The Effect of Practice Schedules on Learning from Instructional Videos

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Thank You

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Abstract

This study investigated the contribution of practice schedules' 'Blocked Practice (1) and Random Practice (2)'' in learning from 'Demonstration-Based Training' videos for software training. For blocked practice, a video is viewed and then an associated task is immediately performed. In random practice, couple of videos are viewed first, after which tasks are done. Furthermore, self-efficacy and flow experience were measured for experimental reasons. Four measurement moments were used: training, posttest, delayed posttest and transfer-test. 89 participants (mean age = 13.1, education level = primary school (N=30), high school (N=69) participated in this study. Conclusion is that random practice schedules lead to better performance on a post test and a delayed posttest. No effect was found on training and transfer. Blocked practice leads to higher self-efficacy after training. For flow experience, blocked practice scored higher on training and random practice scored higher on the delayed-posttest. This study recommends a random practice schedule when learning from instructional videos.

Keywords: instructional videos, practice, contextual interference effect, blocked practice, random practice, self-efficacy, flow experience

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1. Introduction

Over the last years, video tutorials are more often being used to learn software tasks (Briggs, Nunamaker, Zhang & Zhou, 2006; Brar & Van Der Meij, 2017; Van der Meij & Van der Meij 2014).

New computer software and improved hardware (Word, Excel, Adobe, Photoshop) both bring along difficult formatting tasks that can be learned with instructional videos (Mogul, 2014). Learning with instructional videos offers several distinct advantages: unlimited access to learning materials, it enables students to view a video as many times as they want and new software tasks can be integrated into new videos (Briggs et al, 2006).

According to Van der Meij, Van der Meij & Rensink (2017), an instructional video has two major goals: stimulate task performance and support the learning process so a learner can be independent. Research shows that students perform better by following a video instruction instead of a traditional instruction by paper (Van der Meij & Van der Meij, 2014). The use of videos, for example, ensures that a difficult action can be shown visually where it is difficult to explain this action verbally (Ertelt, Renkl & Spada, 2006).

Research from Brar & Van der Meij (2017), states that demonstration-based training (Rosen, Salas, Pavlas, Jensen, Fu and Lampton, 2010; Grossmann, Salas, Pavlas, & Rosen, 2013) combined with the multimedia learning theory of (Mayer, 2014) contains guidelines for the construction of instructional videos. A video instruction shows step by step how to perform a task. For example, a video shows a demonstration of a "software" task after which the user must try to reproduce this task as well as possible. Instructional videos that have been designed based on the DBT model contain design features that promote observation learning. These characteristics are attention, retention, production and motivation (Brar & Van der Meij, 2017). To promote the production, it is important that the task that is seen in the video, is practiced (Van der Meij, Van der Meij & Rensink, 2017; Van der Meij, Van der Meij, Voerman, Duipmans, 2018).

One way to practice is the use of practice schedules such as a random practice schedule and a blocked practice (Van Helsdingen, Van Gogh & Merriënboer, 2011; Van Helsdingen, Van Gogh & Merriënboer, 2011). In a random practice schedule, tasks are practiced in a random order, where in a block practice schedule practice is done according to a fixed pattern. Concluding for video learning: in blocked practice, a video is viewed and then an associated task is immediately performed. In random practice, a couple of videos are viewed first, after which tasks are done.

The benefits of practicing with instructional videos are found in several studies (Van der Meij et al, 2017; Van der Meij et al, 2018). Using practice schedules in video learning is a new research domain. Grossmann et al (2013) show that practicing according to one's own scenarios leads to better results than following a blocked practice sequence, but that it is unclear what effect this has on video learning. Therefore, this study investigates this issue. *So, in this study the research goal is to determine the effect of practice schedules when learning from instructional videos. Two conditions of practices schedules will be investigated within the domain of video-based software training in Microsoft Office 'Word'. This research also investigates the self-efficacy and flow-experience for*

experimental reasons. These new characteristics aren't measured yet in the use of practice schedules and can confirm the effect of random practice.

1.1. Theoretical Framework

1.1.1. Observational learning

An instruction video demonstrates a task-procedure, for example in this study, formatting a text in Microsoft Word. The correct method for accomplishing the task shown in instruction videos can be learned through observation-oriented learning (Van der Meij, Van der Meij & Rensink, 2017). Observational learning is defined as learning different steps in a particular sequence by watching a demonstration. Procedural knowledge can be obtained by observational learning and this knowledge is defined as executing particular steps to complete a task (Rittle-Johnson, Siegler & Alibali, 2001).

Observational learning is part of social learning theory (Bandura, 1977; Bandura, 1986) and this theory describes four processes that play an important role: attention, retention, production and motivation. First, in observation learning, attention must be focused on the important learning points and the other points must receive less attention. The second aspect is retention which stands for understanding the process, processing information (Bandura, 1977). The observed behavior must be saved into long term memory so that it is possible to reproduce the observation without an example. Third, the production process means that an observed task can exactly be reproduced (Bandura, 1977). In this theory, motivation is the driving process behind the other three factors, and with a high motivation, attention, retention and production will be improved (Bandura, 1977).

1.1.2. Demonstration based training

Based on the theory of social learning (Bandura, 1977; Bandura 1986), the demonstration-based training (DBT) model has been created (Rosen et al, 2010; Grossmann, Salas, Pavlas, & Rosen, 2013). Learning by observation alone does not lead directly to better learning outcomes and the DBT model ensures that attention, retention, production and motivation are put in a scheme with a number of descriptive features so that it leads to better learning outcomes (Rosen et al, 2010; Grossmann et al. al, 2013). The DBT model was developed for management education (Rosen et al, 2010; Grossmann et al. al, 2013). Brar & Van der Meij (2017) redesigned it for the purpose of software training and connected it to the theory of multimedia learning of Mayer (2014). It showed, for instance, attention can be increased by giving the viewer of the video a sense of control. In addition, retention can be promoted by dividing information into small, understandable segments. This way, information is better remembered and the motivation to learn will remain. Several other features of the DBT model for software training are mentioned in Appendix A. Furthermore, it is

possible that certain situational variables influence motivation. In addition, user characteristics can influence the process of observation learning within the model.

1.1.3 Instructional videos according DBT

Instructional videos based on the DBT model appear to be an effective way to promote learning from instructional videos (Brar & Van der Meij, 2017; Van der Meij, 2017; Van der Meij & Van der Meij, 2016). Research show that using videos for learning is a proven method to gain procedural knowledge (Brar & Van der Meij ,2017; Van der Meij, 2014). Students often feel motivated because they are challenged to get started with the assignment from the videos (Briggs et al, 2006). The step by step instructions in combination with the visual and auditory input ensure that students find instructional videos an entertaining way to learn (Ertelt et al, 2006; Van der Meij & Van der Meij, 2013). Research shows that the instructional video alone does not have a major learning effect and knowledge is quickly forgotten (Ertelt et al, 2006; Van der Meij & Van der Meij, 2016). Learning from instructional videos could best be stimulated with features from the DBT model (Brar & Van der Meij, 2017). One of those features is practice that promotes production, and practice also is needed to consolidate learning.

1.1.4 Practice in instructional video's

To learn a task performance, a student has to practice a task a few times when observing an instructional video. Practicing and repetition ensures that learning is improved, and knowledge enters the long-term memory (Anderson, 2008). Practicing promotes the production process that is part of social learning theory (Bandura, 1976). Several studies show that observation-based learning in combination with practice leads to higher learning outcomes (Wouters, Paas and van Merriënboer, 2010; Ertelt, 2007; Leppink, Paas, Van Gog, Van der Vleuten, & Van Merriënboer, 2014). Practicing stimulates reflection on the learning process. For example, observational learning can be passive and superficial (Leppink et al., 2014). Practicing during observation learning ensures that learning is done at a deeper level (Ertelt, 2007). Wouters et al, (2010) show that getting an example and the opportunity to practice supports building new knowledge. It supports the integration of new mental schemes into existing mental schemes. Practice with instructional videos has already been applied in studies (Van der Meij, Van der Meij & Rensink, 2017; Van der Meij, 2018, Van der Meij et al, 2018). For example, students perform better when first watching instructional videos followed by practice instead of practicing first, and then watch instructional videos afterwards (Van der Meij, Van der Meij & Rensink, 2017). A higher score for 'video- practice' can be explained by the fact that they see the

task being performed once. Variations in practice and the use of practice can be a promising way to stimulate task performance from instructional videos.

1.1.5 Blocked practice vs Random practice

This study focuses on practicing and the production process when learning from instructional videos. As described earlier, practice appears to promote learning from instructional videos. However, in the domain of learning from instructional videos, little research has yet been executed regarding different forms of practice schedules.

A variation of practice is the use of practice schedules. Studies by Van Helsdingen, et al., (2011) & Van Helsdingen, et al. (2011), make use of a blocked practice schedule (1) and a random practice schedule (2). In a blocked practice schedule, there are blocks in which, after a demonstration, a task is immediately followed that must be done. When a task has been completed a new demonstration with a new task follows. The learning effect in the training is high, because practicing a corresponding task immediately follows after the instruction. On the other hand, this way of training schedules results in a reduced learning effect in the long term. Possible reason is that a person does not have to make connections between the different tasks.

The other practice schedule described by Van Helsdingen, et al., (2011) & Van Helsdingen, et al. (2011) is the random practice schedule. In this way of practicing, a student first gets demonstrations about multiple tasks, after which he starts practicing the tasks after the demonstrations. This schedule of practice is more challenging in a training phase and leads to lower test results than the blocked schedule. A lot of information must be remembered, and it must be used effectively to be able to perform the tasks properly. In contrast, at a later stage, such as a posttest, a random practice schedule provides a better retention and transfer of knowledge than a blocked practice schedule.

The use of random practice schedules has been investigated in various domains such as, for example, sports practice (Broadbent, Causer, Ford & Williams, 2015; Lee & Simon, 2004; Rendal et al, 2010), motor tasks (Guadagnoli & Lee, 2004; Brady, 1998 ; Shea & Morgan, 1979; Lee & Magill, 1983 1985), problem solving tasks (Paas & Van Merriënboer, 1994) , perceptual cognitive task (Broadbent, Causer, Ford & Williams, 2017). The use of random practice, for example, ensures that movements are stored implicitly and can therefore be used better in new situations (Rendall et al, 2010). In addition, research by Broadbent et al., 2017 shows that random viewing of simulations of sports actions ensures that these actions are performed better in practice than when these actions are viewed in a fixed pattern.

1.1.6 Contextual interference effect

The favorable learning outcomes when using a random practice schedule are due to the contextual interference effect 'CI-effect' (Lee & Simon, 2004; Helsdingen et al, 2011; Shea & Morgan, 1979; Rendal et al, 2010; Brady, 1998; Hall & Magill, 1990;). According to Hall & Magill (1990*), the CI effect is a learning phenomenon where interference during practice is beneficial to skill learning* (p. 285). A high level of contextual interference, in contrast to a low level, leads to poorer performance during training, but ensures superior retention (learning effect) and transfer.

The contextual interference effect can be explained by two different hypotheses namely: forgetting reconstruction hypothesis (Lee & Magill, 1983 1985). and the elaborative processing hypothesis (Shea & Morgan, 1979). The forgetting reconstruction hypothesis (Lee & Magill, 1983 1985) states that random practice forces students to constantly develop new strategies to fulfill the tasks successful; since they cannot use the same task strategy for successive tasks. For example, in a blocked practice a strategy is developed by the student to perform a task based on a demonstration. This pattern can be repeated repetitively whereby a learned strategy is immediately applied to a task which ensures successful task performance but not directly related to deep learning. In random practice, a student must constantly reconstruct his strategy to succeed on task performance. This ensures that practicing is more difficult but that learning takes place at a deeper level.

The other explanation for the CI effect is the elaborative processing hypothesis. This hypothesis (Shea & Morgan, 1979) states that random practice ensures that a large diversity of explanations of different tasks causes a student to filter relevant information in order to successfully perform a certain task (Helsdingen et al, Lin; Fisher, Winstein, Wu, & Gordon, 2008). In blocked practice, an explanation is first given about a task, after which the task is practiced. This pattern of practice is not very demanding for a student, since only the steps to be performed of one task must be remembered. This exercise schedule will therefore ensure high scores in a training but lower score in retention or transfer test. In contrast, random practice encourages a student to make strong representations in memory so that multiple variations in tasks and skills are continuously activated in the working memory.

1.1.7 Self-efficacy and Flow experience

Using the random exercise schedule can therefore be a promising way to promote learning from video tutorials. Within the domain of video learning, in a random practice condition, a couple of videos are first viewed, after which tasks are done. In the case of a blocked order, a video is viewed and then an associated task is immediately executed.

In addition to the variation in practice schedules, this study also investigates the effect of self-efficacy when using practice schedules (CI-Effect) for experimental reasons. Self-efficacy is the belief in one's own ability to properly complete a task (Bandura, 1977 & Schunk & Pajares, 2009). Self-efficacy will increase when a student is acquiring new skills in a process (Schunk & Pajares, 2009) and is predictor for success on task performance. In addition, it is related to motivation, which promotes learning from the DBT model (Brar & Van der Meij 2017). Motivation is one of the key features from the DBT model (Appendix A) that is the driving process behind attention, retention, production. Practicing is part of the production process, so a high self-efficacy in practices schedules should lead to a better task performance. A motivation to measure self-efficacy in this study is that this has not been researched in combination with contextual interference effect.

At last, flow experience is measured in this study to investigate the effect of cognitive load in the CI effect. Studies into the CI effect mention that random practice leads to a higher load on the working memory and therefore a higher cognitive load (Van Helsdingen et al, 2011; Van Helsdingen et al, 2011). There are no studies to the CI effect where this was actually measured, and in this study, this is measured in an experimental way by looking at the flow experience. Flow is a state in which an individual can make maximum use of his skills to perform a task (Csikszentmihalyi & LeFevre, 1989). Thoughts, feelings to solve a problem flow seamlessly into each other and it is a state of optimal concentration. (Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2014)

1.2 Study Design

So, the aim of this study is to investigate the effect of practice schedules (CI - Effect) by learning from instructional videos. These video tutorials show demonstrations on how to perform a certain formatting task in Microsoft Word. This study used an experimental design involving two different groups: blocked practice (BP) and random practice (RP). Practice schedules will be used as an independent variable and self-efficacy, flow experience, and task performance are dependent variables. In the control condition (BP), a video will be watched, directly after which a corresponding task will be done. Students in the experimental condition first watch all the video tutorials of a chapter (2 or more videos) and have to practice on corresponding tasks afterwards.

The following research questions will be investigated to determine the effect of practice schedules:

1. *Research question 1: What is the effect of blocked practice and random practice on task performance during training, posttest, delayed posttest and transfer test?*

The learning effect of the instructional videos is measured by the performance on the tasks. Practicing the formatting tasks will happen during the training when videos are viewed. In line with

earlier research (Hall & Magill, 1990; Helsdingen et al., 2011; Shea & Morgan, 1979; Rendal et al, 2010; Brady, 1998) regarding the contextual interference effect, a posttest and a delayed posttest will be used after the training to investigate the effect of practice schedules. The hypothesis is that the blocked practice group will achieve a better score in the training and a lower score in the post training tests (posttest, delayed posttest and transfer test) than the random practice group.

2. *Research question 2: What is the effect of blocked practice and random practice on self-efficacy before and after the training?*

The motivation to measure self-efficacy (SE) in this study is that little research has been conducted regarding this concept in combination with the contextual interference effect. Self-efficacy can be defined as the personal judgment of how good one considers him- or herself capable of achieving goals according the situation (Bandura, 1976; & Schunk & Pajares, 2009) A strong belief of self-efficacy is positively related to greater task involvement and leads to better results on future tasks (Schunk & Pajares, 2009).

The hypothesis is that the blocked exercise condition will achieve higher self-efficacy after training compared to the random practice group. The SE questionnaire is measured directly after the training and the blocked practice group should not suffer from a relative degradation of post-training performances and transfer, which is expected at the random practice condition.

3. *Research question 3: What is the effect of blocked practice and random practice on the flow experience during training and after training (posttest, delayed posttest and transfer test)?*

This study measures the flow experience to investigate the cognitive load during training and after training. Flow can be defined as the holistic experience that people feel when they function at their full capacity in combination with the performance on a learning task (Csikszentmihalyi & LeFevre, 1989). Flow shows if a student has the optimum concentration during performance (Shernoff et al, 2014). Studies into the CI effect state that cognitive load will be different for the different combinations of practice schedules during and after training, but this is not been measured yet. In addition, the instructional videos used in this study are designed according to guidelines to keep the cognitive load for the user as low as possible so that the video itself will not influence the flow experience (Mayer, 2014; Van der Meij & Van der Meij 2013). The hypothesis being tested is that the flow will be highest for the blocked practice group during training and that it will decrease for posttest, delayed posttest and transfer test. The random practice group is expected to score lower on flow experience during training but higher on the posttest, late posttest and transfer test.

2 Method

2.1 Respondents

89 students participated in this study. 30 respondents were from seventh grade of a Dutch primary school and 69 of them followed second class of a Dutch high school. 83 students were included in this study, six respondents were excluded due to errors during the experiment (like illness during the first session, technical problems with the internet connection). The students had an age between nine and fifteen years old, with an average of 13 years old (M=13,1; SD= 8,1). There were 56 male respondents (67,1%) and 27 female respondents (32,9%) participating. All students were native Dutch speakers. The respondents were novice or beginners in Microsoft Word.
The students were randomly assigned to the conditions. The blocked practice group consisted of 28 men and 16 women. The random practice group consisted of 27 men and twelve women. The study took place during regular school times (08:30 – 14:15, primary school; 08:30 – 15:15 high school). The purpose of the study and the intended learning effect was discussed with the teachers of the schools. They gave permission for the research, as it is expected that the experiment will teach the students about computer skills and thus contributes to the development of this students. In addition, all students received a letter (Appendix B) for their parents in which the study was explained. All used materials for this study were stated in Dutch language, since the study was conducted in with Dutch students the Netherlands. Approval for the study was obtained from the Ethical Committee of the University of Twente.

2.2 Materials

Various materials were used for this study, like instruction videos, composed manuals, prepared Word documents, USB sticks and questionnaires to measure both flow and self-efficacy. A website was used to let the students watch all the instruction videos.

2.2.1 Videos

In this study, eight existing videos were used to teach the respondents formatting tasks in Microsoft Office Word. These videos have been successfully used into similar studies regarding the learning effect of instructional videos (Van der Meij, 2014; Van der Meij & Van der Meij, 2016). The videos were organized in three different chapters. Chapter 1 ‘Adjust the margins for the entire text’ consists of twee different videos: 1.1 Adjust the right margin (00:52), and 1.2 Adjust the left margin (00:42). Three videos were presented in chapter 2 ‘Adjust the margin for text segments’: 2.1 Indenting a citation to the left (00:45), 2.2 Indenting a citation to the right (00:45), and 2.3 Adjust the

margins for a list (1:06). Chapter 3 'Create an automatic table of contents' contained three instructional videos as well: 3.1 Give chapter titles a style (00:59), 3.2 Give paragraph titles a style (1:15), and 3.3 Create an automatic table of contents (00:53).

Word 2003 is used in the videos, while Word 2010 is used in the experiment. After a pre-test it turned out this did not influence the experiment. The videos are recorded in Dutch. The videos were designed according to the eight guidelines of Van der Meij, Van der Meij (2013.

The instructional videos were available through a website, figure 1 (instructievideo.gw.utwente.nl). On the left side there was a menu with a table of contents where students could select the chapter with the video they needed to watch. Students were able to control some basis settings while watching video's like: press play, stop, rewind and forward. Furthermore, the students could click on the full-screen button and change the volume of the video.

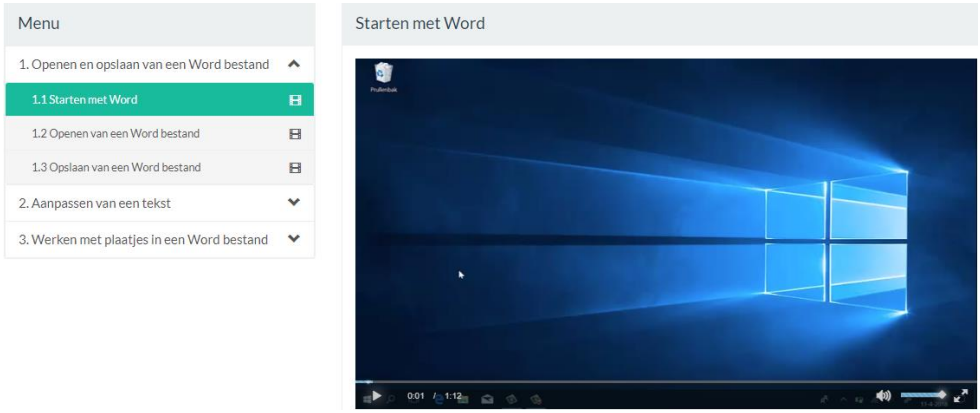


Figure 1. screenshot of the website

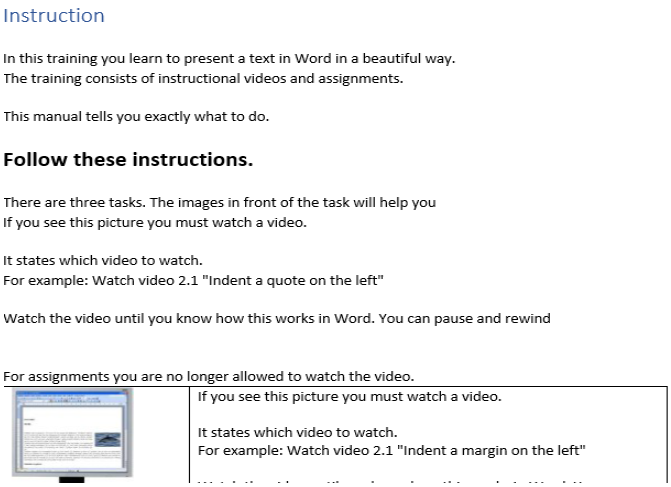
2.2.2 Instruction manual

A paper manual guided the students during practice. Clearly, these manuals vary for the two conditions (random practice (RP); blocked practice (BP). In the blocked practice condition, an instruction to watch a video (V) was immediately followed by an instruction to execute the corresponding task (V1.1- P1.1, V1.2-P1.2-V1.3-P1.3). The manual for the random practice condition explained that, all videos of the relevant chapter had to be viewed first, after which the tasks of that chapter had to be completed (V1.1 – V1.2- V1.3, P1 - P2 -P3).

Both manuals start with an explanation which gives exact directions on what respondent had to do during the experiment. In addition, symbols (watch a video, make an assignment, fill in a questionnaire) that represented a specific action that needed to be completed (figure 2) were explained in the manual. The symbol 'watch a video' explained that students can watch a video as many times as they like until they understand the content and that they have the option to pause or rewind a video. Within 'make an assignment' it is first explicitly stated that it is not permitted to watch a video again. Furthermore, the instructions that must be completed in a sequential order

were explained. For example: which file must be opened, instructions for the formatting task, instructions to save the document and to close it or leave it open for the next task. At last, all manuals included a flow questionnaire (Fill in a questionnaire) after each chapter.

An experiment script was designed to guide the experiment. The script showed exactly what had to be told during the experiment. This way, the respondents received the same verbal instructions in both conditions. Appendix C shows the experiment script.


Instruction

In this training you learn to present a text in Word in a beautiful way.
The training consists of instructional videos and assignments.

This manual tells you exactly what to do.

Follow these instructions.

There are three tasks. The images in front of the task will help you
If you see this picture you must watch a video.

It states which video to watch.
For example: Watch video 2.1 "Indent a quote on the left"

Watch the video until you know how this works in Word. You can pause and rewind

For assignments you are no longer allowed to watch the video.

If you see this picture you must watch a video.

It states which video to watch.
For example: Watch video 2.1 "Indent a margin on the left"

Figure 2. screenshot of the first page from the manual

2.2.3 Word documents

Word files were created to allow the students to practice during training. These Word files left a similar problem to the topics in the instructional videos. For every different part of the training, posttest, delayed posttest and transfer test, a different Word file was used. All Word files had the same underlying structure regarding to the specific chapter. The Word files were available on a USB stick. The correct Word documents were saved on the USB stick just before each session.

2.3 Measurement instruments

The following variables were measured in this study: Task performance, Self-efficacy and Flow experience.

2.3.1 Task performance

There were four assessments of task performances: 1. practice 2, posttest. 3. delayed posttest and 4. transfer test. The first three tests had a similar set-up with 8 items. Each item was linked to an accompanying instructional video. The tasks differed from each other but have the same

underlying structure and the same characteristics. The tasks can be found in the manuals in Appendix D.

Coding the answers was supported by codebooks (Appendix E). A score of 0 was assigned to tasks that had not been performed or had been performed completely incorrect. Students were able to score 0.5 points for certain assignments if they achieved the learning objective of the task correctly but, for example, had selected the wrong piece of text. Respondents received a score of 1 when a task was performed perfectly. Minor mistakes were ignored. For item 2.3 "clarifying a list" (Figure 3), 2 points could be earned. For example, 1 point could be earned when the 'bullet' was used, and the other point could be earned when the list was aligned using tabs. Thus, the maximum score is 9 for all tests. Reliability analyses show that the Cronbach's Alpha is good for all three tests: training phase (α = .81), posttest (α = .88), delayed posttest (α = .82).

The *transfer* test contained items that were not trained but related to the learning objectives. There were 4 items in the transfer test. The first item contained a task in which the top line of a document must be adjusted. The second item contained a dual task where the list must first be made clear and then a segment of text must be quoted. For item three, the student had to indent the first line of each paragraph. At last, the fourth item contained a dual task where a piece of text must first be moved to another place, after which the table of contents had to be refreshed.

Students could earn a maximum of 7 points for the transfer test. With task 2, 3 points could be earned and with task 4, 2 points could be earned. Mean scores for all the four tests were reported. Reliability analyses showed a good Cronbach's Alpha for the transfer test (α = .86)

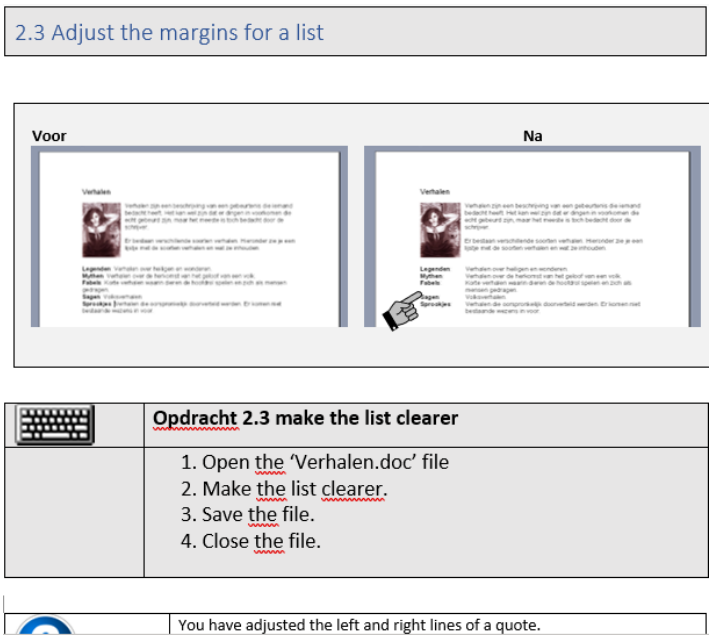


Figure 3. Screenshot of item 2.3 from the posttest

2.3.2 Self-Efficacy

Self-efficacy is the belief that a respondent has the ability to perform a certain task successfully (Bandura, 1977). This was measured with a pen and paper questionnaire based on the Initial Experience and Motivation Questionnaire (IEMQ) (Van der Meij & Van der Meij, 2014). The self-efficacy questionnaires were used twice in this study, once before the training and immediately after the training. Before and after pictures were shown to students about the formatting tasks in Word that occurred in the training phase. The students were asked the same question: "How well do you think you can complete this task?". (see figure 4). A seven-point Likert scale is used. Answers can range from (1) very bad to (7) very well. The mean score for the self-efficacy questionnaires will be reported. Reliability analyzes showed that Cronbach's Alpha was good for the two questionnaires: self-efficacy before training (α = .83), and self-efficacy after training (α = .87).

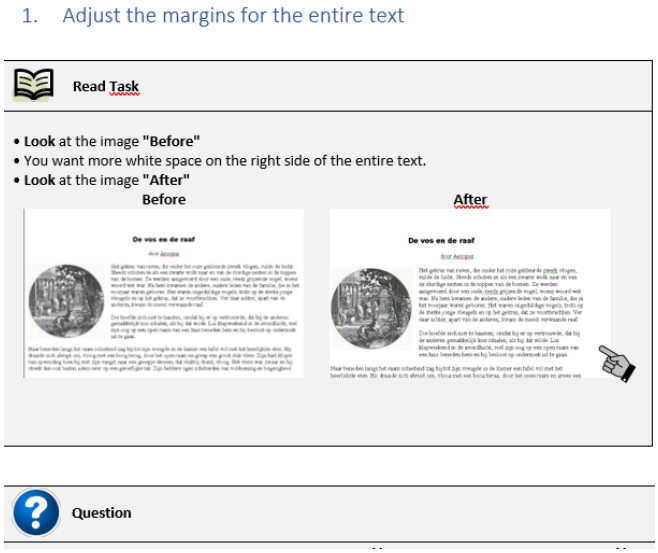


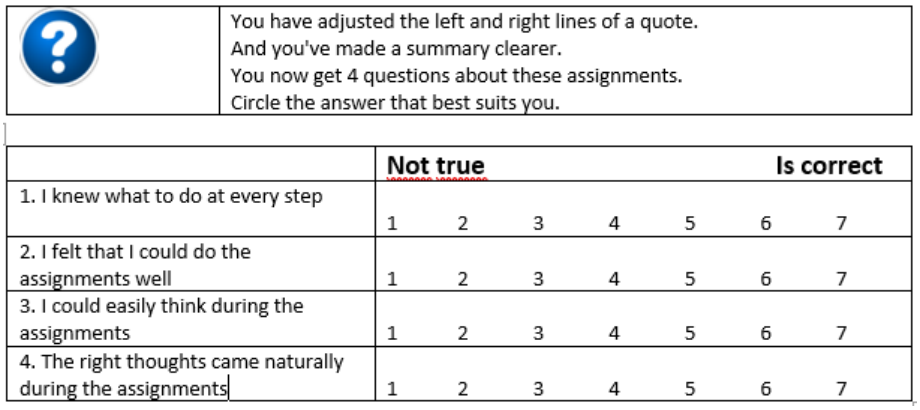
Figure 4. screenshot of an item from the self-efficacy questionnaire

2.3.3 Flow experience

The flow experiences of the students were measured while conducting the tasks. Flow can be defined as the holistic experience that people feel when they function at their full capacity in combination with the performance on a learning task (Csikszentmihalyi & LeFevre, 1989; Shernof Et all, 2014). Flow was measured with a pen and paper questionnaire based on the Experience Sample Form (Shernoff et al., 2014). The flow questionnaire consisted of 4 items. Examples of statements that the students had to answer are: "I knew what to do at every step" and "The right thoughts came naturally during the assignments". A seven-point Likert-scale is used. Answers can range from (1) completely not suits me to (7) completely suits me (see Figure 4). Flow experience questions were

included in the manual after each chapter during practice (i.e., 3 times), and after these topics had appeared in the posttest, and delayed posttest. Flow was measured after each item in the transfer test.

Cronbach's alpha was calculated for each measurement moment. Reliability analyses for the training showed that Cronbach's alpha was excellent for each chapter: chapter 1 (α = .91), chapter 2 (α = .95), and chapter 3 (α =.97). Reliability analyses for the posttest showed an excellent Cronbach's alpha for: chapter 1 (α = .94), chapter 2 (α = .98), and chapter 3 (α =.99). Reliability analyses for the delayed posttest as well showed that Cronbach's alpha was excellent: chapter 1 (α = .95), chapter 2 (α = .98), and chapter 3 (α =.97). At last, also reliability analyses for the transfer showed that Cronbach's alpha was excellent: chapter 1 (α = .97), chapter 2 (α = .98), chapter 3 (α =.98), chapter 4 (α =.97). Mean scores for flow experience per performance assessment were computed. Reliability analyses showed that Cronbach's alpha was excellent: practice (α = .96), posttest (α = .95), delayed posttest (α = .92), and transfer test (α =.95). Only these overall mean scores will be reported in the results.



	You have adjusted the left and right lines of a quote. And you've made a summary clearer. You now get 4 questions about these assignments. Circle the answer that best suits you.

	Not true						Is correct
1. I knew what to do at every step	1	2	3	4	5	6	7
2. I felt that I could do the assignments well	1	2	3	4	5	6	7
3. I could easily think during the assignments	1	2	3	4	5	6	7
4. The right thoughts came naturally during the assignments	1	2	3	4	5	6	7

Figure 4. Screenshot items flow questionnaire

2.4 Procedure

The experiment was conducted in two schools. In the primary school the research was held in a regular classroom and in high school the experiment was conducted in a computer classroom. There was a maximum of 32 seats at both locations. The study was executed during normal school days. The study consisted of one preparatory and two empirical sessions.

The prep-session (Appendix C) (10 min) took place a week before training. It was briefly explained that an experiment would take place on how to perform certain tasks in Word using instructional videos. Besides, the teacher explained the about the research and about is role during the execution. USB sticks were used to set up the Word documents. These USB sticks were numbered (101-115, 201-215,301-331, 401-428) during each session, whereby the researcher in

advance determined which numbers belong to which condition. The random distribution was completed by plugging the USB sticks into certain computers while the students didn't know about the different conditions. The first session consisted of pre-training assessment, training with the videos and the post test. In the second session, a late posttest and the transfer test were executed. In addition, the self-efficacy questionnaire was administered during the first session and the flow questionnaires were administered during both sessions.

In primary school, laptops were used during the experiment, while fixed computers were used in high school. The website with videos was opened on every computer for the first session. The manuals were arranged in correct order on the desks with a pencil. The students were also asked to bring their own pen and earplugs. If necessary, the researcher had extra ear plugs available for the students.

At the start of the first session, the researcher gave a short introduction about the training and the video website. The experiment script (Appendix C) was followed including a short explanation of the video website and a 'how to' guide of the manuals.

The first self-efficacy questionnaire (5 min) was completed first. Afterwards, the students started with the training (25 min), in which the students had to watch videos based on the condition they were in. The blocked practice condition had to watch a video and immediately had to do the corresponding task. (V1.1-P1.1, V1.2-P1.2). The random practice condition first had to view all the videos of a chapter, after which the corresponding assignments were conducted (V1.1-V1.2, P1.1-P1.2). After each chapter a flow questionnaire had to be completed. After completing the training, the same questionnaire for self-efficacy (5 min) was filled in again. Subsequently, the posttest (15 min) was done, followed by the flow questionnaires.

Exactly one week later, the second session took place during which the students took the delayed posttest (15 min) and a transfer test (15 min). Both tests contained flow questionnaires. Most students had enough time during both sessions to complete the assignments during the training. In the event of technical problems, the time was stopped by the researcher so that the respondents had extra time to complete the assignments. There were only a few students in the three classes who did not complete the assignments within the time limit. At both sessions, the researcher and the teacher supervised the course of the research. It was told that work had to be done individually in silence. If the students were ready earlier, they could hand in the manuals and USB stick to the researcher and wait until the experiment was finished.

2.5 Data analysis

The data were analyzed with the program IBM SPSS Statistics version 25. First, the random distribution of the data of the characteristics of the participants (age, gender and class) was done. A chi square test shows that there are no significant differences in the conditions between gender, x^2 (1), p = .289. The blocked practice group consisted of 28 men and 16 women. The random practice group consisted of 27 man and twelve women. An ANOVA test showed that there are no differences between the conditions regarding age, F (1, 82) = 1.71, p = .374. The blocked practice condition had an average age of 12.92 (SD = 1.87) and the random condition had an average age of 13.28 (SD = 1.75). In this analysis, practices schedules and the four measurement moments (training, posttest, delayed posttest and transfer test) are the independent variables. The dependent variables are task performance, self-efficacy and flow experience.

It appeared during the experiment that respondents submitted incomplete questionnaires (Flow, Self-Efficacy). In this study, it was therefore decided to calculate the mean scores of the variables so that the missing values will fall out. Two participants in the blocked practice condition and two students in the random practice condition were unable to complete tasks within the time limit. Compared to the other respondents, this rarely happened so it was decided to include these scores in the calculations, and these were scored with zero.

During the experiment in group 7, the server where the students were logged in failed and ten students from the random condition were therefore unable to take the post-test during the experiment within the time limit. These students therefore had no score in the post-test, and it was decided not to include these students in the task performance analysis (table 1). Analysis without time limit were included in Appendix F.

Tests on normality show that the dependent variables (task execution, flow and self-efficacy) are not normally distributed, so that a non-parametric test was chosen in this study, Mann Whitney U test. Tests were two-tailed with alpha set at 0.05. Cohen's (1988) d-statistic was used to indicate the effect size, classified as small for d = 0.20, medium for d = 0.50, and large for d = 0.80.

3 Results

3.1 The effect of practice schedules on task performance

3.1.1 Training

Table 1 shows the findings for the effect of practice schedules on tasks performance of respondents during the training and posttest. A Mann Whitney U test for the training phase showed there is no statistical significant difference in the mean scores between the two conditions, Z (-1.347) *U*= 676,5, *p*=. 178. This means that the task performance of the two conditions during the training can be considered as equal.

3.1.2 Posttest

A Mann Whitney U test for the task performance during the posttest showed that there is a statically significant difference in score between the two conditions, *Z* (2.261) *U*= 732, *p*= .024 *d*= .63. This means that the task performance of random practice condition is higher than the task performance of the blocked practice condition. The random practice condition outperformed the mixed practice condition on the posttest.

Table 1. Mean task performance on training (maximum score= 9) and posttest (maximum score= 9)

Condition	Task performance training		Task performance posttest	
	Mean	(*SD*)	Mean	(*SD*)
Blocked practice(N=44,41) *	7.15	(2.55)	4.81	(3.19)
Random practice(N=37,27[a]) *	7.11	(2.52)	6.61	(2.04)
Total(N=81,68) *	7.14	(2.27)	5.54	(3.06)

*Number of participants for task performance during training and posttest
a= due to technical errors during the experiment, 10 respondents from 'random practice' were unable to take the posttest due to technical problems.

3.1.3 Delayed posttest

Table 2 shows the findings for the effect of practice schedules on task performance of participants during the delayed posttest and transfer test. A Mann Whitney U test showed that there is a statistical significant difference in mean scores between the conditions on the delayed posttest, *Z* (2.192) *U*= 929, *p*= 0.028, *d*= .58. It means that the mean task performance of the random practice group is higher than the mean task performance of the blocked practice condition. The random practice group outperformed the blocked practice group on the delayed posttest.

3.1.4 Transfer test

A Mann Whitney U test for the transfer test showed that there is no statistical significant difference on task performance between the two conditions, *Z* (1.055) *U*= 859.5, *p*= .291. This means that the task performance during the transfer test can be considered as equal.

Table 2. Mean task performance on delayed posttest (maximum score= 9) and transfer test (maximum score= 7)

Condition	Task performance delayed posttest		Task performance transfer test	
	Mean	(*SD*)	Mean	(*SD*)
Blocked practice(N=40,42) *	5.19	(2.82)	2.38	(2.21)
Random practice (N= 36,36) *	6.61	(2.04)	2.94	(2.35)
Total(N=76,78) *	5.86	(2.56)	2.64	(2.27)

*= Number of participants for task performance during training and delayed posttest and transfer test

3.2 The effect of practice schedules on self-efficacy

3.2.1 Before training

Table 3 shows the results for the self-efficacy test for the both conditions. A Mann Whitney U test shows that there is no statistical significant difference on the self-efficacy test before training, *Z* (.185) *U*= 833.5, *p*= .853. This means that the mean score for the blocked and random practice group can be considered as equal. There is no difference between the mean scores on the self-efficacy test before training.

3.2.2 After Training

A Mann Whitney U analysis shows that is a statistical significant difference for the self-efficacy test after training for both conditions, *Z*(-2.78) *U*= 517.5, *p*= .006, *d*= .46. This means that the blocked practice group scored higher on the self-efficacy test after training than the random practice group. The blocked practice group outperformed the random practice group on the self-efficacy questionnaire after training.

Table 3. Mean Self efficacy per condition and test (maximum score = 7).

Condition	Self-Efficacy before training		Self-efficacy after training	
	Mean	(*SD*)	Mean	(*SD*)
Blocked Practice(N=44,42) *	4.82	(1.37)	6.50	(0.90)
Random Practice(N=37,38) *	4.87	(1.28)	6.08	(0.85)
Total (N=81, 80) *	4.84	(1.35)	6.30	(0.89)

*= Number of participants for self-efficacy test before and after training

3.3 The effect of practice schedules on flow experience

3.3.1 Training

Table 4 shows the findings for the effect of practice schedules on the flow experience for the training a posttest. A Mann Whitney U test for the flow experience during training shows that there is a statistical significant difference between the two conditions, *Z* (-1.967) *U*= 534.5, *p*= 0.049, *d*=.14. The mean score for the blocked practice group is higher than the mean score for the random practice group on flow experience during training. This means that the blocked practice group experienced a higher state of flow during training than the random practice group.

3.3.2 Posttest

A Mann Whitney U test for the flow experience during the posttest shows that there is no statistical significant difference in mean score for both conditions, *Z* (-.229) *U*= 562, *p*= .819. This means that the mean score for the flow experience on the post test is the same for both conditions.

Table 4. Mean flow experience scores on training (maximum score= 7) and (posttest (maximum score= 7)

Condition	Flow during training		Flow during posttest	
	Mean	(*SD*)	Mean	(*SD*)
Blocked practice(N=39,40)	6.46	(1.10)	6.29	(1.29)
Random practice(N=37,29[a])	6.33	(0.83)	6.60	(0.48)
Total(N=76,69)	6.40	(0.97)	5.93	(1.25)

*= Number of participants for flow experience during training and posttest
a= due to technical errors during the experiment, 10 respondents from 'random practice' were unable to take the posttest due to technical problems.

3.3.3 Delayed posttest

Table 5 shows the findings for the effect of practice schedules on the flow experience for the delayed posttest and transfer test. A Mann Whitney U test for the flow experience on the delayed posttest showed that there is a statistical significant difference between the two groups, Z (2.099) *U*=922.5, *p*=0.036, *d*=.41. This mean score on flow experience during the delayed posttest is higher for the random practice group than the blocked practice group. The random practice group experienced a higher flow experience during the delayed posttest than the blocked practice group.

3.3.4 Transfer test

A Mann Whitney U test for flow experience on the transfer test shows that there is no statistical significant difference in mean score between the two different conditions, *Z* (-.869) *U*= 556 *p*= .385. For the transfer test, this means that the mean scores for the flow experience can be

considered as equal for botch conditions. In short, there is no difference in flow experience between the random practice group and the blocked practice group for the transfer test.

Table 5. Mean flow experience scores on delayed posttest (maximum score= 7) and transfer test (maximum score= 7)

Condition	Flow during delayed posttest		Flow during transfer test	
	Mean	(*SD*)	Mean	(*SD*)
Blocked practice (N=39,33) *	5.68	(1.34)	5.97	(1.75)
Random practice (N=37,29) *	6.18	(1.11)	5.86	(1.62)
Total(N=76,71) *	5.93	(1.26)	5.91	(1.67)

*= Number of participants for flow experience during delayed posttest and transfer test

4 Discussion

The main goal of this study was to investigate the effect of practice schedules on learning with instructional videos. In this research an experimental design with a control group (blocked practice) and an experimental group (random practice) was used. Furthermore, four different measurement moments were used: training phase, posttest, delayed posttest and a transfer test.

4.1 The effect of practice schedules on task performance

The first research question was about the effect of practice schedules on task performance. The results from this study partly confirm the predetermined hypothesis. The random practice condition had a higher score on task performance in the post test, delayed posttest than the blocked practice group. Furthermore, no effect was found from different practice schedules on task performance during the training test and transfer test. These findings confirm earlier research into the contextual interference effect (Lee & Simon, 2004; Van Helsdingen et al,2011; Van Helsdingen et al, 2011;) in which a random practice sequence ensures better retention during post training test. This study shows no effect for transfer for the CI effect. A lot of research into the CI effect has been done in other research fields (Lee & Simon, 2004; Helsdingen et al, 2011; Shea & Morgan, 1979; Rendal et al, 2010; Brady, 1998; Hall & Magill, 1990;) but this study shows that variation in practice schedules can be effective in learning instructional videos.

No effect was found for practice schedules for the training phase. The results show that the blocked practice condition scores slightly higher than the experimental condition. A possible explanation may be that the learning effect of the instructional videos is high in both conditions, so that no major differences have arisen. The videos are also used in other studies (Van der Meij, 2014; Van der Meij & Van der Meij, 2016) and these show positive learning outcomes.

In addition, no difference was found in score on task performance for the transfer test. The results show that the random practice condition scores slightly higher than blocked practice. A possible explanation is the different structure of the transfer test compared to the other three tests. Both conditions show a considerable decline in score on task performance compared to the other tests and the transfer test may have been too difficult for both conditions.

Furthermore, it can be said that both practice schedules show a positive learning effect for the instructional videos. In both conditions the highest score is given for the performance of the task on the training, after which this score decreases in the post-training test. This is in line with research into the learning effect of instructional videos (Briggs et al, 2006; Ertelt et al, 2006; Van der Meij & Van der Meij, 2016; Van der Meij, Van der Meij & Rensink, 2017).

4.2 The effect of practice schedules on self-efficacy

The second research question of this study was to determine the effect of practice schedules on self-efficacy. This test was conducted before and after training and the proposed hypothesis was that blocked practice would have higher self-efficacy after training than the random practice group. The research results confirmed this hypothesis. Self-efficacy after training is higher for the blocked practice condition than the random practice condition. In addition, the results show that there is an increase in self-efficacy for both groups. Self-efficacy is higher after training than before training.

The effect of contextual interference on self-efficacy has not previously been studied in the field of instructional videos. Self-efficacy is related to construct motivation from the DBT model (Brar & Van der Meij, 2017; Rosen et al, 2010; Grossmann et al. al, 2013) and stimulates the other processes from observation learning (Bandura, 1977; Bandura 1986) (attention, retention, production). In the area of instructional videos, a low level of contextual interference therefore benefits higher self-efficacy after a training phase. A possible explanation for the finding can be the structure of training for the block practice condition. This condition had the "video-task- video-task" practice schedule, which meant that students did not have to remember much information to perform the task properly. The random practice condition had the "video-video-task-task" practice schedule, as a result of which it was more challenging to remember the strategies from the videos. Their self-efficacy to be able to perform the tasks properly is therefore possibly lower than the blocked practice.

The training was effective in increasing self-efficacy for both conditions. This is in line with research that investigated the effect of self-efficacy on learning with instructional videos (Van der Meij, 2017). A high self-efficacy provides better learning outcomes in observation learning.

4.3 The effect of practice schedules on flow experience

In the third research question, the effect of practice schedules on the flow experience was investigated. Flow experience is an indicator of the degree of cognitive load that is experienced. The expected hypothesis in this study was that the flow is highest for the blocked practice group during training and that it will decrease for the post test, the delayed posttest and the transfer test. The random practice group is expected to score lower on flow experience during training, but higher on the post test, late posttest and transfer test. Results show that this hypothesis is partially confirmed. The blocked practice condition scored higher on flow perception during the training than the random condition. The delayed posttest scores higher on flow perception compared to the random exercise condition. No differences were found for the effect of exercise schedules on flow perception during the posttest and transfer test.

Studies on the CI effect (Van Helsdingen et al, 2011 & Van Helsdingen et al, 2011) say that a high degree of contextual interference causes a high cognitive load during a training phase, but this has not been measured before. A high level of flow experience means that the cognitive load is experience as low since flow is seen as a state of optimal concentration in which a task is optimally performed (Csikszentmihalyi & LeFevre, 1989; Shernoff et al, 2014). This research shows that a low level of contextual interference ensures a higher flow experience during training. The blocked practice condition has trained in a fixed pattern and should not suffer from the contextual interference effect. The random practice group scores higher on the flow experience during the delayed posttest and this condition benefits from the contextual interference effect because they have a better retention and therefore seem to experience less cognitive load

No differences were found for both conditions on flow perception during the posttest and transfer test. Further research is needed to provide an explanation for this effect not found.

4.4 Limitations

There were some limitations in this study. In this study, research was conducted in three different classes, including one seven grade of primary school and two second classes of a Dutch high school. There were technical problems in one session the seven-grade class. Ten participants who were in the random practice condition were unable to take the post test. Analysis shows this influenced significance, but nevertheless there remains a significant difference.

Another limitation of this research is that the registration of the actions during the video is not included in the analysis. Due to technical circumstances, log registrations were not available, so it is not known whether the videos were actually viewed and whether the participants had complied with the conditions associated with the condition they were in. A recommendation for further research is to analyze the log files. The registered actions then show whether a participant has pressed pause, stop, wind or rewind while watching the instructional videos and how long the video was viewed. This analysis would provide more insight into the learning process and could be a possible explanation for other research results.

Another possible recommendation for further research is to take the self-efficacy test after the post-training tests. According to the literature (Van Helsdingen et al, 2011; Van Helsdingen et al, 2011), a high level of contextual interference ensures better retention and transfer on task performance. Like in training phase, higher level of task performance ensures higher self-efficacy. The effect of a high task performance that leads to a higher self-efficacy can also be expected for the post training test. This can be explained by the fact that self-efficacy is related to motivation (Anderson, 2008). According to the DBT Model (Brar & Van der Meij, 2017), a random practice group

that scored high on task performance on a post-training test will have a higher motivation and therefore a higher self-efficacy. In this way, self-efficacy could further confirm the contextual interference effect when learning instructional videos.

4.5 Conclusion

In general, this study showed that the contextual interference effect influences the learning of instructional videos for software training. The effect of practice schedules on task performance, self-efficacy and flow perception has been investigated and results show that a random practice condition leads to better task performance during a post test and a delayed posttest. This is in line with another research into the CI effect. Training schedules while learning instructional videos had an effect on self-efficacy.

A blocked practice group scores higher on a self-efficacy test after training than a random practice group. In addition, a blocked practice group achieve higher flow experience during training than the random practice condition. The random practice group scores a higher flow experience during the delayed posttest than a blocked practice group. These results are in line with earlier contextual interference research and a random practice schedule can be recommended when learning from instructional videos. However, this is an experimental study and more research is needed to determine the CI effect in learning with instructional videos.

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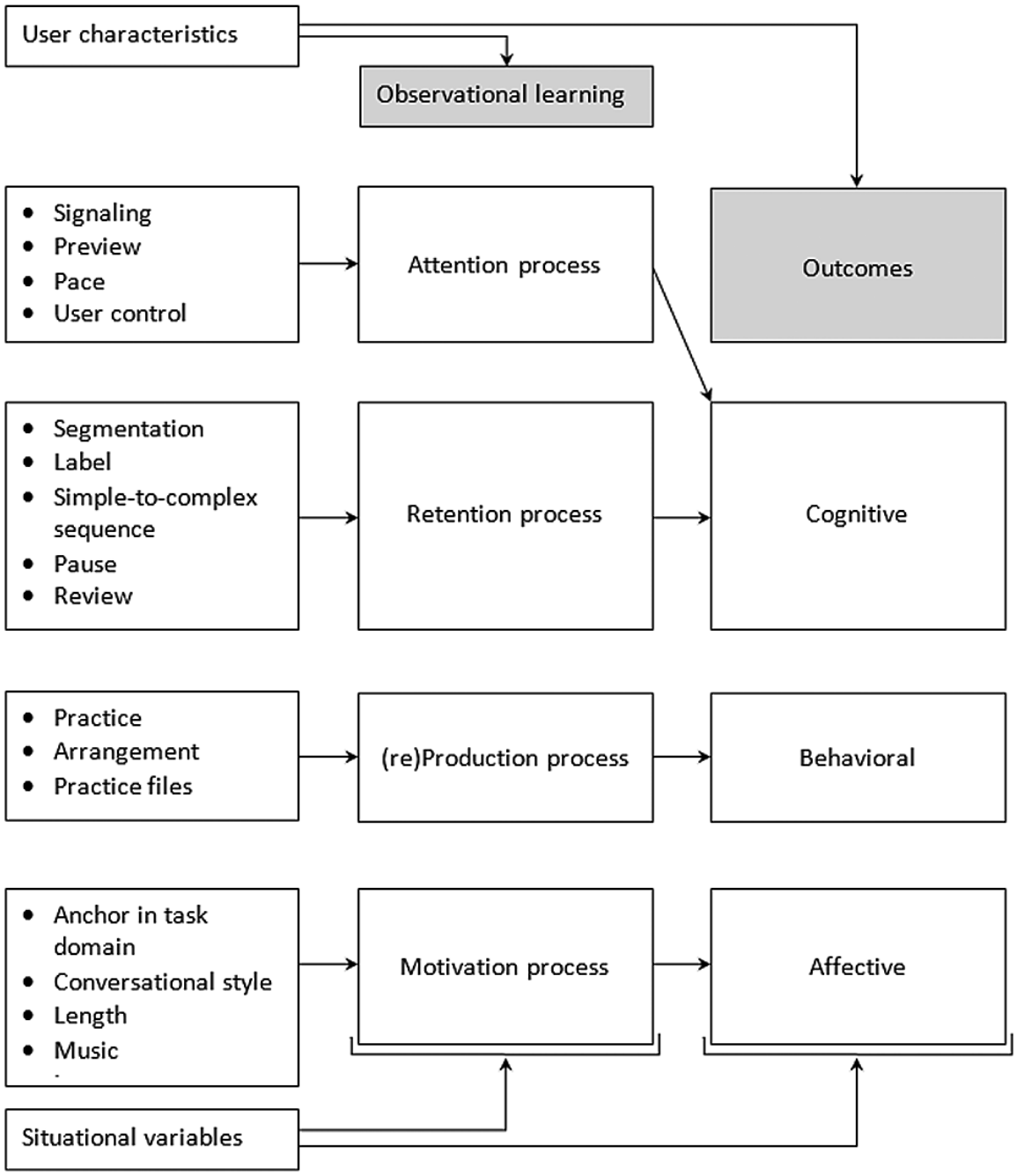
Van der Meij, H., & Van der Meij, J. (2016). Demonstration-based training (DBT) in the design of a video tutorial for software training. *Instructional Science, 44,* 527-542. doi: 10.1007/s11251-016-9394-9

Van der Meij, H., & Van der Meij, J. (2014). A comparison of paper based and video tutorials for software learning. *Computers & Education, 78,* 150-159. doi: 10.1016/j.compedu.2014.06.003

Van der Meij, H. , Van der Meij, J., Voerman, T., & Duipmans, E. (2018). Supporting motivation, task performance and retention in video tutorials for software training. *Educational technology research and development*, *66*(3), 597-614. https://doi.org/10.1007/s11423-017-9560-z

6 Appendix A: Demonstration base training model

Source: Brar, J., & Van der Meij, H. (2017). Complex software training: Harnessing and optimizing video instructions. *Computer in Human Behaviour, 70,* 475-485. doi: 10.1016/j.chb.2017.01.014



7 Appendix B. Information letter for the parents

English

To the parent(s)/guardians(s) of class ….

Date: …….

Concerns: Research of ……

Dear parent(s)/guardian(s)

Your child will soon take part in a study led by Niek Buijvoets as part of his master's degree in Psychology at the University of Twente. This research will take place in April. In this letter, we will inform you about the nature, purpose and method of this study.

The research question: **What is the effect of instruction videos when there are software formatting tasks to been learned.**
The aim of this research is to determine the ability to learn from instructional videos when students are working with creations tasks in Microsoft Word

The data and results of the research are treated confidentially and processed anonymously.
If you do not object to the participation of your child in this study before [05-04-2018] you state in a clear manner that you have been informed about the nature, method, purpose and research. You also agree that your child is participating in this study. You and your child retain the right to terminate participation in this research at any time without giving any reason.

I have given an oral and written explanation to your child. I will answer remaining questions about the research on ability. Your child will not suffer any adverse consequences from any premature termination of participation in this study. If you wish to lodge an objection or have any further questions in response to this letter, please contact me via: ..... @ Utwente.nl

I hope to have informed you sufficiently.

Sincerely,
Niek Buijvoets

8 Appendix C. Experiment Script

	Session 1	
	Condition 1 (Blocked practice)	Condition 2 (random practice)
	Self-efficacy test	
H1	Video 1 (1.1)	Video 1 (1.1)
	Assignment 1.1	Video 2 (1.2)
	Video 2 (1.2)	Assignment 1.1
	Assignment 1.2	Assignment 1.2
	Flow test 1	
H2	Video 3 (2.1)	Video 3 (2.1)
	Assignment 2.1	Video 4 (2.2)
	Video 4 (2.2)	Video 5 (2.3)
	Assignment 2.2	Assignment 2.1
	Video 5 (2.3)	Assignment 2.2
	Assignment 2.3	Assignment 2.3
	Flow test 2	
H3	Video 6 (3.1)	Video 6 (3.1)
	Assignment 3.1	Video 7 (3.2)
	Video 7 (3.2)	Video 8 (3.3)
	Assignment 3.2	Assignment 6+7+8
	Video 8 (3.3)	
	Assignment 3.3	
Flow test 3		
Break (5 minutes)		
Self-efficacy test		
Posttest including **flow test 4**		
Long break (1 week)		
Delayed posttest including **flow test 5 (session 2)**		
Transfer test including **flow test 6 (session 2)**		

Preparation before session 1

- Prepare USB sticks for each session (all right materials for session 1)
- Each USB stick has to get the number that's matching with the student's number
- Make sure that all computers are on and working properly (WIFI/network)
- Make sure that the researcher's laptop is prepared to save all the data after the session is finished and monitor each session.
- Make sure there is sufficient storage space on the laptop to save all the data
- Print all manuals and questionnaires (one sided)
- Make sure that there are enough materials for the students in each session; Headphones, USB sticks, Manuals for both conditions
- Randomize the students into the two conditions and make sure there is 1 condition in a single session to prevent social error
- Assign each student a number

	Preparation	Materials	Procedure	Time
Session 1: Practice + Posttest	-Open Word on each computer - Switch on the ruler in Word - plug USB sticks into the computer	- Flow questionnaire - Self-efficacy questionnaire - Training manual (random practice and blocked practice) - Posttest manual - USB sticks (with all Word documents)	1.Welcome 2.Explanation* 3. Practice session (with flow and self-efficacy test) 4. posttest	- 5 minutes - 25 minutes -20 minutes = 50 minutes

Debriefing after session 1

- Collect all the USB sticks, manuals, questionnaires
- Check if all names are written on the manuals/questionnaires
- Check all sticks to make sure the data is saved
- Move the content of the USB sticks to the laptop and into the right computer folder
- Clean the documents of session 1 from the USB sticks and upload the documents for session 2

Preparation before session 2

- Prepare USB sticks for each session (all right materials for session 1)
- Each USB stick has to get the number that's matching with the student's number
- Make sure that all computers are on and working properly (WIFI/network)
- Make sure that the researcher's laptop is prepared to save all the data after the session is finished and monitor each session.
- Make sure there is sufficient storage space on the laptop to save all the data
- Print all manuals and questionnaires (one sided)
- Make sure that there are enough materials for the students in each session; Headphones, USB sticks, Manuals for both conditions

	Preparation	Materials	Procedure	Time
Session 2 Delayed Posttest + Transfer test	-Open Word on each computer - Switch on the ruler in Word - plug USB sticks into the computer	- Flow questionnaire - Delayed posttest manual - Transfer test manual - USB sticks (with all Word documents)	1. Welkom 2. Explanation* 3. Delayed posttest 4. transfer test	- - 10 minutes - 10 minutes -15 minutes = 35 minutes

Debriefing after session 2

- Collect all the USB sticks, manuals, questionnaires
- Check if all names are written on the manuals/questionnaires
- Check all sticks to make sure the data is saved
- Move the content of the USB sticks to the laptop and into the right computer folder
- Debrief the teacher about the experiment and ask if he wants the results
- Debrief the students about the real purpose of this experiment
- *Optional:* make an appointment for a new session when there is too little data

Explanation session 1
English

Training

- Introduce myself and make sure that all students take place behind a computer with all the materials and a pencil or pen so they can write
- We are going to learn today to make reports in Microsoft Word more beautiful and cleaner.
- You are going to learn these skills by watching instructional videos. These videos show you, for example, how to indent a quote to the left.
- You watch the videos on the basis of the manual that is in front of you and that you should follow exactly. Just follow the manual and if you can't find out, try to ask for help from me or the teacher, but do not discuss with other students. It is explained exactly in the booklet when you have to watch a video, practice an assignment or when you have to fill in a short questionnaire. Follow this manual carefully.
- Viewing the videos is done via the site that is already ready on your computers. Take a look with me on the Digi board. You first see a login page. Here you may log in later with the number on your booklet. The password is the same number on the booklet. You may do this now. (Repeat instruction and occur on the Digi board).
- Take a look with me, you do not have to do anything yourself. Here you see a row, if you click on this there will be a menu where the videos are. If you click on this, a video will appear on the right. You can play the video with this bar at the bottom, you can fast forward and rewind.
- You need a number of word files for the assignments that are already on your computer. I will show you where these are and how you get involved. You have two different folders namely 'practice assignments' and 'assignments after the training'. In the instruction manual of practice, you click on the folder with practice assignments and here you will find the corresponding files
- The name of the USB stick (number) must correspond with your own test subject number
- Don't forget to save to documents when you are finished with it
- You can get started with the training. Don't worry If you can't complete an assignment but go further on with the next assignment. You can play in empty word/excel document/ solve the brain crackers when you finished early with all the manuals. It is not intended that you go on the internet
- If you have problems with something, raise your finger. Try to get started everywhere yourself.
- Do not talk to your fellow students. You can start working in the booklet. Do this quietly so that everyone can work quietly.

- **Posttest**
- The training has been completed, we are now going to test what you have learned from the instructional videos
- You will all receive a new booklet on which you can write down your test subject number

- The tasks resemble to the tasks that you have just practiced and try to make them as good as possible again. You cannot watch a video and show what you have learned from the videos.
- The Word documents that you need are this time in the map ‘tasks after training’ and when you click on the "tasks after training" folder you will get to the documents you need.
- Follow the manual directly again in which everything is precisely explained
- When you have finished a task, don’t forget to save the file
- If you have finished the tasks a bit earlier, you may play in an empty word document
- Try to make the tasks alone. I would like to see what you have learned from the instructional videos and if you do not come out of the tasks, that is fine and you continue with the next tasks
- Success and try to work in full concentration

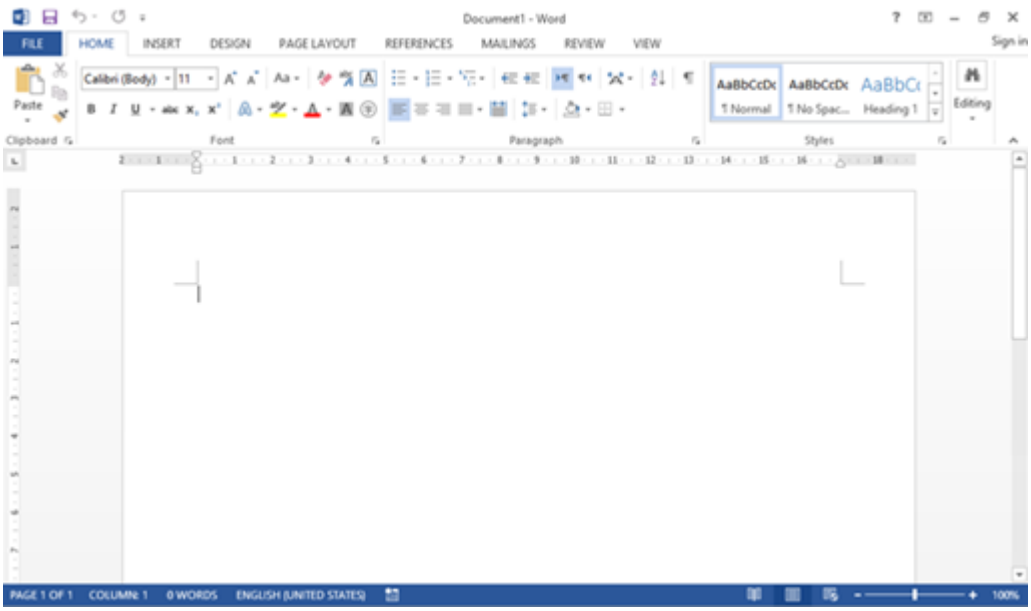
Session 2
Delayed posttest – Transfer test

- Last week you received training on certain tasks that you can perform in Microsoft Word. In this lesson I want to know what you remember from last time. We will not watch any videos this time
- The tasks and booklets are again the same as last week and the necessary files are again on the USB stick in front of you. Make sure that the number of your USB stick is also the number that you have to put on your booklet.
- Read the first page carefully, it explains everything you need to do exactly
- This week there are two different booklets that you have to work through. The first booklet has similar assignments to the previous week. The second booklet contains tasks that you should never have had before but that you could possibly do with the skills you have learned.
- You have 35 minutes for both tests. If you are ready earlier, stay in your seat and play on the computer with an empty Word - Excel document.
- If there are any questions, raise your hand. Only technical questions will be answered and resolved.
- Success and try to work in full concentration

9 Appendix D. Instruction

Example of Manual for the training phase (Random practice)

Training Make Word files more beautiful with the help of instructional videos and exercises



Name .....

Number .....

UNIVERSITY
OF TWENTE.

In this training you learn to present a text in Word in a beautiful way.

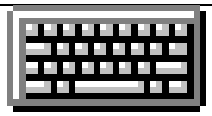
The training consists of instructional videos and assignments.

This manual tells you exactly what to do.

Follow these instructions

There are three different tasks. The images in front of it will tell you what to do.

 Watch a video	If you see this picture you must watch a *video*. It states which video to watch. For example: Watch video 2.1 'indent the margin for a citation to left' Watch the video until you know how this work is Word. You can pause and rewind For tasks you are no longer allowed to watch the video.

 Make a Task	When you see this picture, you have to make a task It states which task you have to make and which Word file you need. For example: task 2.1 Indent the margins of a citations on the left 1. Open the 'Geluiden.doc' file 2. ….

After each chapter you will receive a few questions about the tasks

 Answering questions	When you see this picture, you have to answer 4 questions about the tasks. For example, ''I knew what I had to do within every task´´ Circle the answer that best suits you

Chapter 1: Adjust the margins for the entire text

1.1 Adjust the right margin

Watch video 1.1 ‘Adjust the right margin’

Watch the video until you know how this works in Word.

You can pause and rewind

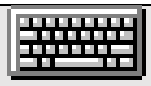
1.2 Adjust the left margin

Watch video 1.2 ‘Adjust the left margin’

Watch the video until you know how this works in Word.

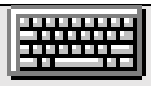
You can pause and rewind

.



Task 1.1 Adjust the right margin
You are not allowed to watch a video

1. Open the ‘Dolfijnen.doc’ file.
2. Adjust the right margin.
3. Save this file.
4. Do not close this file yet, you will need it for the next task.



Task 1.2 Adjust the left margin
You are not allowed to watch a video

1. Continue with the file ‘Dolfijnen.doc’
2. Adjust the right margin.
3. Save this file.
4. Close this file.

You have now completed the tasks of Chapter 1
You have *adjusted the left and right margin* of a text
You now get 4 questions about these tasks.

	Circle the answer that best suits you

	isn't correct						**correct**
1. I knew what to do at every step	1	2	3	4	5	6	7
2. I felt that I could do the tasks well	1	2	3	4	5	6	7
3. I could easy think during the tasks	1	2	3	4	5	6	7
4. The right thoughts came naturally during the assignments	1	2	3	4	5	6	7

Chapter 2: Adjust the margins for text segments

2.1 Adjust a citation to the left

Watch video 2.1 'Indenting a citation to the left'

Watch the video until you know how this works in Word.
You can pause and rewind.

2.2 Adjust a citation to the right

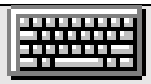
Watch video 2.2 'indenting a citation to the right'

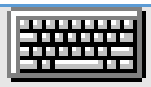
Watch the video until you know how this works in Word.
You can pause and rewind.

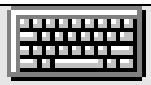
2.3 Adjust the margins for a list

Watch video 2.3 'Adjust the margins for a list'

Watch the video until you know how this works in Word.
You can pause and rewind.

	**Task 2.1 Adjust a citation to the left** You are not allowed to watch the video
	1. Open the 'Geluiden.doc' file 2. Indent the citation to the left. 3. Save this file. 4. Don´t close this file, you need this for the next assignment.

	**Task 2.2 Adjust a citation to the left** You are not allowed to watch the video
	1. Continue with the file 'Geluiden.doc' 2. Indent the citation to the right. 3. Save this file. 4. Close this file.

	**Task 2.3 Adjust the margins for a list** You are not allowed to watch the video
	1. Open the 'Vissen.doc' file 2. Adjust the margins for a list. 3. Save this file. 4. Close this file.

	You have now completed the tasks of Chapter 2 You have *adjusted the left and right margin* of a citation And you have *adjusted the margins of a list* You now get 4 questions about these tasks Circle the answer that best suits you

	isn't correct						**correct**
1. I knew what to do at every step	1	2	3	4	5	6	7
2. I felt that I could do the tasks well	1	2	3	4	5	6	7
3. I could easy think during the tasks	1	2	3	4	5	6	7

4. The right thoughts came naturally during the assignments	1 2 3 4 5 6 7

Chapter 3: Create an automatic table of contents

3.1 Give chapter titles a style

Watch video 3.1 ‘Give chapter titles a style’

Watch the video until you know how this works in Word.
You can pause and rewind.

3.2 Give paragraph titles a style

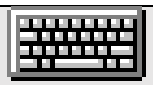
Watch video 3.2 ‘Give paragraph titles a style’

Watch the video until you know how this works in Word.
You can pause and rewind.

3.3 Create an automatic table of contents

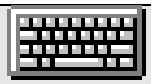
Watch video 3.3 ‘Create an automatic table of contents’

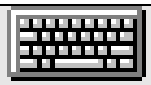
Watch the video until you know how this works in Word.
You can pause and rewind.



Task 3.1 Give chapter titles a style
You are not allowed to watch a video

	1. Open the 'Mexico.doc' file 2. Give all chapter titles the style ´Heading 1´ as in the video. 3. Save this file. 4. Don´t close this file yet, you need it for the next task

	**Task 3.2 Give paragraph titles a style** You are not allowed to watch a video
	1. Continue with the file 'Mexico.doc' 2. Give all paragraph titles the style ´Heading 2´ as in the video 3. Save this file. 4. Don´t close this file yet, you need if for the next task.

	**Task 3.3 Create an automatic table of contents** You are not allowed to watch a video
	1. Continue with the file 'Mexico.doc' 2. Make an automatic table of contents as in the video. 3. Save this file. 4. Close this file.

	You have now completed the tasks of Chapter 3 You have *given the chapter titles ´heading 1´, paragraph titles ´heading 2´* and *you have created an automatic table of contents.* You now get 4 questions about these tasks Circle the answer that best suits you

	isn't correct						**correct**
1. I knew what to do at every step	1	2	3	4	5	6	7
2. I felt that I could do the tasks well	1	2	3	4	5	6	7
3. I could easy think during the tasks	1	2	3	4	5	6	7
4. The right thoughts came naturally during the assignments	1	2	3	4	5	6	7

You are done

10 Appendix E. Codebook

Example Codebook random practice training

Codebook Experiment practice schedules by instructional videos

How should the data be coded

4 Parts
1. Exercise tasks (Blocked Practice vs Random Practice)
2. Tasks after training part 1 (posttest)
3. Tasks after training part 2 (delayed posttest)
4. Tasks after training part 3 (transfer test)

Step 1: The option ¶ must be enabled in Word to be able to score the tasks. This option can be found in the top task bar at the start menu

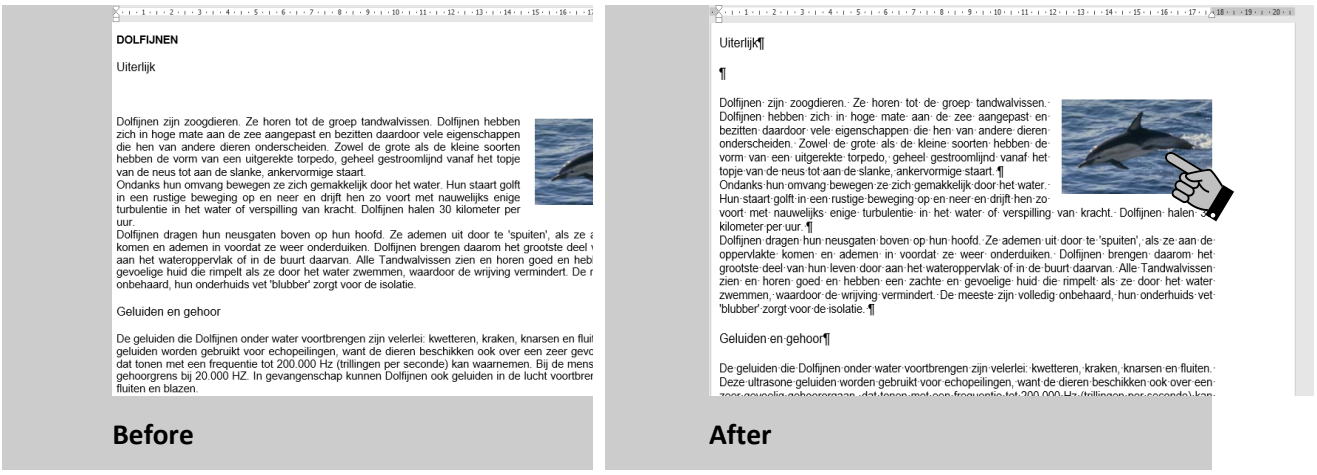
Step 2:
There are 2 possible scores for a task: 0 or 1. If it appears that many respondents make a structural error and this is due to an error in the document, it will be examined whether the method is understood

You enter a 0 if no action has been taken or if the solution of the task is incorrect

You enter a 1 if a student has given the right solution with the right method that is taught in the training. When in doubt, it is checked whether the learned method is understood
(Small mistakes are forgiven)

Step 3:
Score the Word documents at each question, whereby care must be taken that certain tasks consist of 2 or more components, each of which must be scored.

Task 1.1 Adjust the right margin



0 = No action has been taken or an incorrect method has been used. The indentation slider on the sides has been used and you can still see that the top ruler on the right is still largely white (Figure 1.1)
1 = The ruler line has been shifted in the right-hand line (you can see this through a wider black area in the ruler line, Figure 1.2)

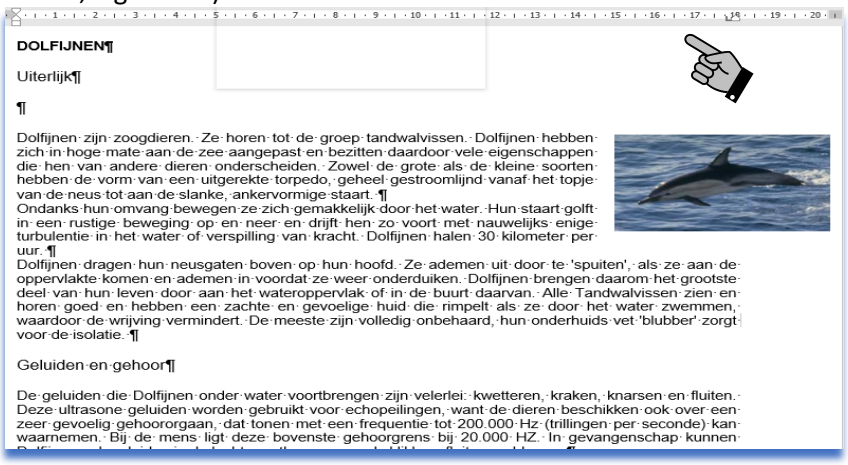
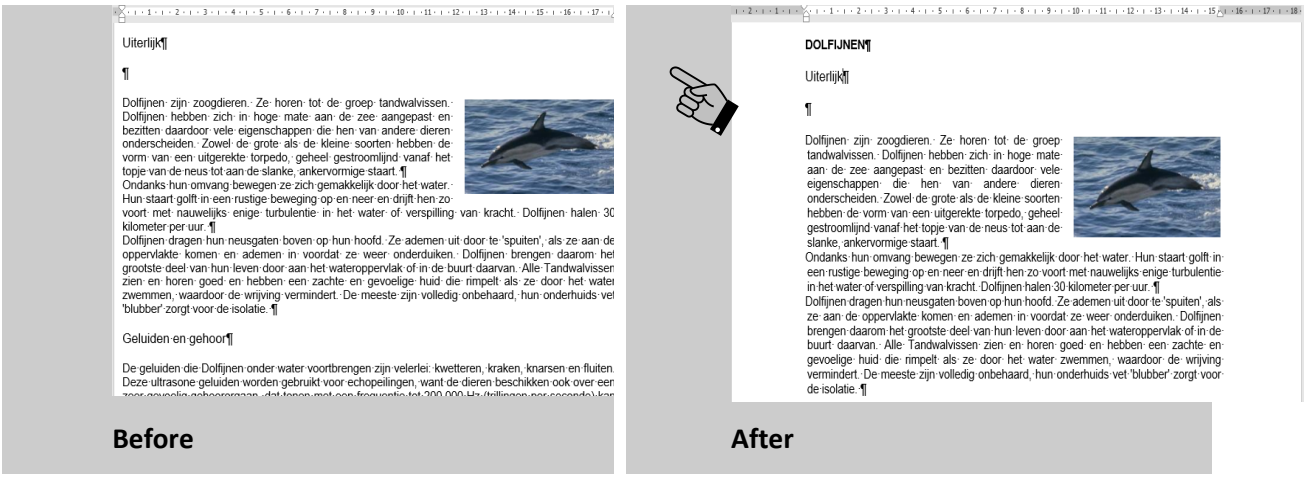


Figure 1.1 Adjust the right margin (incorrect, the lower slider has shifted, and the ruler is still largely white).

Figure 1.2 Adjust the right margin (correct)

Task 1.2 Adjust the left margin



0 = No action has been taken or an incorrect method has been used. The indentation slider on the sides has been used and you can still see that the ruler at the top on the left is still largely white (Figure 2.1)

1 = The ruler line has been shifted in the left-hand line (you can see this through a wider black area in the ruler line, Figure 2.2)

Figure 2.1 Moving the left line (incorrect, the lower slider has shifted, and the ruler is still largely white).

DOLFIJNEN¶

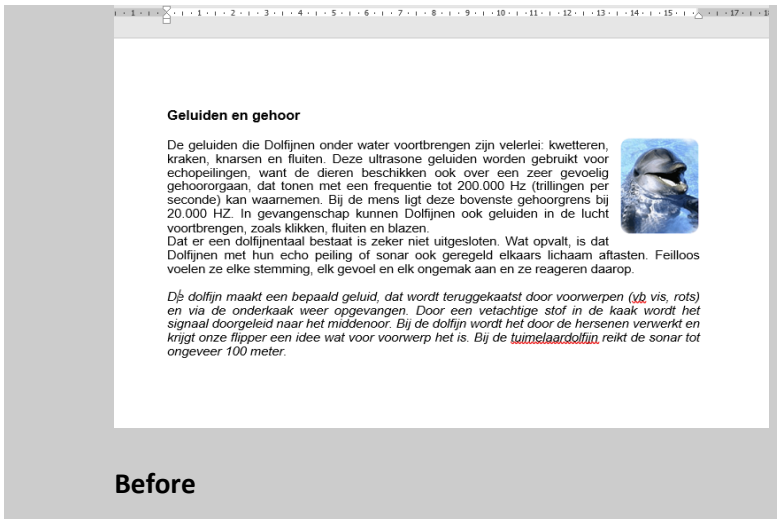
Uiterlijk¶

¶

Dolfijnen zijn zoogdieren. Ze horen tot de groep tandwalvissen. Dolfijnen hebben zich in hoge mate aan de zee aangepast en bezitten daardoor vele eigenschappen die hen van andere dieren onderscheiden. Zowel de grote als de kleine soorten hebben de vorm van een uitgerekte torpedo, geheel gestroomlijnd vanaf het topje van de neus tot aan de slanke, ankervormige staart.¶
Ondanks hun omvang bewegen ze zich gemakkelijk door het water. Hun staart golft in een rustige beweging op en neer en drijft hen zo voort met nauwelijks enige turbulentie in het water of verspilling van kracht. Dolfijnen halen 30 kilometer per uur.¶
Dolfijnen dragen hun neusgaten boven op hun hoofd. Ze ademen uit door te 'spuiten', als ze aan de oppervlakte komen en ademen in voordat ze weer onderduiken. Dolfijnen brengen

Figure 2.2. Adjust the left margin (correct)

Tasks 2.1/2.2 Indent a citation to the left / Indent a citation to the right

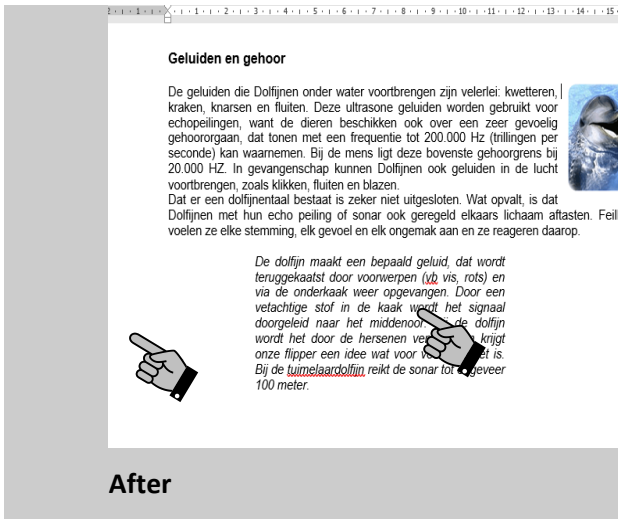


Geluiden en gehoor

De geluiden die Dolfijnen onder water voortbrengen zijn velerlei: kwetteren, kraken, knarsen en fluiten. Deze ultrasone geluiden worden gebruikt voor echopeilingen, want de dieren beschikken ook over een zeer gevoelig gehoororgaan, dat tonen met een frequentie tot 200.000 Hz (trillingen per seconde) kan waarnemen. Bij de mens ligt deze bovenste gehoorgrens bij 20.000 HZ. In gevangenschap kunnen Dolfijnen ook geluiden in de lucht voortbrengen, zoals klikken, fluiten en blazen.
Dat er een dolfijnentaal bestaat is zeker niet uitgesloten. Wat opvalt, is dat Dolfijnen met hun echo peiling of sonar ook geregeld elkaars lichaam aftasten. Feilloos voelen ze elke stemming, elk gevoel en elk ongemak aan en ze reageren daarop.

De dolfijn maakt een bepaald geluid, dat wordt teruggekaatst door voorwerpen (vb vis, rots) en via de onderkaak weer opgevangen. Door een vetachtige stof in de kaak wordt het signaal doorgeleid naar het middenoor. Bij de dolfijn wordt het door de hersenen verwerkt en krijgt onze flipper een idee wat voor voorwerp het is. Bij de tuimelaardolfijn reikt de sonar tot ongeveer 100 meter.

Before



Geluiden en gehoor

De geluiden die Dolfijnen onder water voortbrengen zijn velerlei: kwetteren, kraken, knarsen en fluiten. Deze ultrasone geluiden worden gebruikt voor echopeilingen, want de dieren beschikken ook over een zeer gevoelig gehoororgaan, dat tonen met een frequentie tot 200.000 Hz (trillingen per seconde) kan waarnemen. Bij de mens ligt deze bovenste gehoorgrens bij 20.000 HZ. In gevangenschap kunnen Dolfijnen ook geluiden in de lucht voortbrengen, zoals klikken, fluiten en blazen.
Dat er een dolfijnentaal bestaat is zeker niet uitgesloten. Wat opvalt, is dat Dolfijnen met hun echo peiling of sonar ook geregeld elkaars lichaam aftasten. Feil
voelen ze elke stemming, elk gevoel en elk ongemak aan en ze reageren daarop.

De dolfijn maakt een bepaald geluid, dat wordt teruggekaatst door voorwerpen (vb vis, rots) en via de onderkaak weer opgevangen. Door een vetachtige stof in de kaak wordt het signaal doorgeleid naar het middenoor. Bij de dolfijn wordt het door de hersenen ver krijgt onze flipper een idee wat voor t is. Bij de tuimelaardolfijn reikt de sonar tot ongeveer 100 meter.

After

The indentation method is the same for both left and right and therefore the same scoring model is used for task 2.1 and task 2.2. A common mistake is that the citation has been postponed in the document of tasks 1.1 and 1.2. If the correct method is shown there, then it is calculated correctly

Task 2.1 indent a citation on the left
0 = no action taken, incorrect method used such as the use of spaces, backspace, tap or centering in the middle. Wrong slider has shifted or not shifted enough (see Figure 3.1 with the wrong slider shifted)

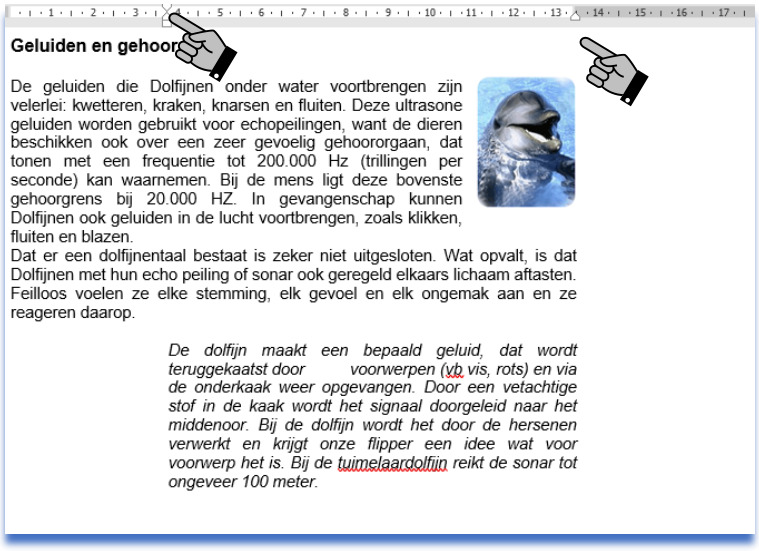
A striking common mistake is that the house at the bottom (wrong to indent) is used instead of the block (indent on the left). The correct solution can then be obtained by means of spaces and tabs

1 = The correct method has been used to indent the citation. The lower slider is used on both left and right to indent the citation (see figure 3.2)

Task 2.2 indent a citation to the right

0 = no action taken, incorrect method used such as the use of spaces, backspace, tap or centering in the middle. Wrong roof has shifted or not shifted sufficiently (see Figure 3.1

1 = 1 = The correct method has been used to indent the citation. The lower slider is used on both left and right to indent the citation (see figure 3.2)



Geluiden en gehoor

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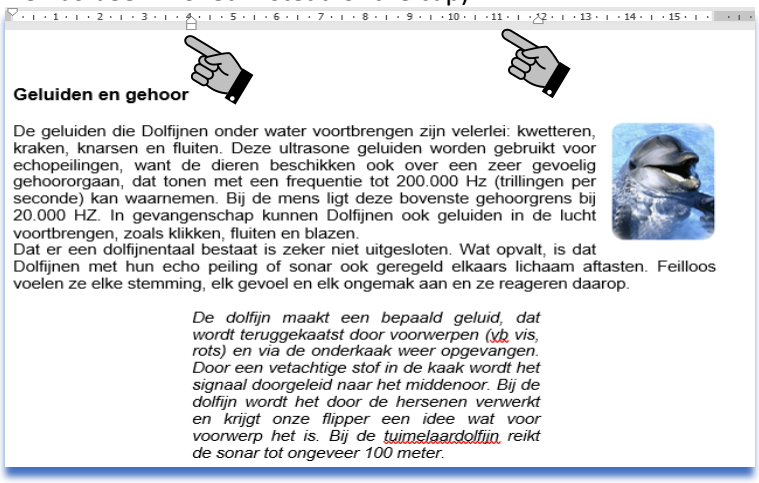
Figure 3.1 indentation of citation (incorrect, the method on the left is correct, on the right the ruler line has been moved instead of the cap)



Geluiden en gehoor

De geluiden die Dolfijnen onder water voortbrengen zijn velerlei: kwetteren, kraken, knarsen en fluiten. Deze ultrasone geluiden worden gebruikt voor echopeilingen, want de dieren beschikken ook over een zeer gevoelig gehoororgaan, dat tonen met een frequentie tot 200.000 Hz (trillingen per seconde) kan waarnemen. Bij de mens ligt deze bovenste gehoorgrens bij 20.000 HZ. In gevangenschap kunnen Dolfijnen ook geluiden in de lucht voortbrengen, zoals klikken, fluiten en blazen.
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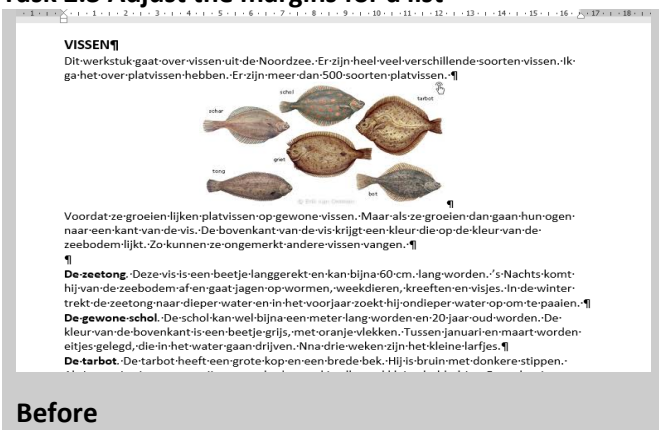
Figure 3.2 indentation of a citation (correct)

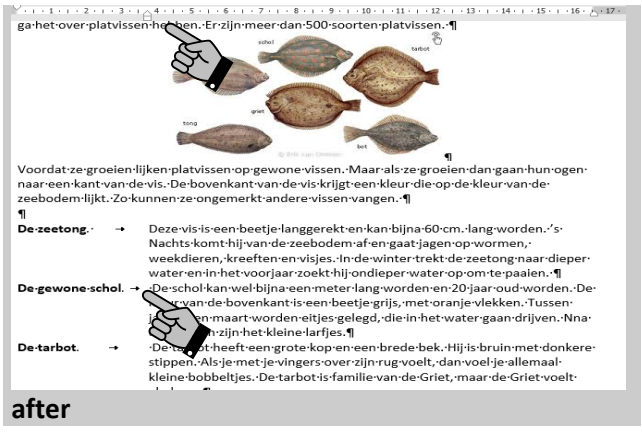
Task 2.3 Adjust the margins for a list



VISSEN¶
Dit·werkstuk·gaat·over·vissen·uit·de·Noordzee.·Er·zijn·heel·veel·verschillende·soorten·vissen.·Ik·ga·het·over·platvissen·hebben.·Er·zijn·meer·dan·500·soorten·platvissen.·¶

Voordat·ze·groeien·lijken·platvissen·op·gewone·vissen.·Maar·als·ze·groeien·dan·gaan·hun·ogen·naar·een·kant·van·de·vis.·De·bovenkant·van·de·vis·krijgt·een·kleur·die·op·de·kleur·van·de·zeebodem·lijkt.·Zo·kunnen·ze·ongemerkt·andere·vissen·vangen.·¶
¶
De·zeetong.·Deze·vis·is·een·beetje·langgerekt·en·kan·bijna·60·cm.·lang·worden.·'s·Nachts·komt·hij·van·de·zeebodem·af·en·gaat·jagen·op·wormen,·weekdieren,·kreeften·en·visjes.·In·de·winter·trekt·de·zeetong·naar·dieper·water·en·in·het·voorjaar·zoekt·hij·ondieper·water·op·om·te·paaien.·¶
De·gewone·schol.·De·schol·kan·wel·bijna·een·meter·lang·worden·en·20·jaar·oud·worden.·De·kleur·van·de·bovenkant·is·een·beetje·grijs,·met·oranje·vlekken.·Tussen·januari·en·maart·worden·eitjes·gelegd,·die·in·het·water·gaan·drijven.·Na·drie·weken·zijn·het·kleine·larfjes.·¶
De·tarbot.·De·tarbot·heeft·een·grote·kop·en·een·brede·bek.·Hij·is·bruin·met·donkere·stippen.·

Before



ga·het·over·platvissen·hebben.·Er·zijn·meer·dan·500·soorten·platvissen.·¶

Voordat·ze·groeien·lijken·platvissen·op·gewone·vissen.·Maar·als·ze·groeien·dan·gaan·hun·ogen·naar·een·kant·van·de·vis.·De·bovenkant·van·de·vis·krijgt·een·kleur·die·op·de·kleur·van·de·zeebodem·lijkt.·Zo·kunnen·ze·ongemerkt·andere·vissen·vangen.·¶
¶
De·zeetong.· → Deze·vis·is·een·beetje·langgerekt·en·kan·bijna·60·cm.·lang·worden.·'s·Nachts·komt·hij·van·de·zeebodem·af·en·gaat·jagen·op·wormen,·weekdieren,·kreeften·en·visjes.·In·de·winter·trekt·de·zeetong·naar·dieper·water·en·in·het·voorjaar·zoekt·hij·ondieper·water·op·om·te·paaien.·¶
De·gewone·schol. → ·De·schol·kan·wel·bijna·een·meter·lang·worden·en·20·jaar·oud·worden.·De·[illegible]·van·de·bovenkant·is·een·beetje·grijs,·met·oranje·vlekken.·Tussen·[illegible]·maart·worden·eitjes·gelegd,·die·in·het·water·gaan·drijven.·Na·[illegible]·zijn·het·kleine·larfjes.·¶
De·tarbot. → ·De·[illegible]·heeft·een·grote·kop·en·een·brede·bek.·Hij·is·bruin·met·donkere·stippen.·Als·je·met·je·vingers·over·zijn·rug·voelt,·dan·voel·je·allemaal·kleine·bobbeltjes.·De·tarbot·is·familie·van·de·Griet,·maar·de·Griet·voelt·

after

In this task, 2 actions must be completed, both are scored: The enumeration slider (a) and the use of tabs (b). A score can only be made for part b if there is a positive score for part a. Minor errors such as not moving the slider sufficiently or a few spaces are forgiven.

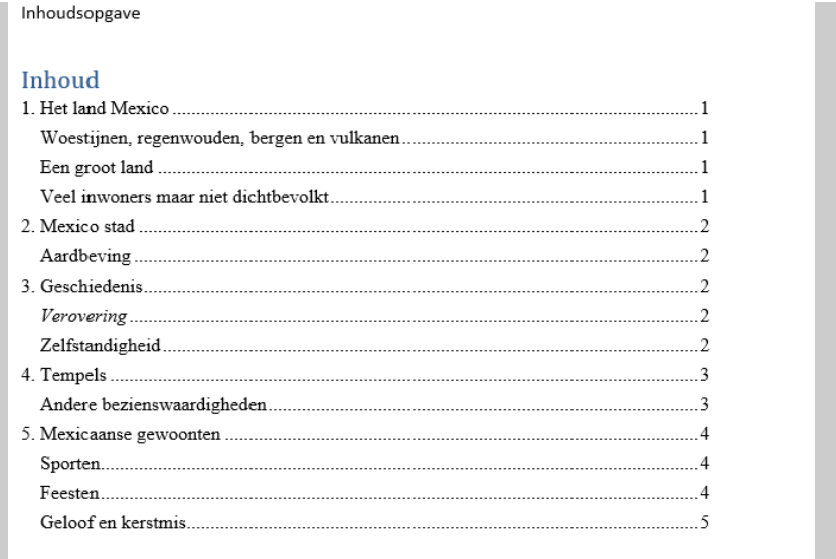
(a)
0 = no attempt has been made, use of tabs, spaces, the wrong slider has been used.
1 = the enumeration slider is well used

(b)
0 = no attempt was made to align the text, spaces were used (visible by the dots instead of arrows).
1 = The list is aligned with tabs

Figure 4.1 Adjust the margins for a list (incorrect, the "left indent" slider is used instead of indenting the wrong way, tabs have been used but that is not scored as good here)

Figure 4.2 Adjust the margins for a list (correct)

Tasks 3.1, 3.2 and 3.3
3.1 Give chapter titles a style
3.2 Give paragraph titles a style
3.3 Creating an automatic table of contents


Inhoudsopgave

Inhoud

1. Het land Mexico 1
Woestijnen, regenwouden, bergen en vulkanen 1
Een groot land 1
Veel inwoners maar niet dichtbevolkt 1
2. Mexico stad 2
Aardbeving 2
3. Geschiedenis 2
Verovering 2
Zelfstandigheid 2
4. Tempels 3
Andere bezienswaardigheden 3
5. Mexicaanse gewoonten 4
Sporten 4
Feesten 4
Geloof en kerstmis 5

After

Tasks 3.1, 3.2 and 3.3 are tasks that belong successively to each other but that will be scored separately. To be able to complete assignment 3.3, assignments 3.1 and 3.2 must be scored correctly.

Task 3.1 Give a style to chapter titles

0 = No attempt was made, chapter titles given the wrong style, less than half of the chapter titles given the "heading 1" style

0.5 = Extra text has been given the "heading 1" style

1 = More than half of the chapter titles given the style "heading 1" (good example heading 1, see figure 5.1)

Task 3.2 Give a style to paragraph titles

0 = no attempt was made, paragraph titles given the wrong style, less than half of the paragraph titles given the "heading 2" style

0.5 = Extra text has been given the "heading 2" style

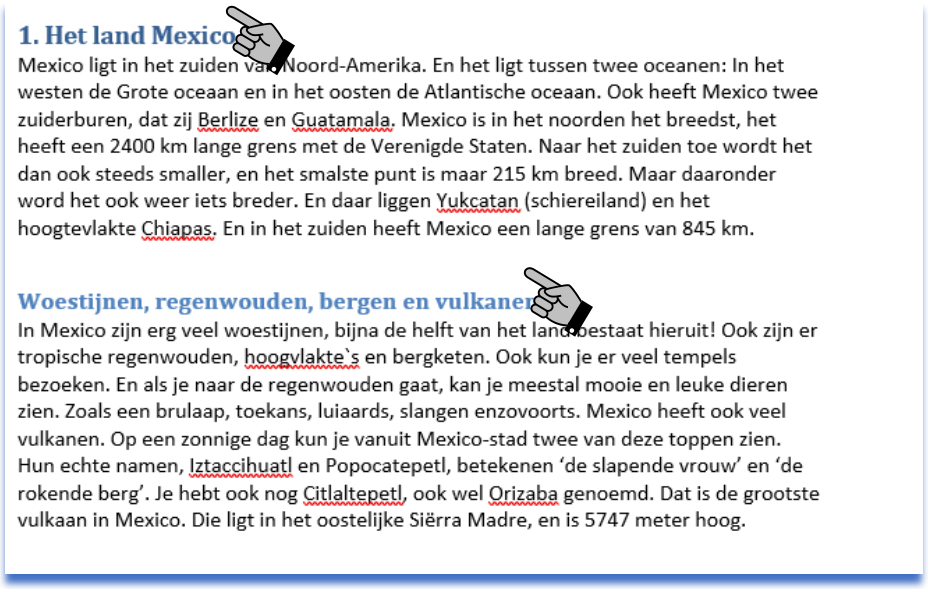
1 = More than half of the chapter titles are given the style "heading 2" (good example heading 2, see figure 5.1)

Task 3.3 Create an automatic table of contents

0 = no attempt was made, you yourself typed a table of contents.

0.5 = table of contents in the wrong place in the text

1 = table of contents is automatically created in the first chosen style and is at the top of the text



1. Het land Mexico

Mexico ligt in het zuiden van Noord-Amerika. En het ligt tussen twee oceanen: In het westen de Grote oceaan en in het oosten de Atlantische oceaan. Ook heeft Mexico twee zuiderburen, dat zij Berlize en Guatamala. Mexico is in het noorden het breedst, het heeft een 2400 km lange grens met de Verenigde Staten. Naar het zuiden toe wordt het dan ook steeds smaller, en het smalste punt is maar 215 km breed. Maar daaronder word het ook weer iets breder. En daar liggen Yukcatan (schiereiland) en het hoogtevlakte Chiapas. En in het zuiden heeft Mexico een lange grens van 845 km.

Woestijnen, regenwouden, bergen en vulkanen

In Mexico zijn erg veel woestijnen, bijna de helft van het land bestaat hieruit! Ook zijn er tropische regenwouden, hoogvlakte`s en bergketen. Ook kun je er veel tempels bezoeken. En als je naar de regenwouden gaat, kan je meestal mooie en leuke dieren zien. Zoals een brulaap, toekans, luiaards, slangen enzovoorts. Mexico heeft ook veel vulkanen. Op een zonnige dag kun je vanuit Mexico-stad twee van deze toppen zien. Hun echte namen, Iztaccihuatl en Popocatepetl, betekenen 'de slapende vrouw' en 'de rokende berg'. Je hebt ook nog Citlaltepetl, ook wel Orizaba genoemd. Dat is de grootste vulkaan in Mexico. Die ligt in het oostelijke Siërra Madre, en is 5747 meter hoog.

Figure 5.1, Example styles "heading 1 and heading 2" (correct)

11. Appendix F Posttest analysis without time limit

Table 6. Mean task performance on posttest (maximum score= 9) and mean flow experience on posttest (maximum score= 7)

Condition	Task performance posttest		Flow experience posttest	
	Mean	(*SD*)	Mean	(*SD*)
Blocked practice(N=41,41) *	4.81	(3.19)	6.30	(1.29)
Random practice(N=34,37) *	6.30	(2.54)	6.44	(.76)
Total(N=81,68) *	5.49	(2.99)	6.36	(1.07)

*Number of participants for task performance during training and posttest

A Mann Whitney U test for the task performance during the posttest showed that there is a statically significant difference in score between the two conditions, *Z* (.193) *U*= 875, *p*= .056. This means that the mean score for the task performance on the post test is the same for both conditions.

A Mann Whitney U test for the flow experience during the posttest shows that there is no statistical significant difference in mean score for both conditions, *Z* (-.791) *U*= 628, *p*= .429. This means that the mean score for the flow experience on the post test is the same for both conditions.