of special need «learning», «communication» and «seeing» whereas for the other areas there were just as many articles with peer review as without. Few studies addressed topics independently of specific learning areas with broader research questions and goals, i.e. related to inclusive classroom environments (see Figure 7).

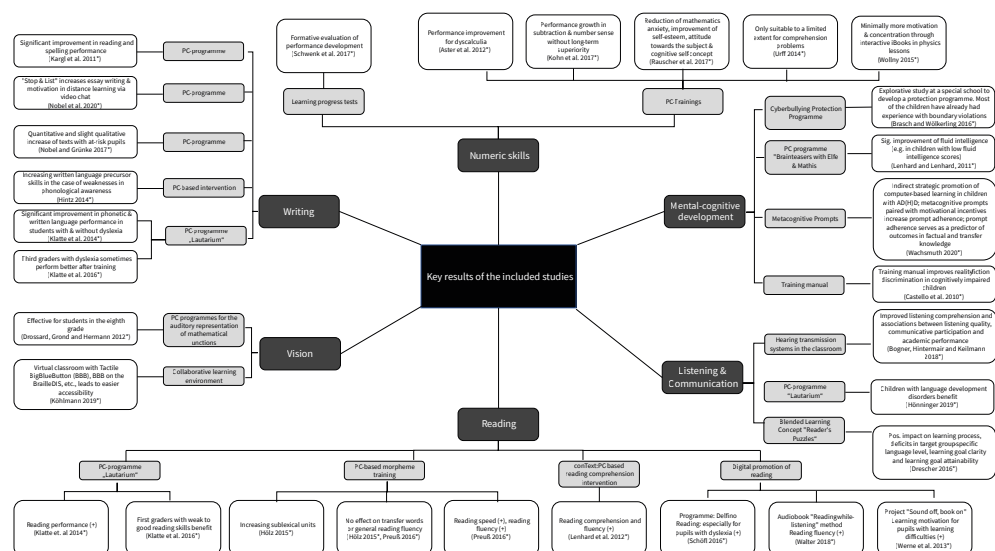


Fig. 7: Key findings with categorized by learning areas.

Author (year)	Key findings
Bosse (2018)*	Quality criteria for the design/use of inclusive teaching media; audiovisual media = high potential for connecting with pupils' interests; important: action and production-oriented tasks, cooperative & collaborative learning
Michna et al. (2016)*	Design of inclusive learning environments using the Universal Design for Learning significant knowledge gain in subject knowledge tests; materials handled equally well by all groups; learners in the inclusive classes rated the unit as more positive in contrast to the mainstream class
Mihajlovic (2012)*	Frequency of use and type of use of computers and the internet in teaching practice at special schools; use regularly and usually several times a week; frequency varies according to subject; computers in lessons mainly for word processing (22%) and internet use (21%); internet use by teachers varies in frequency; use within lessons primarily for information research (54%)
Wicki and Burkhardt (2018)* in Calabrese et al. (2018)	Use of assistive technologies (AT) to support learning and educational processes; mostly use of analogue AT; if electronic ones are used, then those already known from everyday life (smartphones, tablets, etc.); technologies from the field of vision hardly ever used
Müller and Fleischer (2013)*	Media literacy training; media literacy is more likely to be promoted if there is an assumption that pupils have or can acquire the necessary cognitive skills; practical relevance of media is decisive; increasing use in the higher classes; use of media in lessons depends mainly on teachers' own initiative
Schiedek and Menges (2018)*	Evaluation of the method of interactive video annotation in inclusive physical education; quality of the contributions of students with special needs corresponds to the average of the learning group; digitally supported communication: significant positive effect on professional contributions

Tab. 2: Overview of studies without a specific learning area.

6. Limitations

While this study provides valuable insights into the use of publication status as a common inclusion criterion in systematic reviews, it also has limitations that must be taken into account when interpreting the findings. First, the study has a limited scope as it only focuses on two systematic reviews that explore digital media use in specific teaching settings in the German speaking context, thus limiting generalizability to other areas of education and media-related education studies. Secondly, there is no standard for a comprehensive quality assessment of educational empirical studies with different methods, which makes a unified quality assessment challenging. Thirdly, some specialized sub-fields of additional needs could not be represented in the search string due to a limited number of characters accepted by the search engine. Apart from this, a couple of terms which can be considered to be highly relevant to the research question (like «inclusion») led to misleading

results in the database search. Fourth, despite every effort especially grey literature is difficult to find and might be that not every piece of relevant research was found increasing a publication bias.

7. Conclusion

Summarizing the results from the reviews – first of all with regard to the systematic reviews, *not* yet with regard to this article’s methodological research question – the findings of both reviews are similar. Regardless of the review type there is a focus on individualized learning; hardly any study focusing on «learning *about* media» and a strong emphasis on reading, writing and mathematics. Considering the study design, it can be concluded there are mostly intervention studies – which is surprising, as elaborate basic research would have been the logical precondition for elaborating concepts. The study designs are mostly quantitative and experimental with a low number of participants in the majority of the studies. More research from a qualitative perspective is needed, e.g. interviews in relation to experienced barriers to participation. High emphasis is given to participation in society *through* media whereas the aim of learning *about* media (acquisition of media competence) is hardly recognizable. Not any single study could be identified focusing on participation *in* media; and participation *at* media is also underrepresented. The special educational needs areas in Germany are not represented in a balanced way in the reviewed studies. All in all, there is a focus on cognitive areas for the acquisition of certain skills or assistive technologies (psychomotor level), whereas affective components (commitment, motivation) and interdisciplinary competencies (creative thinking, emotional experience) are considered insufficiently. Studies focus on the individual support of pupils, especially in training programs, and the use of assistive technology is hardly considered. This one-sided focus on the rehabilitative use of digital media can be criticized. Nevertheless, it must be said that the function (with regard to SEN) is not always easy to identify. Both reviews reveal a didactic focus (learning *with* media) and hardly any study deals with learning *about* media. It can be said that the interdependence of media and inclusion – which is discussed in theoretical concepts (cf. Liesen and Rummler 2016; Kamin and Schluchter 2018; Bosse 2017; Bosse and Schluchter 2019; Bosse et al. 2019) is currently not researched in an evidence-based way for school education. Only 15 studies in review I and 19 studies in review II met the inclusion criteria. Thus, there is a fundamental gap in the context of inclusive digital learning.

The methodological research question was, *if* and *if so, how* publication status as a selection criterion changes the overall result of systematic reviews in the field of media-related educational studies. This contribution has shown that incorporating grey literature into a systematic review can provide valuable insights

and perspectives, and through this, reduce evidence selection bias. By expanding the scope of the literature search to include grey literature in review II, access to a wider range of information was gained and uncovered relevant studies (n=19) that would have otherwise been missed to answer the original research question on evidence-based use of digital media for participation *in, at and through* media. In consequence, the number of relevant results was more than doubled. This can ultimately lead to a more comprehensive understanding of the topic being studied, and help to answer initial research questions more effectively. It can be summarized (in the context of media-related education studies) that a complete picture of the empirical state of the art has only been possible via considering journal articles without peer review and grey literature¹⁰. However, the comparison of the two reviews confirmed that there are also several challenges associated with finding grey literature, which include:

- Difficulties in identification: grey literature is often not indexed in standard bibliographic databases, making it difficult to locate using traditional search methods.
- Limited accessibility: grey literature was less often available online, and access was sometimes restricted.
- Time-consuming process: In comparison to review I, searching for grey literature was more time-consuming due to the large number of sources that needed to be searched and the lack of standardization in how grey literature is published and indexed.
- Variability in quality: white literature without peer review and grey literature is not subject to the same level of peer review and quality control as traditionally-published literature, which can lead to concerns about the reliability and validity of the information it contains.

To overcome these challenges, researchers should employ a comprehensive search strategy that includes multiple databases and sources, including those that specialize in grey literature. Additionally, using tools such as quality assessments may help to evaluate the quality of the literature found, and ensure that the literature included in the review is reliable. In our study, for review II, a quality assessment was added for studies with missing peer review and for dissertations – both for quantitative (Higgins et al. 2019) and qualitative (Spencer et al. 2003) studies.

In conclusion, the present study supports the argument that neglecting grey literature in systematic reviews in the field of media education studies may increase evidence selection bias. For the limited branch of media-related education

¹⁰ This is in contrast to the statistical fact that the overall number of peer reviewed journals has risen from 16,925 in 2002 to 23,973 in 2008 (Tenopir and King 2009) but goes in line with Kuhberg-Lasson, Singleton, and Sondergeld (2014) who showed that a large number of outputs generated in education studies are published without peer review.

sciences, much high-level research is still published in dissertations, monographs, mission-oriented research papers such as the prominent international comparative school performance study ICILS (International Computer and Information Literacy Study) (Eickelmann et al. 2019). All these findings would have been ignored as a basis for future research if the systematic review had included peer reviewed articles only. For some aspects, such as «media education» there would have been a complete blind spot – if not considering the non-peer reviewed and grey results, too. In particular, research results based on qualitative designs face the risk of not being acknowledged, if publication status had been a dominant exclusion criterion. In contrary to the STEM sciences, few journals with high impact factors do exist in this specialised branch. Action research and evaluative reports in particular do not seem to be published in the peer review format. These findings cannot be generalized, of course. Yet, the question should be critically raised in the scientific community of inclusive digital learning and special educational needs, whether peer review is a «must»-criterion for reading and publishing research findings. In our reviews, valuable insight could be gained via the non-peer reviewed articles and dissertations so that an open approach can be recommended for this research community.

Researchers are therefore advised to reflect very sensitively when conducting systematic reviews about whether publication status is a suitable inclusion criterion. Including grey literature can help to increase the understanding of the context and background of a topic, and the ability to identify gaps in existing research. Additionally, incorporating grey literature can help to enhance the comprehensiveness and credibility of a study. The systematic review method may need to be revised in such a way that published reviews should identify and summarize research thoroughly irrespective of publication status. This would not weaken the peer review seal of quality as an expression of good scientific practice, and, at the same time, important research work could be upgraded and given greater visibility.

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¹¹ *= studies included in the reviews.

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