

Developing writing across and in school subjects: Introduction to special issue

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Abstract: Within the sociocultural theory of writing, texts are seen to result from cultural and social practices that affect the structure, content, and production of them in different knowledge communities. Accordingly, writing is not the same across subjects or contexts. Focusing on writing in subjects other than Language arts, this special contributes to understanding subject-specific writing involving both discipline specific knowledge, knowledge of representation, and production of knowledge in different, subject specific writing contexts. The issue advocates that disciplinary writing can start at an early age in primary school, that students have a range of preparedness for it, and that writing skills can be developed to support the learning objectives of the subject. The introduction considers the perspectives of writing to learn and learning to write as the underpinnings of writing across and in subjects. Consequently, the studies in the issue are related to these perspectives. The content areas scrutinized are Craft Education, Civics, Environmental studies, Science and Science orientation. This issue reflects the multifaceted, contextual, and hybrid forms writing can take, and, how writing can support learning in changing contexts and with different contents.

Keywords: writing in subjects, content specific writing, socio-cultural practice, developing writing



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When we set out to propose this issue on Writing in Subjects, our starting point was strongly rooted in the sociocultural understanding of writing (Barton & Hamilton, 2001; Bazerman, 2016): within the framework, texts are seen to result from cultural and social practices that affect the structure, content, and production of them in different knowledge communities. Writing is learned in social situations, it is used to accomplish social actions, and the sociocultural context shapes the ways in which texts are constructed. School subjects (or content areas), for example, Science, Social science, and Humanities, represent specific knowledge areas with their distinctive knowledge practices including literacy practices of text production (Bazerman et al., 2005; Shanahan & Shanahan, 2008). Accordingly, writing is not the same across subjects or contexts, and therefore knowledge of subject-specific writing involves both discipline specific knowledge, knowledge of representation, and production of knowledge in different text genres. The aim of the special issue is to contribute to the growing body of knowledge on content specific writing as a socio-cultural practice where subject classrooms provide a context for developing writing and content knowledge. In previous research on writing in primary and secondary school, contexts of writing and text genres have been less frequently focused upon (Juzwik, et al., 2006). However, primary education is the context in which foundations for several important competences are built. These include taking the first steps towards future academic writing skills and practicing to collaborate successfully with peers. To provide a solid basis for the development of these competences, it is suggested that introducing both unique disciplinary literacy strategies along with general ones (Shanahan & Shanahan, 2014).

1. Introduction: Developing writing in school subjects

When we set out to propose this issue on Writing in Subjects, our starting point was strongly rooted in the sociocultural understanding of writing (Barton & Hamilton, 2001; Bazerman, 2016): within the framework, texts are seen to result from cultural and social practices that affect the structure, content, and production of them in different knowledge communities. Writing is learned in social situations, it is used to accomplish social actions, and the sociocultural context shapes the ways in which texts are constructed. School subjects (or content areas), such as Science, Social science, and Humanities, represent specific knowledge areas with their distinctive knowledge practices including literacy practices of text production (Bazerman et al., 2005; Shanahan & Shanahan, 2008). Accordingly, writing is not the same across subjects or contexts, and therefore knowledge of subject-specific writing involves both discipline specific knowledge, knowledge of representation, and production of knowledge in different text genres. The aim of the special issue is to contribute to the growing body of knowledge on content specific writing as a socio-cultural practice where subject classrooms provide a context for developing writing and content knowledge. In previous research on writing in primary and secondary

school, contexts of writing and text genres have been less frequently focused upon (Juzwik, et al., 2006). However, primary education is the context in which foundations for several important competences are built. These include taking the first steps towards future academic writing skills and practicing to collaborate successfully with peers. To provide a solid basis for the development of these competences, it is suggested that both unique disciplinary literacy strategies be introduced along with general ones (Shanahan & Shanahan, 2014).

Systematic reviews and meta-analyses on writing where primary and secondary school students were included indicate that much research effort has been placed on identifying effective writing instruction. The most efficient treatments include strategy instruction, collaboration practices, setting product goals, prewriting activities, word processing and process writing (Graham et al., 2012; Graham et al., 2015; Juzwik, et al., 2006). These research contributions do not topicalize the school subjects in which writing is carried out. However, a recent meta-analysis concludes that writing enhances learning in content areas, and at all school levels, namely, elementary, middle, and high school. The content areas studied were Science, Social studies, and Mathematics, and the gain was not dependent on the assignment type. (Graham, et al., 2020.) What these studies have not shed light on are discipline specific genres, social context of writing, and the linguistic characteristics of improvement in writing. The number of studies on genre and social context of writing is inversely related to the age of students and seems to increase after secondary education and with adult participants (see Juzwik, et al., 2006). At primary and secondary school level, research on subject specific text genres and their production in different content area classes has remained scarce.

This special issue of the *Journal of Writing Research* (guest edited by Sara Routarinne, Johanna Pentikäinen, Riitta Juvonen, Arja Kaasinen & Anne-Elina Salo) focuses on writing in school subjects other than Language Arts and especially in elementary school. One of the decisions made in compiling this special issue was to focus on the grades 1–9, from elementary, through middle and lower high school. Research into the early writing development has been biased towards grades K-2 and acquiring basic writing skills such as spelling, using imagination and producing coherent story structures at the expense of diverse genres (Graham et al., 2012; Juzwik et al., 2006). The study of writing in different content areas becomes more common in upper elementary and high school (Graham et al, 2020), not to mention college and university level (Juzwik et al., 2006). The special issue contributes to the field by focusing on subject specific writing in its initial stages: during primary and secondary education. Basic education (primary and lower secondary school, K–9) builds the foundations for several later competencies, including writing skills for a range of different contexts, that is, writing across subjects. Providing a solid basis for developing these competencies involves understanding discipline-specific literacy strategies and developing subject-specific writing abilities (Klein et al., 2014;

Shanahan & Shanahan, 2014). Key messages of the issue are that disciplinary writing can start at an early age, that students have a range of preparedness for it, and that these skills can be developed to support the learning objectives of the subject.

The articles in the issue contribute to the topic of writing in disciplines, or as the context is primary and secondary school, writing in subjects, that have not received much attention: Törmälä and Kulju introduce a new school genre in their article “Work descriptions written by third-graders: An aspect of disciplinary literacy in primary craft education”. They analyze the textual quality of work descriptions produced by third-graders in Craft education. Toledo, Enright and Wright also focus on subject specific writing skills in their article “Advancing Civics-specific Disciplinary Writing in the Elementary Grades”. In their study, teachers engaged students in perspective-taking through writing in Civics, and they describe development in the complexity of argumentative writing from second to third grade. Salo, Routarinne, Juvonen and Kaasinen focus not on student texts but on peer group activities of producing them in their article “Participatory roles adopted by elementary pupils when writing collaboratively in environmental and social studies classrooms”. They develop a framework for analyzing participation in collaborative writing and show how students shift between different participatory roles to pay attention both to content and language. Meneses, Montenegro, Acevedo, Figueroa and Hugo focus on the quality of students’ science explanation texts and their ability to use cross-disciplinary academic language in their article “Cross-disciplinary language changes in 4th graders as a predictor of the quality of written scientific explanation”. Alkema, van Weijen and Rijlaarsdam close the issue with their article “Synthesis writing in Science orientation classes: an instructional design study” where the principles of designing instruction are foregrounded. The title of the special issue, *Developing writing in school subjects*, is deliberately polysemic so that developing refers to developing skills in students, students being in a process of developing, or teaching methods being developed by educators in the context of writing in subjects other than language arts.

2. Learning to write or writing to learn in subjects

Research into writing in school subjects is diverse and often comes with writing to learn or learning to write perspectives (Bazerman et al. 2005; Rose & Martin 2012; Klein & Boscolo, 2016; Hertzberg & Roe 2015). Throughout schooling, reading and writing are an obvious part of school work and a vehicle for learning. Research and pedagogical attention to writing outside language arts classrooms in primary and secondary school dates back to the 1980’s (Bazerman et al. 2005, 9-10, 32-33). By writing to learn perspective we refer to research that approaches writing in the service of learning within a content area. This line of research is often methodologically based on experimental studies of pedagogical interventions to find out the effect of writing on learning. In this vein, research seeks answers to

questions of whether a particular type of instructional treatment improves learning and knowledge in a subject. (Bazerman et al. 2005, 38; Klein & Boscolo 2016). Over the past decades, the benefits of writing in students' learning processes have been suggested in several studies (e.g., Bangert-Drowns et al., 2004; Graham & Hebert, 2011). As was noted above, writing is shown to have an effect on learning at all school levels, and the effect is not dependent on the type of writing tasks (Graham, et al., 2020; Klein & Boscolo, 2016). Since the focus in this line of research has been on learning effects, these studies do not shed light on the details of meaning making either in social interaction or disciplinary characteristics of texts.

By learning to write perspective, we refer to research interest where the focus lies in understanding writing as a situated and socially staged process in content classrooms. Drawing on knowledge about discipline specific literacies and practices of text production in the academy, learning to write approach has also gained a foothold in primary and secondary educations. This line of research is most often methodologically based on qualitative approach either on classroom practices, types of writing assignments, language requirements in these, and qualities of (knowledge) genres in different content areas. In this vein, research aims to understand how literacy practices are enacted in classrooms and how language and other semiotic resources are used for meaning making in different disciplines. (Bazerman et al., 2005; Klein & Boscolo, 2016; Rose & Martin, 2012; Schleppegrell, 2004.) While this approach has placed emphasis on modelling subject specific knowledge genres and teaching them in primary and secondary school, it has been less devoted to report systematically on the characteristics of student texts produced in response to the modelling.

In earlier research on writing to learn (Graham et al., 2020), the focus on science, social studies, and mathematics was brought about by the fact that the great majority of experimental or quasi-experimental writing to learn studies are connected to school subjects related to those fields, even if the actual school subjects may be constructed in different ways in different countries' curricula. Such concentration continues in this special issue, the studied school subject areas being mostly science and social studies. Meneses and colleagues report development in writing in a Science class. Salo and colleagues report from Environmental studies, a school subject that combines science and social studies. Alkema and colleagues focus on Science orientation, a school subject based on natural, social and formal sciences. The study by Toledo and colleagues falls under social studies, but they emphasize that within the social studies content area, Civics Education has been rarely in focus. As a new avenue of content fields for writing in subjects, the study by Törmälä and Kulju focuses on writing in Crafts class, a traditionally non-academic school subject. Although the focus is not on the similarities or differences in school subjects or curricula in different countries, the observant reader can note that the definitions of subjects varies from educational system to educational system, and is

thus reflected in the types of writing assignments. The studies reported in this special issue come from Chile, Finland, the Netherlands and the US.

By writing within a subject area, Graham and colleagues (2020) refer to writing assignments where the students are expected to produce text by shaping, applying and making decisions about relevant content of the school subject. According to Applebee's and Langer's (2011) observations, students write altogether more in subjects other than language arts. This means, for example, structuring and summarizing information, explaining concepts or comparing ideas. Building on Michael Halliday's systemic functional linguistics (Halliday & Matthiessen 2004), scholars from the 'Sydney School' suggest that these knowledge genres, common information conveying genres, which students are expected to read, write, and master in schools, might be unfamiliar to students outside the classrooms (Martin, 2000; Rose, 2012; 2016; Rose & Martin, 2012). Related to this view is research that indicates how writing skills acquired in language arts class transfer poorly to writing in other content areas, a point made by Toledo and colleagues in this issue. The role of writing and differences of writing practices across subjects is an area of interest in this special issue.

The awareness of the importance of writing in school subjects, especially in secondary school is not recent (e.g., Bazerman et al., 2005, 38-43; Childers & Lowry, 2012). However, less is known about the writing and literacy practices in school subjects in primary school. The studies reported in this special issue show that writing practices in subjects can be developed from an early age. In their article on perspective taking in Civics education, Toledo and colleagues show how children as young as 7-8 years old, supported by spoken interaction, start practicing the skills of perspective taking in Civics. Törmälä and Kulju report how 9-10-year-olds are creating a whole new school genre of crafts' work descriptions. In their article, Meneses and colleagues' study 9-10-year-olds explaining scientific phenomena in writing. Salo and colleagues explore participatory roles of 10-11-year-olds when they collaboratively produce texts mainly in environmental studies. Alkema and colleagues focus on a cognitively complex bundle of skills needed in synthesis writing and report on developing synthesis writing in Science orientation classes with students in upper secondary education (16-year-olds).

In this issue, the articles draw from learning to write and writing to learn traditions. Törmälä and Kulju come close to a learning to write approach by characterizing what constitutes a work description as a genre. They then score six dimensions of work descriptions produced by 3rd graders to show how children understood the genre. Toledo and colleagues also study subject specific writing skills, but in Civics on 2nd and 3rd grade. Their focus is on perspective-taking through writing and speaking. While the work descriptions represent the procedural family of recounting texts, the perspective taking texts represents argumentative functions in the evaluating family of educational genres (Rose, 2012). Salo and colleagues

focus on collaborative composing in peer groups, a recurrent form of writing in a subject classroom shown to support writing skills in general (Graham, et al., 2015). The students stay on task and shift between content, literacy, performance and process focused as well as expressive participation. Meneses and colleagues combined learning to write and writing to learn approaches by designing an instructional unit for 4 graders that started using writing for learning, and led to a learning to write phase where the textual and linguistic quality of students' science explanations are scored. The science explanation represents the consequential branch of informing text family (Rose, 2012). The paper by Alkema et colleagues comes closest to a writing to learn study where students were synthesising science material to assist their knowledge and understanding. In this study an instructional design for writing synthesis was evaluated.

3. The analysis of (emerging) genres in student text production within different school subjects

It is not surprising that the research on writing within school subjects has quite often focused on various writing to learn approaches and their applications. Writing is a common learning tool especially in academic school subjects that, in general, rely heavily on textual knowledge processing and sharing. In the writing to learn frame, most studies have been conducted in the context of science, social studies comes second, language arts third, and mathematics fourth (Miller, Scott, & McTigue, 2018). The integration of content knowledge and discourse, including genre knowledge, in writing strengthens learning in both types of knowledge (content and discourse) (Olinghouse, Graham & Gillespie, 2015), especially when the students receive relevant support with their writing processes. For example, recent research on elementary level informational writing shows that pupils often need support to produce relevant text structures (Hebert et. al., 2018; Strong, 2020; Williams, 2018). Although we can identify various uses of writing in subjects in general, students' learning in disciplines seems to benefit from instruction that also pays attention to genre features.

In this special issue, the first aspect we wanted to address is the role of the textual production of various genres within different school subjects. Some established genres, like essays on historical events, book reviews, and scientific examination reports, are consistent with the identifiable, published text genres of the foundational scientific field or knowledge area in the outside world, be the texts addressed to professional communities or to the wider public audience through, for example, newspapers. It is well established in previous research that the genres are not necessarily similar within each school subject but differ according to the foundational scientific and other knowledge-building contexts of the outside world, learning traditions and research, as well as pedagogical precepts like core curricula (Bazerman et al., 2005; Rose & Martin, 2012). The learning objective is

identifying relevant genres for a certain use in school context and, more importantly, understanding the disciplinary specific ways of using and producing those genres. Historical literacy, for example, is not only gathering information of the past but understanding historical evidence and being able to work with that (Nokes, 2010). This approach emphasizes socially identifiable textual practices and considers genres as a socially meaningful way of knowledge communication.

When paying closer attention to writing practices at school, it is worth noting that the school does not only teach the proper use of well-known and established textual genres, but also has the potential of developing new, emerging genres, arising from new learning practices and changes in socio-cultural contexts. The article "Work descriptions written by third-graders", written by Törmälä and Kulju, introduces an emerging genre Work description within a Finnish school subject, Crafts. This article has a number of points that are of special interest. First, the subject, Crafts, is not a traditional academic school subject but part of art and physical education based on practice and a learning-by-doing approach. It is natural to suppose that knitting, sewing, and woodwork apply such craftsman skills that primarily demand hands-on practice. Through writing, the pupils also learn how to document a crafts process and present this by using multimodal textual tools and relevant information and communication technology. The article explicates how this approach can be applied to a traditionally non-academic school subject. The pupils in this study are relatively young, third graders, only starting to learn how to use and produce informational texts, so the teaching approach cannot rely on building on a pre-existing base of informational writing skills.

The emerging genre is "Work description" within crafts class. According to Törmälä and Kulju, "work description is a text in which a craftsman documents the process of making an artefact." In the article, the emerging work description genre is analyzed through textual elements like word count, crafts vocabulary, structure, spelling, multimodality (the use of pictures and written text), and self-assessment. By scoring these elements in each piece, the authors also address the quality of the productions in terms of their level of disciplinarity. The authors define three groups: limited, emerging, and advanced descriptions. This grouping also refers to the process-related development of disciplinary textual skills and can be applied as a pedagogical tool. According to Törmälä and Kulju, mastering the structure of the disciplinary texts precedes mastering the subject-specific vocabulary. This result again emphasizes the role of the text structure as a crucial progression enabler in disciplinary writing learning.

4. The production of subject-specific genres and social (and collaborative) classroom practices

As described above, previous research has discussed the various ways in which educational and classroom contexts, instruction, and the acquisition of subject-

specific languages and genres are intertwined. Understanding discipline-specific writing practices is a particularly important issue of educational equality. Children with access to a wider range of texts out of school are likely to develop their sense of disciplinary discourses in informal encounters with these genres, whereas children with fewer literacy opportunities need to be provided with support, including explicit teaching of literacy practices across subjects (Rose & Martin, 2012). Therefore, the teachers' challenge is to provide such explicit instruction and support in the context of producing these genres. To describe how this is actually done, scholars have suggested models or cycles for reading and writing genres (Rose & Martin, 2012, pp. 305-310). These cycles entail various collaborative and guided practices. As Rose and Martin (2012) state, it is through these steps or cycles that subject-specific literacy skills emerge within interaction between teacher and students. In the current issue, the papers on scientific explanation (Meneses et al.) and synthesis writing (Alkema et al.) report cycles of learning to write.

In this special issue, several studies (Toledo et al.; Meneses et al.; Salo et al.) have been conducted in school contexts where many children come from low-SES, ethnically or linguistically diverse backgrounds. Apart from focusing on the need for mastering subject-specific genres in educational settings, producing them with these students involves making connections to both locally relevant contexts and wider social contexts often those surrounding the schools and their communities. In their article "Advancing Civics-specific Disciplinary Writing in the Elementary Grades," Toledo and colleagues illustrate the development of second- and third-graders' written argumentation when the students and teachers focus on locally-relevant public issues. The article describes a stepwise teaching cycle that scaffolds learning the subject-specific concepts, applying them in local public issues and, lastly, crafting a written argument around an issue within Civics. The authors suggest that alongside locally-relevant topics, especially fruitful was the opportunity to engage in oral argumentation before producing written argumentation.

However, relatively little is still known what happens when students produce certain genres in actual classroom settings. In their article "Collaborative writing in environmental and social studies classrooms: Pupils' spontaneously enacted participatory roles", Salo and colleagues develop a framework to observe systematically pupils' participatory roles during collaborative writing interactions. Collaborative writing can provide an effective mode of advancing subject specific writing skills in peer interaction (see e.g., Nykopp et al., 2014) but previous research equally has shown that coordinating various tasks in peer groups is challenging, especially for younger writers (Herder et al., 2020). Salo and colleagues identified 18 participatory roles and illustrated how pupils contributed through these different roles and flexibly shifted between some of them. Moreover, the authors observed differences between the roles enacted across task types and pupils. The article

introduces a category of literacy-focused roles and suggests that enacting such roles reflects not just the pupils' orientation for correct spelling, for example, but their understanding of subject specific ways of communicating.

5. The trajectories of development of subject-specific writing abilities or practices

Learning to write across subjects involves developmental trajectories of textual skills. In three papers, the development of writing a particular subject specific genre is the focus.

The paper on Civic perspective taking by Toledo and colleagues, takes a cross-sectional approach to the development of argumentative writing skills. They are interested in second and third graders' competence in taking a stance through expressing arguments, providing evidence for them, and in finding counterarguments and their evidence. What is of special interest in their study is the use of mixed data: recorded verbal interactions and written products. These data allow them to observe that third graders' textual products score higher in Civic perspective taking characteristics and their arguments are more complex. The complexity is visible in the higher number of controversies, stakeholders and embedded issues expressed in the texts. However, even if the second graders wrote their arguments simply, they were able to take different stances and consider multiple perspectives in their verbal interactions. As one of the implications, the authors highlight the potential of verbal interaction for development of writing. In addition, they noted that perspective taking toward locally relevant and burning issues created engagement in students.

The paper on scientific explanations by Meneses and colleagues combines writing to learn and learning to write approaches and delves into how scientific knowledge and cross-disciplinary language skills are intertwined. They conducted their study with Chilean fourth graders. On the one hand, they were interested in explanations as these provide an epistemic tool for showing knowledge about causal natural processes and communicating evidence that supports causality. On the other hand, they emphasize the importance of cross-disciplinary language skills for students' ability to compose explanations. By cross-disciplinary language they refer to academic language practices regarding expression of purpose and stance in text, textual organization, and pertinence and precision in grammatical and lexical choices. According to them, both prior science knowledge, measured by multiple choice items, and developing cross-disciplinary language skills lie behind development of explanation quality in the texts produced. The explanation quality scores for students' text products improved between the initial text products and those following, a scaffolded writing assignment and the final writing assignment. The growth was visible in text length, communication of purpose, precision and pertinence of syntactic and lexical choices. Developing skills in writing scientific

explanations requires both knowledge and academic cross-disciplinary language for expressing the knowledge.

In the paper on synthesis writing by Alkema and colleagues, the focus is on the complexity of synthesis writing that consists of comparing, contrasting and relating texts, constructing text comprehension and combining source information and critical observations in a writing task. The development of synthesis writing skills was achieved in a content area called Science orientation. The students received instructional treatment consisting of video clips of modeling and strategy instruction. The development was documented as changes in synthesis text qualities before and after the treatment. The student texts improved regarding information coverage, integration, and indication of students' own knowledge. The highest developmental leap took place in the students' ability to make critical observations. In contrast, no significant development was observed in the comparison group during the same time interval. The study suggests promising strategies to support cognitively demanding content-area writing.

6. Concluding comments

With this special issue, we want to invite and, hopefully, encourage more future research on writing in subjects other than language arts. As there already is a body of prominent research about writing within traditional academic school subjects like natural sciences and history, the new research conducted can expand the understanding of other, less studied subjects such as Crafts or Civics, and multidisciplinary subjects such as Environmental studies or Science orientation for example. The multiplicity of various data collected, research questions formulated, and methods used in this issue actually reflect the multifaceted, contextual, and hybrid forms writing can take, and, additionally, how it can support learning in changing contexts and with different content. The new, emerging areas of disciplinary writing might be at least equally important. The research reported in this issue shows the progress of ever-diversifying genres and textual practices at schools and elsewhere: there are new contexts for writing within school subjects, like crafts, and new, emerging topics in the surrounding society to discuss through writing. We may not be able to forecast what kinds of textual skills will be needed and thus produced in the future by students of today and, therefore, writing education in general needs to establish and instantiate textual agility and flexibility. Such textual ability or flexibility would mean writing resources that enable the students to apply and adjust their writing according to targeted learning objectives, recognized genres or new learning situations, and available writing stances or roles.

Note

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