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Jon Olav Sørhaug

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Collaborative Writing in L1 School Contexts: A Scoping Review

Mindy Svenlin 🅭 [a] and Jon Olav Sørhaug 🅭 [b]

[a]Faculty of Education and Welfare Studies, Åbo Akademi University, Vaasa, Finland; [b]Department of Nordic and Media Studies, University of Agder, Kristiansand, Norway

ABSTRACT

This article examines collaborative writing in schools by systematically reviewing peer-reviewed and empirical articles published in English in scientific journals between 1986 and 2020. Drawing on scoping review methodology and using the typology of collaborative writing, 107 studies on collaborative writing in first-language school contexts (primary to upper secondary) were analyzed. The research gaps are related to school contexts and theoretical underpinnings. Most studies are performed with a sociocognitive, sociocultural or constructivistic theoretical foundation. Therefore, we recommend future research to be conducted with more theoretical diversity and in higher school grades (e.g., upper secondary). Further, most studies analyze the drafting process, whereas the brainstorming and outlining activities are underresearched. Technological advances aside, few articles explicitly study collaborative writing related to technology. In addition to these research gaps, we recommend that longitudinal studies be conducted.

1 Introduction

The importance of digital literacy and collaborative learning in society and education is internationally recognized. Education and schools, being inseparable elements of society, have inevitably followed the digitalization of the twenty-first century, making learning and writing in wiki- and cloud environments in formal education more frequent (Bennett et al., 2012; Hamid et al., 2015). In the OECD Learning Compass for 2030, collaborative learning and co-agency are key competencies (OECD, 2018), thus disclosing the importance of collaborative activities, such as collaborative writing, in society and schools.

Writing, often considered a solitary activity (Storch, 2013, 2019), has experienced significant changes during the past decades. This might be due to the evolution of Web 2.0, the emergence of collaborative writing platforms and thereby increased opportunities for interactivity and cooperativity in the writing process (Alghasab, 2017; Edwards-Groves, 2012; Godwin-Jones, 2003; Kessler et al., 2012; Li, 2018; Talib & Cheung, 2017). Since the research within collaborative writing (henceforth, CW) is steadily increasing, a comprehensive overview of the research field would be helpful for both researchers and practitioners.

The aim of this article is to provide a representative and synthesized overview over the field of CW research in an L1 (primary to upper secondary) educational context. L1 refers to the subject of language arts (e.g., English and literature, Swedish and literature) which is typically a region's

language of instruction and often the students' first (but not necessarily only) language. To the best of our knowledge, previous literature reviews solely on CW in an L1 context have not been conducted. However, in a synthesis of CW in classroom instruction between the years 2006–2016 in first- and second-language (L2) contexts (Talib & Cheung, 2017), two aspects of relevance for this article emerged. The first is that previous studies have mainly been conducted within higher education. Thus, as researchers within a primary and upper secondary context, we found that the synthesis is insufficient in describing CW in classrooms with younger students. The second aspect is that previous studies in CW, to a great extent, have been conducted within a second-language (L2) context. Thus, an overview of CW in L1 in primary to upper secondary school contexts is still lacking. This article strives to address this research gap.

Empirical studies have analyzed CW related to peer response (Hoogeveen & van Gelderen, 2013; Pham & Usaha, 2016; Woo et al., 2013; Zhu & Mitchell, 2012), group dynamics (Li & Kim, 2016; Nordmark, 2017; Schultz, 1997; Zhang, 2019a, 2019b), academic writing in higher education (Cuevas et al., 2016; Deveci, 2018; Sundgren & Jaldemark, 2020; Zhou et al., 2012), collaborative revision (Lee et al., 2019; Razak & Saeed, 2014; Woo et al., 2013), and educational wiki studies (Alghasab, 2017; Chu et al., 2019; Doult & Walker, 2014; Fu et al, 2013; Li & Kim, 2016; Oskoz & Elola, 2011; Woo et al., 2013). Due to the well proven effect on language learning, CW has often been studied within L2 research (Kessler et al., 2012; Oskoz & Elola, 2011; Razak & Saeed, 2014; Storch 2002, 2005; Zhang, 2019a, 2019b). Since some literature reviews have been conducted within L2 (Storch, 2019; Li, 2018), we focus solely on the L1 context in this study.

Digitalization and collaborative work in educational practices are growing internationally, thus the research in this field is increasing. In 1987, Thomas Hilgers stated that there were "little data on joint authorship in school settings, particularly on children working together on the composition of a single product" (Hilgers, 1987). Today, more than 30 years later, the research on CW in school contexts is quite extensive. Therefore, in this study, we assemble, review, and synthesize 107 peer-reviewed scholarly articles on the topic of CW in primary, secondary, and upper secondary school between 1986 (being the year of the first published, peer-reviewed article within our scope) and 2020. The aim of our review is to provide a representative and synthesized overview of the field of CW research in an L1 primary to upper secondary educational context. We ask the following research questions:

RQ1: What are the key concepts within the current research field of L1 CW?

RQ2: What types of evidence are being used?

RQ3: What are the main gaps in research for future deployment?

In this article, we define CW using the definition provided by Lowry et al. (2004): "CW is an iterative and social process that involves a team focused on a common objective that negotiates, coordinates, and communicates during the creation of a common document" (p. 72). Furthermore, CW includes pre- and post-task activities, team formation, and planning and comprises the six different, nonlinear, stages presented in Figure 1.

During CW, contributors may share the workload and responsibility for the common document by utilizing different text production strategies. Sharples (1999) provides three strategy models illustrating how CW can be carried out in different ways (see Figure 2).

Parallel writing means that writers divide the work between them in parallel documents, which later merge into a common document. In *sequential writing*, a single document is passed on from writer to writer. This is a form of asynchronous CW in which changes are made in different stages. In *reciprocal writing*, all writers mutually and synchronously work together on the same document.

These definitions of CW will serve as a reference point for the inclusion of relevant studies in this review, as well as an analytical framework for the results.
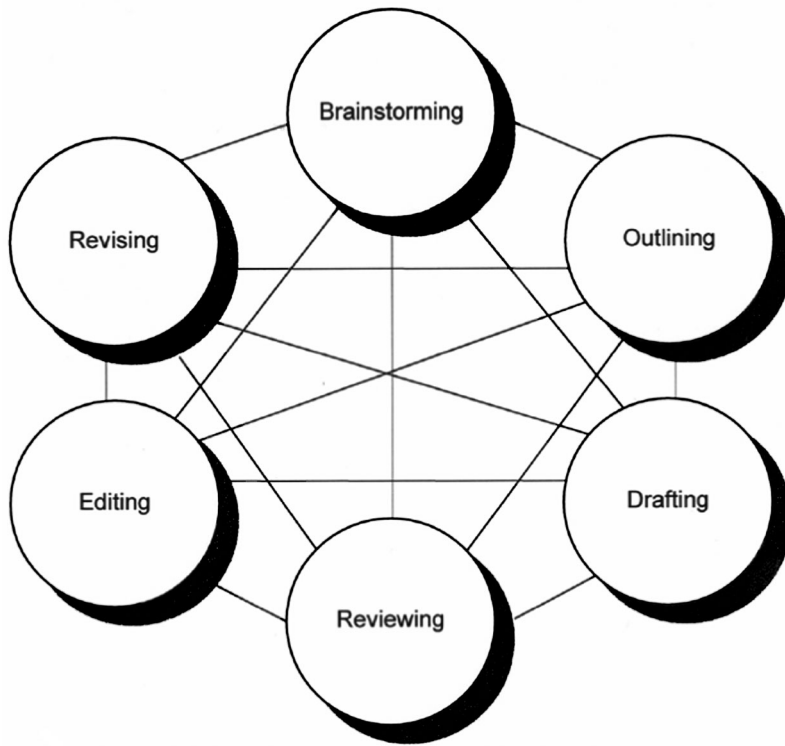
Figure 1. The iterative process of collaborative writing according to Lowry et al. (2004, p. 83). Source: Obtained from Copyright Clearance Center with authors' permission.

2 Materials and methods

2.1 Scoping review methodology

In this study, we have applied a scoping review methodology. We understand a scoping review to be "a form of knowledge synthesis that addresses an exploratory research question aimed at mapping key concepts, types of evidence, and gaps in research related to a defined area or field by systematically searching, selecting, and synthesizing existing knowledge" (Colquohoun et al., 2014, pp. 1292, 1294).

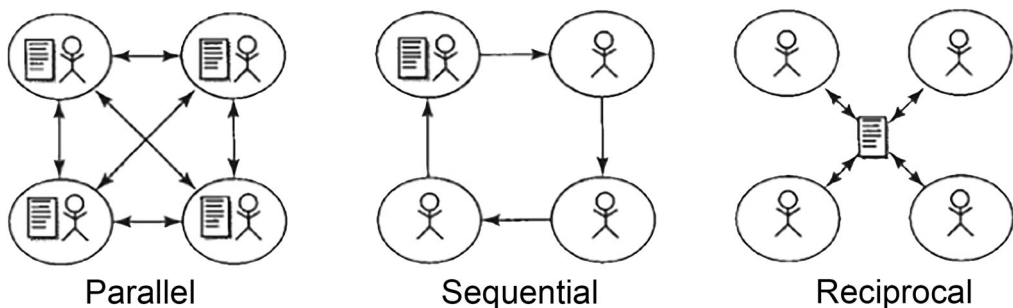**Figure 2.** Collaborative writing strategies according to Sharples (1999, p. 171). Source: Obtained from Copyright Clearance Center with authors' permission.

The scoping review is a useful methodology when no previous reviews have been conducted, since it is a way of identifying research gaps, summarizing previous research, and making recommendations for future research (Peters et al., 2015). Although similar to the systematic literature review (Booth et al., 2016; Petticrew & Roberts, 2006), the scoping review adopts a broader scope in order to map existing literature on a topic and gain insight into the breadth of the field (Peters et al., 2015). Scoping reviews tend to be narrated using *charting data* (Ritchie & Spencer, 1994). Charting data includes summarized and visualized quantitative data and aggregated qualitative data from grand data sets to general categories, leaving most of the details from the findings outside of the actual reporting (Arksey & O'Malley, 2005).

Based on Colquohoun et al.'s (2014) definition, the research questions for this study aim to map key concepts, evidence, and gaps in the research field of CW in school contexts. In our review, we understand key concepts as *theoretical underpinnings*, as well as inductively observed *themes* within the studies. The evidence in these studies is provided by the *research methods* and the *data sources* being collected, analyzed, and discussed, as well as being the actual results of the studies. Gaps in the research field may be identified by comparing themes, results, study contributions, and other data from the articles.

In this study, the process of searching, selecting, and synthesizing data was conducted in accordance with the scoping review framework provided by Arksey and O'Malley (2005), as shown in Table 1.

2.2 Identifying relevant studies

A pilot search in the ERIC database was conducted in June 2020. The pilot study indicated that the following four terms were the most relevant: *collaborative writing*, *joint writing*, *co-writing* and *group writing*. These terms formed the basis for the search process, which was concluded in September 2020. We used Boolean phrases with search terms, including school levels (Table 2).

2.3 Study selection

During the study selection process, we removed all duplicates and initially read titles and abstracts. Articles matching the inclusion criteria were included in the final reading list of 120 articles. These articles were then read in full and matched anew against the inclusion/exclusion criteria presented in Table 3. A quotation check was also performed, which added a few more articles. Any articles causing uncertainty about whether they were to be included were read by both researchers as an internal validity check and discussed until agreement was reached. This process left us with a

Table 1. Scoping review framework stages.

Stage	Purpose of a scoping review	Reference in this article
1. Identifying the research question	To guide search activities, narrow the scope and provide direction to the scoping review.	1.1
2. Identifying relevant studies	To provide research evidence for the scoping review through searching for relevant studies in databases, reference lists, etc.	2.2
3. Study selection	To eliminate studies outside of the central research questions and include studies for review by use of inclusion and exclusion criteria.	2.3
4. Charting the data	To register and map data by sifting, charting, and sorting the materials in accordance with key concepts and evidence needed to address the research questions.	2.4–2.5
5. Collating, summarizing, and reporting the results	To present a prioritized and selected overview of the reviewed material, to shed light on the scoping review topic and research questions.	3.1–3.7 4.1–4.3 Timeline in Appendix (see supplementary material)

Table 2. Activities for identifying relevant studies.

Identifying activity		Found records
Database search	ERIC	1.268
	JSTOR	1.514
	EBSCO HOST	647
	Oria	768
	Finna	482
	Scopus	144
Target search in specific journals	*Journal of Adolescent & Adult Literacy*	44
	Journal of Early Childhood Literacy	25
	Learning, Culture and Social Interaction	24
	L1 Educational Studies in Language and Literature	8
	Journal of Writing Research	23
	Computers and Composition	167
	Computer Supported Cooperative Work	59
	International Journal of Computer-Supported Collaborative Learning	51
	Journal of Computer Assisted Learning	44
	Other sources	15
		N = 5283

final selection of 107 empirically-based, English peer-reviewed journal articles on CW in L1 school contexts to be included in this review.

2.4 Charting the data

As a result of the study selection process, 107 records were collected in an Excel document. For each record, 14 data fields were filled out. Most fields comprised data extracted from the journal articles. Some fields (e.g., themes, activities, and theoretical underpinning) were interpreted and then divided into categories inductively during the charting process (Table 4).

The charting data generated the figures and other statistical data for Section Three. The complete charting of all 107 studies is accessible in the timeline (Appendix 1, see supplementary material).

2.5 Field content criterion

The charted data was extracted or interpreted from the journal articles. Extracted data means data "pulled out" of the journal articles based on explicit stated content. One could argue that this method

Table 3. Inclusion and exclusion criteria.

Criteria	Included	Excluded
1. Presence of CW	CW activity is in the forefront and a central aspect of the article	CW is merely a peripheral activity in the article
2. Definition of CW	CW activity must fit within Lowry et al.'s (2004) definition of CW. However, this definition must not be used explicitly in the article	CW activity does not fit within Lowry et al.'s (2004) definition
3. Educational level	Preschool (if linked to primary school), primary school, secondary and upper secondary school	Kindergarten, preschool (not linked to primary school), vocational school, higher education
4. Subject	All school subjects within an L1 context. School projects not directly linked to a school subject but within a school context	L2 and/or foreign language-learning subjects
5. Peer-reviewed and published journal article	Published peer-reviewed journal articles	Conference papers, reports, book chapters, dissertations, unpublished and non-peer-reviewed articles
6. Empirical and methodologically transparent articles	Articles including empirical evidence and methodological clarity	Anecdotal or theoretical articles, articles where the methodology is not clearly stated
8. Language	Articles in English	Articles in other languages

Table 4. Charting data in the review.

Field	Contains	Data
General information	Authors, year, title of article, journal, issue, year, pages and DOI reference	Extracted from search database
Location	Country	Extracted from article or interpreted based on authors' country of residence or university affiliation
Educational stage(s)	Primary school (ages 5–11), secondary school (ages 11–16), upper secondary school (ages 16–19) or multiple levels	Extracted from article and adjusted to the levels used in this review
Grade(s)	1–13 or multiple	Extracted from journal article
Subject	L1, literature class, mathematics, media, music, philosophy, science, social studies, multiple or unknown	Extracted from journal article
Research design	Qualitative, quantitative or mixed methods	Extracted from journal article
Data sources	Audio-records, chats, document revisions, field notes, interviews, classroom observations, other documents, screen recordings, student texts, surveys, tests and video observations	Extracted from journal article
Student text assignment	Argumentative text, essay, factional text, fictional text, multimodal creation, test, multiple assignments, wiki-pages, and other	Extracted from journal article
Theoretical underpinning	Cognitive theory, cooperative/collaborative learning theories, cultural-historical activity theory, dialogism, gender theory, intersubjectivity theory, mediated discourse theory, new literacy studies, positional theory, posthumanism, rhythm theory, self-determination theory, self-efficacy theory, social constructivism, social interaction theory, social semiotics, social-contextual gender theory, sociocognitive theory, sociocultural theory, systemic functional linguistics or unknown	For most records, theoretical underpinnings have been extracted from journal articles. For some records, we combined sub-theories with mother theories to simplify and synthetize the results
Themes	CW effectiveness, gender, learning study, LGBTQ, metatalk, student interactions, student conversations, platforms, proposals, teaching methods, technology study and text revision	Interpreted based on focal points of interest within journal article
Influence rate	Low (less than 50 citations), medium (50–100 citations), high (101–199 citations), very high (above 200 citations)	Calculated based on Google Scholar citation data 29 January 2021
CW strategies observed	Parallel writing, sequential writing, or reciprocal writing (Sharples, 1999)	Interpreted based on collaboration as described in journal article
CW activities observed	Brainstorming, outlining, drafting, reviewing, editing, and revision (Lowry et al., 2004)	Interpreted based on activities as described in journal article
Study contribution	Free-text field up to 250 characters	Interpreted based on holistic view of content in journal article

of data "extraction" and fitting of information into predefined categories is in fact an interpretation itself. The notion of *objectively extracted* as opposed to *subjectively interpreted* content within this review should perhaps be understood as a continuum of interpretation in the mapping process. Low levels of interpretation contain information on *authors*, *journals*, *locations*, *school levels and grades*, *student text assignments*, and *research methods*. This information was deducted from the search data and initial reading of the articles. In some cases, *data sources*, *methods*, and *CW activities* were not clearly stated and had to be interpreted. The *theoretical underpinnings* include both "mother theories" such as socioculturalism and "daughter theories" such as dialogism. For most records, we kept the label of the theory explicitly mentioned in the journal article—being a superior or a subordinate theory. In some cases, in a more interpretive manner, we merged similar theories to limit the number of categories for charting purposes. Hence, there is some overlapping within this category.

The categories we used for mapping *themes* were invented inductively while reading, and many of the categorizations were also subject to internal discussion, reformulation, and re-reading of articles prior to settlement. Some of the themes, such as *metatalk* or *platforms*, are easily observed as verbal

themes in the literature, results, and discussion elements of the articles. Other themes, such as *CW effectiveness*, are methodological orientations within the studies that appear to be the main interest of the articles. Some of these categories might slightly overlap as well. *Student interactions* represents a general theme where all forms of interactions between students are observed or discussed, while *student conversations* specifically addresses oral interactions or dialogue in writing.

Note that some of the charted data resulted in one field (e.g., school level, subject), while other aspects in some cases resulted in several fields (e.g., theoretical underpinnings, data sources, themes).

3 Results

3.1 Timeline and locations

The earliest study included in our review is from 1986. Since then, 106 studies on CW in first-language school contexts have been published. The number of studies within the 34-year timeline suggests an average of three studies per year. However, during the first years of the timeline, there was seldom more than one study published per year. Since 2014, the number of studies per year has steadily increased.

As Table 5 and Figure 3 indicate, most studies are conducted in English-speaking countries and Western Europe plus East Asia. Hence, there are three geographical clusters for CW research within our review. Since only English articles are included in the scope, the location results in this review are partially inclined to a geographical selection bias.

3.2 School level and text genres

Most of the studies in our scope were conducted in primary schools (63 percent). Secondary school research represents 23 percent and upper secondary school represents 9 percent of the studies. Only five studies in our selection (5 percent) were based on data from multiple school levels (Figure 4).

Fictional texts were the most observed text genre within the scope. This is a typical text genre for language arts classes, especially within a primary and secondary school context. In higher grades, factional texts were the most common text assignment. In general, there were a high multitude of student text genres observed, including 28 studies where the students wrote unspecified factional texts and more than 20 studies with multiple text genres. Students writing unspecified text genres on wiki platforms were observed in only six of our studies; however, the use of wiki platforms for other text assignments was more common (Figure 5).

3.3 Theoretical underpinnings

Most of the studies within our selection have a "social" take on the theoretical propositions for exploration and analysis. This may be due to the collaborative aspect of the study object under consideration. As stated earlier, in many cases several theoretical underpinnings, data sources, and themes can be found in a single article (Figure 6).

Table 5. Timeline for studies in the review.

| Year	Study locations	Sum
–1989	United States (3)	3
1990–1994	England (2), United States (5)	7
1995–1999	England (1), Italy (1), Scotland (1), United States (9)	12
2000–2004	Canada (1), England (1), Scotland (3), United States (8)	13
2005–2009	Australia (1), England (2), Mexico (1), Netherlands (2), Taiwan (1), United States (1)	8
2010–2014	Canada (1), China (2), England (3), Finland (3), Hong Kong (1), Spain (3), Sweden (1), United States (4)	18
2015–2019	Belgium (2), Brazil (1), Canada (2), China (3), England (1), Finland (2), Greece (1), Hong Kong (2), Italy (1), Netherlands (3), Norway (3), Portugal (1), Spain (2), Sweden (2), Switzerland (3), United States (12)	40
2020–	Belgium (1), Brazil (1), Greece (1), Mexico (1), Netherlands (2)	6
		N = 107
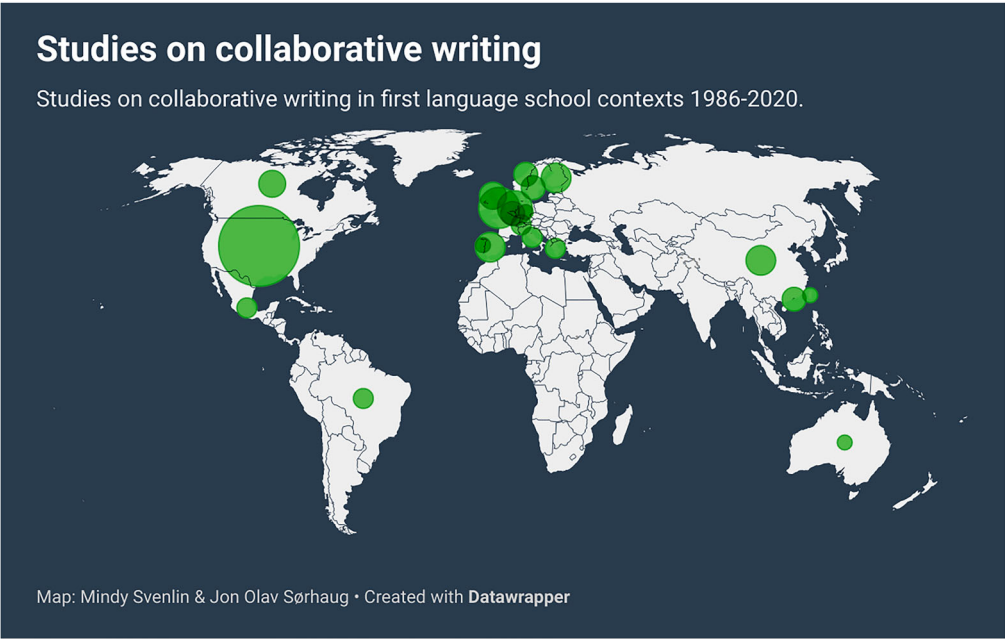
Figure 3. Data visualization of geographical clusters.

Until 2000, almost all studies in our selection were based on a sociocognitive or sociocultural perspective. Between 2000 and 2010, most studies were based on a sociocultural view, but there were also a few studies with a clearly defined cognitive perspective (Hallenbeck, 2002; Hidi, 2002; Humphris, 2010). After 2010, more studies were conducted and therefore there is a higher diversity in theories. Most of the studies with Bakhtin-inspired dialogical perspectives were published after 2015. All eight studies with a new literacy studies (NLS) approach in our selection were published between 2014 and 2019. This indicates a current trend towards these two theoretical underpinnings. To some extent, there seem to be correlations between themes and theories. Most of the studies on student interactions and student conversations follow a sociocultural approach. Almost all of the NLS studies within our review focus on technological- or platform-related topics.

3.4 Themes, topics, and trends

The studies conducted within our selection represent a multitude of themes and topics. However, some themes seem to have a higher representation than others (Figure 7).

Table 6. Most-cited articles.

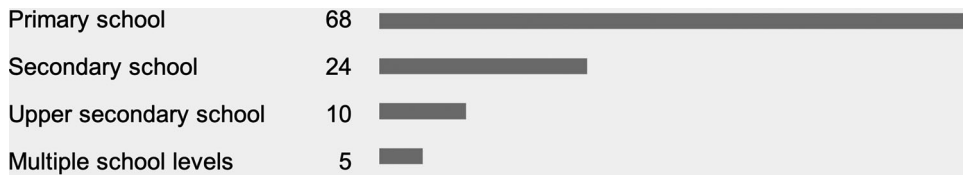| Author	Title	Year	Citations*
Yarrow, F. & Topping, K. J.	'Collaborative Writing: The Effects of Metacognitive Prompting and Structured Peer Interaction'	2001	338
Daiute, C. & Dalton, B.	'Collaboration between Children Learning to Write: Can Novices Be Masters?'	1993	272
Erkens, G., Jasper, J., Prangsma, M., Kanselaar, G., &	'Coordination Processes in Computer Supported Collaborative Writing'	2005	232
Floriana, A.	'Negotiating what counts: Roles and Relationships, Texts and Contexts, Content and Meaning'	1994	208
Hidi, S., Berndorff, D., & Ainley, M.	'Children's Argument Writing, Interest and Self-Efficacy: An Intervention Study'	2002	202

*According to data on 29 January 2021.

Primary school	68	
Secondary school	24	
Upper secondary school	10	
Multiple school levels	5	

Figure 4. School level.

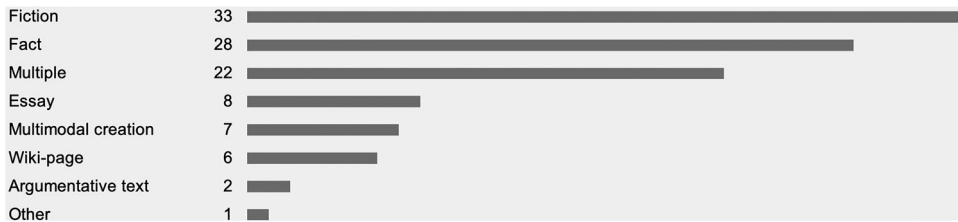| Fiction | 33 | |
Fact	28	
Multiple	22	
Essay	8	
Multimodal creation	7	
Wiki-page	6	
Argumentative text	2	
Other	1	

Figure 5. Student text assignment.

Almost half of the studies in our review relate directly to *student interactions.* How student interactions affect writing activities is a focal point for most of the earliest and influential journal articles in our selection (Daiute 1986, 1989, 1990; Daiute & Dalton, 1993; Dale, 1994; Floriana, 1994; Hilgers, 1987). The theoretical lens for these studies is often sociocultural. Studies within this category explore metatalk during writing (Keys, 1996; Keys & Stewart, 1995), negotiations between students (Doult & Walker, 2014; Smagorinsky & O'Donnell-Allen, 1998), group dynamics, friendship, cognitive conflicts (Christianakis, 2010; Dale, 1994; Hilgers, 1987; Thompson & Wittek, 2016; Vass, 2002, 2007), and technology-mediated interactions between students (Engen et al., 2018; Kumplainen et al., 2014; Nicholson et al., 1998; Smith, 2019). These studies are often concerned with student–student interactions, and only a few explore the interactions between students and their teacher.

The second most represented theme is *student conversations.* This theme focuses on oral communication between students. The dialogue during CW is the common object of analysis in these studies. This is often studied from a sociocultural perspective (Jones, 2002; Norenes & Ludvigsen, 2016; Thompson, 2012) or a Bakhtin-inspired dialogical framework (Jaeger, 2019; Pifarré & Li, 2012; Rojas-Drummond et al., 2020). Many early studies on student conversation find difficulties related to communication and suggest that students need to learn discursive and collaborative skills

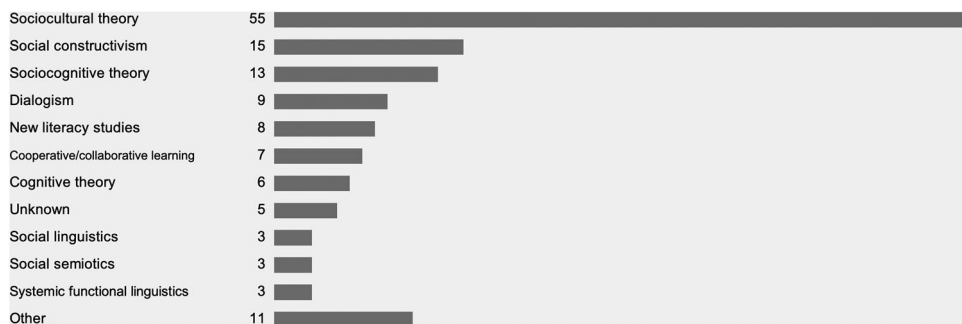| Sociocultural theory | 55 | |
Social constructivism	15	
Sociocognitive theory	13	
Dialogism	9	
New literacy studies	8	
Cooperative/collaborative learning	7	
Cognitive theory	6	
Unknown	5	
Social linguistics	3	
Social semiotics	3	
Systemic functional linguistics	3	
Other	11	

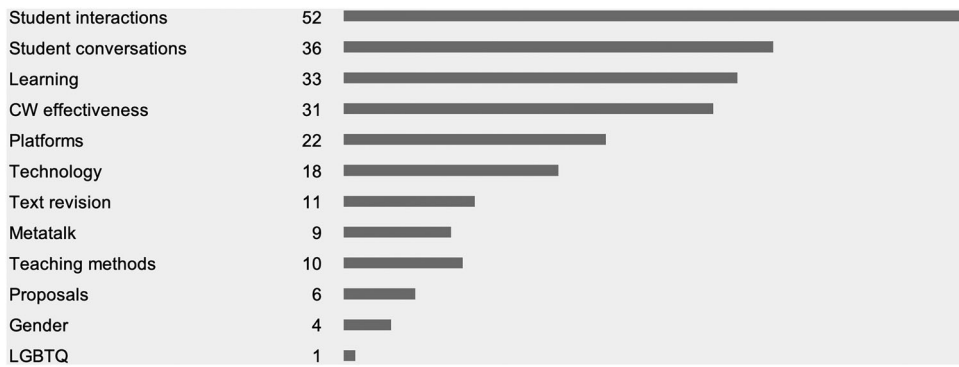**Figure 6.** Theoretical underpinnings.

Figure 7. Themes and topics.

first, to take full advantage of the benefits related to CW (Fisher, 1994; Floriana, 1994; Hilgers, 1987; Jones, 2002). Later studies often tend to focus on composition talk (Jaeger 2019; Smith, 2019; Thompson & Wittek, 2016) or the role of technology in student conversations (Norenes & Ludvigsen, 2016; Pifarré & Kleine Starmann, 2016; Pifarré & Li, 2012).

Learning is a focus area for at least 33 of the articles. Many of these studies have a focus on learning through *metatalk* (Lehraus & Marcoux, 2018; Peterson & Portier, 2014) or *metacognitive strategies* (Daiute, 1990; Herder et al., 2018; Humphris, 2010). These focus areas underline the importance of CW dialogue as learning support. Other studies on learning visualize how knowledge is created and displayed through CW activities (Herder et al., 2020a, 2020b) or how CW *platforms* may be utilized for learning purposes (Ahlholm et al., 2017; Li, 2017; Li & Chu, 2018; Rubino et al., 2018; Sormunen et al., 2013; Wiig et al., 2019). The use of platforms such as Wikipedia or Google Docs is often subject to *CW effectiveness* (Krishnan et al., 2019; Li, 2017; Li & Chu, 2018; Woodrick & Fan, 2017; Zheng et al., 2015; Zioga & Bikos, 2020). Other studies measure the effect of instructional *teaching methods* (Bomer & Laman, 2004; Boyle & Charles, 2011; de Smedt & van Keer, 2018; Sutherland & Topping, 1999; Topping et al., 2000). Most studies on CW effectiveness were conducted within the last few years, indicating a trend within the research field. Also, there seems to be a shift towards quantitative methods. Most of these studies are performed using quantitative or mixed methods, often utilizing pre- and post-tests (Hermansson et al., 2019, Li et al., 2014; Nixon & Topping 2001; Roth & Guinee, 2011; Yarrow & Topping, 2001) and surveys (Woodrich & Fan, 2017). In fact, 17 of a total 22 quantitative studies in our selection were on CW effectiveness. These studies also counted for one-third (7 out of 21) of the mixed-method studies in our review.

Technology has also been an integral part of many CW studies. During the 1990s, computers were still a scarcely distributed and unproven resource in most schools for writing purposes, and studies investigated the influence this new technology would have on *gender* differences (Allen & Thompson, 1995; Nicholson et al., 1998), cooperation issues (Conway, 1995), and oral communication (Kumpulainen, 1994, 1996). Since the 2000s, digital communication (Du et al., 2016; Erkens et al., 2005; Nordmark, 2017; Soobin et al., 2014) and Wikipedia-related topics (Fu et al., 2013; Li et al., 2012; Pifarré & Li, 2018) have dominated the technology-oriented studies on CW. In most of these studies, technology is envisioned as an improved tool for student collaboration and interaction. A few studies explore the impact of software (Skantz Åberg et al., 2014), hardware interactions (Engen et al., 2018; Wargo, 2018), or affordances with digital multimodal composition (Doult & Walker 2014; Rojas-Drummond et al., 2008; Smith, 2017, 2019).

Peer-assisted *text revision* is a key concept within CW. Some of the earliest contributions explore the effect of peer support on text revision (Daiute, 1986; Daiute & Dalton, 1993). Other studies compare solitary versus collaborative revision (Montaro & Madeira, 2019; Portier & Peterson, 2016; Zammuner, 1995). Providing user revision logs, Wikipedia text revisions in school contexts have

been a trending area of interest over the last 10 years (Chu et al., 2017; Du et al., 2016; Pifarré & Fisher, 2011).

3.5 Methods and data sources

Most of the CW studies utilize a qualitative research design (59 percent). Quantitative methods and mixed methods account for 21 and 20 percent of the studies in our scope, respectively. Most of the qualitative studies have a sociocultural or sociocognitive theoretical perspective, and often use observation, video, or audio records as data sources for analysis and discussion. This combination of research design, theory foundation, and use of data sources appears to be the typical set-up for a CW study in L1 school contexts. We have observed this set-up in 62 studies. Some of these studies also utilize student texts and document revisions as data sources, but they are always combined with audio-visual data. This pattern suggests that CW research in L1 school contexts has a strong preference for socially-oriented research designs with predominantly observational or audio-visual data; which further indicates that other relevant perspectives may be under-represented in the research area.

Quantitative methods represent an increasing approach to the field of CW research in recent years; 10 of 22 quantitative studies have been performed since 2017. In contrast to the qualitative studies mentioned above, most of these studies use student texts as data sources, typically examining the effect of CW by comparing student texts before and after a collaborative intervention (Hidi et al., 2002; Krishnan, 2018; Strough & Diriwachter, 2000; Zheng et al., 2015) or utilizing pre- and post-tests (Allen & Thompson, 1995; de Smedt & van Keer, 2018; de Smedt et al., 2019).

Most of the mixed-method studies were conducted in recent years. These studies often utilize a combination of quantitative research on student texts and document revision data with qualitative observation (Boyle, 2011; Daiute, 1986; Li et al., 2012, 2014, 2018; Portier & Peterson, 2016). Approximately 50 percent of the mixed-method studies also use surveys for analysis and discussion (Figure 8).

Overall, the CW studies utilize a wide range of data sources. Student texts account for the highest numbers. The high number of observational data sources in the studies is expected in school-oriented research. Video observations are utilized as data sources just as often as the unspecified-category classroom observations. While audio records were most used circa 2000, video observations seem to be a trending data source from 2015. As the total number of data sources indicates, most studies within our selection combine multiple data sources for analysis and discussion. In fact, only 15 studies utilize fewer than two data sources.

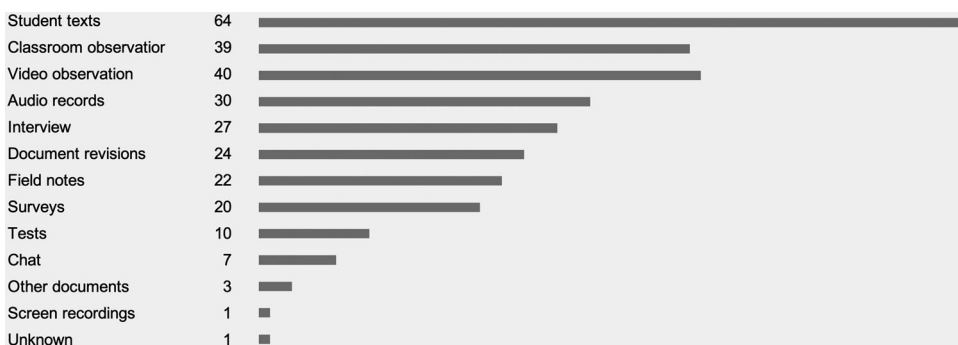|	
Student texts	64
Classroom observation	39
Video observation	40
Audio records	30
Interview	27
Document revisions	24
Field notes	22
Surveys	20
Tests	10
Chat	7
Other documents	3
Screen recordings	1
Unknown	1

Figure 8. Data sources.

3.6 Activities and strategies for collaborative writing

We mapped the CW strategies that could be extracted from the studies using the typology defined by Sharples (1999) (Figure 9).

In most of the CW studies, the reciprocal writing strategy was observed. A typical CW study observes how students talk in groups and simultaneously write in a common document (Calil & Myhill, 2020; Daiute, 1989; Keys, 1996; Kumpulainen, 1994, 1996; Peterson & Rajendram, 2019). In about 25 percent of the studies, sequential writing strategies were observed. Many of these studies were wiki-related articles written after 2010 (Ahlholm et al., 2017; Du et al., 2016; Pifarré & Li, 2012, 2018). The parallel writing strategy was less commonly observed and found only in six studies, all published after 2011.

We also mapped the collaborative activities observed using categories defined by Lowry et al. (2014). Only explicitly stated data in the articles was registered, making the categorization somewhat challenging. Drafting, being the main process for text production, was observed in most articles. Many articles stated that the students were reviewing and revising texts together. The earliest stages of the CW process (brainstorming and outlining) were less often observed or commented on in the studies (Figure 10).

3.7 Influence rate

Based upon citation data from Google Scholar, we calculated the influence rate of the articles in our review: 71 articles were rated *low*, counting less than 50 citations; 20 articles were rated *medium*, counting between 50 and 100 citations; 12 articles were rated *high*, counting between 101 and 200 citations; and 5 articles were rated *very high*, counting more than 200 citations.

These five articles represent high diversity regarding research design (quantitative, qualitative, and mixed methods are all used), theories (cognitive, sociocultural and linguistics), and themes (the topics range from teaching methods to student conversations/interactions and technology studies). They are all published in the 1990s and early 2000s (a longer timespan always increases the chance of citations). Most of the authors are also highly regarded, with several publications in the research field. Also, these articles are interdisciplinary and may be of interest to researchers within education, psychology, communication, linguistics, computer science, and several other research fields. Further, the topics are general and can be helpful to practitioners and researchers working in educational stages from kindergarten to higher education. Additionally, they provide interesting and well-written perspectives on CW in the school context.

4 Discussion and recommendations

4.1 School contexts

Based on locations and countries of origin, we found the field of CW research to be on the move. During the last 20 years, study locations are gradually moving eastwards, from the US and other English-speaking contexts to diverse locations in Europe and East Asia. Due to the selection criterion, the number of L1 studies conducted without being reported in English academic journals
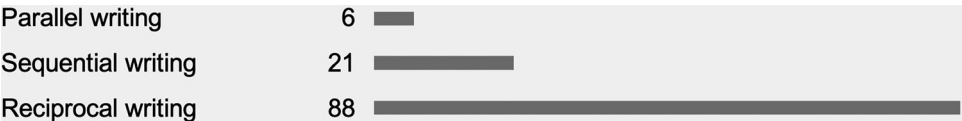
Parallel writing	6
Sequential writing	21
Reciprocal writing	88

Figure 9. Collaborative strategies observed.

Brainstorming	47	
Outlining	11	
Drafting	103	
Reviewing	73	
Revising	70	
Editing	63	

Figure 10. Collaborative activities observed.

is unknown. Reviewing refereed journal articles in other languages is a recommendation for future research.

Regarding the location of students in the school system, there is a clear bias in favor of studies in primary school contexts. Only 10 studies focus on the upper secondary level. This is an interesting under-representation, given that there are many studies on CW in higher education (Talib & Cheung, 2017). Further, the CW of fictional texts in higher grades is under-represented in our review, suggesting the need for more research in this school level in combination with this type of text.

4.2 Gaps in research perspectives

Due to the collaborative and student-oriented aspect of CW, the high degree of "social" theories and perspectives was expected, as well as the clear dominance of qualitative research designs. The charting data support these assumptions; in fact, there was less diversity in research perspectives than we expected. *Grounded theory*, being a highly influential approach within qualitative research, was observed only in three studies (Peterson & Rajendram, 2019; Pifarré & Li, 2018; Smith, 2017). There was only one study with a *sociomaterial* approach in our selection (Wargo, 2018) and in fact no studies utilized theories such as *narrative inquiry*, *phenomenology*, or *actor–network theory*. These findings indicate that greater diversity among theoretical underpinnings would be welcome in future research.

Quantitative and mixed-method studies seem to be increasingly popular approaches to CW studies. This could indicate that new perspectives and paradigmatical takes are being applied to CW studies. While qualitative studies often use observational data, the quantitative and mixed-method studies are more oriented toward student texts for analysis. Nevertheless, the dominating theoretical approaches in both qualitative and quantitative studies are social constructivism or sociocultural theory. This reflects the researchers' areas of interest, and it may also affect the focal object of study regarding the strategies and activities observed.

We have identified that most researchers observe *reciprocal* writing strategies between students in school. *Parallel* writing and *sequential* writing are less often observed, which may indicate potential for future exploration. Sequential writing is the writing strategy used by Wikipedia but is seldom observed and analyzed in the articles. Intervention studies into this kind of collaboration in school contexts would be of high educational value, linking in-school and out-of-school text practices.

Regarding CW *activities*, most studies report and discuss findings related to the drafting and reviewing processes. Less than half of the studies in our review include *brainstorming* activities, and only in 11 studies is *outlining* of student texts part of the observation or analysis. This is a particularly interesting research gap, as team formation, planning, and outlining activities are often emphasized in CW theory: "any optimally performed group task should include pretask activities" (Lowry et al., 2004, p. 72). The use of digital tools and platforms may move the writing processes in

non-linear and synchronous directions, but this is only sensed and not fully explained in the current materials and should be further explored.

4.3 Theme gaps

Student interactions, metatalk, and other "conversational" takes on CW seem to be well explored in the current research field. CW effectiveness is also well documented. This is, however, an area of CW research that is vulnerable to research bias, clearly addressed by Hermansson et al. (2019). Most of these studies conduct pre- and post-evaluations within a short time span. Apart from Vass et al. (2008) and Zheng et al. (2015), no longitudinal studies examine the long-term effects of CW. This is an obvious gap within the research field.

Given the importance of technology in writing and digital CW, one would expect to find more than 11 studies with an explicit focus on technology. This result might contrast with the broad focus on technology-supported CW in the review undertaken by Talib and Cheung (2017). One explanation is that our mapping may have been more "conservative" regarding main themes. Only studies where technology is the *center of attention* have been mapped as technology studies. This omits platform studies and studies where computers are used in general from this category. Technology is the center of attention in only one of the five most-cited articles in the review (Erkens et al., 2005), and only six studies in total explore the CW aspects of digitally-created multimodal texts (Jocius, 2017; Rish, 2015; Rojas-Drummond et al., 2008; Smith, 2017, 2019; Wargo, 2018). Hence, the ways in which technology affects writing strategies and collaboration remains a relatively underresearched topic and should be further investigated.

4.4 Limitations

Some limitations are to be considered regarding this study. Although we systematically and carefully reviewed several databases, we acknowledge that some studies of interest to this review article may have been overlooked. One inclusion criterion in our scope was that CW must be a primary focus of the studies. This means, however, that some studies in which CW is present but not the focal point have been excluded; as a result, there is a risk that some enlightening material has been missed.

We chose to exclude book chapters, conference reports, ongoing research projects, doctoral dissertations, and "gray literature" such as unpublished papers (Booth et al., 2016). Gray literature is often included to broaden scope and reduce publication bias (Rothstein & Hopwell, 2009). With this article being a scoping review, one can argue that it would be motivated to include gray literature. However, we chose to establish distinct boundaries in our search to locate a comprehensive yet manageable number of articles. Therefore, we excluded gray literature. On the one hand, this may be considered a disadvantage because it excludes unpublished and ongoing research in the field. On the other hand, solely including peer-reviewed and published articles guarantees a certain quality, comparability, and standard in the studies included. Any articles creating a sense of uncertainty were read and discussed by both researchers; however, double-screening was not possible, which is a limitation we acknowledge.

Further, the synthesizing methodology of this scoping review may leave some of the contextual richness, diversity, and variation between the studies in the shadows. This is a limitation that may be addressed in future CW L1 reviews with less data and a greater focus on variety.

5 Summary

In this scoping review we isolated and highlighted 107 empirically-based, English peer-reviewed journal articles that we found to be relevant to CW L1 contexts in primary, secondary, and upper secondary schools. Based on the scoping review methodology as defined by Colquohoun

et al. (2014), our research questions led us to search for *key concepts* and *use of evidence* within these studies. To answer these research questions, we charted data on study locations, school levels, student text assignments, theoretical underpinnings, themes, methods, activities, writing strategies, and influence rates. Based on the charting data we discussed some recommendations for future research. Future studies should investigate L1 CW published in languages other than English to expand the notion of geographical cluster. Since most studies are based on a qualitative research design using constructivism or sociocultural theory, we recommend that future studies be oriented to a wider range of methods and theories. Future studies should provide information on the early stages of CW activities, such as group brainstorming and outlining. We also recommend longitudinal studies as well as further research on how digital technology affects CW activities in school contexts.

This review shows that CW is used in classrooms. However, students are often given a CW task without further instruction on how to best complete the collaborative activity. Therefore, we recommend that teachers instruct and discuss meta-aspects of CW with students. These meta-aspects include different stages in the CW process (see Figure 1), different strategies for conducting CW (Figure 2), communication skills, feedback instruction, and collaborative revision. Our review indicates that the initial phases of a CW process are often not observed. Previous research stresses the importance of brainstorming and outlining, and therefore we encourage teachers to not rush through these important steps when giving instructions for a CW task.

In conclusion, this article has synthesized 35 years of research and provided an overview of CW research. Our synthesis shows that the research field is growing, indicating that CW as an activity is increasing in general. This article provides valuable insight into this way of conducting writing and contributes an understanding of the nature of CW, especially that CW can be conducted in a myriad of ways. Our hope is that practitioners and researchers find this article helpful when orientating themselves in this field of research. Yet, with constantly developing technologies and platforms, CW is experiencing rapid change. Therefore, we acknowledge that this review is less a finishing line and more a starting point for new, innovative ways to conduct and research collaborative writing.

Disclosure statement

ORCID

Mindy Svenlin http://orcid.org/0000-0003-1677-7212
Jon Olav Sørhaug http://orcid.org/0000-0002-6102-0502

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*For references within this article to studies in the scoping review, see appendix 2 (see supplementary material)

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