Roles for Collaborative Writing: the Effect on Text Quality and Group Atmosphere

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Abstract: As collaborative academic writing has a prominent place at university, students need to learn how to write academically and at the same time how to maintain a positive group atmosphere in which information can be exchanged and students feel well. One way to support this, is providing roles. In the current study, 41 groups of three university students wrote a literature overview. 21 groups were asked to distribute roles aimed at improving text quality, smooth collaboration and fostering a positive group atmosphere. In this paper, the results of using roles on collaboratively written text quality and group atmosphere are discussed. The results show a positive effect of roles on text quality, but no effects on group atmosphere.

Introduction

It is widely recognized that university students should learn to collaboratively write texts in order to be successful in academic education and in the current society (Szymkowiak et al., 2021). Students need to select and connect the relevant and reliable pieces from the high amount of information that is available as they are expected to develop a critical stance towards a multitude of topics. In this light, writing to learn becomes increasingly important. At university, this is often manifested in the form of a literature overview task, in which students need to integrate information from different sources into a new, meaningful text in order to learn about a specific topic. To do so, students need to select, connect and organize information (Spivey & King, 1989), learn to write academically and learn how to collaborate, as research is mostly done collaboratively, and as students gain a variety of writing and critical thinking skills from their group members (Lange et al., 2020; Lin & Maarof, 2013). However, collaborative writing is not self-evident (Putzeys & De Wever, 2021).

If students are expected to engage in writing to learn (e.g., writing a literature overview), they first need to learn to write. Earlier research has shown that university students possess advanced reading and writing levels, but nevertheless experience difficulties with writing (Mateos & Solé, 2009). Therefore, students need support regarding academic writing, involving specific vocabulary and grammar rules. In addition, three key skills must be mastered. The first skill is searching for reliable sources on a specific topic and selecting useful information. The second is connecting these pieces of information. The third is organizing the information in such a way that a new, meaningful text is created (Spivey & King, 1989; van Ockenburg et al., 2019).

Writing instruction does not necessarily encompass how to write collaboratively in an efficient and productive manner. However, students often experience several issues in terms of communication, aligning individual work styles and coordination (Putzeys & De Wever, 2021). These issues can be ascribed to students insufficiently contributing to the relational space within collaborative writing. To do so, students should carry out communicative and social activities aimed at maintaining a positive group atmosphere (Janssen & Bodemer, 2013). A positive group atmosphere allows for open communication and the exchange of information (Janssen & Bodemer, 2013), which is key for effective collaborative writing (Damşa, 2014; Putzeys & De Wever, 2021).

Consequently, collaborative writing support focusing on learning to write and maintaining a positive group atmosphere is required. This support can take on the form of roles. Roles are prescribed functions guiding individual behavior and group collaboration. It is a way to distribute tasks and responsibilities, supporting interdependence and at the same time individual accountability (Putzeys & De Wever, 2021). In the current study, we designed a set of roles in such a way that the prescribed functions are directly or indirectly aimed at a higher text quality. Functions indirectly related to text quality either focus on a more efficient collaboration process, or on a good group atmosphere, and potentially to a high text quality. Examples can be found in Table 1. If they are formulated too loosely, chances are that students will not act upon them as intended. If they are formulated too coercive, students most likely will refuse to use them (Dillenbourg, 2002). This can be explained based on the self-determination theory, which states that three psychological needs drive autonomous motivation: the need for autonomy, the need for relatedness and the need for competence (Deci & Ryan, 2002). Regarding using roles, this means that students need to feel that they perceive themselves as sufficiently competent to fulfill the role's functions, that they can enact the role to a certain degree in their own way, and that the role does not inhibit them from being a valuable member of the group. The development of these roles is described in the methods section.

This study investigates the effect of using roles, focusing on text quality, productive collaboration and group atmosphere, on university students' collaboratively written text quality and their group atmosphere.

Methods

123 students (mean age 20 years, $SD = 0.55$) participated in this study. They were all in the third year of their bachelor's degree in educational studies at a Flemish university (Dutch-speaking part of Belgium). The study took place within an academic writing course. For this course, they were randomly assigned to 41 groups of 3 students. 21 groups were randomly assigned to an experimental condition, in which students used roles. The other 20 groups formed the control condition in which students did not use roles.

All groups wrote a literature overview, as if it were the theoretical framework for a hypothetical study. Students were free to choose a topic within a variety of provided research domains. They received specific instruction lessons and learning materials on academic vocabulary, grammar, the structure of research articles, and on searching reliable sources, selecting, connecting and organizing information, according to the design principles for synthesis writing instruction by van Ockenburg et al. (2019). The students wrote their text over the course of eight weeks. Every week, one fixed session was planned, in which students worked for 2.5 hours while interacting via Microsoft Teams. During these sessions, an instructor was available for questions and advice. Students were allowed to also work outside of these sessions if they felt this was necessary.

Students in the experimental condition were required to distribute three provided roles to their liking. The roles were designed based on earlier research (Bereiter & Scardamalia, 1987; Wise et al., 2012).As they used these roles earlier in a shorter task months before, students were already familiar with these roles. At the start of the current task, students were allowed to take on a different role than during the short writing task. Once distributed, the roles were not changed, nor rotated. Students received a chart with the name of all three roles, their functions and prompts. Students were instructed to fulfill their role as well as possible and were in no way obliged to use these prompts literally. The functions were directly or indirectly aimed at a higher text quality. Functions indirectly aimed at a higher text quality either focused on attaining a smooth collaboration process, or on ensuring a positive group atmosphere, as stated earlier. An overview of the roles and their aims can be found in Table 1.

Table 1

Overview of the roles. Students received a similar table, without the column 'Aim'.
C = collaboration, T = text quality, G = group atmosphere

Role	Functions	Prompts as example	Aim
Initiator	Motivate your group.	'You're doing great.'	G
	Agree on a clear task approach.	'What shall we do first?'	C
	Distribute tasks.	'Who wants to do…'	C
	Keep track of time, set deadlines.	'How much time do we spend on…'	C
	Plan the text, ask for ideas and how the information will be organized.	'What should be in our text?' 'I would first write about…'	T
Moderator	Hear everyone's opinion.	'Does everyone agree with…'	G
	Make sure everyone understands all concepts.	'Does everyone know the meaning of …?'	T
	Compromise as a group.	'I hear different opinions, let us…'	G
	Summarize, remind what you are all working towards.	'What do we have already?' 'Now … should be done.'	C
Proof-reader	Read the text and make suggestions for improvement.	'I would word this as follows…' 'I would replace…'	T
	Make sure the text meets all criteria as seen in the instruction lessons.	'.. is still missing.'	T
	Check whether information can be better connected.	'I think … is too wordy.' 'We could connect …'	T
	Check whether the text is clear for a reader who did not read all resources.	'As a reader, I would not understand…'	T

Two independent instructors scored each text's quality, based on argumentation and reasoning, structure, resource processing, and language, style and formal requirements. A mean score out of 10 points was calculated.

The group atmosphere was reported by the students, using the Fiedler Group Atmosphere scale (Fiedler, 1967) at four times: at the beginning, before a two-week midterm holiday, after that holiday and after submitting the text. The scale consists of nine bipolar adjective items to be scored on an 8-point scale. This scale has been

used in former research on collaborative learning and is easy to use, while providing a comprehensive image of how the group atmosphere is perceived by the group members (Fiedler, 1967; Kreijns et al., 2007). Due to the nested data structure, multilevel analyses were conducted using MLwiN 2.29. First, a fully unconditional null model was estimated (i.e., time at level 1, students at level 2 and groups at level 3). Second, the experimental condition was included into the model (Model 1) to investigate differential group atmosphere scores. Third, time was added to the model (Model 2) and finally, the interaction term condition*time was included (Model 3) to investigate differences between the four measurement times and the conditions.

Results

Text quality

An independent samples t-test showed a small, but significant difference between groups using roles ($M = 6.71$, $SD = 1.07$) and groups not using roles ($M = 5.91$, $SD = 1.45$), $t(108.6) = -3.48$, $p < .001$. Groups using roles scored 0.8 points out of 10 higher on average than groups who did not use roles. We further asked to what extent students enacted the roles as described on a 4-point Likert scale (1 = not at all, 2 = almost not, 3 = almost entirely, 4 = entirely) at four different time points. The answers followed a similar pattern for each time point: almost no students answered 'not at all' (n respectively 4, 0, 1, 2), almost half of the students answered 'almost not' (n respectively 26, 26, 29, 32), the other half 'almost entirely' (n respectively 26, 30, 29, 25) and almost no students answered 'entirely'(n respectively 5, 6, 2, 3). Next, we calculated an average score for 'role enactment'. Then, a one-way ANOVA was performed to search for differences between students in the control condition, students in the experimental condition that stated to have used the roles not at all or almost not (non-users), and students that stated to have used the roles almost entirely or entirely (users). There was a significant difference between at least two groups ($F(2, 119)$, $p = .002$. The mean scores were 5.91 ($SD = 1.45$) for the control condition, 6.8 for the non-users ($SD = 1.12$) and 6.42 ($SD = 0.88$) for the users. Games-Howell's test for multiple comparisons revealed that the mean score for text quality was significantly different between the control condition and the non-users ($p = .001$). There was no significant difference between the non-users and the users ($p = .408$), nor between the control condition and the users ($p = .235$).

Group atmosphere

Variances were significantly different from zero for time level ($\chi^2(1) = 181.006$, $p < .001$) and student level ($\chi^2(1) = 24.837$, $p < .001$), but not for group level ($\chi^2(1) = 2.952$, $p = .086$). All estimates are shown in table 2.

Table 2
Summary of the model estimates for the three-level analysis of students' group atmosphere.

	Model 0	Model 1	Model 2	Model 3
Fixed part				
CONS	5.593 (0.052)***	5.646 (0.073)***	5.615 (0.08)***	5.584 (0.086)***
Roles		-0.104 (0.102)	-0.104 (0.103)	-0.043 (0.120)
Time 2			-0.015 (0.051)	0.034 (0.072)
Time 3			-0.029 (0.051)	-0.039 (0.072)
Time 4			0.167 (0.051)***	0.251 (0.072)***
Roles * Time 2				-0.096 (0.101)
Roles * Time 3				0.022 (0.101)
Roles * Time 4				-0.166 (0.101)
Random part				
Level: Group				
CONS/CONS	0.045 (0.026)	0.043 (0.026)	0.043 (0.026)	0.043 (0.026)
R²	12.5%	12.01%	12.25%	12.29%
Level: Student				
CONS/CONS	0.152 (0.03)***	0.152 (0.03)***	0.154 (0.03)***	0.154 (0.03)***
R²	42.22%	42.46%	43.87%	44%
Level: Time				
CONS/CONS	0.163 (0.012)***	0.163 (0.012)***	0.154 (0.011)***	0.153 (0.011)***
R²	45.28%	45.53%	43.87%	43.71%
Loglikelihood	705.634	704.622	685.352	680.87
Reference Model		Model 0	Model 1	Model 2

Note. Standard error estimates are placed between brackets. *** p < .001.

Discussion

Generally, the results show that using roles does not always affect the quality of collaboratively written literature overview tasks: non-users' texts showed higher quality than students in the control condition. Users, however, did not perform significantly better than non-users or students in the control condition. In addition, the roles did not seem to affect group atmosphere at any time. These findings are unexpected, since the roles were designed in such a way that text quality and group atmosphere could have been ameliorated (Bereiter & Scardamalia, 1987; Wise et al., 2012). The only overall significant increase in group atmosphere at time 4 might possibly be explained by a general feeling of success, as the students filled in the questionnaire at time 4 right after they submitted their final version of the task.

A possible explanation may lie in the small number of students who reported to actually have used the roles as described. We attempted to make the roles almost all-encompassing, yet at the same time limited in functions. This way, we might not have paid sufficient attention to group atmosphere functions, or too much to task related functions, making students feel overwhelmed. The roles might have added to the already high cognitive load a collaborative writing task provokes, instead of distributing the cognitive load among the group members (Lange et al., 2020). Students may also have perceived the roles as too coercive. Subsequently, students in the current study possibly did not enact every function of their role as intended, which has happened in earlier research (De Wever et al., 2008; Dillenbourg, 2002). Future research will focus on students' perception of these roles and other ways to support students' collaboration processes.

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