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A systematic review of research on teachers' guides

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Abstract

Denne artikel præsenterer resultaterne af et systematisk review af forskning om lærervejledninger. En lærervejledning er defineret som en tekst rettet mod læreren, der vejleder i brugen af et didaktisk læremiddel, det vil sige læringsressourcer lavet med henblik på undervisning og læring. Gennemgangen er foretaget for at identificere de vigtigste forskningsområder i international forskning om lærervejledninger, og hvad forskningen kan fortælle os om de forskellige aspekter af lærervejledninger. Vi inkluderer metodisk mangfoldig forskning publiceret 1990-2020 med fokus på grundskolen. 43 studier blev inkluderet. Vi identificerede induktivt seks temaer, der skiller sig ud, når man læser på tværs af de inkluderede artikler: Den historiske udvikling af lærervejledninger, analytiske tilgange til lærervejledninger, forskning i lærernes brug af lærervejledninger, lærernes fortolkning eller interaktion med lærervejledninger, og hvad lærervejledninger skal indeholde ifølge henholdsvis lærere og forskere.

This article presents the results of a systematic review of research on teachers' guides. A teachers' guide is defined as text directed at the teacher guiding the use of a didactic learning material, that is learning resources made for purposes of teaching and learning. The review is conducted to identify the main research areas in international research about teachers' guides, and what the research can tell us about the various aspects of teachers' guides. We included methodically diverse research published 1990-2020 focusing on primary school and lower secondary school. 43 studies were included. We inductively identified six themes that stood out when reading across the included articles: The historical development of teachers' guides, analytical approaches to teachers' guides, research on teachers' use of teacher guides, teachers' interpretation or engagement with teachers' guides, and what teachers' guides should provide according to teachers and researchers respectively.

A systematic review of research on teachers' guides

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Introduction

Didactic learning materials are defined by being produced for purposes of teaching and learning (Hansen & Gissel, 2017). Prototypical examples of didactic learning materials are textbooks or a course for a specific school subject and grade level. The didactic learning material will typically embody a didactic approach that is the producer interprets the curriculum or subject, and the learning material transforms this interpretation by having explicit aims, tasks and activities for students, measures for evaluation, and so on. Hence, a didactic learning material is designed to facilitate that teachers and students can perform certain actions. Another defining feature of didactic learning materials are teachers' guides that is texts that meta-communicate to teachers how the material is to be used, the empirical or theoretical base of the learning material, and the intentions of the producer. The teacher's guide is a special type of user text, which can function as user instruction, professionally developing text or as a source reflection and inspiration for teachers.

Internationally, textbook systems vary across countries. In some countries, textbooks undergo state approval in order to ensure a fit between the official curriculum and learning resources whilst in other countries, textbooks are produced independently (Houang & Schmidt, 2008). In addition, there is variation in the degrees of freedom teachers enjoy as to how to teach the curriculum. These contextual circumstances are likely to influence the design of teachers' guides. Some didactic learning materials will seek to engage the teacher in a process of reflection whilst other materials will prescribe what the teacher should do without explaining why or inviting the teacher to make active choices (Remillard, 2012). To the extent that teachers use the learning materials as prescribed, didactic learning materials can have a great impact in aligning intended curriculum on the one hand and implemented intentions and objectives on the other hand (Houang & Schmidt, 2008). However, didactic learning materials that invite the teacher into a process of learning and reflection can potentially have

a greater impact on teachers' professional development compared to materials that do not (Remillard, 2012).

Various mappings indicate that didactic learning materials are widely used by teachers in their teaching activities (Mullis, Martin, Foy, & Arora, 2012; Gilje, 2016; Sikorová, 2011; Watt, 2015). Research about didactic learning materials is mainly focused on the design and content of the learning materials (Knudsen, 2011), and a recent review shows that international research in the use of didactic learning materials is rare (Gissel & Buch, 2020). It follows that research focusing on the use of teachers' guides, that is the role that they play for teachers, their views on teachers' guides and the relationship between guide and enactment in the classroom is sparse (Skjelbred, 2007). However, studying the design, contents, use and impact of teachers' guides seems highly relevant as these guides are likely to influence what takes place in the classroom (Selander, 1988). Research published before 1990, which is when the current review departs, has shown that teachers to a significant degree deviate from the intended didactic design in didactic learning materials (Durkin, 1984; Schmidt, Porter, Floden, Freeman, & Schwille, 1987; Schwille, Porter, Belli, Floden, Freeman, Knappen, Kuhs, & Schmidt, 1983; Freeman & Porter, 1989; Stodolsky, 1989).

In this article, we present the results of a systematic review of research on teachers' guides in relation to didactic learning materials. The research interest behind the review is to uncover trends in the international research about teachers' guides:

What are the main research areas in international research about teachers' guides, and what can the research tell us about the various aspects of teachers' guides?

It follows that the aim of the review is *configurative* that is the review is trying to understand a field of research and provide new insights through identifying the themes that are studied in this field (Gough, Thomas, & Oliver, 2012). Even though our research question is broad, that is the review is methodologically inclusive and includes all research topics that fall within our inclusion criteria, the review is limited to focus only on research that is about teachers' guides in didactic learning materials. Hence, we do not include studies that concern different guides for teachers that do not relate directly to materials for students (textbook, worksheets, and so on). We include studies concer-

ning both teachers' guides for digital and analogue learning materials.

In the following sections, we will present our method for performing the review, that is inclusion and exclusion criteria and search strategy. Then we present the themes that we have identified by reading across the included articles and the findings obtained.

Method

We intended to perform a systematic review, i.e. a review with clear and accountable methods (Gough, Thomas, & Oliver, 2012). All search strings in the various databases used can be found in Appendix 1, and we define clear criteria for inclusion and exclusion. Furthermore, we chose to scan the reference lists of the included studies to identify relevant publications beyond the search results.

Databases

We searched the following international databases: Education Resources Information Center (ERIC), Teacher Reference Center (TRC), PsycINFO, and Academic Search Premier (ASP). We supplemented the international search with the following Nordic databases: Den danske forskningsdatabase (The Danish research database, in both English and Danish), Oria.no (Norwegian search engine for academic libraries), and LIBRIS (search engine of the National Library of Sweden). The full search strings of all databases used are presented in Appendix 1.

Inclusion and exclusion criteria

In the review, the interest is to locate and gain knowledge from any research about teachers' guides. Hence, we include methodically diverse research about teachers' guides to both digital and analogue didactic learning resources. To be included, the research had to be peer reviewed, about primary or lower secondary school, published between 1990 and 2020, and be published in either English or Nordic languages (see Figure 1 for full list of inclusion and exclusion criteria).

Figure 1.

Inclusion and exclusion criteria.

— Focus: Studies about design of teachers' guides, teachers' use of guides and outcome of using teachers' guides in relation to didactic learning materials.

— Language of publications: English and Nordic.

— Grade level: Primary and/or lower secondary school.

— Type: Peer reviewed research publications – including reviews, literature studies and meta-analyses. Both qualitative and quantitative studies.

Records and manual screening

The searches were performed in November 2020. Our database search and screening of reference lists yielded 484 records after removal of internal duplicates. 396 records were excluded by title and abstract screening leaving 87 articles for full-text assessment (Figure 2). The reasons for exclusion of 44 studies in the full-text assessment are reported in Table 2. The full-text assessment led to inclusion of 43 studies for synthesis.

Figure 2.

Number of hits from each of the databases and the total number of hits after removal of internal duplicates, records screened and excluded, number of records assessed in full-text and number of studies included.

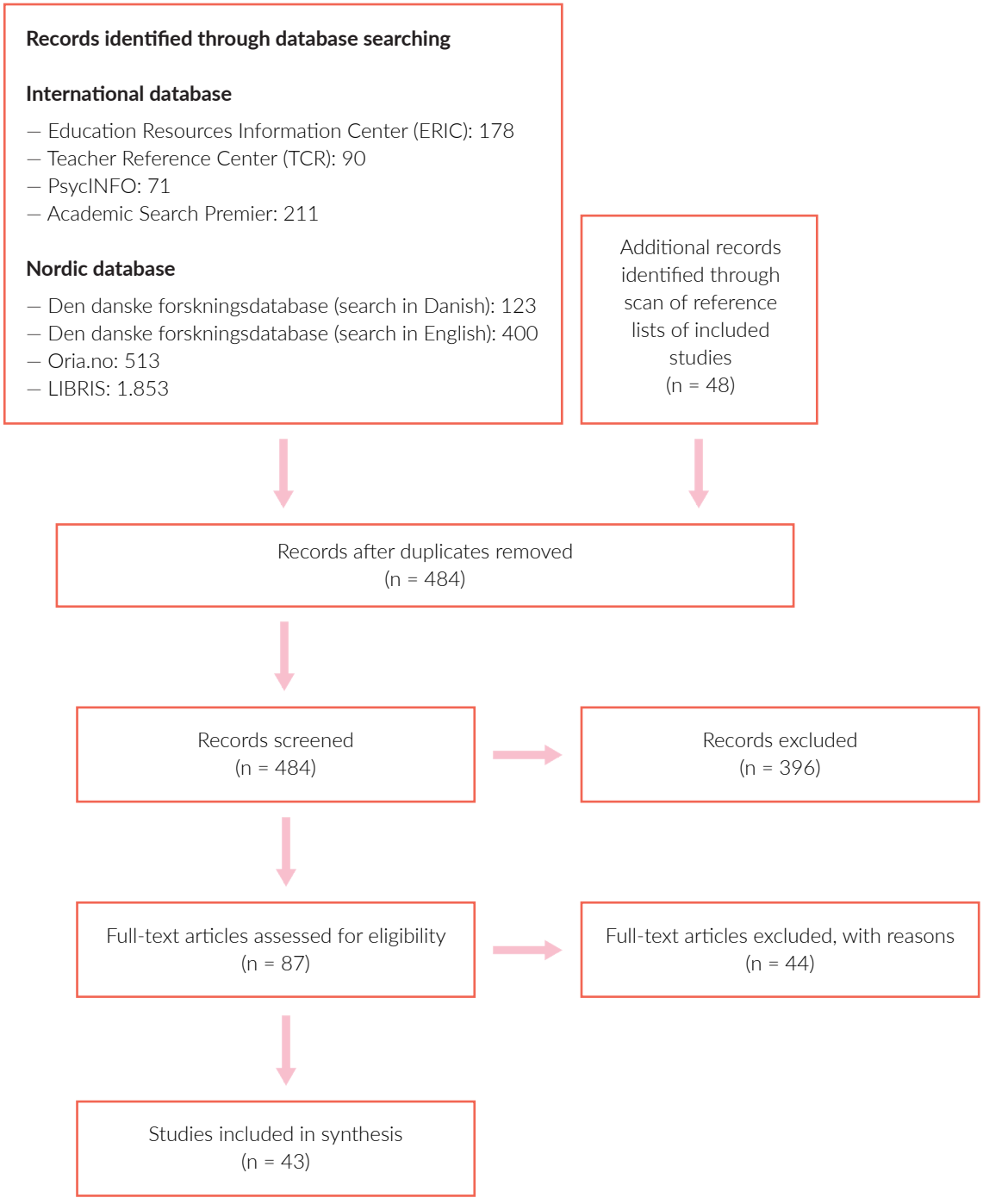

Table 1.

Reasons for exclusion in the full-text assessment and number of excluded records for each reason.

Reason for exclusion	Number of excluded records
Not study of design, use or outcome of teacher's guides	33
Not peer reviewed	5
Wrong study design	2
Not elementary school	2
Study published before 1990	1
Duplicate	1
Total	**44**

Synthesis

We read through all included articles and for each paper, we coded the relevant themes regarding teachers' guides. Then, we grouped the subthemes under more general headings. Hence, we inductively identified six themes that stood out when reading across the included articles: The historical development of teachers' guides, analytical approaches to teachers' guides, research on teachers' use of teacher guides, teachers' interpretation or engagement with teachers' guides, and what teachers' guides should provide according to teachers and researchers respectively.

Results

In the following sections, we report on the six themes found during the reading and interpretation of the included studies.

How have teachers' guides developed and changed through history?

Although a historical approach to the study of textbooks is relatively common (Sammler, 2018), it seems not to be the case with the study of teachers' guides. In our review, we have only identified two studies focusing on the historical development and change of teachers' guides. The first study by Robinson (1992) presents a historical overview of the development of teachers' manuals on basal reading. Robinson mentions how textbooks for teachers have been around for many years, for example Mulcaster's *Elementarie* originally printed in 1582 and Hoole's *Some New Discoveries on the Old Art of Teaching* printed in 1660. According to Robinson, there has been "areas of little change" in the development of teachers' manuals like lesson plans, vocabulary, and a proportionate amount of teacher directions. On the other hand, there has also been "areas of major change" like an increased focus on the needs of individual children, supplementary materials, and multiethnic concerns in the development of teachers' manuals.

The second study by Nastase and Corbett (1998) shows how teachers' guides have changed through history using a Foucauldian discourse theoretical perspective. The authors argue that the value of a historical approach to the understanding of teachers' guides is that it gives an insight into the dominating "educational trends" of a particular historical era represented in the material. Their object of study is teachers' guides from the 1990's on literature-based reading. They find that there are blurred and mixed messages in different teachers' guides because they build on different philosophies. Comparing with teachers' guides from the beginning of the 20th century, they find that the guides have increased in size and become "more technocratically designed, directing teachers step by step to move students through lessons of isolated skills in reading texts called basal readers" (Nastase & Corbett, 1998, p. 52). Through the 1990's, there has been a "philosophical shift" building on current theories of reading and literacy. Studying the historical changes of teachers' guides make us aware of how the broader societal context like the dominant political and educational discourses influence the content and form of the teachers' guides.

What are the foci of teachers' guides analyses?

When studying the use of teachers' guides, one focus has been the investigation of what to actually focus on when analyzing teachers'

guides. The review shows a variety of foci depending on the aims of the analysis. One recurring focus for analysis is what to focus on in research. Based on a literature review, Remillard (2005, 1999) suggests focusing on three arenas: the design arena, the construction arena and the mapping arena. The design arena considers the selecting and designing of tasks in the classroom and the construction arena considers the actual support for the enacting of teaching in the classroom, which requires teachers to be able to make "on-the-spot decisions" and adapting the text to the students, not the other way around (Remillard, 2005, p. 226). Finally, Remillard describes the mapping arena, which is not linked directly to the day-to-day teaching in the classrooms, but rather considers the overall planning and organization during the year (Remillard, 2005). Based on studies, Remillard offers a complex model for studying curriculum materials and their use. Remillard sums up learning materials and teachers' guides as curriculum materials and describes four different aspects of foci. Historically, according to Remillard, focus has been on the teaching materials assuming that teachers actually followed the guides and transferred the knowledge from the books to the students. But other foci have emerged such as actual teacher practices in the classroom influenced by the curriculum materials, teachers' interpretation of the curriculum materials and lately, a focus on how curriculum materials and teachers influence each other, what affects this synthesis and which teaching it leads to. The final focus is relatively new and is less common according to Remillard (2005). Two older studies focus on the rationale for studying teachers' guides. Gearing (1999) finds that the main reasons for evaluating teachers' guides are: helping teachers to decide their selection of textbooks with teachers' guides, making them more aware of the content of the teachers' guides they use, helping teachers to make more effective use of teachers' guides, making teachers more aware of the advantages and deficiencies of the teachers' guides and generating ideas for the improvements of teachers' guides. Gearing also presents recommendations for a checklist for evaluating teachers' guides. Radencich (1998) presents a rationale and procedure for evaluating teachers' guides building on Langer's (1990) model for literature study. Radencich uses the evaluation model to show how five publishers' guides treat the same books very differently.

Remillard (2005) also discusses the concept of curriculum materials. The author describes two different ways of looking at the materials. From texts as subjective schemes that teachers interpret as a sheet of music to texts as objective structures that are given. These two views on the curriculum material as text imply different focal points in research from the interaction and interpreting to the detailed study of the text. This leads to another focus for teachers' guides, namely

their ability to educate teachers while they use them. For instance, Davis, Palincsar, Smith, Arias, and Kademian (2017) designed enhanced teachers' guides called educative curriculum materials and used built-in tracers to follow the teachers' uptake of the materials and use of them as analytic tools. They recommend other researchers to adopt a similar strategy in intervention studies where the aim is to follow teachers' uptake. Remillard, Van Steenbrugge, and Bergqvist (2014) made a cross-cultural analysis of six different teachers' guides from learning materials for teaching mathematics in the US, Flanders and Sweden in order to investigate how teachers' guides can support teachers' learning. Their analysis is based on a coding scheme containing six different categories: 0: Providing Referential Information, 1: Directing Actions, 2: Design Transparency, 3: Anticipating Student Thinking, 4: Explaining Mathematical Ideas and D: Decision Making. They define the categories 2-4 and D as educative. They found that teachers' guides differ according to the cultural educational context but they also found similarities. American and Flemish teachers' guides are more detailed than the Swedish ones. Also, the Flemish teachers' guides contain more directives than educative parts which is in contrast to the two teachers' guides from the USA and one from Sweden that is more balanced, and the second from Sweden being the most educative. The authors assume that these differences point to the fact that the role of teachers' is more directing in the USA and Flanders and less direction is put into the students' material. This is in contrast to Sweden where directions are also to be found in the students' material.

Another focus is how teachers' guides support the subject learning and to which degree this support is sensitive to context. Such an analysis was carried out by Stylianides (2007) who investigated 4855 tasks in a material for teaching mathematics focusing on a narrow mathematical content namely the use of proof. Stylianides did a detailed study of whether the teacher's guide offered a solution to the student tasks or if it offered a solution and additional guidance. Stylianides shows that teachers' guides do not always offer supporting guidance to teachers or the guidance does not consider all possible solutions. It is suggested that teachers will use the materials with higher fidelity if teachers' guides offer more support to the teachers, meaning that they provide "guidance that goes beyond possible solution(s) to tasks" (Stylianides, 2007, p. 211). This is especially important if the content is hard to learn and hard to teach and teachers might have limited knowledge of the content themselves.

Teacher's guides do not always cover all tasks and subject matters. Demosthenous and Stylianides (2014) analyzed teachers' guides focusing on explicitly and non-explicitly algebra-related tasks. 15.9%

of the algebra-related tasks were non-explicitly identified as such in the teachers' guide. Another result was that the number of explicitly identified algebra-related tasks increases from fourth to sixth grade (p. 374). Gissel, Hjelmborg, Kristensen, and Larsen (2019) analyzes eight selected teachers' guides for teaching Mathematics in Danish primary schools. The researchers explored whether the teachers' guides expressed the potential for teaching in a competency-based perspective explicitly or implicitly. The researchers emphasize that it demands analytical competencies from the teachers to be able to identify the potential. Furthermore, the conclusion is that implicit potential is dominating the selected teachers' guides to a larger extent than the explicit potential. Hemmi, Krzywacki, and Liljekvist (2019) gives an analysis of four Finnish teachers' guides for grades 1-6. The aim was to explore if and how the guides are a resource for mathematics teaching based on a framework according to three main content categories: "(a) the use of curriculum material, referring to descriptions of and instructions for use; (b) concepts and facts within mathematics (cf. Davis & Krajcik, 2005); and (c) pedagogical support for teaching and learning mathematics" (Hemmi et al., 2019, p. 4).

Part of the subject teaching is also the teachers' guide's ability to support the teacher's planning of lessons. Hoelgaard (2015) analyzes four teachers' guides for mathematics in Swedish elementary school. The purpose of the study is to investigate if and how the teachers' guides support the teacher in planning and practicing teaching. The analysis focuses on the appearance, structure, content, and function of the activities and how they address the teachers' needs. All four guides provide explicit and descriptive approaches supporting the teachers, and they are a potential resource for the teacher.

Teachers' guides also reflect the cultural norms. Koljonen, Ryve, and Hemmi (2018) presents an analysis of nine Finnish teachers' guides (grades 1-6) for Mathematics. The purpose of the study is to "identify underlying cultural norms of potentially constructed classrooms, by analyzing recurrent activities" (p. 295). Results documented that three norms were embedded in the teachers' guides: "(1) creating opportunities for learning through a variety of activities and communication (2) keeping the class gathered around a specific mathematical topic; and (3) concurrent active involvement of teachers and students" (p. 295). Radencich (1998) also concludes that context and needs play an important role in the selection of teachers' guides: "To what degree the guides should resemble basals really goes back to the needs assessment and the definition of the local ideal" (p. 111). The study by Remillard, Van Steenbrugge, and Bergqvist (2014) (see above) also points to the teachers' guides being culturally responsive.

Finally, Stein and Gooyeon (2011) have been looking into trans-

parency, that is explanations of why a given task or learning path was selected and how it can lead to student learning, and how students might interpret or approach the task. They analyzed two systems and found that transparency is important if teachers are to make use of the teachers' guides.

How do teachers use teachers' guides?

A number of studies have focused on how teachers use teachers' guides. A common finding is that they use the teachers' guides differently and to various degrees. In a study by Gissel (2015) on how three Danish primary school teachers used an online learning resource including its guidelines, such differences were clearly found. Whereas one of the teachers followed the recommendations in the teachers' guide closely and evaluated the learning resource positively, the other two were more critical towards the material, and did not follow the guide in their teaching. Li, Ding, Capraro, and Capraro (2008) have shown how differences in use can be related to cultural contexts. In comparing the use of mathematics teacher's guides in China and US, they found that US guidebooks only included a limited number of guiding strategies put forward as suggestions, whereas the Chinese guidebooks were more comprehensive and imperative. In addition, teachers in China to a larger degree saw the textbooks and guidebooks as authoritative and something to be followed in order to perfect their teaching and improve their knowledge. Several other studies show that differences in use relate to the level of experience and educational qualifications of the teachers as well as the professional teaching context of the teachers. A report from the Swedish Ministry of Education, Skolverket (2006) explored how Swedish primary teachers in various school subjects evaluated teachers' guides. The report showed that teachers in grade 5 more often find support in teachers' guides than teachers in grade 9 did. Furthermore, the study showed that less educated and experienced teachers tend to seek support in teachers' guides to a greater extent than teachers with a higher level of education and more experience. Some teachers, who did not use the teachers' guides, gave reasons such as lack of time, limited access to guides and poor quality of the guides. Another study from Sweden presented in Ahl, Koljonen, and Hoelgaard (2015) shows a similar finding. Based on interviews with five primary school mathematics teachers, they found that both less and more experienced teachers consult the teachers' guides to gain support and inspiration for teaching. However, the less experienced teachers consulted the guides on a wider array of topics, for example insights in how students understand concepts and how to establish progression and coherence in their teaching. Valencia, Place, Martin, and Grossman (2006) examined how four elementary teachers

during their first 3 years of giving reading lessons thought about and used curriculum materials over time. They found differences related to how confident the new teachers were and to different school contexts of the teachers. The two teachers with more restrictive materials and teaching contexts or less well-developed knowledge followed the material faithfully and were least able to develop their teaching. The other two, who had stronger content knowledge, access to multiple materials and support for curricular decision-making, were more selective in their use of the material and teachers' guides, learned the most and were most able to change their teaching during the three years. Valencia et al. (2006) also conclude that even if materials were mandated, there was little on-site support to help new teachers with their understanding of the conceptual underpinnings of the materials and how to use them.

In a study on how two 6th grade teachers from the US use a teacher's guide for an innovative mathematics curriculum, Superfine (2009) concludes that teachers seemed to draw largely from their previous experiences and their own conceptions of mathematics teaching and learning and not particularly from the teachers' guide, when they plan mathematical tasks. In line with these findings, other studies show that the use of teachers' guides to a large degree depends on the teachers' own conceptions of the school subject, including ideas on subject-specific teaching and learning. In a study by Remillard (1999), two experienced, elementary school, mathematics teachers used a new textbook including the teacher's guide in their curriculum development processes, and it was found that the teachers' patterns of use were based on their ideas about teaching mathematics and also different contexts of teaching-development. One of them was heavily guided by the textbook in her decisions about content, structure, and tasks, although she rarely read the supplementary pages in the teachers' guide. She had few formal opportunities to learn about reforms in mathematics education or to talk with colleagues about their practice. The other teacher used the text as a source of ideas from which she adapted and invented her own tasks, in addition to making content decisions independent of the textbook and teachers' guide. She had been involved in her own teacher development for several years and discussed her experiments in her teaching with colleagues. Thus, she relied more on her own ideas than in the case of the other teacher. However, the study also showed that both teachers drew on their own personal resources to assess students, examine tasks, and improvise responses when they taught in praxis, even when they had taken the original task from the textbook. Although not explicitly focusing on teachers' guides, Zembat and Aslan (2016) found similar results in their study on how 24 middle school teachers implemented an inno-

vative mathematics curriculum. They found that the teachers operated with certain teaching prescriptions in line with their own strongly held beliefs about teaching and learning, and not in line with what they learned at the teacher course on how to implement the new curriculum.

The fact that teachers do not always use teachers' guides when implementing new teaching programs or curriculum is also shown by Leitão, Barratt-Pugh, Anderson, Barblett, and Haig (2015). They evaluated the implementation of a new reading program managed by librarians but expected to be supported by teachers informed by teachers' guides of activities. Based on interviews with eight teachers, they found that five of them did not use the teachers' guides due to lack of time and they did not see the connection between the program at the library and their teaching in schools. The three teachers who used the guides saw them as valuable but felt they were unable to make full use of it. Many of the studies mentioned above emphasize that teachers need time and support to explore and discuss teachers' guides and learning materials, especially if they are expected to implement a new curriculum or program and/or to develop their own knowledge and teaching.

Teachers' interpretation or engagement with teachers' guides

This theme is closely related to the theme 'How do teachers use teachers' guides'? However, some research departs from socio-cultural theory to understand how teachers interact, interpret, ascribe meaning to, and enact didactical learning materials. Hence, these studies do more than merely register which parts of the teachers' guide is implemented and what is transformed. They seek to understand what goes on in these transformations. Most studies in this area focus on both teachers' guides and teachers. Remillard (2012) identifies five categories relevant to study the form of address in textbooks: structure, look, voice, medium, and genre. Regarding voice, Remillard introduces the distinction between materials that speak *through* the teacher and speak *to* the teacher as a reflecting professional. Remillard finds that there are four primary forms of reading involved in a teacher's mode of engaging a textbook: what she reads for, which parts she reads, when she reads (before, during or after instruction), and who she is as a reader. Remillard and Bryans (2004) studied how eight teachers used a mathematics curriculum and how the curriculum materials support teachers in practice and teacher learning. The authors observed classroom practice and did interviews with the teachers. It was found that teachers' orientation influenced how they used materials but also their view on the curriculum, their degree of agreement with the way the mathematics subject was interpreted in the material and their

view on curriculum materials in general mediated their use. Also, the researchers found that less experienced teachers followed the recommendations in the material more closely than the more experienced. Based on teachers' use of a single learning resource, Brown and Edelson (2003) created a model for analyzing teachers' use and understanding of learning resources, Design Capacity for Enactment framework (DCE) – targeting a spectrum of use from offload to adaptation and improvisation. Their model implies that it is important to understand the teacher's Pedagogical Design Capacity (PDC), which they describe as:" ...ability to perceive and mobilize existing resources in order to craft instructional contexts" (Brown & Edelson, 2003, p. 6). This capacity is important for the teacher's capability to prepare teaching or gain access to the teaching materials according to Brown and Edelson (2003). Brown (2009) assumes that teaching involves a process of design and that teachers will use materials in unique ways in this design process. Viewing teaching as a design process has implications for designers of materials because they need to support teachers' design processes rather than transmitting instructional ideas. The relationship between teacher and tool is a bi-directional influence: curriculum materials influence teachers by offering affordances and constraints, and the teacher interprets and uses the material based on perceptions and decisions. Hemmi et al. (2019) studied the interplay between 12 Swedish primary teachers and translated Finnish curriculum materials, which they voluntarily started to use to reform their mathematics teaching. The data collection was based on interviews with 12 teachers, questionnaires, classroom observations and recordings of the teachers' collegial meetings. They conclude that when implementing new reform curriculum material, the role of teachers and the surrounding community's shared knowledge about the rationale behind the new ideas provided in the materials seems to be crucial.

Ahl, Hoelgaard, and Koljonen (2013) developed an analytical tool that contains five categories of content in learning materials for mathematics. They used the tool to analyze interviews with teachers about which kinds of support they would like to find in teachers' guides. Focusing on the teachers, Collopy (2003) shows, based on a long-term study of two math teachers, that teachers can use teachers' guides made for teachers' learning very differently and far from the intended use. Teachers seem to teach in accordance with their beliefs and following the teachers' guide depended on how it matched with the teacher's belief or expectations. To identify which parts of a learning material the teacher used in teaching, Remillard and Kim (2017) propose Knowledge of Curriculum Embedded Mathematics (KCEM) as a framework. Through analysis of elementary school mathematics

teachers' guides and interviews with seven teachers, they identified elements of curriculum resources teachers interact with when planning lessons. The element the teachers emphasized is assumed to be central and thus the framework is also a benchmark for determining how the teachers' work relates to the curriculum design.

What should teachers' guides provide, according to teachers?
Some research focuses on, or includes, what teachers' guides should provide, according to teachers. In line with research that shows differences in use of teachers' guides depending on experience, some research also demonstrates that level of experience has a bearing on what they want guides to offer. Ahl, Koljonen, and Hoelgaard (2015) interviewed five teachers in mathematic grade level 1-3 in Swedish primary school with different levels of experience, and found that the more experienced teachers primarily use the guides as a toolbox to find inspiration for their practice, whilst the less experienced teachers also seek out more fundamental information about how pupils understand concepts, how to create progression, and so on. This difference is also demonstrated in another study by the same researchers in Ahl, Hoelgaard, and Koljonen (2013). In this study, they interviewed two teachers and two teacher students and conducted a survey amongst 60 teacher students focusing on how they use and think of teachers' guides in mathematics teaching in Sweden. Their results show that teachers want teachers' guides to provide specific materials and activities to be used in the classroom, how to organize the teaching, and how to help pupils with difficulties. The students expect more and want them to offer support for teaching methods and evaluation besides providing activities, tasks, and materials. They also want the guides to be close to the national curriculum and provide information on how pupils understand or misunderstand different topics. Hammad (2014) investigated through a questionnaire given to 70 teachers and interviews with 12 teachers how Palestinian teachers in English grade 1-3 think of English textbooks and teachers' guides. One of the conclusions is that many found it difficult to follow all the procedures put in the guides while teaching, due to the limited teaching time. They also raised critical views on the theoretical assumptions in the guides, and especially that guides did not take the educational conditions in the specific context into account. In order to bridge the gap between theory and practice, the teachers thought that textbook writers should be more aware of the actual teaching contexts (for example lack of time, large number of pupils, lack of audio-visual material, and the academic level of the pupils).

In Lin, Chang, and Cheng (2011), they present results from a large-scale survey of how science teachers in elementary and junior

high school in Taiwan perceive the functions and usefulness provided by teacher's guides developed for the Grades' 1-9 Science and Technology Curriculum. The findings indicate that the guides were of greater benefit to elementary school science teachers than they were to junior high teachers. Both groups, however, believed that the function of a teachers' guide is to provide teaching resources rather than to guide teacher thinking. Thus, they found the explanation parts least useful. The authors suggest that development of educative curriculum materials should address the function of teacher thinking which would encourage teachers to reflect upon their beliefs, to compare with the rationales of reform and to develop innovative teaching. They suggest that there should be opportunities for conversation within the guides by embedded questions that explicitly point out how to reach the goals through the teaching, and show dialogues between teachers and developers to present teachers' voices and developers' intentions and suggestions.

As part of a wider research project on how six teachers implemented a mathematics curriculum from Singapore in a South African context, Naroth and Luneta (2015) thought of the teachers' guides. Some of the teachers used the learners' textbook as a structure for planning their lessons, rather than the teachers' guide. One of the teachers also expressed she could use more detailed guidelines and explanations. The authors conclude that if teachers are expected to implement a new curriculum developed in a completely different context, they need additional support not just in teachers' guides but also by professional development programs and collaboration.

What should teachers' guides provide, according to researchers?
Most of the studies included in this review present researchers' findings and recommendations for what teachers' guides should provide. The general point is that teachers' guides should not only be instructions for how to use particular didactic learning materials. Teachers' guides should also aim to scaffold the professional learning of the teachers using them. It is a problem if the teachers' guides do not actually support the teachers in what is intended with the didactic learning material. As when, for example, Gissel et al. (2019) conclude that the lack of explicit potential for teaching in a competency-based perspective in the teachers' guides becomes an obstacle for the efforts to practice competency-based teaching.

In their historical and discourse theoretical analysis of teachers' guides in reading instruction, Nastase and Corbett (1998, p. 53) point to the need for teachers' guides that:

— present learning in an integrated fashion rather than isolating the skill instruction.
— are less technocratic, encouraging more empowerment for teachers as active decision-makers.
— provide experiences for students to become meaning-makers rather than receptacles in which to deposit information.

They also argue that teachers' guides not only have to deal with questions about "to do" and "how to" but also should address the "what" and "why" of teaching and learning.

The question of "why" can be important when a new didactic learning material is introduced. An example of this is found in the study by Ma (2012). Ma analyses how a new domain "emotion and attitudes" in the English language syllabus from 2001 in China is implemented in a prestigious textbook and a teachers' guide for primary school grade level 6. Ma concludes that it is important that the teachers' guides help the teachers understand the change in the syllabus, including the meaning of this change. If not, the teaching may only be an implementation of changes at a superficial level.

Remillard (1999, 2005) analytically distinguishes between the design arena, the construction arena and the curriculum mapping arena of teachers' guides (see section *How are teachers' guides analyzed*). These arenas are not only analytic categories, but can also be used in the design of teachers' guides. The interest in how teachers' guides actually can become professional learning resources for teachers has become a cornerstone of research initiatives in the field in the last couple of decades using the term "educative curriculum materials" (see section *How are teachers' guides analyzed*). As already emphasized by Ball and Cohen (1996), there can be a gap between the intended curriculum and the enacted curriculum in the classroom. How curriculum materials are designed plays a role in how to better connect the intended with the enacted curriculum. According to Davis (2021, p. 837): "In educative curriculum materials, the print or media materials themselves are designed with the intention of supporting teacher learning as well as student learning".

In our review, we find different studies looking at teachers' guides in the form of educative curriculum materials. Schneider and Krajcik (2002) investigate the role of educative curriculum materials in supporting new teaching practices in science education. The study focuses on both teacher use, their understanding of the materials and classroom practice. The educative curriculum materials in the study were designed to support teacher learning by inspiring teachers in thinking about content beyond what is suggested for students in the material, to construct knowledge about the subject and pedagogy

in the physics subject by informing about such things as strategies, representations and students' ideas about science. A later study by Davis and Krajcik (2005) is often referred to in the research on teachers' guides and this article also elaborates on the design of educative curriculum materials.

Valencia et al. (2006) discuss how didactic learning materials can become more educative for teachers and argue for the importance of including the teachers more in the decision making of the use of the materials and the teachers' guides: "To be truly educative, teachers' guides should support teacher thinking about content, instruction, and student learning, not simply provide directions for implementation" (p. 115). Nicol and Crespo (2006) also investigate how teachers' guides can support the professional learning of teachers. They analyze four prospective teachers' interpretation and use of textbooks while learning to teach mathematics. The study shows how the textbooks and teacher's guides did not easily answer questions raised in the lessons of the practicum they were involved in. The study also shows varied approaches to using the textbooks and teacher's guides ranging from adherence, elaboration, and creation. Nicol and Crespo (2006) discuss how teachers' guides can be designed to support professional learning and recommend that:

> Textbooks need to offer them more elaborate explanations for why particular topics are presented in the order and sequence they are in the text. Further, teacher's guides could provide suggestions and rationale for how to use textbooks with diverse learners. (Nicol & Crespo, 2006, p. 353)

In other words, they suggest – like Nastase and Corbett (1998) – that teachers' guides should also address the "why"-questions. Superfine (2009) also concludes that if the teachers' guides should be more useful for teachers, the rationale behind the recommendations and suggestions should be made more explicit.

The importance of a sociocritical stance towards teachers' guides is also mentioned in the literature. This is the case in a qualitative content analysis of textbooks and teachers' guides by Opoku-Amankwa, Brew-Hammond, and Kofigah (2011). They investigated three English textbooks for primary classes 4, 5, and 6 in Ghana and their complementary teachers' guides with a focus on the approach to language and literacy learning. They conclude that, although not stated explicitly, the guides endorse the 'technical skills' approach which sees literacy as the development and achievement of reading and writing skills. The implicit pedagogical intentions of teachers' guides appear to be influenced by the transmission method of teaching, with particular

emphasis on grammar.

But it is not only the "why"-question that is important in the qualification of teachers' guides. Grossman and Thompson (2008) stress the importance of teachers' guides answering both didactic questions about content (what) and method (how). In their study of how 10 newly graduated English teachers perceive and use teaching aids, they also conclude that teachers' guides should offer teachers better opportunities to learn from the materials.

Lin, Lieu, Chen, Huang, and Chang (2012) investigated how research-based educative teachers' guides can be designed to help teachers in elementary school to teach the nature of science. In their study, they followed and observed 10 teachers combined with an open-ended questionnaire and focus-group interviews. They found that three features for designing teacher's guides are: 1. Explicitly indicating teaching practice on the nature of science, 2. Building pedagogical knowledge for teaching in this area, and 3. Guiding teachers' reflection and learning.

Some of the researchers give recommendations for how to design teachers' guides so that they become more educative. Brown (2009) refers to the notion of Pedagogical Design Capacity (PDC) that is the teacher's capacity to design instructional contexts. Brown suggests that teachers with relatively low degrees of PDC may need more support through curriculum design to identify different ways that the material can be used to accomplish instructional goals. Producers should therefore design materials to support different modes of use by teachers. However, the materials need to be sufficiently open-ended to accommodate flexible use whilst also being coherent and meaningful regarding intended use.

Schneider (2013) discusses how the development of didactic learning materials also can be educative for teachers building on a study of one 7th-grade teacher that uses five inquiry units with varying support for teachers over a two-year period. Schneider especially looks at the pedagogical content knowledge of the teacher. It is concluded that designers or writers of such materials should be aware of how they connect to teachers' thinking.

In a large, three-phased study on science teaching in primary education, Davis et al. (2017) present six design principles for creating educative curriculum materials (cf. Foster, 2018). The materials should be:

1. Able to adapt to teaching circumstances such as for lessons that take different amounts of time and meet a range of student needs.
2. Situated and supporting concrete changes in teachers' practice like expectations for students' use of rubrics and/or narratives to descri-

be teachers' enactment of lessons.
3. Use multiple forms of support for highlighting important content (for example storylines, definitions, graphs).
4. Be able to meet different needs of teachers (for example different recommendations for practice).
5. Limit scientific explanation and instead help teachers appreciate definitions and intentions of scientific explanations for use in classroom ("Examples include narratives, expository text, capstone questions, and rubrics that synergistically define, illustrate, and guide explanation construction and argumentation in the classroom.")
6. Support easier-to-enact practices connecting to existing teaching practices (like narratives and how-and-why support).

Conclusion, discussion and perspectives

A number of studies have focused on how teachers use teachers' guides. Several other studies show that differences in use relate to the level of experience and educational qualifications of the teachers as well as the professional teaching context of the teachers. Teachers with limited education, experience and/or a supportive professional teaching context tend to seek support in teachers' guides to a larger extent than teachers with a higher level of education, more experience and/or supportive professional teaching context. In line with the above findings, these or other studies also demonstrate that teachers' wishes towards teachers' guides vary with the level of teacher experience and may differ from what teacher students expect. The students and lesser experienced teachers want more support from teaching guides when it comes to teaching methods, evaluation, coherence, how pupils understand or misunderstand various topics, and so on. A study also showed that teacher students expect the guides to be closely related to the national curriculum. Some teachers emphasizes that in order to bridge the gap between theory and practice, writers of teaching guides (and textbooks) should be more aware of the actual teaching contexts (for example lack of time, large number of pupils, lack of audio-visual material, the academic level of the pupils).

In relation to the theme of teachers' understanding or engagement with teacher guidance, some studies focus on characteristics of teacher guidance, while others emphasize teacher competencies. Remillard (2012) introduces the distinction between materials that speak *through* the teacher and speak *to* the teacher as a reflecting pro-

fessional. This is partly in line with Brown (2009), who distinguishes between the teachers´ guides acting as a support in the teacher's own design process or simply as an instructional manual. Ahl et al. (2013) and Remillard and Kim (2017) both examine the elements that support the teacher in planning instruction. Several studies focus on the fact that the teacher's understanding and use of the teacher's guides depends on whether the teacher agrees with the way the subject is presented in the guide and whether it corresponds to the teacher's expectations (Collopy, 2003; Remillard & Bryans, 2004). In order to use teachers' guides as a subject renewal element, the importance of the teacher understanding and the rationale behind the teachers' guide is emphasized (Hemmi et al., 2019).

Most of the included studies present researchers recommendations for what the teachers' guides should provide for teachers. In many of the recent studies, it is suggested that teachers' guides, that are part of didactic learning materials, become more "educative" and support the professional learning of teachers. Some of the included studies suggest a number of design principles to use in the production of "educative curriculum materials". These studies also address the importance of including answers to the "what" and "why" questions and not only the "to do" and "how to" questions in the materials. In other words, there seems to be a shift from focusing on teachers' guides as instructive manuals to a focus on how they can become more educative for the teachers using them.

There seems to be a "research gap" when it comes to research in the history and development of teachers' guides and the comparison of earlier and newer versions of teachers' guides accompanying didactical learning materials. When analyzing teachers' guides, focus seems to be on either the actual content of the guides or how educative they can be. As for the content, Remillard (2005) presents a complex model for the analysis and older research presents lists or other models (Gearing, 1999; Radencich, 1998). Educative teachers' guides focus on the support for teachers to learn from the teachers' guides and most studies have been investigating and testing learning materials for teaching mathematics. Teachers' guides can support teachers' learning of subject matter as well as of teaching the subject. An aspect of this focus is the context sensitivity, and here, research finds that hard-to-understand subject matter needs more possible solutions in the teachers' guides and that teachers' guides must be explicit and transparent. Cultural norms and how to identify them in teachers' guides is another focal point and studies point to the importance of culturally and contextually responsive texts.

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Appendix 1. Full search strings

Databases that support partial block search have been searched as block search to the extent possible given the affordances of the database.

International databases
ERIC
(SU "Teacher Guidance" OR SU "Teaching guides") AND (primary education OR elementary education OR primary school OR lower secondary school OR elementary school) AND (teacher OR student OR classroom OR school)
Limiters - Peer Reviewed; Date Published: 19900101-20201231
Hits: 178

Academic Search Premier
(TEACHING N3 guides OR teacher N3 guides) AND (primary education OR elementary education OR primary school OR lower secondary school OR elementary school)
Limiters - Scholarly (Peer Reviewed) Journals; Published Date: 19900101-20201231
Narrow by Language: - English
Hits: 211

APA PsycInfo
NB: No term for teacher guide.
(TEACHING N3 guides OR teacher N3 guides) AND (primary education OR elementary education OR primary school OR lower secondary school OR elementary school)

Limiters - Publication Year: 1990-2021
Narrow by Language: - English
Peer reviewed
Hits: 71

Teacher Reference Center
(teaching N3 guides OR teacher N3 guides) AND (primary education OR elementary education OR primary school OR lower secondary school OR elementary school)
Limiters - Published Date: 19900101-20201231; Peer Reviewed
Narrow by Language: - English
Hits: 90

Nordic databases
Den danske forskningsdatabase (The Danish research database, search in Danish)
(lærervejledning* OR vejledning* OR "pædagogisk vejledning") AND (læremid* OR undervisningsmateriale*) AND (folkeskole* OR grundskole* OR skole*)
Hits: 7
Lærervejledning
Hits: 0
didaktisk* lærem*
Hits: 90
grundskole* AND (didaktisk* OR instruktion*)
Hits: 26

Den danske forskningsdatabase (The Danish research database, search in English)
Teach* AND guide*
Hits: 189
Elementary school curriculum
Hits: 10
Teaching guides
Hits: 201
(Teach* guide*) AND (Elementary school curriculum)
Hits: 0
(Teaching guides) AND (Elementary school curriculum)
Hits: 0

Oria.no (Norwegian search engine for academic libraries)
"teaching instruction" ELLER "teaching instructions" ELLER "teacher instruction" ELLER "teacher instructions" ELLER lærerveiledning* ELLER lærerressurs* ELLER "teaching guide" ELLER "teaching

guides" ELLER "teacher guide" ELLER "teacher guides" ELLER lärarhandledning*
OG
almueskole ELLER almueskolen ELLER grunnskole ELLER grunnskolen ELLER folkeskole ELLER folkeskolen ELLER barneskole ELLER barneskolen
OG
År>1999
Hits: 513

LIBRIS (search engine of the National Library of Sweden)
((undervisningsmateriel* OR läromedel*)
AND (grundskola*)) NOT (elevbok* OR gundbok* OR läsebok* OR elevhäfte* OR arbetsbok* OR övningsbok* OR kopieringsundelag*)
Og år>1999
Hits: 1.853