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### Synthesis writing

*Teaching high school students how to read, plan, draft, and revise*

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## CHAPTER 7

### GENERAL DISCUSSION

In this dissertation, we aimed to design and test a unit for ninth-grade pre-university students which focused on learning how to perform synthesis tasks. The unit should cater for different writing routines and be effective, regardless of the students' preferred routine.

The start of this dissertation was triggered by the appearance of news items in the Dutch media about first-year students' poor writing skills. In more recent years, there were also reports of the decline in Dutch adolescents' reading skills compared to adolescents in other OECD countries (OECD, 2019). Nevertheless, teachers of Dutch in the Netherlands spend a large part of their time on teaching reading and writing skills (Meestringa & Ravesloot 2014). The question then is why Dutch students' reading and writing skills are considered to be insufficient, despite teachers' efforts to improve them.

A possible explanation is that the skills taught in secondary education and the skills students are expected to master when they take part in OECD tests or enter higher or academic education are not aligned (Bonset, 2010; Wertebroek & Nunn, 2016). The outcomes of the OECD tests showed that Dutch 14–15-year-olds mainly lag behind in the area of critical processing of source information, which focuses on building knowledge, critical thinking, and informed judgment (OECD, 2019). In higher or academic education students are expected to write source-based essays to demonstrate their knowledge of a specific subject or write research reports with a sound theoretical (source-based) framework (Meestringa, 2011; Meestringa & Ravesloot, 2013). In secondary education however, writing skills are often taught in isolation, not aimed at demonstrating knowledge through writing or acquiring new knowledge through writing.

Nevertheless, in secondary education we increasingly hear a call for a more integrated curriculum (NederlandsNu! [DutchNow!] in cooperation with the section board of *Levende Talen Nederlands* [Living Languages Dutch, LTN], 2018). An example of an assignment that integrates reading, writing, and sourcing skills, is the synthesizing task. Students compose a relatively short synthesis of source-information, through which they show that they can select, organize, and structure source information, by recursive reading and writing, into a new text with all relevant information integrated in a meaningful way, and which is understandable for readers who did not have access to the sources (Klein and Boscolo, 2016).

Learning how to perform synthesis tasks could be a way to develop the necessary reading, writing, and sourcing skills to function well in education and, later, in society. How can teachers effectively instruct their students how to

synthesize? Much is already known about effective writing instruction. However, many scientific insights about (teaching) writing do not find their way into the classroom (Taalunie, [Union for the Dutch Language which develops and promotes policy on Dutch in the Netherlands (see: <https://taalunie.org/informatie/112/taalunie-union-for-the-dutch-language>)], 2015). In addition, not much research has been done in the Netherlands into effective instruction for learning to perform synthesis tasks.

Therefore, one of the aims of this research project, conducted by a teacher-researcher, in collaboration with writing researchers, but also with teachers from secondary education and their students, was to increase the dissemination of knowledge from writing skills research in educational practice. To this end, there was a strong focus on the reception and feasibility of the designed materials for teachers and students.

In this general discussion, we will first summarize the main findings and provide answers to the project's four sub-questions, after which we will describe the overarching limitations of the research project, possibilities for future research and present our conclusions.

## 1 SUMMARY OF FINDINGS

Where do you start when you aim to design a lesson unit to teach students how to write high-quality synthesis texts? When we started our research project, we looked for ways to facilitate the design of an effective learning unit. Identifying essential learning activities in interventions which had been tried and tested, appeared to be a good starting point. Therefore, we first conducted a review of the research literature. *Chapter 2* reports on the systematic review, which yielded 16 studies. For each study, we calculated effect sizes based on reported text quality scores at posttest. The calculations revealed that six interventions had an effect size of  $> 0.80$  (i.e., a large effect). These interventions formed the basis for further analysis. First, this analysis indicated that effective synthesis writing instruction should encompass all three synthesizing processes, selecting, organizing, and connecting. Students can practice these processes by performing specific learning activities, such as comparing-and-contrasting sample synthesis texts, by ranking the samples, by comparing-contrasting source features and content, and by schematizing source content, using tables, concept maps, or graphic organizers. We regarded the learning activities in these effective interventions as valuable input for the learning unit we aimed to design. Second, we found indications that providing students with the option to choose from various strategies or learning activities within the unit could contribute to its effectiveness.

Therefore, we formulated two main design principles: theoretical insights on relations between learning activities, instruction, and the intended outcomes. The principles that guided the design of the learning unit were a. effective synthesis writing instruction should stimulate all three transformational processes, selecting, organizing, and connecting, during the intervention or learning process, and b. if we want to increase the effectiveness of an intervention even further, then we need to provide students with freedom of choice, so they can adapt the available strategies to their personal writing routine or develop their own strategies.

Next, based on the principles yielded by the literature review, we designed and evaluated a prototype of a synthesizing learning unit. In the design, we focused on ninth-grade pre-university students, because the teacher-researcher who conducted this research taught at a secondary school for pre-university education, with Grades 7 to 12. In addition, it is in secondary education that students reach the sensitive age for learning how to perform synthesizing tasks. In this age group, Brown and Day (as cited in Spivey & King, 1989, p. 20) found special gains in metacognitive development, such as an increased sensitivity to textual importance, use of text organization, and ability to supply connective links.

*Chapter 3* described the design process of the synthesizing learning unit. Additionally, we evaluated the quality of the unit. To that end, we considered three aspects: the validity, feasibility, and effectiveness of its design (Nieveen, 1999; Van den Akker, 1999). By formulating design principles, we aimed to achieve content validity, i.e., ensure that the unit represented state-of-the-art knowledge about learning how to synthesize. Starting points were the two basic design principles described in Chapter 2. We supplemented these two design principles with a third principle, because previous studies among students in ninth grade (Kieft et al., 2007; Kieft & Rijlaarsdam, 2008) showed that writing instruction based on different content planning strategies - a Preplanning by outlining (Post-it) strategy and a planning by Drafting strategy- sometimes resulted in different learning outcomes. The effect was moderated by the students' writing routine. In this study, we wanted to avoid such an interaction and aimed for an effect that is independent of writing routine. Therefore, students had to make an informed choice from the strategies, based on knowledge about their own writing routine. This resulted in the following framework for the content of the learning unit:

1. Focus on Cognitive Strategies: If students learn to apply strategies for selecting, organizing, and connecting, then they will write better synthesis texts.
2. Focus on Writing routines: If students are offered strategies for writing synthesis texts which match their personal writing routine, they will write better synthesis texts.
3. Activate Metacognition by Choice: If students are aware of the different strategies that are offered, so that they can decide which one might suit them best given their personal writing routine, they will write better synthesis texts.

In addition, we formulated principles that guided the mode of learning:

- A. Observational learning: If students acquire learning content as described in the three focus principles through observational learning, this will contribute to the effectiveness of the unit.
- B. Evaluating: If students are encouraged to evaluate through various types of learning activities, with the aim of developing task knowledge, this will contribute to the effectiveness of the unit.
- C. Practicing: If students have enough opportunity to apply what they have learned, first through scaffolded practice, and then gradually working towards independent, self-regulated task execution, this will contribute to the effectiveness of the unit.

Subsequently, the actual design of the unit was guided by the principles we formulated, which increased the likelihood of sufficient construct validity. Empirical user data indicated that the construct's operationalization was indeed valid: the construct was reflected in both the unit's content and structure. In addition, teachers were generally positive about the unit's overall feasibility and teacher logs indicated that the lessons were mostly taught as intended. Student data indicated that the unit was feasible for students, as well, and its overall effectiveness was confirmed. Furthermore, an analysis of students' choices between the two writing strategies (a Preplanning (Post-it) strategy and a Drafting strategy) showed a balanced distribution. Both strategies were feasible choices for the students. However, only 15.5% of students' reasons for choosing a specific strategy showed signs of insight in their own writing process. We had expected a larger effect of this learning activity related to design principle 3 (metacognition). This unexpected result could be an indication that students lacked a frame of reference and vocabulary to refer to their own writing processes. Therefore, we

redesigned the unit to create opportunities to raise students' awareness of their writing processes by adding an extra lesson to provide students with general information about writing processes.

Part of the design process of the prototype of the learning unit was the design of an animation video. This video was intended to prepare students for the synthesis assignment that the students performed prior to the intervention, while at the same time serving as a pre-test of the experimental design. We considered such an instruction to be essential because it was unlikely that ninth-grade students would already have a well-developed definition of the synthesis task. Developing their task definition through a short instructional video prior to the synthesis assignment would increase the probability of task validity. *Chapter 4* reports on the effectiveness of this three-minute video aimed at promoting the integration of source information into synthesis texts. Results indicated that students who viewed the video, wrote better integrated synthesis texts than students who did not, measured both analytically and holistically. It therefore seems that this brief pre-instruction can result in more integrated synthesis texts, based on a better developed task definition.

Then, we tested the prototype and redesign of the synthesizing learning unit in practice. *Chapter 5* reported on the results of two intervention studies. LCST 1, an efficacy study, was carried out in a controlled, single school setting ( $N = 152$ ), to determine whether the learning unit we designed was able to produce the desired outcome. We reported a full description of the design principles, an evaluation of its efficacy, preliminary analyses of its main effects and suggestions for a redesign in Chapter 3. In Chapter 5, we reported on its effectiveness. LCST 2 was set up as an effectiveness study, in which a redesigned version of the unit was implemented on a larger scale ( $N = 233$ ) in multiple schools.

The results of both studies demonstrated that the learning unit was generally effective for teaching ninth-grade students the basics of composing synthesis texts. However, analyses showed that in LCST 1 the effect was moderated by writing routine. To generalize the effect across writing routines, we provided students in LCST 2 with an extra session on metacognitive knowledge about (synthesis) writing processes and goal setting, enabling them to make better-informed strategy choices. Subsequently, the effect was no longer moderated by writing routine. This indicates that the redesigned intervention was equally effective for students with different routines. Furthermore, we examined the effect of strategy choices. The unit offered three possible learning paths: all-Preplanning (PP-PP), all-Drafting (D-D) and Switching (PP-D/D-PP). In LCST 1 we found that students who scored relatively high on Preplanning, often preferred the All-Preplanning path. Additionally, choosing the all-Preplanning path (PP-PP),

yielded significantly more learning gain than the all-Drafting path (D-D). We also observed a general effect of Preplanning, which means that higher Preplanning scores were associated with higher text quality scores, regardless of condition, measurement occasion and learning path. In LCST 2 we found no effects of learning path or writing routine.

In students' motives substantiating their strategy choices, we did not find differences between LCST 1 and 2 in terms of references to students' regular writing process. However, in LCST 2 we did find that students referred to their writing process related to upcoming synthesis tasks more often than in LCST 1, which may indicate that they had more metacognitive knowledge and thus were more aware of the influence of writing routine on task execution and made it easier for them to set clear writing goals.

Finally, in *Chapter 6*, we investigated the effect of a one-hour training session for students, on the coherence between peer and teacher assessments of synthesis texts. Strikingly, there is little agreement among teachers of Dutch about the requirements that written products must meet. Often the emphasis in the assessment of texts is on spelling and formulation errors, possibly with some general remarks about text structure (College voor Toetsen en Examen [Counsel for Tests and Exams], 2011). Regarding a genre that is still relatively unknown in secondary education, such as the synthesis text, there will certainly be a lack of clarity among teachers about what constitutes a good text. We expected that an assessment tool with which teachers can validly diagnose and assess the quality of synthesis texts would contribute to the introduction of the learning unit in education. We therefore developed an assessment tool and procedure based on the research literature (see also Chapter 3). The assessment tool turned out to be useful for teachers: the jury reliability of the teacher's evaluation of text quality was acceptable (see Chapters 3 and 5).

Besides the importance of a reliable evaluation of text quality by teachers, the evaluation of (parts of) synthesis texts by students (design principle B) was an important learning activity in the learning unit. Therefore, we wanted to learn more about the way these peer assessments of text quality relate to teacher assessments and the extent to which we can teach students to assess the quality of synthesis texts in the same way that experienced raters (experts) do. We first examined the degree of agreement between student and expert assessments in four areas: internal consistency, strictness, external coherence, and meaning. The results showed that student and expert agreement (internal consistency) did not differ at any measurement time and for any condition. Similarly, the conditions did not differ with respect to agreement on quality ranking (external coherence). Participation in an assessment training for students had no effect on these two

items. However, students did give the texts a significantly higher holistic rating than experts. After training, students' assessments were still higher, but the difference with experts' assessments had become significantly smaller compared to the pretest and disappeared completely when assessing texts on a different topic. In addition, the meaning of the holistic student assessment, i.e., the weighting of various aspects of text quality in the holistic final assessment, did not (completely) correspond to the holistic expert assessment at all measurement points, but after training it started to correspond more closely to the experts' weighting.

## 2 DISCUSSION OF THE MAIN FINDINGS

We provided the discussions on each of the individual studies in the respective chapters. Therefore, in the following paragraphs, we will focus on the research project's overarching limitations and indicate how these could be of interest to future research.

### 2.1 *Literature review*

A possible point of criticism on the review study reported in Chapter 2, is the choice of selection criteria that we used as a rationale for including or excluding studies. There are three possible problems related to this issue.

First, due to a lack of clarity about what a synthesis task is exactly, we included a broad selection of studies for the systematic literature review (see Chapter 2). Therefore, the review included all kinds of intervention studies related to source-based writing, including studies about, for example, historical reasoning. Of course, historical reasoning requires synthesizing information from different sources and one's own historical knowledge, but in these types of studies the emphasis on sourcing (cf Britt & Aglinskias, 2002) is often greater than in interventions that, for instance, focus mainly on learning to write synthesis texts. Nevertheless, we propose that even studies that did not directly focus on synthesizing as we defined it for this study (see Chapter 1) can still provide evidence for effective learning activities for learning how to synthesize. If we look further than just the basic learning unit that we have developed in the context of this dissertation, and see it as a preparation for, for example, learning to write a good theoretical framework in a research report, then sourcing is an important skill that can be added to the basic synthesizing skills *selecting*, *integrating*, and *connecting*, at a later stage. Therefore, it did not seem advisable to exclude these kinds of related studies in advance.



A second point of criticism could be the inclusion of interventions for students ranging from sixth grade up to college undergraduates. It can be problematic to pool studies across such a wide age range in the hope of improving instructional interventions for the middle grades of secondary education, based on the rationale that students all approach the synthesis task in similar ways. However, all the interventions we analysed focused on students who had little or no experience with performing synthesis tasks. Consequently, the similarity between these interventions was that all participants had to master the fundamental synthesizing processes, regardless of their level or age. A set of apparently diverse interventions could therefore serve as a basis for the specific intervention we developed for ninth-graders.

A third dilemma was that there are currently no guidelines available, to the best of our knowledge, for describing the content of an intervention in effect studies. As a result, descriptions of interventions are sometimes very limited, probably due to word count restrictions imposed by scientific journals. Nevertheless, it is important that interventions are well described considering replicability and interpretation of the results. A scheme on reporting the content and structure of writing interventions proposed by Rijlaarsdam et al. (2017), could serve as a guideline for this. Second, it is not always possible to determine an intervention's implementation quality (O'Donnell, 2008). In review studies, authors often develop their own systems to assess the fidelity of interventions (e.g., Graham & Perin, 2007). If the fidelity is insufficient, the results are less reliable or even unreliable. Yet it is often difficult to determine how well the implementation of an intervention has been monitored, mainly because of the same problems that we encounter in determining the exact content of an intervention.

Despite these limitations, the review study has been of great value to us in developing a framework on which to base the intervention. Investigating which learning materials are already available and have already been tried and tested, increases the probability that a new intervention will be embedded in the research field and results in an extension of the already existing knowledge base.

## *2.2 Designing and testing a learning unit*

In Chapters 3 to 5, we paid attention to the systematic design and evaluation of the learning unit. To evaluate the design's validity, feasibility, and effectiveness, we performed a literature study and collected empirical data (see Chapter 3). Overall, we found the validity, feasibility, and effectiveness acceptable, except for one thing. Based on the study of Robledo-Ramon (2016), we formulated a design principle in which we anticipated that the effectiveness of an intervention could

be increased if students are taught to make informed strategic choices based on metacognitive knowledge of their own writing process. Students' responses in our study, however, showed little sign of insight in their own writing process. Perhaps they lacked a frame of reference and the vocabulary to refer to their own writing processes. Therefore, we proposed creating opportunities to raise students' awareness of their writing processes. In a redesign of the unit, we added a lesson to the task representation phase of the intervention, to provide students with general information about writing processes and help them to set goals. By adding this lesson, we extended the original unit, which was already experienced as intensive by students as well as teachers. The risk was that this extension would not improve students' general motivation. However, the evaluation of the redesign (see Chapter 3) did not show that this was the case. What the analyses did show, was that the influence of writing routine and strategy choice had disappeared. However, whether this was caused by a reinforced frame of reference and the provision of vocabulary to articulate metacognitive processes could not be determined.

The unit's lessons were preceded by a whole-task assignment, as part of the task representation phase. In addition, this whole-task assignment was introduced with a pre-task instruction in the form of a short, animated video (see Chapter 4). This choice was motivated by two reasons. Based on Merrill's principles of instruction (2002), we expected a whole-task assignment to increase the unit's effect. This whole-task assignment was presented as part of the learning unit by comparing-and-contrasting various possible outcomes of this task (synthesis texts) as a learning activity in Lesson 1. Recent research by Overoye et al. (2021) shows that such a pre-task can contribute to the learning effect of an intervention. Additionally, Overoye et al (2021) found that providing learners with context prior to pretesting can enhance those benefits. In our studies, we provided context by showing the students an instructional animation video before the pre-task, because we expected students to have a poorly developed task definition. If this proved to be true, then their whole-task assignment could not serve as a valid pretest. However, a pre-task instruction might affect the outcomes of the intervention as measured at posttest. Results indicated that this was indeed the case: the pre-task instruction had a significant effect on the quality of integration of source information in synthesis texts. The overall quality of the synthesis texts written during the pre-task was therefore higher than it otherwise would have been. At the same time, a pre-task instruction increased the chance of valid pre-task measurements and reasonable pretest/posttest correlations. In LCST 2 the overall correlation between measurement occasion 1 and

2 was ( $r = .43, p < .001$ ), and between measurement occasion 2 and 3 ( $r = .34, p < .001$ ).

Both effect studies reported in Chapter 5, took place in a real-life school setting. This increased the ecological validity of the studies, but also had drawbacks. The first experiment was conducted by three teachers (including the teacher-researcher who developed the unit) from one school and closely monitored through observations, logbooks, and interim consultations. The second experiment was conducted by six teachers at three different schools. These teachers kept logs, but it was not possible to observe their lessons and during the implementation of the learning unit there was limited contact between the teacher-researcher and the teachers who carried out the lessons. The logs showed that all learning activities of the redesign were carried out as intended, but at the same time it is likely that the teachers who performed the redesign adhered less strictly to the implementation protocol than the teachers who performed the first design. Nevertheless, the learning unit proved effective in two independent studies, which each contained a direct replication due to the inclusion of a switching panels design (see Chapter 5). As a result, the external validity of the intervention, i.e., the generalizability of the results to other circumstances appears to be relatively large.

When testing and evaluating the first design, we paid a lot of attention to the analysis of the teaching materials and the observation and evaluation of the implementation of lessons in the classroom situation. Therefore, we were confident that the redesign would be feasible for teachers and students to use as well. However, a concern remains that it is difficult for teachers who have not developed the lessons themselves to carry out an intervention as intended by the researchers. First of all, teachers continuously have to deal with unforeseen events with a great deal of flexibility: lessons sometimes start later than planned, the fire alarm might go off, lessons can be shortened due to a 40-minute lesson schedule, etc. This can have major consequences for the implementation of an intervention and learning activities that were originally planned to be performed within the same lesson might have to be moved to subsequent lessons as a result. This can have consequences for the subsequent learning activities as well and can cause a chain reaction. Second, many teachers find it difficult to carry out the instructional activities which they have not developed themselves. Many like to add their own emphasis and/or feel the need to speed up or slowdown the lesson's tempo in response to students' reactions. As researchers, we think it is important for the ecological validity of the intervention that teachers are given the space to implement the unit in such a way that it suits their own school,

students, and vision. Fortunately, a switching panels research design allowed for some control of these aspects.

A switching panels research design offers the opportunity to measure the effect of an intervention in a comparison between an experimental and a control condition and to replicate any effect afterwards by switching the conditions. A successful replication is thus a strong confirmation of the effectiveness and at the same time ethical, since it enables all participants to participate in the intervention. Because the first synthesizing task in our studies was nested in M1 because of the whole-task assignment with follow-up in the first lesson of the unit, we chose to nest the other assignments as well. In a switching research design with three measurement occasions, sufficient information about the effect of an intervention can also be obtained in this way, provided the tasks are not too easy or too difficult. However, the design with three synthesis tasks nested in three measurement occasions also meant that progression over time could not be determined, because tasks were nested in measurement occasions. When visualized in a graph, this can give the impression that students' performance deteriorated from measurement occasion 1 to 2, while it is possible that the task nested in measurement occasion 2 turned out to be somewhat more complex than the task nested in measurement occasion 1.

The results of a study into the assessment skills of students compared to that of experts (see Chapter 6), showed that students can be taught to assess the quality of synthesis texts more like experts do, by means of a one-hour training. This effect was transferable to synthesis texts on a different subject than the one in which the students had been trained. The reliability of teacher assessments of synthesis texts, however, proved to be rather low. The interrater agreement in juries consisting of three independent assessors averaged around .60, among teachers as well as students. Under exam conditions, an agreement of .80 is desired. Such reliability would require a jury of eight assessors who evaluate texts, each independently rating each text (Spearman-Brown prophecy formula). Although a reliability of .80 is desirable, it is difficult to achieve in practice. However, even if we were to settle for a standard of .70, it would still require five independent assessors (Spearman-Brown prophecy formula). This is remarkable, because the raters were provided with an extensive rubric for the assessment, describing the aspects to pay attention to and a rating scale with anchor texts for the holistic assessment.

Another remarkable finding was that the meaning of the holistic assessment differed between tasks. In other words, the weighting of various aspects of text quality in the holistic assessment was significantly different for the task on endangered wild animals (Topic A, pretest and posttest) than for the task on

artificial food additives (Topic B, transfer test). However, this happened in the holistic expert assessments as well as in the student assessments. In all conditions, the weighting of the aspects in the holistic student assessments moved along with the shift in the weighting of experts, so that no significant difference could be demonstrated between the meaning of the holistic student and expert assessment of Topic B texts. The topic of the synthesis task thus seems to influence its assessment.

These results therefore confirm what was previously found by, among others, Schoonen (2012) and Van den Bergh et al. (2012). Not only are multiple assessors needed per text to generate a sufficiently reliable assessment, but students must also compose several (synthesis) texts in order to get a good idea of their (synthesis) writing skills. By allowing students to participate in the assessment after a short training, much can be gained in terms of reliability and writing multiple texts per term. Fortunately, nowadays there are many options for easily involving students in the assessment process. One example of such an option is having students evaluate each other's work in Comproved (Van Ockenburg, 2019).

### 3 FUTURE RESEARCH

This dissertation focused on learning to write within Dutch as school subject, and, consequently, there are some limitations to the scope of the research presented here. One limitation is that the tested learning unit mainly offers strategies for executing writing processes and pays less attention to reading processes. Although attention is paid during the intervention to the selection of relevant source information, which is a reading task, contributing strategies are only minimally represented. However, a good synthesis process requires a recursive alternation of reading and writing (Martínez et al., 2015). Therefore, an important part of the synthesis process remains underexposed because we chose to focus on learning-to-write in this study. Furthermore, we did not include reading literacy and general writing ability as explanatory variables in the analyses, because reliable information about the students' general reading and writing skills was lacking. In future research, perhaps more attention could be paid to a balanced distribution between practicing reading and writing strategies. More attention should also be paid to the influence of general reading and writing skills on the quality of synthesis texts.

Another limitation is related to the choice to focus on learning-to-write as well. A synthesis task is well-suited for writing-to-learn tasks, since the mental effort it takes to create a super-proposition from different sources (Segev-Miller, 2004) can contribute to the development of students' topic knowledge. The

learning unit was embedded in the school subject Dutch and the topics of the synthesizing tasks were related to Dutch (e.g., animal language; regional dialect). However, this had no implications for the measurement tasks. We used synthesis tasks that were created in the context of the LIFT project (Vandermeulen et al., 2020a). These tasks cover a wide area of interest, as they have been developed in line with the four possible exam profiles that students in upper secondary education can choose: Culture, Economics, Health, and Technology. However, although the tasks were designed to arouse students' interest, the topics were not related to content they were already learning about in their regular curriculum. In these studies, students did not compose synthesis texts to learn more about topics, and so there was no feedback or question about the (implicitly ever-present) knowledge acquisition component of the synthesis tasks. Knowledge acquisition did not play a role in this research, but neither did personal interest or motivation, since students were not allowed to choose the subject of the tasks themselves. This could have had a negative influence on the motivation of the students because it may not automatically be 'useful' for them to write about these topics, and motivational factors are known to make a fundamental contribution to text quality (Camacho et al., 2021.). Despite this limitation, the intervention proved to be sufficiently effective, but the question is whether this effectiveness can be achieved again in follow-up lessons without a direct curricular relationship. Future research into the relationship between subject-specific synthesis tasks and motivation could shed more light on this.

A third limitation is that the effect of the unit was only measured in ninth-grade pre-university education (vwo). The first design was tested in ninth-grade pre-university classes only, because of practical reasons. However, our goal was to also test the effect in ninth-grade general secondary education (havo), because many of these students proceed to higher vocational education, in which synthesizing skills are just as necessary as in academic education. Therefore, the redesign of the unit, was implemented in havo classes as well, but this was unsuccessful. Many teachers in senior general secondary education were unable to carry out the intervention in such a way that the data could be used for research. One teacher dropped out after the first lesson of the unit because he had not realized that participating in the intervention would require so much preparation. Other teachers at the senior general level were unable to carry out the lessons and measurements within the agreed time frame and to supply all the necessary data. Interestingly, the teachers who failed to successfully complete the intervention were not the teachers who had taken the initiative to participate in the intervention. In all cases, the initiative lay with the vwo teachers, who sometimes also taught a single havo class in addition to their vwo classes. The number

of *havo* classes that successfully completed the intervention was too small to include in the analyses. We regret this, as teachers of the few *havo* classes that successfully completed the intervention, indicated that they experienced a difference in the implementation of the unit in *havo* and *vwo*. Future research into the feasibility and effectiveness of the unit for *havo* would therefore be welcome.

A fourth and final limitation is the limited extent to which we have gained insight into the process of choosing between strategies. During the unit's lessons, the students were allowed to choose twice which planning strategy they wanted to apply. This enabled them to create their own learning path within one and the same unit: All-Preplanning (PP-PP), All-Drafting (D-D), or Switching (PP-D/D-PP). Students were asked to briefly describe the reasons for their choice in their workbooks. These reasons were analysed as part of the evaluation of the prototype (see Chapter 3) and again in the effect study (see Chapter 5). In the evaluation of the prototype, we coded the reasons bottom-up, i.e., data-driven. We found that hardly any of the reasons given were related to knowledge about (different components of) one's own writing process. In the effect study (see Chapter 5, LCST 2), we simplified the codes and only analysed whether reasons related to knowledge about one's own writing process focused on a. writing assignments from the past and/or b. future writing assignments. Overall, the total number of references to the writing process was limited. However, we did find a difference between LCST 1 and 2 regarding the influence of students' writing routines and their choices on holistic text quality. In LCST 1, both a preference for a Preplanning routine and the interaction between routine and learning path influenced text quality, while in LCST 2, no influence of writing routine and/or learning path on text quality was found. We could not explain this difference based on our analysis of the reasons students provided for their choices in their workbook. An explanation could be that the difference was caused by the extra lesson on writing processes that we added to the unit in LCST 2. This explanation is consistent with Kieft's conclusion (2008, p. 75-76) that writing routines are not the only variable affecting the effectiveness of writing instruction. Several studies showed that the level of self-monitoring (Snyder, 1987) interacts with the mode of writing (Galbraith, 1992; 1996; 1999). According to Snyder, high self-monitors are goal-oriented and monitor their expressive behaviour to ensure their rhetorical goals are met. By contrast, low self-monitors are more concerned with the freedom to express themselves, thus their expressive behaviour is usually less goal oriented. In the extra lesson on writing processes, the students are asked to make an individual plan for approaching the upcoming synthesis tasks. In this plan they therefore formulate goals for themselves. This could also ensure that low self-monitors work more purposefully than they normally would and that

the difference between high and low self-monitors is somewhat reduced. Future research will have to show exactly what the relationship is between writing routines, strategy choices, and text quality.

#### 4 CONCLUSION

To conclude, this dissertation expands our knowledge on learning to write synthesis texts. Specifically, it answered the main research question:

Does a unit that teaches students how to write synthesis texts, while taking different writing routines into account, improve the quality of ninth-grade pre-university students' synthesis texts, regardless of their preferred routine?

This dissertation showed that the analysis of proven effective interventions can be a good starting point for the design of a learning unit. Furthermore, a systematic evaluation of the validity, feasibility, and effectiveness of the prototype can provide valuable information for its redesign. While the prototype proved to be valid, feasible, and effective, we also found that achieving effectiveness independent of writing routine required more than merely offering choices from different strategies. Based on this outcome, it seemed that there was not yet sufficient attention for knowledge acquisition about one's own writing routine and setting writing goals. Therefore, in the redesign of the learning unit, we added an extra lesson on these aspects, thereby realizing the research goal: the effect of the unit was no longer moderated by writing routine. This result indicates that it might be feasible in regular educational practice to increase the effectiveness of writing education as well, by not only paying attention to practicing strategies, but also by reflecting on one's writing routine and setting goals. Finally, the tool we developed to validly assess the quality of synthesis texts proved to be sufficiently useful for both teachers and trained students.