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Sørensen, Birgitte Holm; Levinsen, Karin Tweddell; Holm, Madeleine Rygner

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Framework for Students' Online Collaborative Writing

Birgitte Holm Sørensen, Karin Tweddell Levinsen, Madeleine Ryger Holm
Department of Learning and Philosophy, Aalborg University, Copenhagen, Denmark
kale@learning.aau.dk
Birgitte@learning.aau.dk
madeholm@gmail.com

Abstract: The paper focuses on collaborative writing in Google Docs and presents a framework for how students can develop methods for collaborations that include human and non-human actors. The paper is based on the large-scale research and development project *Students' Digital Production and Students as Learning Designers* (2013–2015), funded by the Danish Ministry of Education. The target groups were primary and lower-secondary schools. The project explored teacher-designed frameworks that involved students' agency as digital producers of learning objects aimed at peer students. The project demonstrated that digital production facilitates students' learning processes and qualifies their learning results when executed within a teacher-designed framework that allows for and empowers students' agency. The overall research design was organised as a mixed methods approach. A sub-study within the large project, which is based on an ethnographic approach, shows that the students develop their own strategies for the online collaborative process, through which they organise the work in different ways when interacting with the technological affordances and material performance of the technology. The sub-study also shows that teachers do not introduce or refer the students to online collaborative strategies, roles or communications. The students' online collaborative writing is entirely within the students' domain. On this basis, the paper focuses on how teachers' awareness and articulation of the students' online collaborative writing within a framework can qualify students´ methods to collaborate online with the intention to improve their learning results. In relation to this, the paper explores how digital technologies may act as co-participants in collaboration, production and reflection. Moreover, the framework is designed to help teachers to scaffold students' reflections of their strategies, roles and communications in online collaborative writing processes.

Keywords: Online collaborative writing, teachers' framework**,** students as learning designers, learning for collaboration, agency

1. Project background and introduction

Students' Digital Production and Students as Learning Designers was a large-scale research and development project out of five *Demonstration School Projects* that represent the largest single effort initiated by the Danish Ministry of Education. The *Students' Digital Production and Students as Learning Designers*, which ran from 2013 to 2015, involved a consortium of two universities, three university colleges and the LEGO foundation, as well as 13 researchers, 40 teachers and 800 students in total chosen from a pool of candidate schools that applied for participation to meet geographical and socio-economic dispersion. The project built upon our previous research, whose findings challenged the consensus that design for learning belongs to the teachers' domain, as even young students proved capable of dealing with design for learning reflectively and in practise (Sørensen and Levinsen 2014). We also found that staging digital productions as learning objects aimed at peers has a positive impact on students' learning as both a process and a product.

A sub-study within the large project, as based on an ethnographic approach, shows that students develop their own strategies for the online collaborative writing process, through which they organise the work in different ways when interacting with the technology. The sub-study also shows that teachers do not present, introduce or refer to online collaborative strategies, roles in the writing process or ways of communicating and therefore leave the qualifications of the students' strategies, roles and communications entirely within the students' domain. The students' productions are based on their own prior experiences in- and outside of school or on developments in their groups. The involved teachers have not yet discussed how to conduct online collaborative writing in class (Sørensen and Levinsen 2015a).

The study shows that the collaborative processes were peer-to-peer and peer-to-technology processes, in which the students learn to write collaboratively in interactions with the technological actor. The students' own designs for the writing process saw the different groups develop and use several variations between collaborative and cooperative writing strategies in close interactions. The students use different writing strategies, where creating a document in real time, reacting and adjusting to each other's contributions and changes (Lowry, Curtis and

Lowry 2004) was an overall and general strategy used during the collaborative writing process. The students' roles in the process were constantly changing. Both students and technologies took on multiple roles and alternated between them. The extent and scope of students' communications depend on their collaborative and cooperative strategies. The students' communicative and reflective competencies are increasingly elaborated on the more often they work collaboratively (Sørensen and Levinsen 2015a).

The students developed their own practices and methods for online collaboration, and the collaborative writing processes were very different. The student groups continued to use their developed collaborative writing practices in Google Docs, regardless of the character of the task. The students' works were only evaluated on the content of the student productions, not on their mode of working (Sørensen and Levinsen 2015a). The study challenges a perspective of learn-to-collaborate, which is in focus in this paper based on the question: *How can teachers support students' online collaboration in writing processes in Google Docs?*

Based on the Design for Learning model below (Figure 1), this paper presents an extended framework that sets the stage for the teacher to be active in relation to students' developments of methods for online collaboration. All the aspects in relation to online collaborative writing mentioned above are taken up and included in the framework.

Figure 1 below illustrates the organisation of the learning design over time, including how the students' full process is embedded into the teacher's *practice-in-class phase*, whereby the teacher acts as facilitator, process manager and project manager in relation to the students. In the *pre phase*, the teacher designs the framework for the students' full process and the expected teacher roles and activities during the *practice-in-class phase*. In the *post phase*, the teacher shares knowledge with colleagues and develops a learning design for future courses. The students in the *pre phase* are introduced to and they co-formulate the learning objectives into evaluation criteria for the *practice/production phase* (Levinsen and Sørensen 2015). During the students' *post phase*, the products and processes are evaluated in various ways based on shared evaluation criteria.

Figure 1: Design for Learning model**:** The chronological relationship between the teacher and students' work as learning designers.

The learning design is dynamic, even though it can be subdivided into phases that are framed by milestones and deadlines. Both the teacher and students have the option of re-designing during a series of iterative activities within their respective *practice phases*, where they exploit new knowledge and qualified feedforward to change and modify approaches and choices in an informed way. In the *practice-in-class phase*, the teacher shifts between two positions. From the participant position, the teacher *reflects in action*, facilitates students and differentiates feedforward in relation to students' abilities and levels. From a withdrawn position, the teacher observes and *reflects on action*, thus producing decision-supporting knowledge regarding whether to proceed or modify the framework. In the *practice/production phase*, the students perform activities similar to those the teacher performs in relation to their production. For example, they use the evaluation criteria to discuss and decide on whether they have performed appropriately and are satisfied with their work.

This model will be taken up in section 5, where the teacher and students' framework for *practice-in-class* is extended, with the goal of developing the students' methods of collaboration in Google Docs. The extended framework will encourage learning-to-collaborate, with the intention that pupils will attain online competencies that will facilitate and support the student when collaborating to learn.

2. Related work

Online collaborative writing in schools is a new research field. Some research has been carried out, but mostly in relation to online collaborative writing in workplaces and higher education. Several studies in the field of computer-supported collaborative learning concern the concept of collaboration, among which Dillenbourg (1999) is particularly noteworthy. He distinguishes between collaborative processes and cooperative processes (Dillenbourg 1999). In relation to Dillenbourg's concept of collaboration, Lowry, Curtis and Lowry (2004) provide a taxonomy of collaborative writing. Their article defines collaborative writing terms and builds a taxonomy, including collaborative writing activities, strategies, control modes, work modes and roles. The target group is academia and industry, but parts of the taxonomy are useable in relation to schools.

Zhou et al. (2012) conducted a study on Google Docs through a collaborative writing activity among university students. It showed that Google Docs was considered a useful tool for group work that altered the means of communication. When the students collaborated through Google Docs, students became less dependent on social media, such as Facebook and text messaging (Zhou et al. 2012).

Knain (2009) focused on students' text development processes. He analysed the editing history of co-produced online documents and identified several approaches to text co-production. He found that students to a higher degree add text more often than they revise texts.

Response during the process was studied by Dahl (2006). According to his study, response is a qualifying part of the collaborative writing process, as supported by a recent study by Kraglund et al. (2013), who found that giving and receiving responses is a crucial strategy for improving the quality of online written work.

The advent of several information and communications technology (ICT) applications inspired and initiated studies with a focus on collaborative writing within e.g. wiki-based collaborative writing as an approach to the writing process, which includes collaborative planning, partitioned drafting, peer revising, peer editing and individual publishing (Chao and Lo 2009); blogs for collaborative writing in foreign language learning (Amir, Ismail and Hussin 2011); and the integration of the Internet into English as a second language (Young 2003).

The research on online collaborative writing in school is incomprehensive and, especially, without a focus on the relation between human and non-human actors.

3. Research design and methodology

The project is based on a combination of action research and design-based research using quantitative and qualitative approaches. The overall framework for the project includes interventions within different subjects. In accordance with action research, the researchers and teachers collaborate closely when preparing the interventions locally at each school, because the interventions must be integrated into the ordinary planning of the school year. The interventions are in accordance with design-based research, designed with increasing complexity, from simple subject exercises to more complex trans-disciplinary activities that involve advanced technologies, such as social media, robotics or location-based technologies (Sørensen and Levinsen 2014).

The project produces data using two main approaches within an overall mixed-methods framework: 1) baseline measures are conducted as a long-term diachronic quantitative survey combined with qualitative structured observations at the start, middle and end of the project and 2) each of the six interventions are followed through a combined synchronic and diachronic approach, where the researchers follow the interventions to document and identify changes and developments in the performed practice. Qualitative data are collected before, during and after the interventions in the form of individual semi-structured interviews, semi-structured focus groups and informal conversations with teachers and students, as well as videos, photos and artefacts. The aim is to produce a complementary dataset that records and documents the interventions and allows for an analysis of their impact on students' learning and teachers' practices (Levinsen et al. 2014).

4. Theoretical frame

The writing strategies can be understood as the procedural processes or the arrangement of the writing processes. Lowry, Curtis and Lowry define writing strategies as, 'A team's overall approach for coordinating the writing of a collaborative document' (2004: 75). The approach of Lowry and colleagues is based on adults in

professional work, as they operate with taxonomies of collaborative writing strategies. The taxonomy can also be used to unfold the collaborative processes of the students' work in school. The collaborative writing strategy taxonomy includes *single-author writing*, in which one person is directed to write for an entire team; *sequential single writing*, in which one person writes his or her part at a given time and passes the text on to the next person; and *parallel writing*, in which the team divides the work into units, works in parallel and then gathers the units. Parallel writing can be divided into two main types: *horizontal-division writing*, in which each person is responsible for a section of the text, which is by the end completed by one person, and *stratified-division writing,* in which the participants take on different roles, such as author, editor and reviewer. The latter is a strategy of *reactive writing,* occurring when writers create a document in real time, reacting and adjusting to each other's contributions and changes (Lowry, Curtis and Lowry 2004: 74–79).

When students engage in collaborative writing, their activities and responsibilities change during the process, as do their roles. A writing role in collaborative writing is defined by Lowry, Curtis and Lowry (2004: 75) as the formal or informal responsibility of a participant in a collaborative group, which is known to the group and which lasts for an unknown or set amount of time. They operate with the following collaborative writing roles: writer, consultant, editor, reviewer, team leader and facilitator (Lowry, Curtis and Lowry 2004: 85–87). These roles among the actors, which changed both intentionally and unintentionally during the process, were identified through observations from the four cases.

Communication plays a pivotal part in collaborative processes. It would therefore be appropriate to focus on negotiations and students' types of talk. Negotiation can be understood as an exchange of meaning between students as they try to reach clarification or a mutual agreement during their collaborative writing. Types of talk are important to the quality of the negotiation and the social practice in groups and accordingly to the quality of the collaborative writing work. Littleton et al. (2005) present three types of talk: *disputational talk*, a debating, confrontational, non-constructive conversation with the nature of a controversy that does not lead to collaborative decisions; *cumulative talk,* a conversation in which the participants confirm each other's views and do not discuss or challenge each other, accepting uncritically what has been said and proceeding from there; and *exploratory talk,* a conversation of active joint engagement in which students make assumptions, challenges and discussions, and the progression of the work takes place based on a common acceptance of the proposals. The first two types of talk are not conducive to collaboration.

Online collaborative writing in the school context actualises design for learning. In this respect, McCormick (2004) explores the concept of designing collaboratively, looking at both learning to collaborate and collaborating to learn, two inter-related themes that can be useful for learning designs aimed at collaborative writing. Google docs allow several students to write simultaneously and from several logins. The students' online writing processes are understood, in line with Orlikowski (2009), as a dynamic socio-material configuration in which different human agencies and material performances co-construct different strategies, activities and roles for students and technology. For example, during the writing process, the technological actor performs as an externaliser and mediator of both the students' agency directed towards producing the text and the text as a whole while it emerges. Thus, the technological actor performs in many different ways and with different strategies for various students. We adopt Orlikowski's position that human and non-human actors differ *a priori* with respect to agency and performativity, while the parts they play in the emerging co-construction cannot be determined *a priori* (Orlikowski 2005). Orlikowski (2009) uses the perspective of entanglement in practice, which, in relation to writing processes, includes an understanding of a relational and mutually connected relationship between the student and the technology.

5. An extended framework for students' online collaborative writing

Online collaborative writing technologies have entered the educational domain in the Danish school system. Google Docs is one possible online collaborative writing technology that offers both possibilities and challenges. In our earlier research, we found that students develop their own strategies for the online collaborative writing process, through which they organise the work in different ways in interaction with the technological affordances and the material performance of the technology. The teachers did not present, introduce or refer to online collaborative strategies, roles in the writing process or ways of communication, nor did they further introduce the technology and its affordances. The ways of working online were entirely within the students' domain and therefore led to more or less coincidental collaborations, depending on the group dynamic. In light

of this, we develop the teacher's framework in the design for learning model (Figure 1) in relation to online collaborative writing in Google Docs.

Figure 2 below can be seen as an extended framework of the teachers' framework in Figure 1, with a focus on online collaborative writing. It amplifies/expands the central box of the figure "Practice in class" and shows how teaching and learning evolve over three layers: the teacher's professional reflections and design for learning at the top (in the framework: Teacher), the interaction between the teacher and the students in the classroom in the middle (in the framework: Teacher and students) and students working together in a group at the bottom (in the framework: Students). When looking at the framework as an elaboration of the middle of the original figure, one must bear in mind the forward-pointing arrow, which proceeds from "pre" to "practice in class" to "post". This means that even though the framework only represents the center of the figure, it is still a part of the bigger design for learning and part of a continuous learning process. This learning process is to be understood as dynamic, which means that even though it states that the teacher is introducing writing roles, it might not be a fully comprehensive introduction with all of the roles addressed, but an extract relevant to the age of the students and the subject-related content. The next lesson plan and related framework will be influenced by the outcome ("post") and in this way learn from and build on top of the previous phases.

Teaching deals with two equal foci on learning: the subject-related content and the methods related to collaborative writing. The subject-related content is closely connected to the overall goals for the subject and therefore co-defines the framework. When working with developing the students' collaborative writing in relation to content, it is relevant to connect to approaches as *creative writing*, *writing in the disciplines* and *writing across the curriculum*, which focuses on the teacher as a supervisor, using dialogue, response (both teacher-to-student and peer-to-peer) and scaffolding as the main guidelines (Fibiger et al. 2009). Meanwhile, even though this approach is represented as the subject-related content in the framework, it is not within the scope of this paper to elaborate further on this. It is foremost included to emphasise the importance of bracketing content and method. In other words, it does not make sense designing a framework for developing online collaborative writing without subject-related content to concretise the teaching through which the collaboration takes place.

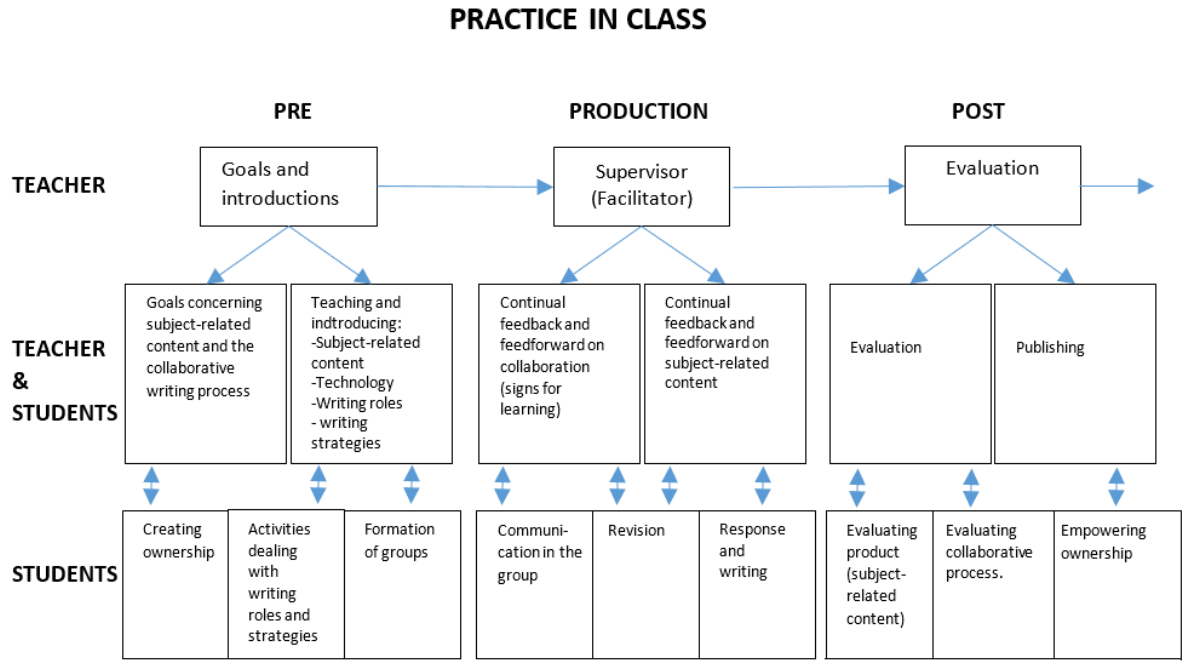

Figure 2: An extended framework with a focus on online collaborative writing.

The framework divides the teaching into three phases: "pre", "production" and "post". During the first phase, the teacher and the students work with goals and with activities introducing both subject-related content and methods related to the collaborative writing process. In that respect, writing roles and writing strategies need to be explicated and taught. The goal is, through the introduction, to provide the students with a range of possible collaboration strategies and to make them experiment with writing roles, that they are not as

comfortable with as others are. This can break their customary collaboration patterns and force them to make considered and informed decisions when moving on to the production.

Google Docs is an essential non-human actor in this phase, as well as in the remaining phases, given that the developments of the students' knowledge of the writing roles depend on the context in which the roles unfold. It is, therefore, insufficient to know the concepts of "editor" or "consultant" when the technological actor, Google Docs, defines and materially performs a digital setting that more or less dictates how the human actors can enact their writing roles. In Google Docs, the collaborative functions, where everyone can write at the same time, make it possible to include, for example, more than one editor, which means that writing roles are not in themselves sufficiently bounded. They must be further defined by the group according to their writing process, which can be a challenge for the students. Google Docs here increases the complexity around the collaborative writing process, which stresses the importance of letting the teacher's framework contain an introduction to the technology in the first phase.

During the production phase, the teacher functions as a supervisor, giving students continual feedback and feedforward. When they concern the students' collaborative process, feedback and feedforward must be of a certain character to facilitate ideal communication within the group. Littleton et al. (2005) state that *exploratory talk* is conducive to collaboration. Examples of observable signs of explorative talk*,* learning and collaboration are whether the students do/do not "consider alternative opportunities in their work process", "affirm each other just like that" or "build on each other's ideas". When and if the teacher takes these signs into account and involves them in his/her feedback and feedforward, there is a more likely chance that the students' communications will reach *exploratory talk*, because the feedback and feedforward then raise challenges and commitments to the group discussions.

The arrows connecting level two and three are pointing in both directions to indicate that when the teacher has initiated a feedback and feedforward situation, the students will not only revise their work, but also be inspired to give a peer-to-peer response (Sørensen and Levinsen 2015b). Their peer-to-peer response will influence the classroom and from there lead to new teacher feedback/feedforward and then again, new revisions will be made. Consequently, levels two and three in the framework influence each other continually.

Furthermore, Google Docs' material performance makes it possible for the teacher and for the students to add a digital dimension to the enactment of their feedback and feedforward. The technology allows the participants in the document to review and comment via specific editing functions. These make it possible to give feedback and feedforward across time and the physical boundaries constituting the classroom, which can enhance the face-to-face supervision of the teacher over the students. The material performance of the editing functions in Google Docs also makes it possible for the students to better enact some of the emerging writing roles. For example, the consultant and the reviewer will stand out more clearly due to the technology.

During the third and last phase, "post", the teacher initiates an evaluation of both the product and the collaborative process. The evaluation, in line with the rest of the framework, focuses on dialogue and not merely between teacher and student, but also among the students themselves to ensure the empowerment of ownership over the writing product and their individual and collective learning results concerning collaborative writing skills.

6. Conclusion and Perspective

Earlier research has shown that teachers have not presented or introduced the students to online collaborative writing, nor have they discussed it in class. The students' productions are based on prior experiences or developments of different writing strategies and different choice of roles in their groups. The students' online collaborative writing is entirely within the students' domain. On this basis, the paper has developed an extended model in relation to the teachers' framework in Figure 1, with the intention of improving the students' collaborative methods and subsequently the quality of their learning.

The extended framework model is one teachers can use to plan their teaching and students' learning processes, with the intention of supporting students' online collaborative writing. The model provides suggestions on how teachers in different phases of students' processes can introduce, support and facilitate students' online collaborative writing so that the students can better reflect and selectively decide which type of writing

strategies are relevant to qualify their academic learning and which roles will be effective to use in different writing processes. Furthermore, it gives suggestions for how students can develop appropriate ways of communicating that promote both their learning and their collaborative processes. Finally, the student–technology interaction is also a parameter in the model. Students are introduced to reflect on and experiment with the affordances and the material performance of the non-human technological actor. The model is developed in relation to online collaborative writing in Google Docs, but the model can also be used with small modifications in relation to the co-construction performance of other technologies, through which students collaborate online, e.g. multimodal production programmes.

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