Process-oriented writing and text quality in L3 German – cognitive challenges and motivational aspects

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Abstract

This article presents the results from an intervention study on process-oriented writing in L3 German among 21 Swedish students in an upper secondary school. Our study investigates the relationship between process-oriented writing and text quality concerning accuracy, content, text length, and syntactic complexity. We also consider how individual variables, such as cognitive load (CL), learner engagement, and achievement goals, relate to the learning outcome in process-oriented writing. Our data consist of students' mind maps, student texts, and questionnaires. Regarding accuracy, results show a slight improvement in basic morphology and syntax. As for text quality, there is a correlation between a well-prepared mind map and a text rich in content, whereas only a weak relationship between mind map and text length was found. In contrast to previous studies (cf. Pon/Varga 2017), our analysis shows only a weak relationship between text length and syntactic complexity. Concerning cognitive load and engagement, the students experienced problems when giving and receiving feedback. Even so, most students perceived the work with process-oriented writing as engaging. Overall, they express a clear desire to develop their writing and appreciate the opportunity for planning and time for reflection.

1 Introduction

In Sweden, German is taught as a second foreign language[1] (L3) after English from grade 6 to grade 9 in lower secondary school. In upper secondary school, it is possible to continue learning German for another two or three years. According to the Swedish curricula, learners should be given the opportunity to develop linguistic confidence in speech and writing, as well as the ability to express themselves with variety and complexity. However, a report by the Swedish Schools Inspectorate shows that text production in modern languages is a neglected area: "The written exercises are limited and often consist of answering questions in connection with a text that the pupils have read" (Skolinspektionen 2022: 6). Overall, there are few studies that have investigated younger learners' written production in a foreign language (cf. Lee 2016).

Process-oriented writing is based on a cognitive model of the writing process developed by Hayes/Flower (1980). It involves a series of steps, including pre-writing activities such as

[1] In Sweden, German, Spanish and French are the most frequently learnt languages taught as modern languages in compulsory education.

brainstorming, planning and revision, to enhance metacognition. The model has since been further developed by Hayes (2012). Process-oriented writing has mainly been studied in English (cf. Williams 2012; Kadmiry 2021); there are only a few studies for other foreign languages.

To gain a comprehensive understanding of students' work with process-oriented writing, we combine results from two earlier exploratory studies that investigated text production in the context of process-oriented writing in L3 German among Swedish students (n = 21, 17-year-old students) during their second year in upper secondary school (level A2+). In this article, we examine the relationship between process-oriented writing and text quality from a broader perspective, specifically in terms of accuracy, content, text length, and syntactic complexity. Additionally, we conduct a qualitative analysis concerning students' cognitive load, learner engagement, and achievement goals.

Our research questions are as follows:

RQ 1. How does the work with process-oriented writing correlate with text quality concerning accuracy, content, text length, and syntactic complexity?
RQ 2. How do cognitive load, learner engagement and achievement goals relate to the learning outcome in process-oriented writing?

This article provides a theoretical background and an overview of empirical studies on process-oriented writing, followed by a discussion of the concept of text quality investigated in earlier research. It concludes with a description of various cognitive and affective factors that affect the individual's ability to carry out various learning activities in the classroom. The material, method, and results are then presented, and the study concludes with a discussion of our findings and implications for working with process-oriented writing in the classroom.

2 Writing process and quality

2.1 Process-oriented writing

Process-oriented writing is a learner-centred approach, which includes collaborative and awareness-raising activities. It involves several steps in the writing process and does not focus solely on the final product. According to Murray's initial work, the writing process can be divided into three stages: prewriting, writing, and rewriting (Murray 1972). Hayes' (2012) process model is a revised version of the 1980s writing model, offering an accurate description of each stage of the writing process. The new model also considers cognitive, social, internal and external factors that influence writing. Writing is divided into three levels: control, process and resource. The control level relates to the student's motivation and commitment to writing. The way writing activities are designed influences how students approach writing. The process level concerns the task environment, including collaborators, task materials, written plans, and text written so far. The resource level embraces functions such as attention, working memory and long-term memory. Several studies have found that writing together improves written production, particularly in terms of accuracy (cf. Williams 2012: 325). Bayan/Zahibi (2020: 513) refer to Long (1996): "From a psycholinguistic perspective, peer-to-peer interaction helps learners notice their problematic utterances, give and receive feedback, and modify output." Hence, peer review is now often an integrated part of process-oriented writing. The complete process model includes the following steps (cf. Hyland 2003: 11): topic selection, prewriting, composing,

response to draft, revising, response to revision, proofreading and editing, evaluation, publishing, and follow-up tasks to address weaknesses.

Studies indicate that revision is crucial for improving grammatical correctness in student writing. In their review of earlier research on the effectiveness of corrective feedback in L2 writing, Liu/Brown (2015) conclude that students do not learn from grammatical feedback unless they actively revise their texts. This finding corroborates the results of a study by Ekanayaka/Ellis (2020), which involved 91 students participating in a four-week writing task. Students who revised their texts and used the corrected draft in a new task showed most improvement in grammatical correctness. In contrast, the effect was smaller for groups that only discussed feedback or had no opportunity for revision. They conclude that for written corrective feedback to work, it must be attended to by students. Revision proved to be more effective than pair discussions. However, they raise the question of whether training students in discussing corrected errors would have changed this picture.

2.2 Prompts for writing

Several studies have shown that the choice of topic and the instructions for the writing task influence the linguistic form of a text (cf. Crossley 2020: 433). With the help of concrete instructions (prompts), students not only get inspiration for the text content but also writing impulses (priming) that allow them to start writing more quickly. They often incorporate words, expressions, and different linguistic structures from the instructions.

In Nurlaila's study (2013), 36 seventh-grade students participated in a writing project using mind maps. Her results showed that the use of mind maps was beneficial. The technique proved effective in supporting students in writing descriptive texts in an enjoyable way. Mind mapping helped students improve their writing skills by enriching their vocabulary, enhancing creativity, structuring sentences, and organizing ideas (cf. Nurlaila 2013: 14).

Writing prompts can be an effective way to develop writing skills in a second language (L2). Studies have shown that writing prompts are one of the most important factors influencing students' written production, but the effect varies depending on the task type (cf. Liu/Stapleton 2018). Cho (2019) found that reading-based prompts, i. e. model texts, facilitate strategy use in untrained writers. Reading-based prompts also led to long-term improvements in the writing process.

Kang (2020: 1) investigated model texts and teacher feedback as two different types of prompts for revising student texts. Kang found that working with model texts contributed more to the improvement of texts compared to corrective feedback. Teachers' corrections focus mainly on errors in student texts. The advantage of model texts is that they provide suggestions for relevant content, vocabulary and the overall organisation of the text.

2.3 Text quality and syntactic complexity

Various measures are used in the literature to assess the quality of a text. Text quality is often used in an overarching sense, as in the study by Bayan/Zahibi (2020), referring to the author's voice and traditional measures of complexity, accuracy and fluency (CAF). Abrams (2019) looked at the quality of linguistic output and the characteristics of effective collaboration among

learners of L2 German. To assess text quality, she used more specific measures, in line with task-based language teaching (TBLT): complexity, grammatical and lexical accuracy, fluency, lexical diversity, and propositional content. She used two measures for syntactic complexity: the mean length of communicative units (c-units), including any subordinate clauses, and subordination (i. e., the ratio of clauses to c-units). Results reveal that collaborative patterns only had influence on fluency, individual factors and task type playing a larger role in terms of complexity and accuracy. She concludes that further research is needed to investigate the relationship between task type, collaborative process, and learners' written product.

Measures often used to determine syntactic complexity are sentence length and coordination or subordination (cf. Lecouvet 2021: 5). According to Norris/Ortega (2009), there is a strong correlation between syntactic complexity and language development. Initially, learners produce single clauses, then coordinated clauses, followed by an increasing number of subordinate clauses. Finally, learners use more complex phrases and shorter sentences. A general problem in studies of syntactic complexity is that different measures are used, which prevents comparison (cf. Norris/Ortega 2009: 559). Another indicator of syntactic complexity widely used in L2 acquisition research is text length, i. e. number of words (cf. Norris/Ortega 2009: 558). According to Chitez/Hoefele/Konstantinidou (2017: 34), text length is a highly objective and reliable measure in methodological terms. Longer texts are generally the better ones in terms of text quality, and this applies to different text types.

Pon/Varga (2017) analysed subclauses in German L2 texts (125 words on average) written by 57 18-year-old Croatian learners, all of whom were at level B2 according to the CEFR (cf. Council of Europe 2001). Regarding learners' syntactic knowledge, they analysed different types of subclauses, subordinating conjunctions and embedded subclauses. They found little variation regarding conjunctions and type of subclause. The typical compound sentence contained a main clause and a subordinate clause, with the subordinate clause mainly occurring after the main clause, beginning with *dass*, *wenn*. They also found a correlation between text length and the use of subclauses, i. e. the longer the text, the higher the proportion of subclauses (cf. ibid.: 91f.). However, they question the results from their study concerning the acquisition of German syntax. In future research, they suggest conducting longitudinal studies on a larger corpus of texts and various text types.

3 Cognitive load, learner engagement and achievement goals

3.1 Cognitive Load Theory (CLT)

According to Sweller/Chandler (1991), the design of the instructions that students receive to complete a task affects the cognitive load (CL) on students' limited working memory. There are three different types of CL: intrinsic, extraneous and germane. Intrinsic CL concerns difficulties in processing the learning content due to a lack of knowledge. In the case of extraneous CL, the instruction is too complicated, and both intrinsic and extraneous CL hinder learning. In contrast, germane CL concerns instructions that are easy to process and thus support learning (Cierniak et al. 2009). Cierniak et al. (2009) found evidence of a negative correlation between extraneous CL and learning outcomes, and a positive correlation between germane CL and learning outcomes, which is in line with Cognitive Load Theory (CLT).

3.2 Learner engagement

Wang/Bergin/Bergin (2014: 1) define learner engagement (LE) as "a student's active involvement in classroom learning activities". They distinguish between affective, cognitive and behavioural engagement. Affective engagement is associated with positive feelings during the lesson. Cognitive engagement relates to mental effort, including the use of strategies, meaningful processing, concentration, and metacognition. In terms of the behavioural dimension, Wang/Bergin/Bergin (2014) distinguish between two factors – co-work (compliance) and effort (participation) in teaching. They found a strong correlation between affective engagement and the amount of effort a student puts into learning (cf. ibid.: 15).

3.3 Achievement goals

Papi et al. (2019) found that students' language beliefs and achievement goals correlated with their feedback-seeking behaviour. Learners with a growth mindset, i. e. a strong belief in their learning capability and a development approach, absorb and seek feedback from teachers and peers. Students with a fixed language mindset and demonstration goals tend to perform only for the moment, making a good impression on their teachers. They tend to avoid reflecting on feedback and request feedback only for the current task.

4 Materials and methods

4.1 Informants

The study was conducted in a German as a foreign language class at an upper secondary school in Sweden. The students had learnt German for 5.5 years. The gender distribution in the class was even, with an average age of 16.7 years among the students. According to the Swedish curriculum (cf. Skolverket 2021), which is aligned with the CEFR (2001), students should have reached level A2.2. The students reported Swedish as their first language (L1), followed by English (L2) and German (L3). Seven students stated that they had also learnt other languages: Bosnian, Norwegian, Polish, French, Italian and Latin.

4.2 Data collection and analysis methods

The data collection began at the start of autumn 2020 with a questionnaire concerning biodata. It concluded in January 2021 with a follow-up questionnaire to evaluate the work and capture students' attitudes, reflections, and impressions. The intervention consisted of seven different steps within the framework of process-oriented writing (adapted from Løkensgard Hoel 2001): a mind map (in any language), text version 1, correction 1 in peer review groups based on a checklist, text version 2, correction 2 in peer review groups based on a checklist, text version 3, correction by teacher (see Table 1). The students were asked to write a text (250–300 words) on the theme "Wohin reisen die Schweden im Sommer?" (Rosén/Fredriksson 2022: 207). Along with the instructions, written in Swedish, they also received a German model text as a prompt, entitled "Wohin reisen die Deutschen im Sommer?" The data consist of students' mind maps (18 students), first text versions (18 students) and questionnaires (21 students). The texts from three students were excluded from the study because they were incomplete. However, their questionnaire responses are included in the study.

Time frame	Material	Number of learners
September 2020	Questionnaire 1 biodata	21
September 2020	Mind map	18
September 2020	Text version 1	18
September 2020	Correction 1 based on teacher's checklist	18
September 2020	Text version 2	16
October 2020	Correction 2 based on teacher's checklist	18
October 2020	Text version 3	18
December 2020	Correction by teacher	20
January 2021	Questionnaire 2 students' attitudes	21

Table 1: Time frame and data collection

Research design

A. Comparative error analysis of Text Version 1 and Text Version 3.
B. Qualitative content analysis of topics in mind maps and texts.
C. Correlation analysis: topic type versus topic token in mind maps and texts.
D. Correlation analysis: i) topic type in mind maps and text length (word amount); ii) topic token in mind maps and text length.
E. Correlation analysis: syntactic complexity and text length (word amount).
F. Qualitative content analysis of student comments in questionnaire 2, regarding cognitive and affective factors.

In our first study (A), an error analysis was conducted to compare text version 1 and text version 3, identifying the revisions made by students after two rounds of peer feedback. The errors were analysed and categorised qualitatively and quantitatively in Atlas.ti. After an initial reading of the texts by both researchers, the categories chosen for analysis were the following: capitalisation of nouns (e. g., *book* as 'Buch'), nominal phrases, prepositional phrases, subject-verb congruence, lexical words, word order in subordinate clauses and main clauses, changes in tense, verb phrases, omitted words, and other errors (cf. Rosén/Fredriksson 2022).

The analyses B to D are based on the students' mind maps and text version 1. First, a qualitative content analysis was conducted using Atlas.ti. Eighteen topic categories were found using an inductive method (cf. Mayring 2014). To investigate whether the presence of different topic categories (topic type) and the total number (topic token) of the 18 categories in the students' mind maps were reflected in the student texts, correlation and regression analyses were carried out. How is text content influenced by type versus amount of topics in the mind-maps? Is a text richer in content when it is based on a mind map containing many different topics (type), or does a mind map containing only a few but elaborated topics (token) lead to a content-rich text? To answer these questions, correlation and regression analyses were conducted. Further analyses focused on the correlation between different topic types and text length, as well as the total number of topics (topic token) and text length (number of words).

Study E examines student texts both quantitatively and qualitatively in terms of syntactic complexity and text length (cf. Fredriksson/Rosén 2024). Syntactic complexity is measured by

counting the total number of subordinated and coordinated sentences in relation to all complete sentences. Accordingly, all sentences containing coordination and subordination, whether correct or incorrect, were considered, as they were seen as an expression of a more complex sentence structure.

Study F concerns the qualitative content analysis of student comments in questionnaire two based on Cierniak/Scheiter/Gerjets (2009), Papi et al. (2019) and Wang/Bergin/Bergin (2014). See the coding scheme below, Table 2. Based on the student comments, the various steps in the writing process were then linked to cognitive load, learner engagement and achievement goals.

Cognitive Load	Intrinsic – *)	When dealing with the task, many things needed to be kept in mind simultaneously. Dealing with the task proved to be very complex.
	Extraneous –	When dealing with the task, it was exhausting to find the important information. When dealing with the task, it was difficult to recognise and link the crucial information.
	Germane +	The elements provided in the task supported my comprehension.
Engagement	Behavioural	I get really involved when dealing with feedback. I work with other students, and we learn from each other.
	Cognitive	I ask myself questions as I go along to ensure the work makes sense to me.
	Affective	I am interested. I have fun.
	Disengagement	I am "zoned out", not really thinking or dealing with feedback.
Achievement goals	Development approach	My goal in this class is to increase my writing competence in the L2.

*) *Intrinsic* and *extraneous* CL are considered to have a negative (-) impact on learning, while *germane* CL (+) is considered to have a positive impact.

Table 2: Coding scheme

5 Results

This section presents the results from Study A–E, which answer the first research question and its associated sub-questions. Finally, we present the analysis of the student comments regarding cognitive load, learner engagement and achievement goals.

5.1 RQ 1. How does the work with process-oriented writing correlate with text quality concerning accuracy, content, text length, and syntactic complexity?

The quantitative analysis of text version 1 (blue bars) and text version 3 (orange bars), i. e. the text corrected after two rounds of peer review and revisions, shows a reduction in the number of errors. However, a noticeable reduction can only be seen regarding the capitalisation of nouns and subject-verb congruence. Regarding categories such as NP, PP and word order, most errors remained (see Figure 1 below and cf. Rosén/Fredriksson 2022).

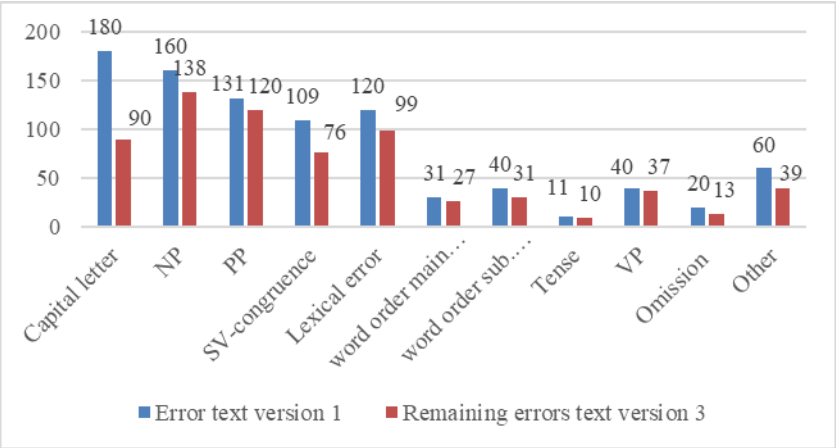

Figure 1: Remaining errors in text version 3

The following text example (Figure 2) illustrates text quality regarding remaining errors in text version 3. Overall, the text shows that the student has problems with basic morphology, syntax and lexis as well as the capitalisation of nouns.

Wohin reisen die Schwedischen?

Das Schwedischen ist ein reisende volk die reisen weltweit.
Vielen reisen nach länder als liegen nahe Schweden. Als Dänemark Norwegen und Finnland. Diese länder haben ein größer historische kontakt mit Schweden.

Aber urlaub nach zweiter länder mit ein küste mit Ostsee ist sehr populär mit dem Schwedisch. Zum beispiel Deutschland, Polen, Russland und der Baltischen länder. Vielen schwedischer fahren nach diesen länder meistens es ist nicht zu teuer mit die reise und shoppen ins Einkaufszentrum.

Anderen länder das Schwedisch reisen nach ist länder mit ein küste mit die Nordsee und Ärmelkanal als bist Frankreich, England und dem Benelux länder um zu ist nahe.

Vielen Schwedisch habt ihren urlaub ins warmen länder unter die winter um zu es ist ungefähr 20 grad Celsius in diesen länder. Thailand und Gran Canaria ist meist beliebt.
Aber einigen reisen nach skigebieten und ski fahren. Meistens in der Österreicher Alpen.

Wenn es ist WM oder der olympische spielen ins ein land dann müssen das schwedisch anfeuern auf den schwedische mannschaft.

Ob dem Schwedischer wollen ein billig urlaub dann befinden das campingplatzer rundherum den süd Schweden. In der norden Schweden ist vielen bergen und vielen bergen bedeuten gut Skigebieten. Vielen Schweden reisen auch nach große städte als Stockholm, Göteborg Lund und Malmö. Einkaufen ist sehr populär für den Schwedischen ins diesen Stadt.

Figure 2: Text example, showing remaining errors in text version 3

Regarding text content (B), 18 different types of topics were found in the mind maps as well as in the texts. Topics include, for example, *activity, own narrative, travel destinations within Sweden and abroad*, *own accommodation*, and *comments* (cf. Fredriksson/Rosén 2023).

A correlation analysis (study C) between the distribution of the 18 topic types in the mind maps and the texts (type/type) shows a weak positive correlation (r-value = 0.64). The more diverse category types in a student's mind map, the more diverse category types are to be found in the text (cf. Fredriksson/Rosén 2023).

A linear regression analysis in Diagram 1 reveals a weak correlation between the total number of topics in the mind maps and the texts (token/token), with an r-value of 0.525. See the cluster in the lower left corner.

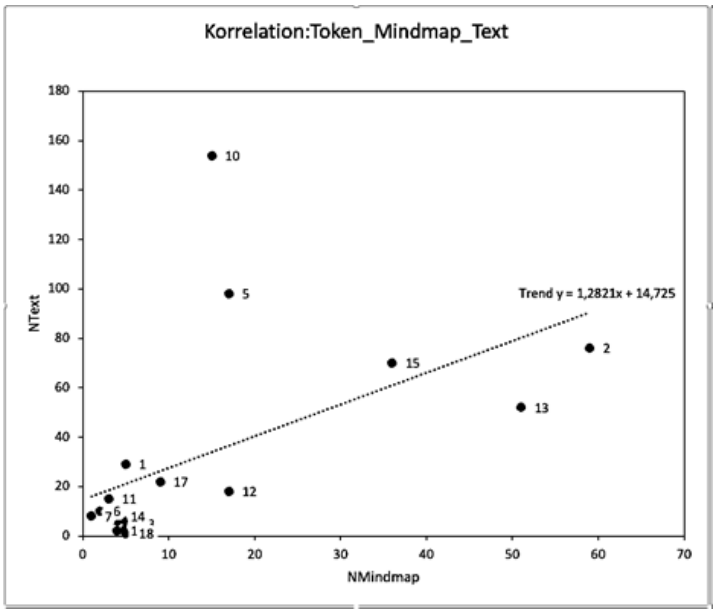

Diagram 1: Distribution of the number of topics (tokens) in the mind maps and the texts, respectively

The topics that mainly stand out in Diagram 1 are *own narrative* (5) and *comment* (10), as shown in Figure 3 below.

Figure 3: Word cloud showing token frequency in the texts

However, when these two topics are excluded, a strong correlation remains between token frequency in mind maps and texts (r-value = 0.913) (cf. Fredriksson/Rosén 2023). Overall, we can conclude that students who write content-rich mind maps (= with more tokens) also write content-rich texts (= with more tokens). They mainly expanded the texts with their narrative and comments.

5.1.1 Correlation between topic type versus topic token in mind maps and text length (word amount)

The correlation analysis (study D) shows that there is no correlation between the presence of different topics (type) in the mind map and text length (r-value = 0.13), as shown in Diagram 2 below:

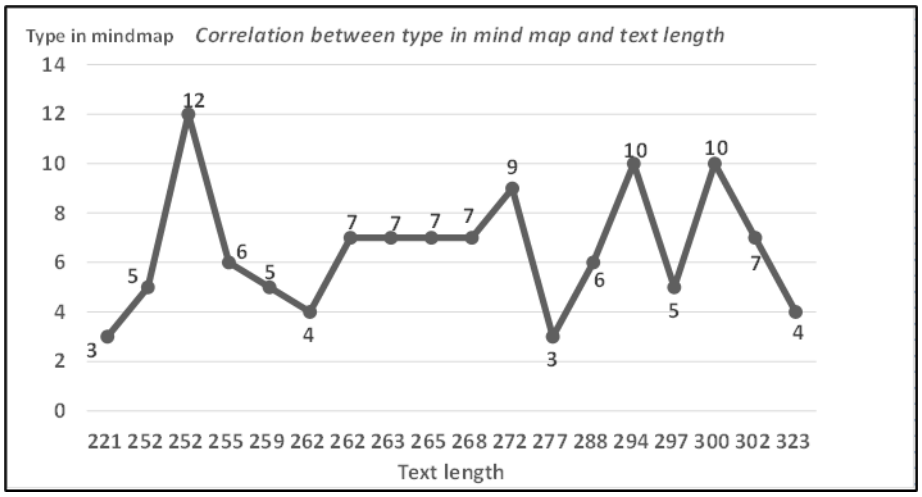

Diagram 2: Correlation between topics (type) in the mind map and text length

However, the correlation analysis regarding the total number of topics (tokens) in the student's mind map and text length shows a weak correlation (r-value = 0.55), as shown in Diagram 3:

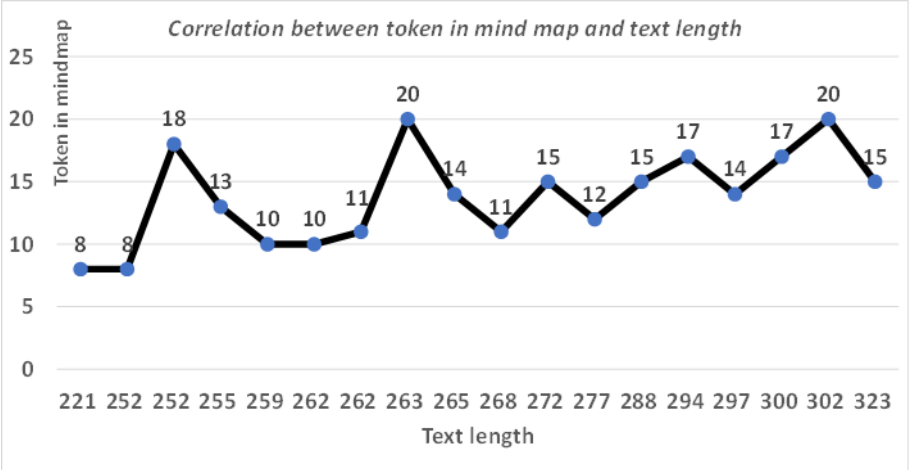

Diagram 3: Correlation between the total number of topics (tokens) in mind maps and text length

5.1.2 Correlation between syntactic complexity and text length

Regarding syntactic complexity, a regression analysis reveals a weak relationship between complex sentence structures and text length ($R^2 = 0.1064$). Thus, a short text may contain a high proportion of subordinate clauses and co-ordinated clauses (complex clause constructions) while a longer text may contain mainly simple clauses. There are also clear outliers, as illustrated in Diagram 4.

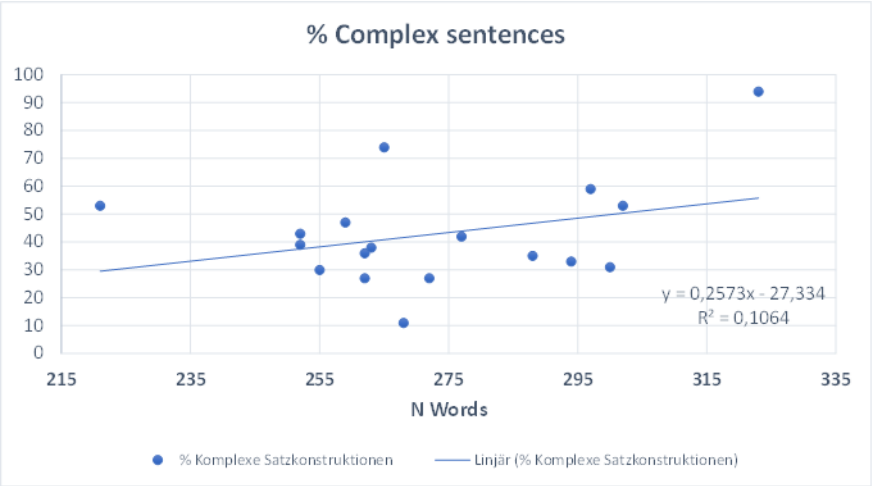

Diagram 4: Correlation between complex sentence constructions and text length

Overall, our results regarding research question 1 show that peer review and revision of texts did not lead to any noticeable improvement in grammatical correctness (see Figure 1). Regarding the planning phase, a correlation was found only between the total number of topics (tokens) in the mind map and a content-rich text. The total number of topics (tokens) in the learners' mind maps also correlated with text length. The analysis of the relationship between syntactic complexity and text length only showed a weak correlation.

5.2 RQ 2. How do cognitive load, learner engagement and achievement goals relate to the learning outcome in process-oriented writing?

Table 3 below shows how students' responses are distributed across the different variables. The students' comments on the work with process-oriented writing concerned the following steps: 1. the planning phase, 2. the writing phase, 3. the peer feedback and 4. the revision phase. Out of 68 comments (from 21 students) in the open response fields of the questionnaire, 58 comments could be categorized as different types of cognitive load (CL), learner engagement and achievement goals.

	1. Planning	2. Writing	3. Peer review	4. Revision	**Total**
Intrinsic CL -	1	1	9		**11**
Extraneous CL -			1	1	**2**
Germane CL +			6	1	**7**
Behavioural Engagement				2	**2**
Cognitive Engagement				1	**1**
Affective Engagement +	1	5		7	**13**
Disengagement -		6	4	1	**11**
Achievement Goal	3	8			**11**

Table 3: Cognitive load, learner engagement and achievement goals related to the four writing phases

5.2.1 Cognitive load (CL)

In terms of cognitive load, comments expressing a negative cognitive load predominate. Eleven comments relate to intrinsic CL, see example (1) and extraneous CL, see examples (2) and (3). Most comments concern peer review and reveal that learners perceive a lack of German language skills, which causes problems:

(1) Intrinsic CL: Peer review
"Kan inte så mycket tyska så det var svårt o att rätta eftersom man inte visste vad som var rätt."
'I don't know much German, so it was difficult to correct because I didn't know what was right.'

Comments categorised as expressions of extraneous CL (e. g. examples (2) and (3)) address difficulties in implementing and using feedback. Students also expressed uncertainty concerning the reliability of the feedback they gave. Clear instructions seem to have been a problem here, specifically the use of a checklist, which was likely not clear enough. This left much room for interpretation, as evident in comments such as "Underline all verbs – make sure it is the right form! and Is the word order correct?". Another problem was likely the peer groups, as students at the same language level could not assist each other (see example (3)).

(2) Extraneous CL: Revision
"Däremot fanns risken att man letade för mycket fel och rättade sådant som redan var rätt."
'However, there was a risk of looking for too many errors and correcting what was already correct.'

(3) Extraneous CL: Peer review
"Vi som rättade varandras var ungefär på samma nivå så vi fastnade lite ibland, fick inte med alla fel."
'Those of us who corrected each other were roughly at the same level, so we sometimes got stuck and didn't catch all the errors.'

Germane CL is associated with learning (cf. Cierniak et al. 2009). Seven comments can be linked to this category, six referring to peer review and one to revision. Below are some examples of this category:

(4) Germane CL: Peer review
"Det fungerade bra att rätta varandras texter och jag gillade att vi var tre i grupperna vi rättade med så att om man var osäker på något kunde man diskutera det och oftast lösa felet själva".
'It worked well to correct each other's texts, and I liked that there were three of us in the groups who corrected so that if you were unsure about something you could discuss it and usually solve the error yourself.'
"Det var kul för man hittar mer fel hos andra än hos sig själv."
'It was fun because you find more errors in others' texts than in your own.'

(5) Germane CL: Revision
"Jag tyckte att kommentarerna var väldigt användbara eftersom man då kunde rätta felen man gjort men själva diskussionen i sig var också väldigt bra."
'I found the comments very useful because you could correct the mistakes you made but the discussion itself was also very good.'

Some students were positive about collaborative work and mentioned that they learnt from each other's texts.

5.2.2 Learner Engagement

Two comments indicate that learners were engaged in the work on their texts based on the peer review. The first comment indicates that the learner has changed his/her behaviour.

(6) Behavioural engagement: Revision
"Mycket användbara, fick en att reflektera över det man skrivit."
'Very useful, made you reflect on what you had written.'
"De hjälpte mig att hitta fel som jag själv inte hade hittat."
'They helped me identify errors I would not have found on my own.'

Another comment mentions a new way and new perspectives for reviewing one's text, which we interpret as an expression of cognitive engagement.

(7) Cognitive engagement: Revision
"En del var bra, man fick andra perspektiv på texten, vissa saker var dock sämre då det gjorde en osäker på vad som vad rätt."
'Some parts were good, because it gave you a different perspective on the text, but some things were not good as you got unsure of what was correct.'

Concerning affective engagement, i. e. how students reacted positively to the approach, the most frequent comments concerned writing (8) and revision (9):

(8) Affective engagement: Writing
"Det var en ny metod som jag gillade."
'It was a new approach that I liked.'
(9) Affective engagement: Revision
"Jag känner att jag lärde mig mycket och verkligen fick finslipa min text."
'I feel like I learnt a lot and really sharpened my writing.'

A relatively high number of comments indicated that students were bored with the way of working (n = 10), writing texts (n = 6), or were critical of the relevance of peer review (n = 4).

(10) Disengagement: Writing
"Det var kul i början men mot slutet började det bli långtråkigt."
'It was fun at the beginning, but towards the end, it started to get boring.'
(11) Disengagement: Peer review
"Inte användbar, fick inte mycket hjälp men när jag fick tillbaka texten av läraren så var det mycket fel. Antingen ville min grupp inte vara elaka och rättade inte eller så brydde dem inte sig."
'Not useful, did not get much help, but when I got the text back from the teacher it was very wrong. Either my group did not want to be mean and did not correct, or they didn't care.'

5.2.3 Achievement goals

The answers below clearly show that students want to improve their writing. Three comments concern the planning of writing (12) and eight concern the actual writing (13):

(12) Achievement goal: Planning
"Jag har en struktur och vet ungefär hur jag ska lägga upp texten. Jag försöker numera planera min text ytterligare innan jag skriver den."
'I have a structure and know roughly how to organize my text. I now try to plan my text further before I write it.'

(13) Achievement goal: Writing
"Nja, jag har börjat fundera så att jag får med alla moment vi lärt oss i min text och att inte skriva saker jag inte kan skriva korrekt."
'Well, I have started to think so that I can include all the elements we have learnt in my text and not write things I can't write correctly.'
"Tänker igenom mer, antecknar ner grammatik på ett papper bredvid och försöker använda det i min text."
'Thinking more, writing down grammar on a piece of paper next to it and trying to use it in my text.'
"Jag har börjat att bli mycket mer noggrann och verkligen tänka efter om vad jag skriver."
'I have started to be much more careful and really think about what I write.'

To summarise, comments reveal that working in peer review groups and revising texts were mainly associated with a negative cognitive load, see examples (1)−(3). Several students had problems with correcting and giving reliable feedback. However, some students also expressed germane CL, i. e., they benefited from working with peer review and revision.

Regarding learner engagement, many students were engaged in writing and revision; however, some also expressed dissatisfaction with writing and with receiving feedback from their peers in the group.

Regarding the achievement goal, several students expressed a development approach, i. e. they indicated that they reflected on the feedback they received and used it in their further writing. They also mentioned that they had become more careful and planned their texts before starting to write. Students showed an awareness of wanting to develop their writing in German.

6 Final discussion and implications for teaching

In this section, we discuss our results concerning RQ 1 and RQ 2. Working with process-oriented writing proved beneficial in terms of text content, text length, and syntactic complexity. Most students created detailed mind maps and notably long and content-rich texts. This finding is consistent with the results reported by Nurlaila (2013: 14): "Mind mapping could help students improve their writing skills […] in terms of enriching vocabulary, increasing creativity, arranging sentences, and organising ideas."

Regarding the relationship between syntactic complexity and text length, our results partially confirm the findings in Pon/Varga's study (2017). Short texts could contain many complex sentences, while longer texts could contain mainly simple sentence constructions. Although students did not master writing correct sentences, many of them strained themselves to write more complex sentence constructions, which indicates what writing instruction should focus on.

Regarding the work in peer review groups, our study shows that the task of giving and receiving feedback did not contribute to the accuracy of the texts in terms of basic morphology and syntax

(Study A). It can be questioned whether the learners' linguistic knowledge aligns with the expected CEFR level A2.2.

A high cognitive load (CL) might explain the difficulties with correcting the texts. Students' comments (Study F) indicate that peer review could mainly be connected to intrinsic cognitive load due to a lack of German language skills, which made it challenging to give and receive feedback. Additionally, a vaguely designed checklist might have contributed to this outcome. Nevertheless, working in peer review groups seemed to facilitate learning (Germane load), as some students mentioned learning from each other's texts. As Ekanayaka/Ellis (2020: 10) pointed out, it might have been fruitful to train students in discussing errors.

In terms of engagement, there are contradictory comments. Some expressed a positive interest in writing (n = 5), as in example (8), and revision (n = 7), as in example (9). Others were more dissatisfied with writing (n = 6) and peer review (n = 4) (see examples (10) and (11)). Regarding achievement goals, comments indicated that students wanted to improve their writing skills (n = 11) (see examples (12) and (13)).

Overall, the study suggests that process-oriented writing should be carefully prepared to motivate and reduce cognitive load. It is important to design a checklist that mediates the learning process. Learners must be aware of the structures they should provide feedback on. More direct feedback from teachers and students is crucial at the beginning of the writing process, enabling learners to revise their texts effectively. They need to practice reflecting on their errors. Joint correction of model texts could be a good initial approach.

Future studies on the effects of process-oriented writing on students' writing development should be longitudinal and related to individual learner variables. Based on the data, this was not possible in our study. Future research should also include recorded observations of the work, with peer review and teacher reflections, leading to a deeper understanding of the entire writing process.

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