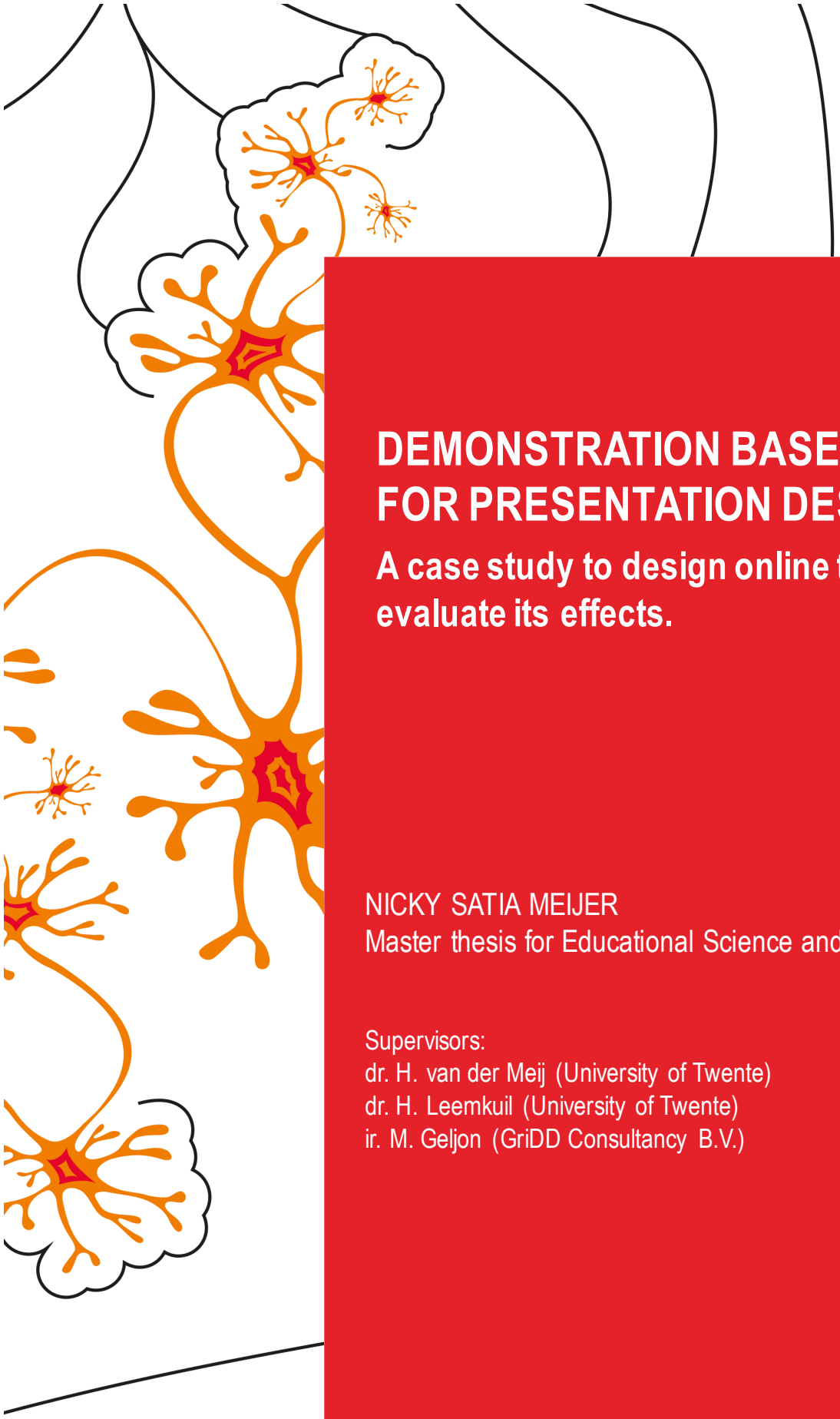

DEMONSTRATION BASED TRAINING FOR PRESENTATION DESIGN.

A case study to design online training and evaluate its effects.

NICKY SATIA MEIJER

Master thesis for Educational Science and Technology (EST)

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UNIVERSITY OF TWENTE.

GriDD effective information

This master thesis was conducted as the final assessment for the master degree Educational Science and Technology (EST) at University of Twente in the Netherlands.
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Acknowledgement

When I started my studies the field of learning and instruction had my interest, and now I am sure that being an instructional designer is a part of me for life. However, this master thesis marks the end of an era for me: the end of being a student. The road to the completion of the thesis was a bumpy one, but I have learnt much along the way. The most important lesson is that when you are doing something difficult, there are so many people willing to help when you ask (and even when you don't). In this preface, I would like to take the opportunity to thank all of them.

First of all, I owe a lot of thanks to my supervisor Hans van der Meij. He gave me confidence in my abilities when I needed it and always provided sharp, constructive and fair feedback. Thanks also to the second supervisor, Henny Leemkuil, for taking the time to read the thesis and suggesting ways to make it better. And thanks to the participants in the study for their time and cooperation and to the professionals at Splintt for their collaboration and help.

Furthermore, I would really like to thank my colleagues at GriDD, in particular my external supervisor Mark, Jeroen and Marjolijn, for all their support in finishing the study and thesis. Applying for an internship at GriDD was one of the best decisions I have ever made.

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Nicky Satia Meijer
December, 2016

Abstract

The client for this study, GriDD Consultancy B.V., saw a rising need for professionals to be able to create effective, visual presentations. They created face-to face training years ago but were interested to offer training online using instructional video and to objectively evaluate learning effects. The purpose of this study was therefore to design online training in which the creation of slideshows for oral presentations is taught to professionals using instructional video, and to evaluate its effects. The study is design-based, fits a pragmatic paradigm and uses mixed methods for this exploratory descriptive case study.

Training was designed and constructed using a Demonstration-Based Training approach enhanced with context-specific instructional features and based on analyses from practice and theory. Evaluation of training focused on its effects on motivation and task performance. No effect of training on motivation could be concluded from statistical analyses. A large significant effect of training was found for participants' overall increase of performance of the task to create effective, visual presentations. Additionally, a large significant effect was found for increased adherence to four cognitive communication principles related to task performance.

Theoretical implications for this study are its addition to the knowledge base on applying DBT approach to construct training and building further on the accessibility of a presentation design instrument to gain insight into one's ability to create effective, visual presentations. Practically, the client for the study has gained effective online training to add to their list of services.

Keywords: demonstration-based training, e-learning, presentation design, PowerPoint

1. Introduction

Lots of slide-assisted presentations are created on a daily basis; a frequently used estimate circling the internet speaks of more than 350 presentations per second (Parks, 2012). In this day and age, many professionals have created presentations in a business setting. Often people use Microsoft PowerPoint software to create their slides. Business presentations are used for many purposes, for instance to inform, persuade, propose a plan, explain a program, solicit input or motivate an audience (Yates & Orlikowski, 2007). Strong presentations can have very positive effects on the audience: they can lead to good recall and comprehension of information (Garner & Alley, 2013), positive credibility of the speaker (Levasseur & Kanan Sawyer, 2006) and audience engagement (Savoy, Proctor, & Salvendy, 2009). The need to be able to create effective presentations has become common practice and an expected, important skill in the workplace.

Unfortunately, criticism concerning PowerPoint presentations is very common as well. Almost everyone has multiple examples in mind of irrelevant, incomprehensible, long or boring presentations they sat through. Weak presentations can have a negative impact on the information processing of audience members (Tangen et al., 2011) and can lead to bad decision making (Tufte, 2003).

This criticism and the need for good presentations does not just follow from theory, but was also recognized in practice by the consultants at GriDD Consultancy B.V. (from now on referred to as GriDD), a consultancy agency based in the Netherlands. They see a rising need to develop the ability to create more effective presentations in many of their clients. Years ago, GriDD added support for presentation issues as one of the services the company provides and now they aim to improve their level of service. The company serves as a client for this design based master thesis.

1.1 Problem statement

GriDD was founded in 2008 and consists of ten professionals. Their mission is described as follows: “GriDD thinks of practical innovative concepts for effective information. The GriDD team is made up of pragmatic professionals, specialists as interface between the person, information and digital means.”(GriDD, 2015). The organization offers services in the fields of user experience and digital tactics, human centred process design and effective content and storytelling. They mainly work in a business-to-business (B2B) setting, which means products, information and services are aimed at other businesses rather than at consumers. GriDD’s clientele consists mostly of large corporations and organizations in which the consultants work with educated professionals in middle management. The organisation focuses on knowledge driven organizations with complex information problems. GriDD aims to assist anyone who wants to use information more effectively to reach (business) goals.

In their way of working GriDD believes in the power of using visualization to communicate information effectively. In their experience, using visuals to explain information in optimal combination with text, ensures better understanding, comprehension and recall. This is reflected in their meetings, where they both write and draw on a whiteboard, and of course in their presentations, which contain more visuals than text to support their story.

GriDD’s clients often use slideshows for oral presentations to communicate and share (complex) information and ideas to others. Most of them use default company or PowerPoint templates to create their presentations. Consultants at GriDD regularly heard clients speak of not being understood, information from their presentations being forgotten or having difficulties with creating presentations to fit their purposes. To help their clients with issues concerning presentation design and creation, GriDD developed training called ‘Presenting with visuals (original name in Dutch: ‘Presenteren met beeld). Training usually takes place in small groups either at the office or at the clients’ office location. The existing training received positive reactions from clients, but required a lot of planning to gather trainees and a qualified trainer present at a certain time and location. Additionally, training was never evaluated for learning effects so GriDD does not know whether their method is in fact objectively effective.

To be able to serve a wider audience, loose the aforementioned restrictions and discover learning effects, GriDD wanted to transform existing face-to-face training into stand-alone online training and evaluate its effects for their target audience with this study. Since the company always emphasizes to ‘practice what you preach’, this training should use visualization, preferably

instructional video, for explanation.

1.2 Research design

The purpose of this study is to design online training in which the creation of slideshows for oral presentations is taught using instructional video, based on the content of GriDD's existing offline training and aimed at their (potential) clients and to evaluate its effects.

The research is design-based and an exploratory descriptive case study in nature: the objective is to gain and describe insights into a specific training design and its effectiveness. These insights could be used to improve the training design and possibly advance educational practice.

The research model used is the generic model for educational design research by McKenney and Reeves (2014) is used (See Figure 1). This model describes essential components and is built based on their surveys and analyses of other existing models and frameworks. The model offers a systematic way of working for educational design research toward practical application and theoretical understanding.

This study fits a pragmatic research paradigm, which emphasises practical application of theory, workability in research and actual behaviour to determine effectiveness in which results count (Mertens, 2014).

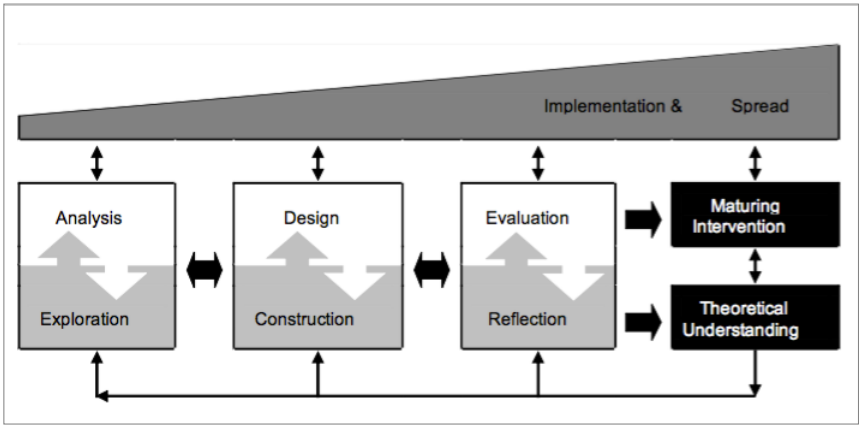


Figure 1: Generic model for educational design research (McKenney & Reeves, 2014)

In this thesis, all of the components of the research model are discussed in chapters. The exploration and analysis phase is described in chapter two. At its conclusion, research questions for the study are stated. In the third chapter both the theoretical basis for design and construction of training is described. The fourth chapter evaluates the constructed training in an empirical setting. The discussion and conclusion on theoretical understanding and maturing the intervention are found in the fifth and final chapter.

1.3 Scientific relevance

A body of research can be found on presentation slide design (e.g. Garner & Alley, 2013; Kosslyn, Kievit, Russell, and Shephard, 2012; Tangen et al., 2011) and there are relevant sources that provide guidelines on presentation creation (e.g. Duarte, 2008), but little can be found in terms of empirical research into effective training for this subject. Also, to the researcher's knowledge, the Demonstration-Based (DBT) Training approach does not often appear in literature so this study adds to the knowledge base in that respect. Practically, this research is relevant for the consultancy agency GriDD which aims to offer effective online training on slideshow design to its clients.

2. Analysis phase

In the analysis phase the problem is further explored (McKenney & Reeves, 2014). First it is explored from a practical perspective and then from a theoretical perspective, resulting in the research questions for this study.

2.1 Analyses of practice

In both in the analysis and instructional design phase, the researcher worked in close collaboration with the managing partner from GriDD, a subject matter expert and developer of the existing training (from now on referred to as SME). Apart from him, other experts or people from the target audience are consulted as well. Active participation and collaboration with experts and practitioners increases the relevance and practicality of the intervention (Van den Akker, 1999).

A summary of main guidelines follows from each analysis for instructional design and content. These will be taken into account in the design and construction of training. The guidelines are numbered for easy reference.

2.1.1 Stakeholders needs analysis

Semi-structured interviews with three consultants at GriDD were used to gain a deeper understanding of the company's needs concerning the design of online training.

Since GriDD does not have its own platform for online training, the organisation sought out partnership with Splintt. This organization offers their clients total solutions in the field of online learning programs and states: "It is our mission to ensure learning in a safe, efficient and practical way. Even better when we can mix it with a bit of fun." (Splintt, 2016). The GriDD online training will be offered on their online learning platform and the organization will invest expertise and resources in the online training for GriDD. Therefore, Splintt's expertise and possibilities and limitations of this learning environment should be taken into account and a manager from Splintt has answered five open questions on their company's needs for training.

See Appendix A for the instrument used to interview the stakeholders: the Stakeholders Needs Analysis Questions Guide. Summaries of the main results are used to describe goals, design requirements and target audience characteristics for this online training in this paragraph.

Goals for online training

The main goals of training are:

- Training should teach professionals to create effective, visual PowerPoint presentations to support oral speeches (from now on referred to as: effective, visual presentations) using the method from GriDD's existing training 'Presenting with visuals'. This refers to the development of knowledge and skills: learners should be able to create effective, visual presentations. The focus of content in the online training should be on story architecture and slide design. Training should also be aimed at teaching learners the added value of visually rich presentations, which requires a change in attitude and leads to the second main goal.

- Training should be motivating to learn and create effective, visual presentations
  Training teaches both the procedure and the reasoning behind the procedure. Learners should see the added value of training and be motivated to learn and apply what they have learnt. To illustrate, phrases provided by people from GriDD to describe how they would like learners to respond to training were: "Totally cool, I can work with this!" and "Wow, I would like to learn more about this".

Design requirements

Apart from its main goal, other important traits for the online training were mentioned as well. These are grouped into the following requirements:

- Training should be a good experience for learners
  This means that training is relevant for the target audience and that they have a good experience. Additionally, training should have user friendly navigation, an attractive layout,

be clear and accessible. It should use instructional video and visualizations appropriately, with a preference for multiple short videos instead of one longer video. Active training elements should be the majority of online training.

- Training should position GriDD as expert in this field
  One of the reasons for creating the online training is to position GriDD's field of expertise to a wider audience and share knowledge with the community. Therefore, it is important that the online training is recognizable as a GriDD product in 'look' and 'feel'. With regard to the GriDD 'look', suggestions such as appropriate use of the GriDD name, referring to GriDD as source and proper branding were mentioned. The following words were used to describe the GriDD 'feel': professional, competent, informal, modern, dynamic, fun, fresh and light.

Target audience characteristics
When asked about the target audience for the training, all consultants agreed that it should consist of (potential) clients for GriDD. These are described as educated professionals who work knowledge intensive organization and regularly create and use slideshows for oral presentations at work to communicate. Specifically, they are said to be professionals who want to achieve a (business) goal using slide-assisted presentations, for instance when they need to explain complex information (such as policy makers, engineers or consultants), have a (line) responsibility which requires them to argue decisions (such as managers or project leaders) or to need convey a specific message (such as sales people or evangelists). Also, they are said to be driven, critical, motivated to learn, fluent in Dutch and only satisfied when price, quality and impact of training align.

Guidelines for training design following from stakeholders needs analysis
Training should:

1. teach professionals to create effective, visual PowerPoint presentations to support oral speeches using the method from GriDD's existing training 'Presenting with visuals'.
2. be motivating to learn and create effective, visual presentations.
3. be a good experience for learners.
4. position GriDD as expert in this field.
5. be aimed at (potential) clients for GriDD: educated professionals who work in knowledge intensive organization and regularly create and use slideshows for oral presentations at work.

2.1.2 Exploratory target audience needs analysis

The target audience for training was defined in the stakeholders needs analysis. To gain insights into their knowledge (needs) on the subject of presentation design and needs pertaining instructional video, an explorative analysis was performed by interviewing three clients of GriDD who fall within the target audience description. Interviewees were asked about the current situation and issues concerning creating presentations. Since video instruction will be used in training, they were also asked about their requirements for learning from video. See Appendix B for the questions asked in the Target Audience Needs Analysis Interview Guide. A summary of the main findings from the analysis is provided in this paragraph.

Current situation: trainee characteristics and goals
The clients who were interviewed state that many professionals in organisations create presentations; both managers and people on the work floor. They state everyone should be able to create a good presentation. The younger generation said to be more adept than older generations, for they grew up using the current technology and design principles. They are said to have more of a balance between the data to show and the story to tell, while the older generation is more used to lectures.

Interviewees state there are different expectations for different people. Managers are stated to give presentations for people outside of the organisation such as the surrounding ecosystem (e.g. stakeholders, clients). Presentations aimed at the surrounding ecosystem are under more scrutiny and they should have a clear storyline, be to the point and spot on, according to the interviewees. Interviewees say that others such as people in the departments, create presentations but often aimed at showing others how things are done in which the substance is most importance. For these

presentations, lower quality is more acceptable.

People are said to have their own style of presenting. Most often, interviewees state the goal is to share knowledge and for everyone involved to be up to date. The focus is on subject matter; visuals are used in the form of screenshots are used to show work for instance. One of the interviewees says that: "Presentations are aimed at 'showing people the plumbing and sharing complex information related to projects".

Issues concerning creating presentations

Presenting is said to be a combination of content, form and personality by the interviewees. One of them states that often one or more of these variables is not of acceptable quality. Another says that weak presentations have no clear beginning or ending and the slides do not match the message. All of the interviewees that often there is no point to the message, presentations are given for the sake of presenting instead of having a clear goal. One of the interviewees stat that people just want to convey too much information, and that often presentations could be a lot shorter. Also, weak presentations are stated to be the ones that do not trigger understanding or do not challenge or support the audience. A interviewee added that in international settings, language can be a barrier for understanding.

It is stated by all interviewees that presenters should be able to convey the message short and to the point, but they know that creating a presentation that is to the point can be difficult. An interviewee mentions that preparation makes a big difference, for instance thinking about the target audience and the goal of training. It is stated to be important the presenter knows what to convey and why. For the audience the goal should be as clear as it is to the presenter and there should be plenty of time to convey the message with room for questions.

Little text and lots of visuals are considered good practice by the interviewees. People are said to tend to use presentations created by others, which means bullet lists or text on slides are used to keep grip on the story, which is not always right for the audience. Too much text is not considered good in presentations, but too little text is also not great.

Requirements for the use of video for learning

Most of all interviewees agree that instructional video should be highly relevant. The information should be directly applicable to the work environment. It is stated that the benefits of watching instructional video should be clear and the message should come across logically. An interviewee states that when videos are boring or too long, people would stop watching. Multiple, short videos are stated to be preferred over longer videos. A reason given is because this provides more control over when, where and which videos to watch. Video should be fun, humorous, easily accessible, use lots of examples and show how things work or what effects are, according to the interviewees. A good storyline is considered to be very important.

Guidelines for training design following from exploratory target audience needs analysis

Training should:

6. aim to teach learners with divergent learning needs (for example, younger versus older generation learners).
7. teach learners to define a goal for their presentation.
8. teach learners to create a presentation with a clear beginning and ending.
9. teach learners to create presentations that are short and to the point.
10. teach learners that preparation for a presentation is important.
11. teach learners to create balanced and appropriately designed slides.
12. use highly relevant videos in which benefits and the message are clear.
13. use short video(s).
14. use fun, humorous and easily accessible video in which examples are used.

2.1.3 Task analysis

The subject of training is learning to create effective, visual presentations. In GriDD's existing offline training they developed a learning method which forms the basis of the instructional content for the online training. This learning task analysis makes clear what knowledge and skills are needed to execute the learning task based on the existing training.

For the analysis, a structure of knowledge technique is used: the technique emphasises the relation between the execution of the learning task and the way separate task elements are being taught (Plomp, Feteris, Pieters, & Tomic, 1992). Since the new online training ought to be based on the existing face-to-face training, the developer of the GriDD method was asked to reconstruct the training for the researcher. In an unstructured interview with the SME, the existing training procedure and content were discussed using a presentation and other documents used in training. Additionally, he was asked what essential key concepts ought to be included in the new online training. Insights from these analyses are described in the following sections to form a description of the existing GriDD training and key concepts for new training.

Since participation in training will become a part of the services GriDD offers for a fee, it is not possible to describe its content in details this thesis. For scientific, non-commercial ends readers can request more information on the method used in the original training, but in this thesis the description is limited to the general steps and the manner in which they are taught (e.g. explained from a slide, good example provided etc.)

Description of the existing GriDD training

The existing training 'Presenting with visuals' takes place in a group setting with one trainer. The training is flexible in duration, depending on delivery. Sometimes clients want just the explanation of the procedure, in which case the trainer uses a PowerPoint presentation to explain the method. Training lasts about one hour in this lecture setting.

Other clients want trainees to be active in training, then the PowerPoint presentation is used to explain the method after which learners actively work on creating an effective, visual presentation according to the explanation, in a workshop setting. In this workshop setting, training lasts about three hours.

Introduction

Training starts with a presentation in which the method to create effective, visual presentations is explained. A short introduction into the benefits of visual thinking is provided, supported with a slide in the presentation (see Figure 2). Visual thinking is defined as 'visually supporting the thinking process in order be more effective'. It creates clarity in order to gain or capture insights for oneself or with others. In reference to presentations it refers to using appropriate visuals, so your audience understands you. The aim is not just aesthetic value, but to ease understanding and emphasise the story. Slides support the oral story. The idea is that using visuals in this manner, is the rationale behind creating effective, visual presentations.

Figure 2: Visual thinking introduction in existing training

Next, the trainer asks about the learners' experiences with presentations and introduces frequently stated issues: boring, uninspiring presentations which mostly consist of text in which a logical structure or storyline is lacking. The introduction ends with an overview of what will be discussed in training.

Figure 3: Overview of the five step plan in existing training

Body

The body of training consists of GriDD's method: a five step plan to creating effective, visual presentations (See Figure 3). Steps can be seen as a sub task for executing the task of creating an effective, visual slideshow for oral presentation. Walking through these steps helps trainees to not slip up when creating presentations. Each step is explained using examples (See Figure 4 for an illustration),

first the task is described followed by a worked out example of the task (See Figure 5 for an illustration).

The first step is to determine idea and goal for the presentation. Knowing why and for whom to present is seen as essential for a good presentation. This task is facilitated with a table listing questions to be answered by the participant.

The second step concerns creating a storyline: creating a mind map with all the information that make up the story of the presentation. Mind mapping is explained and steps to take to create a mind map are provided. Additionally, tips & tricks on how to create mind maps are provided.

The third step is to create a storyline structure in slides. First, it is explained how a story can be structured. Attention is focused on the procedure; how to relate (information from) the mind map to the slides. Gathering information and structuring this logically is shown as an essential part of creating an effective, visual presentation since it forms the basis for the visuals.

The fourth step is to visually support the text on the slides. The procedure is shown to use the appropriate visual for the story. The trainer explains which visuals are appropriate for a certain goal and that these can be used both realistically and as a metaphor. Visuals refer to photos or illustrations, video, graphs, models and tables However, short text and short bullet lists could be included as well for specific reasons. Additionally, the trainer provides the learners with their own information design guidelines: Consistency, Colour, Contrast, Calligraphy and Pattern (CCCCP). He describes why these are important and how to apply the guidelines. To close, he mentions the importance of using copyright free visuals presentations, so as to not use visuals illegally.

The fifth and final step refers to fine-tuning the presentation. There is a need to test and refine the presentation. The trainer mentions why fine-tuning and practice is important and provides an example of how to do this.

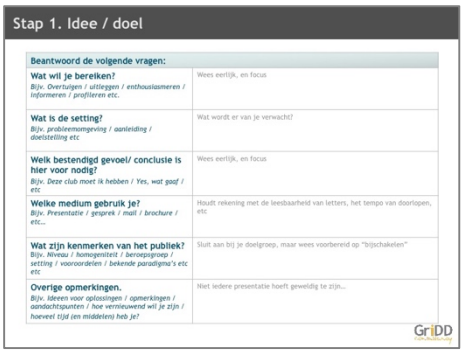


Figure 4: Example used in Step 1 in existing training

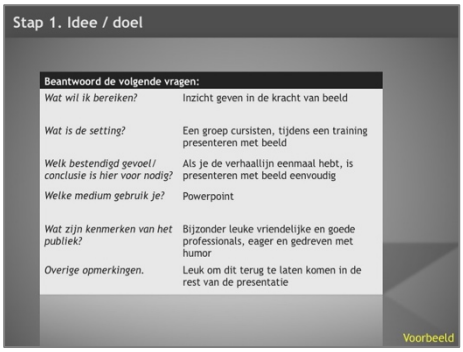


Figure 5: Worked example used in Step 1 in existing training

Figure 6: Drawing exercise in existing training

Figure 7: Assignment in existing training

Conclusion

In closing the trainer switches to a related subject: visualising by drawing. Daring to draw is related to creating an effective, visual presentation according to the training, because it teaches you to visualize the way you want. The trainer challenges learners to draw using simple exercises (See Figure 6). This provides a 'break' for learners who, at this point, have been listening for a while or as a start of the workshop.

After the exercise, the training may introduce an assignment. The assignment states to use the GriDD method to create a slide for a presentation of your own, as

an example of how you could do this for a real presentation (see Figure 7). Learners are assigned a limited amount of time.

After the drawing exercise, the trainer shares some of this own methods and tools which learners could look up in case they are interested to learn more. An overview of related topics taught by GriDD in similar training is also provided; on the spectrum the training 'Presenting with visuals' is shown to teach the basics. To wrap up, the trainer emphasises the rationale of training again.

The learners receive a Quick Reference Card (QRC) for Presentation Design, an A6 format laminated card with the key insights from training (See Figure 8). Learners can use it as reference for the next time they create a presentation.

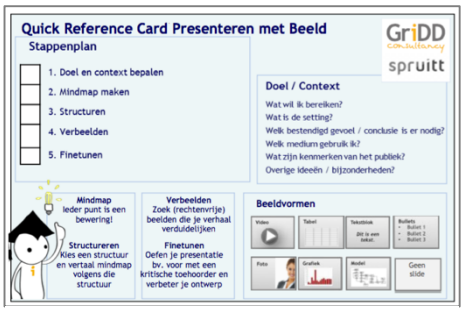


Figure 8: QRC as handout after existing training (page 1)

Key concepts to be taught in the new, online training

Since existing training is offline and face-to-face, there are lots of opportunities to adapt its contents to the audience. The new online training aims to use video which is pre-recorded and means there are more limitations. In this section learning goals and key concepts are described, following from the interview with the SME and what he deems to be essential and less essential.

The first key concept in training is that learners know why to create effective, visual presentations. This means the rationale behind training, presentation will be better received and understood, when appropriate visuals are used in slides to convey a structured story, is understood.

The other key concept is that learners know how to create effective, visual presentations. All steps in GriDD's five step method are assumed to be equally important to include in the new training, even though existing training seems to focus less on the fifth step (fine-tuning). For the steps it is both required that learners know why a step is important and learners are able to execute the step to create effective, visual presentations.

In the SME's experience, it seems the workshop setting (in which trainees perform an assignment) is more effective than the lecture setting (in which trainees do not preform an assignment). Therefore, it is key that instructional video is accompanied by active learning elements.

Less essential information taught in training are the tips & tricks on mind mapping, structuring and visualisation. Also, the drawing exercise is not essential to the learning task. Other topics, which are taught in other training at GriDD, are not essential to learning but mentioning them is desirable for sales and marketing purposes. Good and bad examples are often appreciated by the learners for reference but are not considered essential knowledge.

Guidelines for training design following from task analysis

Training should:

15. teach learners the rationale behind creating effective, visual presentations.
16. teach learners how to create effective visual presentation using GriDD's five step method: define goal & context, create a mind map, structure the story, visualize slides, fine-tune the presentation.
17. teach learners the rationale and execution method for each step in GriDD's five step method
18. provide both instructional video and active learning elements.
19. provide tips & tricks fro mind mapping, structuring and visualization.
20. provide examples of presentation design for reference.
21. mention other topics for which training is available at GriDD.

2.1.4 View of the learning environment

The new online training 'Presenting with visuals' will be part of the e-learning platform by Splintt (See Figure 9). The organisation's e-learning platforms are always in development, this section describes key elements of the learning environment used in this study, which is version 3 from 2014.

Training consists of one or more Levels. These are comparable with chapters in a book. Every Level consists of one or more Events, comparable to paragraphs in a book. Every Event consist of one or more Steps, comparable to the rest of the content in a book. A Step can contain video, audio or text.

The most dominating feature in the learning environment is the 'main screen', a large rectangle area in which video, audio or text is displayed (the aforementioned 'Steps'). Users can navigate by clicking 'vorige' (previous) or 'volgende' (next); the blue buttons beneath the screen.

Below the main screen, tabs are shown where users can see an overview of training ('inhoud'), find extra videos ('tutorials'), find documents relating to training ('library'), find tips in the form of text ('tips'), find test results ('mijn testresultaten) and write notes ('mijn notities'). These notes remain within the learning environment; they cannot be downloaded by the user.

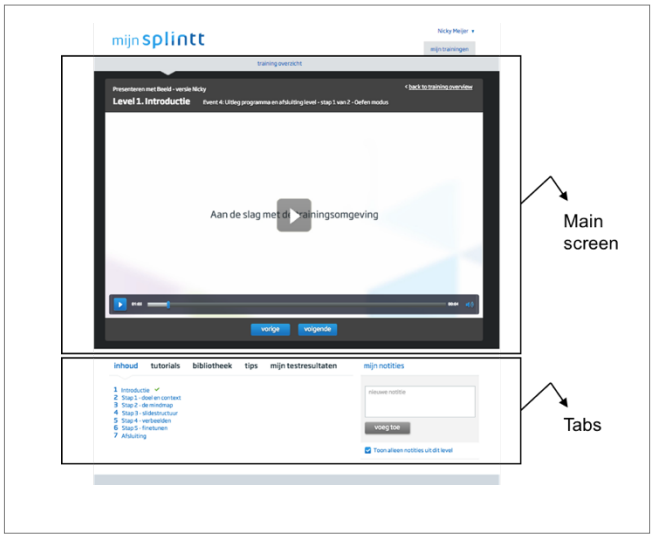


Figure 9: Splintt learning environment, version 3, 2014

Guidelines for training design following from a view of the learning environment

Training:

22. should consist of Levels, Events and Steps in the learning environment.
23. should be designed so the main learning route can be accessed in and navigated through the main screen in the learning environment.
24. could provide additional material (text, documents, audio, video) in the tabs of the learning environment.

2.2 Analyses of theory

Apart from the practical perspective and guidelines, the concepts in this study are also explored from a theoretical perspective, to help define research questions. First, background is provided on designing slides for presentations. Then aspects of good presentation design are provided, followed by insights into attitude towards (learning to) create slideshows for presentations and ending with instructional design considerations.

2.2.1 Background on designing slideshows for presentations

In order to understand what constitutes a good presentation, it is important to provide some background into the critique presentations have received over the years. The most common argument found that presentations hinder instead of enhance to cognitive information processing (e.g. Tufte, 2003; Garner, Alley, Gaudelli & Zappe, 2009; Kosslyn et al., 2012). Some background information on cognitive processing is provided to better understand why supporting these processes is important, then issues concerning slide design are explored to see how these processes are hindered.

Cognitive information processing

Cognitive processing relates to the way the human brain processes information it receives in terms of memory, perception and comprehension. One's working memory is used for current processing of information and is assumed to have limited capacity to process a certain amount of information at a time. Baddeley and Hitch (1974) proposed a working memory theory consisting of three elements: the visual spatial sketchpad to store visual information, the phonological loop stores verbal auditory information and the central executive, the attentional controller. In a later version, the episodic buffer was added to the model and is assumed to be a limited capacity temporary storage system which integrates information and moves it in and out of long term memory (Baddeley, 2000).

Schemas encode incoming perceptions into categorized information and are used to organize

and store information in long term memory and to reduce working memory load (Sweller, Van Merrienboer, & Paas, 1998). Schema creation is described by them as an active process that can be influenced (helped or hindered) by the way information is delivered, presented or perceived. For instance, the slides used during a presentation can help or hinder the way your audience processes the information. Kosslyn et al. (2012, p.17) state that when "(..) presentation taxes information processing, the audience members will have difficulty perceiving, remembering, or comprehending it".

Issues concerning slideshow design for presentations

Several potential reasons for why presentations might violate cognitive information processing can be found in literature. Tufte (2003, p16) is a vocal critic of presentation design and his view, the popular software Microsoft PowerPoint has added greatly to current issues: "PP [PowerPoint] has a distinctive, definite, well-enforced, and widely-practiced cognitive style that is contrary to serious thinking.". According to the same article, presentations stand or fall with the quality of the content, and the hierarchical and linear default slide design format hurts content rather than enhances it. However, this software is widely used: a study by Thielsch and Perabo (2012) under 1014 participants, shows a strong preference for using Microsoft PowerPoint to use in order to create computer-based presentations. Garner et al. (2009) empirically found that common practice slides are heavily influenced by PowerPoint's default styles and that these do not follow cognitive principles. They state that common practice slides hide connections between informational elements, contain too much text and do not contain images that promote optimal comprehension and retention.

Others (e.g. Shwom & Keller, 2003; Doumont, 2005; Kosslyn, 2007) have stated that it is not (just) the software that is to blame, but the people creating the presentations who do not ask themselves for whom and why they are presenting. In their response to Tufte's (2003) article, Shwom and Keller (2003, p.2) wrote: "(…) a bad PowerPoint presentation is a symptom of the writer's failure to employ simple slide design principles, basic communication skills, and -most importantly- fundamental rhetorical techniques."

Another reason for weak presentations can be found in the twofold function of PowerPoint slides in organizations. Slides can be used to support oral presentations but also as documents to communicate ideas in the organization or project documentation (Yates & Orlikowski, 2007; Schoeneborn, 2013). Slides for oral presentations are meant to be used to support a spoken story and slides as a document are meant to provide stand alone information, both a different cognitive information design approach (e.g. the latter requires a greater amount of content to explain). This duality in function can become problematic when the same slides are used for both functions, which is therefore discouraged (Doumot, 2005; Duarte, 2008; Reynolds, 2008).

2.2.2 Aspects of effective slideshow creation for presentations for this study

Building on this background information on cognitive information processing and issues concerning the creation of slides, this paragraph states what is considered influential for effective presentation design in this study.

The method GriDD employs and on which the online training will be based, is largely influenced by popular books on the subject of presentation design. Duarte (2008) states in her 'slide:ology' approach that presenters should create ideas, not slides. In her book Duarte (2008) states that presenters should treat their audience as king and presentations as vehicles to spread ideas, cultivate relationships and design -not decorate- slides, in order to help the audience see what you are saying. In his 'Presentation Zen' approach Reynolds (2008) proposes three phases to presentation design: preparation, design and delivery. The delivery phase concerns actually giving the presentation, states a few guidelines but is otherwise given the least attention. In the first phase creativity is important and presenters should plan analogously (away from the computer) questioning themselves around the key question 'what is your main point and why does it matter', after which they craft a story using brainstorming and storyboarding methods. When it comes to designing, Reynolds (2008, p.122) states it is important to make sure slides have a high signal-to-noise ratio: "the ratio of relevant to irrelevant elements or information in a slide or other display". He also promotes the use of visuals in presentations, for he states these are remembered better than words.

Support for these ideas can be found in scientific research. For instance, Mayer (2001) states

in his multimedia learning theory that people learn better from word and pictures than from words alone. Multimedia learning theory builds on the assumption of limited working memory capacity and how to help information processing for learning. He formulated several cognitive multimedia principles, such as the 'coherence principle' which states that people learn better when extraneous words, pictures and sounds are excluded rather than included (Mayer, 2001).

A very comprehensive overview of guidelines founded in research is provided by Kosslyn (2007) and Kosslyn et al. (2012). Kosslyn (2007) provides three goals that define effective presentations: connecting with your audience, directing and holding attention and promoting understanding. Kosslyn et al. (2012) formulate eight comprehensive cognitive communication principles related to these goals and the information processing operations of encoding, working memory and accessing long term memory:

- Principle of Appropriate Knowledge: Communication requiring prior knowledge of pertinent concepts, jargon, and symbols.
- Principle of Discriminability: Two properties (such as two colors, degrees of gray, or sizes) cannot convey different information unless they differ by a large enough proportion to be easily distinguished.
- Principle of Compatibility: A message is easiest to understand if its form is compatible with its meaning.
- Principle of Limited Capacity: People have a limited capacity to retain and to process information and will not understand a message if too much information must be retained or processed.
- Principle of Informative Change: People expect changes in perceptual properties to carry information, and expect every necessary piece of information to be conveyed by such a perceptible change.
- Principle of Perceptual Organization: People automatically organize elements into groups, which they then attend to and remember.
- Principle of Salience states: Attention is drawn to large perceptible differences.
- Principle of Relevance: Communication is most effective when neither too much nor too little information is presented.

In their study, combining and building on relevant research on psychological processes, Kosslyn et al. (2012) have formulated specific rules for presentation design relating these principles, specifically aimed at slideshows for oral presentation. Apart from the eight cognitive principles they distinguish, Kosslyn et al. (2012) also include an 'Over-Determined' principle in which items are stated that relate to more than cognitive principle at the same time.

In this study, the ability to create effective, visual slides for oral presentations, is referred to as task performance. Good task performance is defined as a high level of adherence to the nine cognitive communication principles stated by Kosslyn et al. (2012).

2.2.3 Attitude towards (learning to) create slideshows for presentation

To create slideshows in a dissimilar way to how one has been doing it before, requires a change of mind set concerning the approach to what constitutes an effective presentation for professionals. This not always easily implemented as Nathans-Kelly and Nicometo (2014, p 49) state: "Changing slide design inside an organization can also mean a fundamental shift in how engineers, technical experts, and others communicate with each other." So, not only should training aim to improve slide design, a change in attitude towards the presentation creation method is needed in order for professionals to actually start creating more effective presentations in organizations.

Clark (1998, p41) states that the two most important internal performance processes are our knowledge system and motivational system which according to him relate to each other as follows: "Knowledge functions like a car's engine and transmission. It provides direction, strategies and tactics for achieving goals. Motivation functions as the gas and battery in a car -it provides the energy to achieve goals. An expert performer with inadequate motivation is like a precision racing car with an empty tank or a dead battery." He sees motivation as interlinked processes of commitment and mental effort and developed the Commitment and Necessary Effort (CANE) Model to diagnose and solve

motivation problems related to goal commitment.

Commitment to a task follows from learners' personal agency and emotional state (Bandura (1997); Ford (1992)). The degree to which learners perceive they are able to execute a task is referred to as self-efficacy and together with learner' perception of support for executing a task, forms learners' personal agency. Emotion plays a role in motivation since, for instance, negative feelings such as anxiety and stress can be interpreted as signs of failure (Pajares, 1997) and thus negatively influence commitment to learn or execute a task.

The other aspect of the model refers to the mental effort learners are willing to apply. People are motivated to spend effort on a task when they value its effectiveness. This builds on the expectancy-value theory as described by Eccles and Wigfield (1995). When learners are interested in a task, find it important or see its utility, their motivation increases to learn or to apply what was learnt.

In this study, motivation is defined as the commitment and necessary effort applied to (learning to) create effective, visual presentation, for which, following from the CANE Model by Clark (1998), personal agency, emotion and effectiveness value are assumed to be influential.

2.2.4 Instructional design for learning from video

Online training offers many possibilities for multimedia learning. Instructional video has become of popular use in multimedia learning and would fit GriDD's need to take a visual approach in training and the requirement of the use of instructional video. The interest in learning from video has significantly increased in recent years (Giannakos, 2013). In a literature review, Berk (2009) found that there is an empirical foundation of the use of video for learning; to increase memory, comprehension, understanding and deeper learning. An empirical study by Kay and Kletskin (2012), showed learners found video useful, easy to use, effective as a learning tool and helpful for knowledge gain.

Support for the use of instructional video can also be found in multimedia learning theory which states that students learn better from words and pictures than from words alone (Mayer, 2001). It assumes meaningful learning involves cognitive processing by actively organizing and integrating incoming visual and auditory information. Mayer (2001) proposed multimedia learning principles which take the issues of limited capacity of working memory into account and can be used for effective instructional design. Building on this research, eight guidelines for the design of instructional video are provided in Van der Meij and Van der Meij (2013). They define practical guidelines such as to make tasks clear and simple and to keep videos short. In a later study, they found using instructional video, constructed according to these guidelines, resulted in significant learning gains compared to paper based instruction (Van der Meij & Van der Meij, 2014).

Video can be used to model desired knowledge, skills and/or attitudes, which makes it a form of demonstration (Grossman, Salas, Pavlas, & Rosen, 2013). When training relies for a large part on instructional video for learning, a demonstration-based raining approach can be used. Demonstration-Based Training (DBT) is defined as 'a strategy of training development and delivery involving the systematic design and use of observational stimuli intended to develop specific knowledge, skills and attitudes in the learner" (Rosen et al., 2010, p.597).

Well-designed DBT focuses the quality of the demonstration (e.g. in person or in video) with instructional features; information provided to learners or activities learners are presented with in addition to demonstration (Rosen et al., 2010). Combining demonstration with situation appropriate instructional features is considered to enhance leaning efficacy and make it a highly flexible training technique (Grossman et al., 2013).

DBT is rooted in Bandura's (1986) Social Cognitive Theory and therefore based on four interlinked processes: attention, retention, production and motivation. In attentional processes learners must actively process what they are observing to learn, in retention processes what is observed must be stored to affect future behaviour, in production processes the stored knowledge must be reconverted into overt actions and in motivational processes the perceived consequences of performing the observed behaviour must be favourable enough to strengthen the likelihood of future performance (Rosen et al., 2010 p. 598).

In this study, a DBT model will be used to design training with instructional videoContext-specific instructional features are defined to facilitate the aforementioned four learning processes.

2.3 Research questions

Following from the previous sections and the aim of this research, three main research questions were formulated. The first relates to the design and construction of training:

1. How to design online training, using instructional video, in which professionals learn to create slideshows for oral presentations, based on the existing offline training 'Presenting with visuals' by GriDD?

To answer to this first question, the following topics are studied: a) instructional features to facilitate the learning processes (attention, retention, production, motivation) stated in the Demonstration Based Training model (Rosen, 2010; Grossman, 2013), b) construction of training based on these defined instructional features and the guidelines defined in the analyses of practice.

In the analysis from practice the two main goals for training were provided and these are studied in the evaluation; learners should be motivated and able to create effective, visual slideshows for oral presentations. Definitions for these concepts (motivation and task performance) were provided in the analyses from theory. This results in the following questions:

2. What are the effects of the online training 'Presenting with visuals' on the motivation of professionals to create effective, visual slideshows for oral presentations?

To answer this second question, the following topics are studied: a) participants' overall opinion of training, b) increase of overall motivation to (learn to) create effective, visual presentations post training compared to pre training and c) increase of personal agency, positive emotion and effectiveness value post training compared to pre training and d) participants' statements about participation in training, in terms of personal agency, positive emotion and effectiveness value.

3. What are the effects of the online training 'Presenting with visuals' on the task performance of professionals to create effective, visual slideshows for oral presentations?

To answer the third question, the following topics are studied: a) increase of participants' overall performance to create effective, visual presentations post training compared to pre training, b) increase of participants' performance to adhere to specific cognitive communication principles (Appropriate Knowledge, Compatibility, Discriminability, Informative Change, Limited Capacity, Perceptual Organization Relevance, Salience and 'Overdetermined') post training compared to pre training

3. Design phase

Literature study was performed to design instructional features following a Demonstration-Based Training approach and related to guidelines following from the analyses from practice. A pragmatic and collaborative approach was then taken towards construction of training, based on these instructional features and guidelines from practice. The role of the researcher is to develop a product in collaboration (Visscher-Voerman, Gustafson, & Plomp, 1999). The SME from GriDD was the main collaborator for design. All instructional material was constructed by the researcher, building on existing material at GriDD and in agreement with and reviewed by the SME.

Two other experts collaborated as well. One of the e-learning specialists from the stakeholder organisation Splintt was consulted on the topics relating to the implementation in the e-learning platform and with regard to intermediate products, such as the scripts for the videos. She has multiple years working experience in that field and was very helpful in all matters. The last person involved was a video expert. He filmed and edited the videos for training and gave advice. In collaboration with these experts, training was constructed in iterative steps.

3.1 Demonstration Based Training (DBT) model

Grossman et al. (2013) present a theoretical DBT model in which instructional features, learning processes and outcomes are connected. An adapted version of this model used in this study is shown in Figure 10. Trainee characteristics are the features related to the target audience, such as experience creating presentations. Situational variables relate to the learning environment of training.

The design and construction of instructional features to facilitate learning processes and outcomes are described in the following paragraphs. When an instructional feature is mentioned in this thesis, a reference number is provided related to the learning process the instructional feature is meant to facilitate, for instance ‘instructional narrative’ relates to attention processes and is referred to as ‘A1’. Related guidelines from practice are referred to with their number and short description.

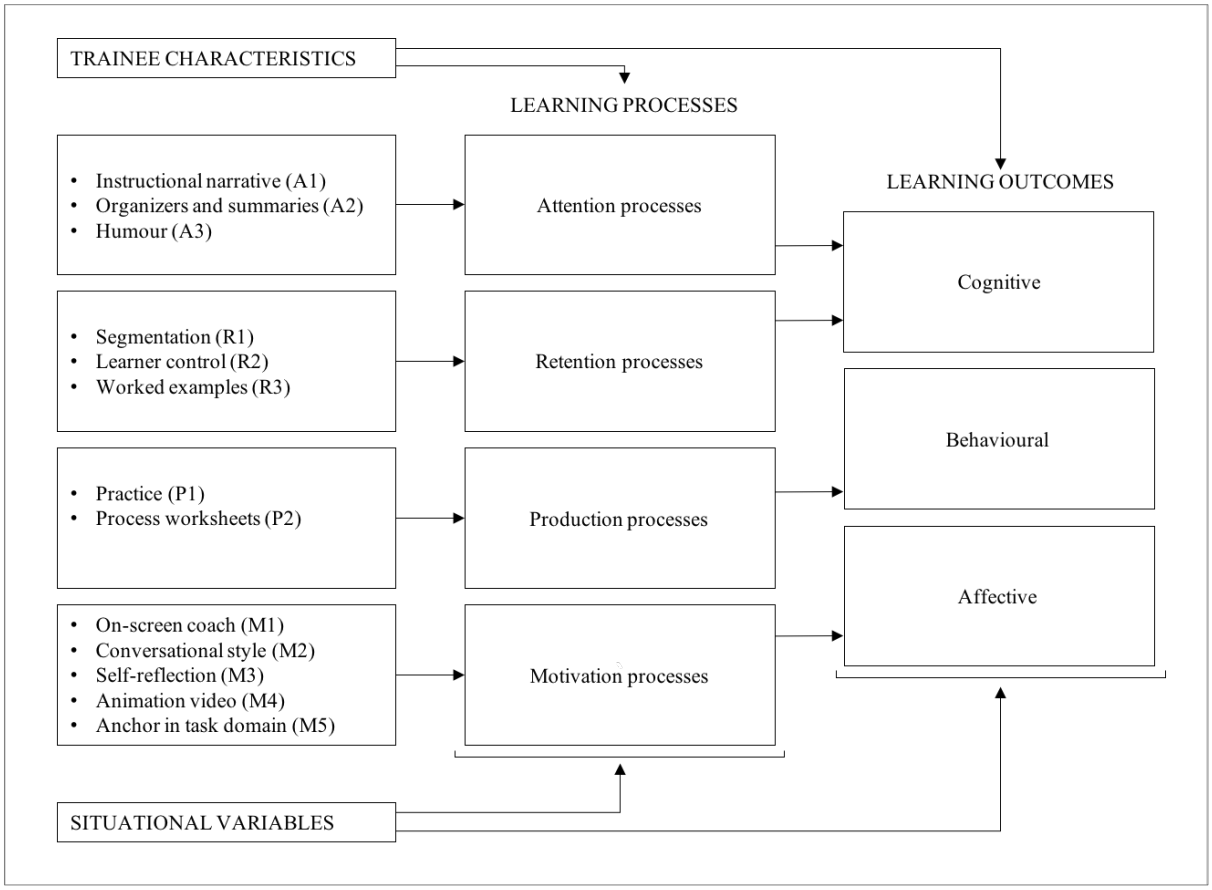


Figure 10: Model of Demonstration-Based Training

3.2 Training design

3.2.1 Instructional features to facilitate attention processes

Instructional features designed to facilitate attention processes aim to ensure that learners attend to the appropriate information needed to reach their learning objectives (Grossman et al., 2013). A way to direct attention is the addition of an *instructional narrative (A1)*. An instructional narrative is used to describe the reasoning behind and the utility of the instruction (Grossman et al., 2013). Smith and Ragan (1999) state that when it comes to learning attitudes, it is important to start with a persuasive message concerning the affective component: why is the demonstrated skill important? This structures the process of learning by focusing attention on critical aspects of performance (Rosen et al., 2010) and is preferably provided by a role model, a respected person who demonstrates the desired behaviour (Smith & Ragan, 1999). Inclusion of instructional narrative also matches *guidelines from practice 2, 12, 15 and 17* which call to make the rationale behind training clear.

Another instructional feature is to add *organizers and summaries (A2).* A summary is a brief description of the learning objectives of a demonstration and an organizer contains statements on what the instruction entails in terms already known to the learner (Grossman et al., 2013). In a study by Li (2012) a positive effect was found for the use of an advance organizer, introductory material to activate background knowledge, on learning outcomes. Adding organizers and summaries also provide overview therefore relating to *guideline from practice 3*, which states training should be clear and accessible.

The final attention strategy to discuss, is the use of *humour (A3)* to attend the learner to the material (Keller, 1987). This can refer to aspects such as making humorous analogies, telling jokes or just creating a light-hearted atmosphere that may make instruction more attractive to watch. Humour also relates to *guideline from practice 14* which calls for fun and humour in video. However, it should be used carefully, since while appropriate humour is found to positively associate with student learning, inappropriate forms of humour did not correlate with student learning and could even lead to directing attention the wrong way (Wanzer, Frymier, & Irwin, 2010).

3.2.2 Instructional features to facilitate retention processes.

Instructional features for retention aim to facilitate deep-level information processing (Grossman et al., 2013). An instructional measure to increase retention is *segmentation (R1).* When material is complex, demands of essential processing could overwhelm the learner (Mayer, 2008). The segmentation principle states that 'learners understand multimedia explanation better when it is presented in learner-controlled segments rather than as continuous unit' (Mayer & Moreno, 2003, p.47). With video this refers pacing options such as using start, stop and continue buttons to control video. And for instructional content is refers to presenting information in smaller segments. Segmentation of multimedia instruction has been proven to facilitate basic (recall) and deep (application) knowledge acquisition (Lusk et al., 2009). Also, relating to segmentation, *guidelines from practice 3, 13 and 22* call for (multiple) short videos and designing separate instruction elements.

Related to segmentation is the instructional feature of *learner control (R2)*. Segmentation refers to instructor based segmentation and learner control to the level of freedom and decision making on the part of the learner on how learning is conducted. Instructional design should fit as much as possible the diverging needs and propensities of the intended audience (Van der Meij & Carroll, 1995). This also relates to *guideline from practice 5 and 6*. Providing learner control also incorporates *guidelines from practice 23 and 24*, which call for multiple learning routes within training. However, Kirschner, Sweller, and Clark (2006) state that guidance is still necessary for learners. It is important to state to allow learner control wisely and make sure balance control, structure and guidance (Salas, Tannenbaum, Kraiger, & Smith-Jentsch, 2012).

Another instructional feature to improve retention are *worked examples (R3)*. Worked examples consist of both the formulation of a problem a detailed presentation of the steps that are required for a solution (Stark, Mandl, Gruber, & Renkl, 1999). Schworm and Renkl (2006) state that these are typically employed as follows: 1) a principle is introduced, 2) a worked out example is provided and 3) related to-be-solved problems are given. When worked examples are used, the learner can devote the available working memory to studying the solution and constructing a schema for

solving such problems in long term memory (Paas & Van Gog, 2006; Sweller & Cooper, 1985). Renkl (2011, p.272) states it is an appropriate instructional method, for instruction "should encourage learners to encode and interconnect both abstract concepts as well as abstract principles and concrete cases in which it is shown how this abstract knowledge is applied". Also, good examples or 'best practices' let adult students know what they are doing compared to a known model (Cercone, 2008). Worked examples are also a way to incorporate *guidelines from practice 14, 16, 17 and 20* related to teaching the execution of the learning task and use of examples.

3.2.3 Instructional features to facilitate production processes

Instructional features designed to facilitate production aim to provide opportunities in which demonstrated behaviour can be applied (Grossman et al., 2013). The main instructional feature related to production is *practice (P1).* Support for this can be found in (Van der Meij & Van der Meij, 2016)who state that 'the ultimate goal of observing a demonstration is for the user to be able to accomplish a task that is similar or related to the one demonstrated'. Practice opportunities should be appropriate for transfer of learning to the workplace (Salas et al., 2012). It is important for adult learners to link what they are learning with how this applies to their lives, so assignments should be relatable and preferably refer to real situations (Cercone, 2008). Also, creating practice opportunities in training can be considered an active learning element, which according to *guidelines from practice 3 and 18* should be a large part of training.

To facilitate practice, another instructional feature can be applied: *process worksheets (P2)*. Kirschner et al. (2006) name process worksheets as a good guided instruction measure, and it refers to a document providing problem solving phases of the task and/or hints that might help to complete a phase. Nadolski, Kirschner, and Merriënboer (2005) found that learners who were provided with this kind of guidance outperformed the ones who did not. Additionally, including process worksheets relates to *guidelines from practice 19 and 24* which state additional information, not necessarily essential but beneficial to learning, could and should be provided.

3.3.4 Instructional features to facilitate motivation processes

Instructional features designed to facilitate motivation aim to encourage learners to acquire and apply the learning material (Grossman et al., 2013). Using social cues in instruction can influence engagement and commitment to a task. When an instructional lesson "does not contain social cues, the learner does not feel engaged with the author and therefore will not work as hard to make sense of the material" (Clark & Mayer, 2008 p.163). One of the social cues distinguished, is the use of an *on-screen coach (M1),* in the form of real people using video and human voice or artificial characters using animation and computer voice. Homer, Plass, and Blake (2008) hypothesized that including a visible instructor in video could improve learner engagement. Support for this can be found in a study by Morain and Swarts (2012) who include picture-in-picture video of the narrator to heighten self-efficacy through identification, as an aspect of good instructional video. Kizilcec, Papadopoulos, and Sritanyaratana (2014) found that learners strongly preferred video instruction with a visible instructor to no instructor, and that they perceived this as more educational. An on-screen coach could provide an opportunity to comply with *guideline from practice 4*, which calls for positioning GriDD as an expert in the field, by using someone or something affiliated with the company as the on-screen coach.

Another social cue can lead to a sense of social partnership and improved learning, mentioned by Clark and Mayer (2008): using *conversational style (M2)* or polite wording in instructional material. This means to favour using informal wording and speaking directly to the learner, over formal wording. It relates to *guideline from practice 3*, for it could make training more user friendly and accessible to learners.

To provide learners with opportunities an instructional feature to apply is *self-reflection(M3).* Self-reflection can be seen as a self-regulatory activity which maintain learners' attention and keep them on task by encouraging self-monitoring of performance, comparison of progress to an end goal and adjustment of learning effort and strategy if appropriate (Salas et al., 2012). Prompting reflective questions at online training, for instance on how are they managing in the online course, should help adult learners focus their learning process and gain confidence (Cercone, 2008).

Using *animation videos (M4)* for learning is another instructional measure to add to

motivation. Animation is defined as 'any application which generates a series of frames, so that each frame appears as an alteration of the previous one, and where the sequence of frames is determined either by the designer or the user' (Bétrancourt & Tversky, 2000). Animation is found to develop higher motivation to learn science in terms of self-efficacy, interest and enjoyment, connection to daily life, and importance to their future compared to the control students according to Barak, Ashkar, and Dori (2011). This influences personal agency, for animation can be used to make abstract concepts concrete thus improving understanding and improvement of perceived ability. Lee, Kazi, and Smith (2013) mention narrative animated sketches as a compelling new visual communication technique, drawing from sources stating sketches add personality, viewers of sketched drawing to be inclined to focus on high-level aspects instead of details. The role of animation video for increase of engagement relates it to *guidelines from practice 3 and 14*.

An instructional feature to influence the value of task effectiveness is to *anchor the tool in the task domain (M5)*. This is one of the heuristics from user-centred design philosophy minimalism (Van der Meij & Carroll, 1995). When using video for demonstration of a procedure it is important to select meaningful training tasks: real tasks and components of instruction reflect the task structure. Other related heuristics to choose an action-oriented approach and support error recognition and recovery. In *guideline from practice 12* this need for highly relevant video is also made apparent. When learning from demonstration, seeing the software used in video (in this case for instance PowerPoint) adds to its relevance and thus improves the motivation to spend mental effort. Screencasts can be very useful for this. They are defined as 'capturing what you do on the computer screen with synced audio commentary' (Lloyd & Robertson, 2012). Screencasts are stated to be attractive as a learning medium due to authenticity, multimedia affordances and a feeling of personal contact that they engender (Palaigeorgiou & Despotakis, 2010). Oehrli, Piacentine, Peters, and Nanamaker (2011) found in their study, as a good practice, that screencasts should be short (maximum of one or two minutes) but can be part of a sequence. Also, a good screencast should provide overview, describe a procedure, present a concept, elaborate on content, and focus attention (Sugar, Brown, & Luterbach, 2010). Van der Meij and Gellevij (2004) have formulated four components of a procedure (goal, action & reaction, warnings and problem solving) with guidelines that can be used to design procedural screencasts.

3.3 Construction of training

In this paragraph the construction of training is described and shown, based on instructional features and guidelines from practice.

An overview of the instructional content of training is shown in Figure 11. *Segmentation (R1)* is applied and visible in Figure 11 in the overview of construction. Training consists of seven Levels: an Introduction Level (1) and a Conclusion Level (7) precede and conclude the body of training (Level 2 – 6). Levels consist of separate Events; instructional elements grouped under a Level. There are 26 Events in training. Sixteen Events are videos, nine animation videos (such as 'what & why' and seven screencast videos (such as 'procedure'), with durations ranging from 1.05 minutes to 4.19 minutes. The learner is able to stop, play, fast forward and rewind each video. Other Events consist of text on screen, which can cover one (such as 'assignment') or multiple screens (such as 'reflection'). The assignment displays the process of the *worked example (R3)* for that learning task and it was designed to be able to see the whole task at the same time, since steps are closely related. The reflection contains *self-reflection (M3)* questions for the learner, designed in multiple screens because the questions are not closely related and separating them emphasises each individual question.

The overall learning task is also segmented into smaller tasks. In the Introduction the rationale of training and the overview of training are what is focused on. In the Conclusion attention is paid to other areas for learners to deepen their understanding of presentation in 'Next Steps', which are also topics for which training is available at GriDD (*guideline from practice 21*). Also, an overall summary is provided in 'Summary'. The main instructional content is taught in the body of training (Level 2-6). In compliance with *guidelines from practice 1,2 7, 8, 9, 10, 11, 15, 16, 17 and 21* training is based on GriDD's existing method to create effective, visual presentations. The five steps of the method are turned into in five Levels in training: 'Goal and context'(Level 2), 'Create a mindmap' (Level 3), 'Structure the story' (Level 4), 'Visualize slides' (Level 5) and 'Fine tune the presentation' (Level 6). Each of these Levels can be seen to have a similar structure that encompasses the entire learning task of one of the steps of the GriDD method: a 'what and why' video, followed by a

'procedure' video, an 'assignment' and concluded with a 'reflection'.

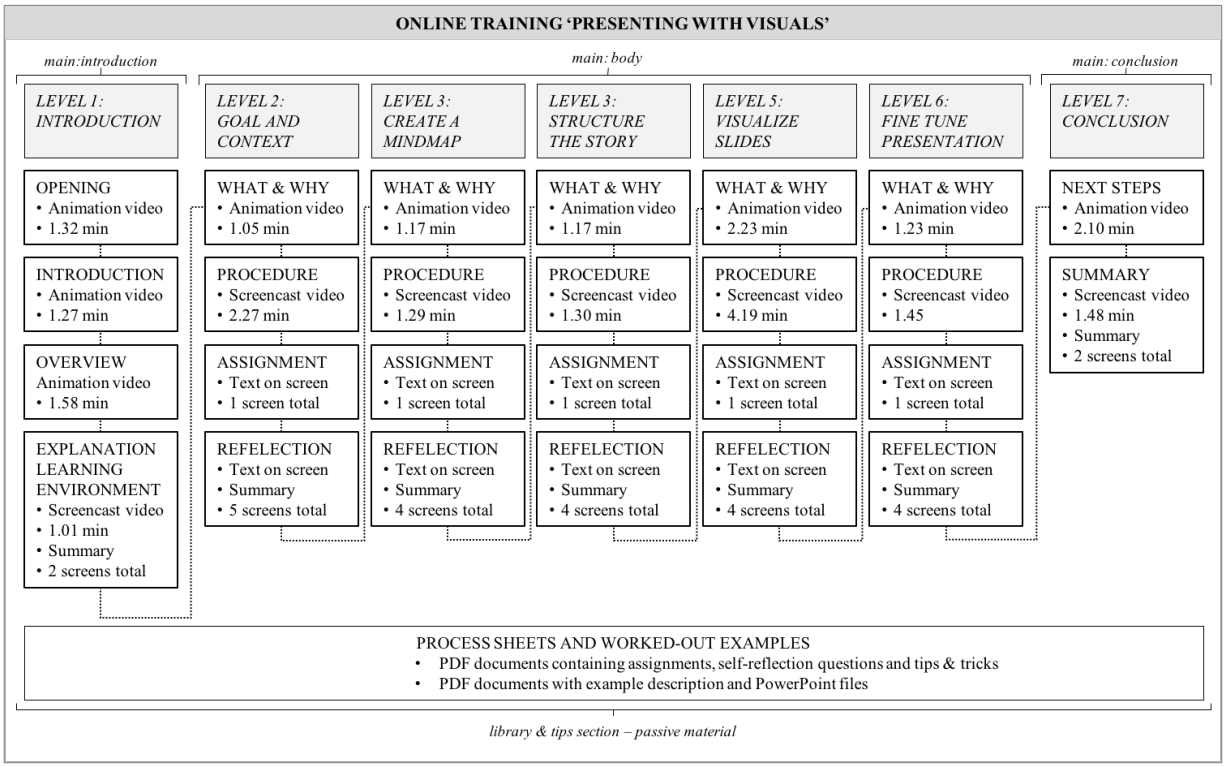


Figure 11: Overview of constructed training

The 'what and why' *animation video (M4)* explains the *instructional narrative (A1)* among others. The animation video precedes the demonstration video 'procedure'. It states the importance of the learning task in the process of creating effective, visual presentations using sketched animations. The 'opening', 'introduction' and 'next steps' videos (See Figure 11) are also instructional narratives.

An *organizer and summary(A2)* instructional feature is incorporated in the 'what and why' animation videos. Every animation video in the body of training, starts with an overview of previous steps and a short statement of what the learner can expect in the next Level. This is visualized as a hurdle race (see Figure 12). The hurdle race is introduced in the Overview event in Level 1, starts in the animation video of Level 2 and ends in the one in Level 6. Another way this instructional feature is applied in training is with summarizing text in the main screen as the final screen of each Level (See Figure 13). Additionally, the 'summary' video shortly revisits the most important learning task procedures as a conclusion of training in Level 7.

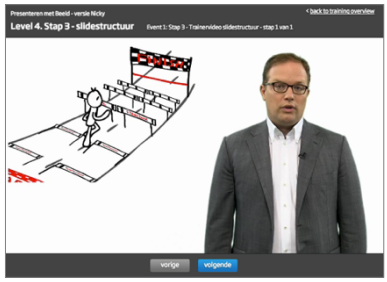


Figure 12: Organizer and summaries in animation video

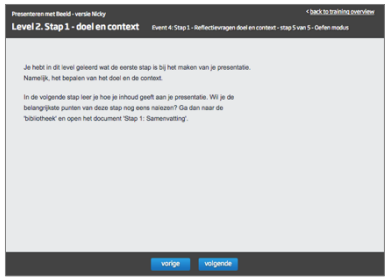


Figure 13: Organizer and summaries in text on screen

Next to these animations, an *on-screen coach (M1)* models the desired behaviour (See Figure 14) of the instructional narrative. To comply with the *guideline from practice 4* to position GriDD as an expert in this field, one of their managing partners is the on-screen coach in training. He is mainly visible at the start of video and at the end to close, to direct attention. For information in the video where learners need to pay attention, the on-screen coach disappears from view and just the animation is show so as to not overload the working memory capacity (See Figure 15). In the procedural screencasts he is

not seen, but his voice is the narration. His presence should provide consistency throughout training and provides a *conversational style (M2)* in training. The on-screen coach speaks directly to the learner (e.g. "You are now in this part…"). This style of informal communication is also incorporated in the text of training, which can be seen in Figure 13 for instance.

The animation videos are also where the instructional feature of *humour (A3)* is most applied. An example of its implementation to direct the learners' attention can be seen in the opening video (see Figure 16). This animation exaggerates common issues concerning presentations for comical effect, in the style of a silent, slapstick like movie. This is meant to be funny, recognizable as bad example and helpful to prime the idea that creating weak presentations will be a thing of the past for the learner when training is concluded.

The demonstrations, which form the heart of training, are the 'procedure' videos in the body of training. In these videos the procedure of the learning task, *worked example (R3),* is demonstrated. To *anchor the tool in the task domain (M5)* a screencast is used in which, for instance, the actions and reactions are demonstrated (See Figure 17). The screencasts demonstrate all the learning material needed to create presentations.

Demonstration is therefore followed by an assignment to *practice (P1)* what was learned. In Step 1, learners fill in question concerning the goal and context of their presentation. In Step 2 learners create a mind map, in Step 3 information is structured (for instance, using the storyline of a fairy tale), in Step 4 slides are visualized and in Step 5 learners fine tune the presentation. The idea is: when training is completed, so is the learner's presentation. Learners are stimulated to choose their own topic for presentation, preferably one that they will have to make anyway, to make practice as realistic as possible. To accommodate different learners and provide *learner control (R3)*, there is also an example topic that can be used to create a presentation.

Assignments are provided via text in the main screen (see Figure 18), but also in *process worksheets (P2)* that can be found in the library section of the training. The *worked example (R3)* for each learning task in written down in pdf documents. There is also a fully worked example available (see Figure 19), in which the work process for the learning task is explained in detail using the example topic. This could also could be to compare learners' own work to a good example.

Other passive material consists of tips & tricks, the Quick Reference card from existing training, a checklist and knowledge test. The library also holds process worksheets *self-reflection (M3)* questions, in case learners want out their write answers they can fill them out digitally or print the documents (see Figure 20). These questions are written so learners review their task execution or process, which can help ensure learners that preparation is important as per *guideline from practice 10* for it enables them to spot potential errors sooner. All process worksheets are provided with the GriDD logo in compliance with *guideline from practice 4*.

Finally, training offers *leaner control (R2)* in several ways. The learner can navigate freely throughout training. The dotted line in Figure 11 shows the guided route of the learning material, but

Figure 14: On-screen coach with animation

Figure 15: Sketched animation for instructional narrative

Figure 16: Humour in opening video

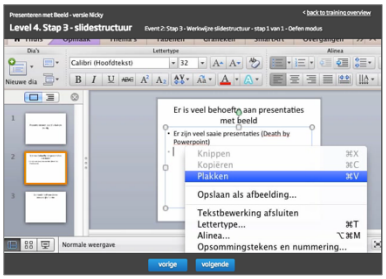


Figure 17: Action & reaction demonstrated in screencast

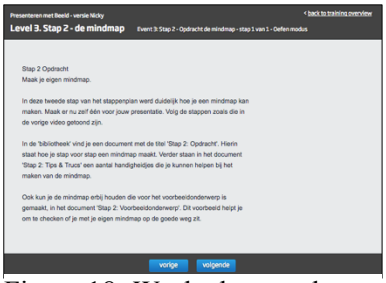


Figure 18: Worked example (assignment) for practice

another route is possible if learners are so inclined. Passive material in the library and tips section provides another method of delivery of learning material (using text and static pictures) and additional material (such as the aforementioned tips and tricks documents) if a learner wants more or different information than is offered in the main guided learning route.

GriDD consultancy spruitt

VOORBEELD

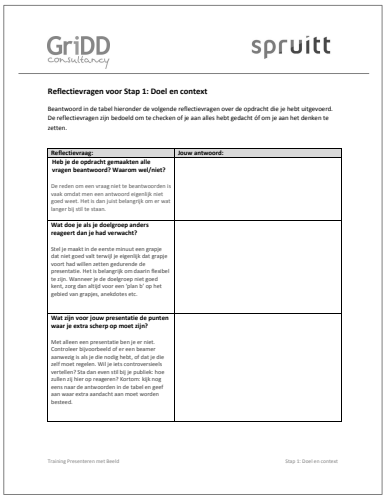
Voorbeeld opdracht 1 : Bepaal het doel en de context van je presentatie

Beantwoord de volgende vragen:

Wat wil je bereiken? *Bijv. Overtuigen / uitleggen / enthousiasmeren / informeren / profileren etc.*	In de eerste plaats informeren en in de tweede plaats enthousiasmeren. Meer mensen uit de auto en op de fiets voor een betere gezondheid en een beter milieu.
Wat is de setting? *Bijv. probleemomgeving / aanleiding / doelstelling etc*	Een salespitch om electrisch fietsen te bevorderen voor woon- en werkverkeer.
Welk bestendigd gevoel/ conclusie is hier voor nodig? *Bijv. Deze club moet ik hebben / Yes, wat gaaf / etc*	Ik ga vaker (electrisch) fietsen naar mijn werk in plaats van met de auto! Elektrisch fietsen is niet alleen voor senioren, maar ook voor mij een goed idee.
Welke medium gebruik je? Bijv. Presentatie / gesprek / mail / brochure	Powerpoint presentatie die gegeven wordt in een zaaltje met de presentatie op een groot scherm.
Wat zijn kenmerken van het publiek? Bijv. Beroepsgroep / setting / vooroordelen / leeftijd / homogeniteit	Volwassenen die wel op de fiets naar hun werk zouden kunnen komen (gezien de afstand), maar dit niet doen. En volwassenen waarbij door elektrisch fietsen de afstand naar werk ineens wel te doen is. De groep bestaat uit zowel mannen als vrouwen en er wordt vanuit gegaan dat ze wel eens in aanraking zijn gekomen met een elektrische fiets, maar deze zelf niet bezitten. Leeftijdscategorie 30-45 jaar.
Overige opmerkingen. Bijv. Ideeen voor oplossingen / opmerkingen / aandachtspunten / hoeveel tijd (en middelen) heb je?	Richten op herkenbare situaties voor de doelgroep en ze op die manier geinteresseerd maken. Er is een half uur tijd beschikbaar voor de presentatie, inclusief beantwoorden van eventuele vragen.

Voorbeeldpresentatie Stap 1: doel en context 1 / 1

Figure 19: Fully worked example



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Reflectievragen voor Stap 1: Doel en context

Beantwoord in de tabel hieronder de volgende reflectievragen over de opdracht die je hebt uitgevoerd. De reflectievragen zijn bedoeld om te checken of je aan alles hebt gedacht óf om je aan het denken te zetten.

Reflectievraag:	Jouw antwoord:
Heb je de opdracht gemaakten alle vragen beantwoord? Waarom wel/niet? De reden om een vraag niet te beantwoorden is vaak omdat men een antwoord eigenlijk niet goed weet. Het is dan juist belangrijk om er wat langer bij stil te staan.	
Wat doe je als je doelgroep anders reageert dan je had verwacht? Stel je maakt in de eerste minuut een grapje dat niet goed valt terwijl je eigenlijk dat grapje voort had willen zetten gedurende de presentatie. Het is belangrijk om daarin flexibel te zijn. Wanneer je de doelgroep niet goed kent, zorg dan altijd voor een 'plan b' op het gebied van grappes, anekdotes etc.	
Wat zijn voor jouw presentatie de punten waar je extra scherp op moet zijn? Met alleen een presentatie ben je er niet. Controleer bijvoorbeeld of er een beamer aanwezig is als je die nodig hebt, of dat je die self-moet regelen. Wil je iets controversieels vertellen? Sta dan even stil bij je publiek: hoe zullen zij hier op reageren? Kortom: kijk nog eens naar de antwoorden in de tabel en geef aan waar extra aandacht aan moet worden besteed.	

Training Presenteren met Beeld Stap 1: Doel en context

Figure 20: Process sheet, self-reflection questions

4. Evaluation phase

In this chapter the design of the evaluation is provided by describing the procedure, the sample of participants, the instruments used and how data is analysed. In the second paragraph, the results of the evaluation are provided.

4.1 Evaluation design

In this section the evaluation design is described. The goal of the evaluation is to explore the effects of training on the task performance and motivation of participants to create effective, visual presentations**.** This study uses a partially mixed methods approach in which qualitative methods have a more dominant status. Mixing can be used for multiple purposes such as triangulation, seeking convergence and corroboration of findings, and complementarity, seeking elaboration and clarification (Onwuegbuzie & Leech, 2006). In this study is it used to triangulate the results for answering the main question, using qualitative methods for instructional design, quantitative methods to measure task performance and a mix of qualitative and quantitative features to evaluate motivation. For the latter, mixing is used to seek elaboration of insights on the factors influential to motivation.

4.1.1 Procedure

For the evaluation part of this study, participants took part in the online training which they started and completed within one week. Before training, participants were asked to send the researcher the slideshow (PowerPoint presentation slides) of a recently created presentation. Additionally, they were asked to fill out a short online questionnaire, to be completed before training. Immediately after finishing training, participants were asked to send the slideshow they created during training to the researcher and to fill out another short online questionnaire. Individual one-hour interviews were scheduled in the week following training. Figure 21 provides a schematic overview of the procedure.

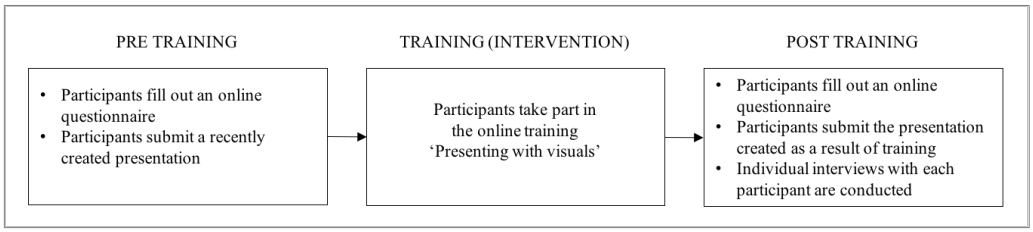

Figure 21: Evaluation procedure

4.1.2 Sample

Participants in this study were selected based on purposive sampling techniques (Ritchie, Lewis, Nicholls, and Ormston (2003). They were selected through typical case sampling, to be able to select respondents who accurately represent the target audience of the online training; (potential) Dutch clients of GriDD. Additionally, it is important that the participants are able to take part in the training in terms of ability to use the necessary technology. Inclusion criteria for participants are the following:

- working professional (>1 year working experience)
- knowledge level consistent with a degree of higher education, such bachelor degree or more (in Dutch: hbo+)
- regularly create and use slide-assisted presentations at work (<1 per month)
- mastering the Dutch language at a native level
- experience using the software Microsoft PowerPoint and computers in general
- availability of a computer with Microsoft PowerPoint installed and internet access

These characteristics were likely to yield a large sample pool. Within this sample pool, convenience sampling was applied, which refers to the most efficient and convenient way to obtain participants (Boudah, 2011). Participants were not offered any kind of monetary compensation, but it was made clear that by volunteering for training they would have the chance to develop new knowledge and

skills for free. For information on communication with (potential) participants, refer to Appendix C.

Twelve people participated in the study, eight women and four men. Several of them are colleagues of each other; participant H, I and J are employees within the same organization and participants F and G work together. Table 1 shows all participants' characteristics. Participants work in education, science, management, engineering, design, health care and as policy staff. Their average age is 42,2 years, ranging from 30 to 61 years. Average working experience is 19,4 years, ranging from 7 to 40 years.

When it comes to the extent of their experience creating presentations, 75% of the participants create 0-1 presentations per month and the other 25% create 1-3 presentations per month. No one stated to create more than this. Also, most of the participants (eight people) state an average expertise level of Microsoft PowerPoint, with only two people stating they have below average expertise and two people claiming more than average expertise.

To maintain anonymity, participants were assigned a letter (A to L) for reference in this report. All participants completed both questionnaires and eleven of them were interviewed. Unfortunately, one of the participants opted out of the study after answering the post training questionnaire. Everyone submitted a PowerPoint presentation before training, but only nine participants submitted completed PowerPoint presentations after training to be included in the study.

Table 1: Participants' characteristics

	Job description	Sex (male, female)	Age (in years)	Working experience (in years)	Average amount of presentations created (per month)	Perceived expertise level PowerPoint software (1, very low to 7, very high)
A	Teacher, manager[a]	female	52	32	1 to 3	Average (4)
B	Manager, teacher	female	57	37	0 to 1	Below average (3)
C	Policy staff	female	47	25	0 to 1	Below average (3)
D	Teacher	male	36	11	0 to 1	Average (4)
E	Designer[b]	female	34	11	1 to 3	Average (4)
F	Engineer	male	37	10	1 to 3	Average (4)
G	Manager, engineer	male	33	7	0 to 1	Above average (5)
H	Health care provider[b]	female	37	14	0 to 1	Average (4)
I	Health care provider, trainer	female	48	27	0 to 1	Average (4)
J	Behavioural scientist	female	34	12	0 to 1	Average (4)
K	Consultant, manager	male	61	40	0 to 1	High (6)
L	Policy staff	female	30	7	0 to 1	Average (4)

[a] Opted out of the study after training and answering pre- and post training questionnaires (no interview, no post training presentation)
[b] Submitted an incomplete presentation after training

4.1.3 Instruments

In this paragraph the instruments used for evaluation are described.

Demographic Questionnaire

In order to gain insights into participants' characteristics, a demographic questionnaire was constructed. It consists of seven items and concerns participants' characteristics (five items), such as age and job description, as well as previous experience (two items), such as the average amount of presentations created per month.
The Demographic Questionnaire is submitted pre training, together with but preceding the CANE Questionnaire. See Appendix D for the full instrument. The results are included in this thesis as a description of the sample in paragraph 4.1.1.

Commitment and Necessary Effort Questionnaire (CANE Questionnaire)
Following the CANE model (Clark, 1998) as a framework, the three factors found to increase or decrease motivation are used as constructs: Personal Agency (self-efficacy and support), Emotion and Effectiveness Values (utility, interest, importance). This means multiple items on the checklist underlie one construct, for instance eight items are assumed to load the construct of personal agency. Since no appropriate, existing and validated questionnaire could be found, items for the CANE Questionnaire were adapted from existing, validated scales for which method was inspired by DiPietro and Condly (2007), who also use the CANE model as a basis. The CANE Questionnaire consists of 21 items in total. See Table 2 for an example of the items used and see Appendix E for the full CANE Questionnaire and its relation to original items on existing, validated scales used.

Mean scores for items related to each construct were used to create the Overall scale and the sub scales Personal Agency, Emotion and Effectiveness Value, for both the pre- and post training questionnaires. Cronbach's alpha was calculated to determine reliability. Table 2 shows that even though the reliability of the existing scales used for adaptation were acceptable, the adapted sub scales for the final instrument used in this study are not all satisfactory.

The Overall Score scale reliability is good ($\alpha = .80$ and $\alpha = .83$) and can be used in analysis to answer the question whether motivation differs significantly before and after training. Only the reliability for sub scale Emotion is good enough ($\alpha = .86$ and $\alpha = .80$) to use in analysis to answer the aforementioned question for this construct. Both in pre and post training questionnaires, Personal Agency sub scales are not reliable enough ($\alpha = .50$ and $\alpha = .57$) to gain insights from it. The sub scale Effectiveness Value is only reliable on the post training questionnaire ($\alpha = .88$) and will be used to gain insights into participants' attitude towards that construct.

Deleting items on the pre- or post training questionnaires for Personal Agency and Effectiveness Value would not improve these sub scale enough or would only either increase reliability on the pre training questionnaire while decreasing reliability for that sub scale on the post training (or vice versa) which still makes comparison impossible. All adapted items are in Dutch and worded as statements to create one block of items with the same answering scale; matrix style. Respondents were instructed to respond to these statements (items) using a 7-point Likert type scale. Labels for the scales are added to improve reliability (Krosnick & Presser, 2010) and were provided as follows: 1) strongly disagree, 2) disagree, 3) somewhat disagree, 4) neutral, 5) somewhat agree, 6) agree, 7) strongly agree.

To minimize order bias such as fatigue and context effects in questionnaire response (Krosnick & Presser, 2010), all items are automatically randomized by the questionnaire software which means every respondent will respond to the same items but in a different order. The CANE Questionnaire was answered online and submitted before and after training. These questionnaires are slightly different. Present tense wording is used pre training instead of the past tense wording used post training. The latter also includes one additional question about the learner's opinion of training which is not present in first questionnaire since it can only be answered after training: rate the training with a grade, on a scale of 1 (lowest) to 10 (highest). However, the questionnaires are similar enough to be considered pre- and post-tests.

Both versions of the CANE Questionnaire were piloted through a review of how understandable and fit for purpose items and scales were, by a subject matter expert and someone who fits the participant profile. Small changes were made to create a better questionnaire, mainly concerning particular aspects of online delivery and spelling.

Table 2: Items and reliability CANE Questionnaire

Scale	Description of scale design	Example questions (pre and post training)
Overall Score (21 items)	The Overall Score consists of the mean score of all items in the CANE Questionnaire. Reliability of the scale in this study: - Pre training: α = .80 - Post training: α = .83	
Personal Agency (8 items)	Six items are adapted from the Motivated Strategies for Learning Questionnaire (MSLQ), self efficacy component for learning and performance, with a reported reliability of .93, described by Pintrich, Smith, Garcia, and McKeachie (1991). Additionally, two items are developed by the researcher, based on guidelines for the creation of scales by Bandura (2006). Reliability of the sub scale in this study: - Pre training: α = .50 - Post training: α = .57	- 'I am confident I can do an excellent job on the assignments in this training' and 'I did an excellent job on the assignments in this training' - 'I expect that the organization I work for, finds it important I am able to create effective, visual presentations' (item is the same pre and post training)
Emotion (6 items)	This construct is measured using six items. Items are adapted from Positive Affect Negative Affect Schedule (PANAS), originally by Watson, Clark, and Tellegen (1988), as described in a Dutch version by Engelen, Peuter, Victoir, Diest, and Van den Bergh (2006). Three items were chosen out of the top 5 with the highest factor load for Positive Affect (PA) and three were chosen out of the top 5 with the highest factor load for Negative Affect (NA) from their study. Reliability of the sub scale in this study: - Pre training: α = .86 - Post training: α = .80	Items are the same pre and post training: - 'I feel enthusiastic when I think about creating effective, visual presentations' - 'I feel nervous when I think about creating effective, visual presentations'
Effectiveness value (7 items)	Seven items are adapted from Perceived Task Value items by Eccles and Wigfield (1995). They distinguish three factors: utility (reliability 0.62), interest (reliability 0.76) and importance (reliability 0.70). Reliability of the sub scale in this study: - Pre training: α = .19 - Post training: α = .88	- 'I expect that the effort to participate in training is worth it, to be able to create effective, visual presentations' and 'The effort to participate in training was worth it to be able to create effective, visual presentations' - 'I like creating presentations' (item is the same pre and post training)

Interview Topic Guide

Since the sample in this study is quite small for statistical analysis, qualitative in-depth individual interviews are used to illustrate participants' motivation using the same constructs as in the CANE Questionnaire. Individual interviews are well suited for understanding responses to experiences because of the depth of focus and the opportunity for clarification by participants (Ritchie et al., 2003).

No standard interview guide could be used, for this study is aimed at specific online training which requires context-specific questions. For these reasons, an Interview Topic Guide was designed. A topic guide provides documentation of subjects to investigate that serves as an interview agenda and the research approach that was taken (Ritchie et al., 2003). Participants were asked how they experienced and perceived content and design of training. In specific, about Personal Agency (perceived ability to create presentations and execute tasks in training), Emotion (towards presentation creation) and Effectiveness Value (value of the method to create effective, visual presentations and usefulness of the instructional material). See Appendix F for the full Interview Topic Guide.

To minimize participant response bias (participants might answer in what they perceive to be a socially desirable manner), participants were encouraged to be open and honest about their experiences and were told that both positive and negative information were very welcome information at the start of the interview by the researcher.

The Interview Topic Guide was piloted by using it in the first interview with one of the participants. Topics were not changed, but the position of topics in the guide were altered to create a more natural flow to the conversation. Also, a printout overview of the instructional material in training was created to make it easier to discuss specific training elements and to make sure both people researcher and interviewee were talking about the same thing. Since topics were not changed, the results of the pilot interview were included in the results of this study.

Presentation Checklist

The checklist of rules Kosslyn et al. (2012) created in their study can be used to score presentations on violations of cognitive communication principles. Apart from the eight cognitive principles they distinguish, the checklist also includes a 'over-determined' category in which items are state that relate to more than one cognitive principle at the same time. Items on the checklist are formulated as rule statements so that these, if they described a slide or slideshow, reveal a violation of a rule. In this study, an adapted version of this checklist was be used as an instrument to score presentations created by participants before and after training, in order to research effects of training on participants' task performance to create effective, visual presentations.

The checklist by Kosslyn et al. (2012) is detailed, well researched, provided inter-rater agreements of .88. At the time of the design of training, the study by Kosslyn, Kievit, Russell, and Shephard (2012) was not known to the researcher or GriDD. This means there are discrepancies between items of the original checklist and the guidelines provided in the online Training 'Presenting with visuals', which required an adaptation of the original checklist to make it usable in this study.

To determine which items to in- and exclude in the instrument, guidelines from training and checklist items were compared for common ground. First, a list was devised of GriDD guidelines which directly impact slide design and follow from the instruction material in training. Second, all items in the checklist were provided with background information and/or explanation of the item to make these less vulnerable to a difference of interpretation since the rules in the original checklist were only generally explained in the article by Kosslyn et al. (2012). The article draws from Kosslyn (2007) who explains guidelines underlying of the rule violations were more explicitly. Both sources were used to explain all rule items. Third, a table was created in which for each checklist item an indication was provided whether the item was taught in the same manner, in a different related manner or not all during training. An item was considered to be taught in the same manner if it is fully in line with one of the guidelines taught in training. An item was considered to be differently taught in training, if a guideline touches upon the same idea or is related to the item in a way that could possibly affect a change for this item before and after participating in training. When an item was considered not have been taught in training in one of those ways, it was not included in the instrument used in this study. See Appendix G for excerpts of the GriDD guidelines and the determination table for in- and exclusion of items. The full determination table can be requested from the researcher.

The adaptation process resulted in a 67 item Presentation Checklist to be used in this study. For Appropriate Knowledge 5 items were included, for Compatibility 18, Discriminability 6, Informative changes 7, Limited Capacity 6, Perceptual Organisation 12, Relevance 11, Salience 7 and Over-Determined 8 items. Table 3 shows an excerpt of the Presentation Checklist with one item for each principle. The instrument consists of a column for item numbering, the item, explanation of item

and an empty column for scoring. Score is indicated with ‘1’ if a rule is violated and with ‘0’ if it is not. The complete Presentation Checklist can be found in Appendix I.

Table 3: Excerpt of Presentation Checklist Instrument

No.	Item by Kosslyn et al. (2012)	Explanation	Score
Appropriate Knowledge			
1	Non-standard or unfamiliar display formats are used	The way information is displayed in the presentation is not familiar to people which requires processing effort (Kosslyn, 2007). This can be in regard to placement (use of a visual pattern, alignment) or elements such as visuals (photo, illustration, graph, diagram etc). Important here is not whether these are incompatible with the story, but whether they are displayed in an unfamiliar manner.	
Compatibility			
6	Font is incompatible with its connotations (sans serif implies modern, technological; serif implies traditional)	For example: "Old-fashioned looking typeface would send a conflicting message if used in a written description of a high-tech device." (Kosslyn et al., 2012, p5).	
Discriminability			
11	Entries in a table are too small to be read easily	One of the indicators of a too complex table is that font has to be made small for the table to fit the sheet. Even if the entries are highlighted, determine whether it is readable or whether too much information is being tried to convey or zoom in should be used (Kosslyn, 2007).	
Informative Changes			
17	Visual or auditory characteristics change even when they do not signal a change in information	Viewers assume that changes in appearance, such as background, bullet points, color, font, terminology etc, convey new information. If this is not the case, it can be confusing or lead the audience astray (Kosslyn et al., 2012)	
Limited Capacity			
24	More than two lines are used per bulleted sentence	According to Kosslyn (2007) two lines can convey four concepts. Perceptual grouping laws state we can hold four units in our working memory (Kosslyn et al., 2012)	
Perceptual organization			
30	In tables with more than two rows and two columns, grid lines are not included	Grid lines are the lines within a tables, signaling components in the table and help viewers read the table and its specifc entries (Kosslyn, 2007)	
Relevance			
42	Bullets do not introduce topic sentences/phrases or specific cases	Bullets should only provide key concepts or examples , match with the message and not every word in the p presentation should be in a bulleted list. (Kosslyn, 2007)	
Salience			
53	Different colors are not being used for emphasis or to specify	Use color consistently to signal change, so it groups together. Use of too many colors to emphasize or specify (more than three) can be overwhelming to viewers and should be avoided (Kosslyn, 2007).	

"Over-determined"			
60	The title of a slide does not focus attention on the most important point	Title should only include the most relevant information and what is most important first (Kosslyn, 2007). It should fit the message.	

The subject matter expert, who was involved in the design of training, reviewed the instrument in a discussion with the researcher and found no significant alterations needed. Both SME from GriDD and researcher piloted the instrument by scoring a presentation. Disparities were discussed and a consensus was reached.

Inter-rater agreement was assessed for this instrument. A second rater, the subject matter expert from GriDD, scored three pre-training presentation and three post-training presentations. His scores on the Presentation Checklist for these presentations were compared to the scores of the researcher on these same presentations. Cohen's kappa was run to determine the proportion of time that raters both coded '1' (violation) or both coded '0' (no violation) when scoring 402 items (67 items per presentation checklist). Using the interpretation guide by Landis and Koch (1977) there was a substantial agreement between raters, $\kappa = .654$ (95% CI, .562 to .746), $p<0.001$. These principles should not be thought of as a scale for which all items aim to relate to the same question (such as in the CANE Questionnaire), but as a categorisation of similar items, which means it is not necessary to calculate scale reliability.

4.1.4 Data analysis

In the pre-training CANE Questionnaire an outlier was detected in one of the Effectiveness Value items. Because the population in this study was already small, the case was not excluded but single imputation was applied by replacing the outlier with the mean score of the other responses for that item. Negatively worded items on the sub scale Emotion are reversed to match the other, positively worded, items. Reversal meaning that if a participant entered '1' (strongly disagree) on the Likert scale, this is recoded to be the opposite score on the spectrum, in this case '7' (strongly agree). A high score on a scale in the questionnaire means a positive attitude towards the construct. The study is mainly interested in the increase of motivation post training compared to pre training.

For the analysis of the Presentation Checklist results, pre- and post training mean scores overall (for all items) and per principle were computed per participant. Using mean scores instead of actual scores makes comparison between scores easier, since not all of the principles have the same amount of items. The checklist was coded with '1' if a violation occurred and '0' if not, but for the purposes of analysis these codes are reversed (1=0 and 0=1) so the direction of the scores can be more positively explained. A high (mean) score on the Presentation Checklist means a participant did not violate many rules thus adheres better to cognitive communication principles, which is interpreted as the participant being abler to create effective, visual presentations. The higher the (mean) score on the Presentation Checklist, the abler the participant is to perform the task. The study is interested in the increase of scores post training compared to pre training. Only completed post-training presentations can be compared to the presentations submitted before training, which are also completed presentations, because it would not be a fair comparison otherwise. Any uncompleted presentations are therefor not included as data for this analysis.

Comparison of results pre and post training are analysed using a Wilcoxon Signed-Rank Test with a 95% confidence interval, for both the CANE Questionnaire and the Presentation Checklist. If a significant difference ($P<0.05$) is found for any of the statistical analyses, effect size is calculated. This is done by dividing Wilcoxon Signed-Rank test's Z-value by the root of N, in which N is the sum of the amount of participants on the pre- and post-test (Rosenthal, Cooper, & Hedges, 1994). Effect size is interpreted with criteria by Cohen (1988) which provides .10 as a small effect, .30 as medium effect and .50 as large effect.

The grade participants awarded training is analysed by calculating the mean scores and standard deviation. The higher the score, the better training was perceived but training is considered acceptable from an average grade of 6 and higher. Mean scores and standard deviations on the Effectiveness Value results of the post-training questionnaire are provided to gain insight.

Interviews were recorded, transcribed and analysed with the software AtlasTi, using codes for

participants' opinion (positive, negative and neutral), CANE model constructs (personal agency, emotion, effectiveness value), instructional design features (instructional narrative, organizers & summaries, humour, segmentation, learner control, worked examples, practice, process worksheets, on-screen coach, conversational style, self-reflection, animation video, anchor in task domain) and instructional content (overall method, goal & context, mind mapping, structuring, visualizing, fine tuning). All statements and quotes from participants are translated from Dutch to English to the best of the researcher's knowledge. When quotation marks are used to describe results, it concerns a direct (translated) quote and when a statement is just displayed in italics (without quotation marks), the statement is paraphrased.

4.2 Evaluation results

In this section the results of training evaluation instruments are provided in order to be able to answer the second and third sub question of this study; the effect of training on motivation and task performance.

4.2.1 Effect on motivation

All of the participants in this study completed the CANE Questionnaire pre-training and post-training (*n*=12). The first question to answer, when studying the effect of training on motivation, is what participants' overall opinion of training was. Table 4 shows the descriptive statistics analysis. An average grade of 7.4 was awarded. One out of twelve participants graded the training as with a 4.0, below the acceptable grade. The others graded training between 6.0 and 9.0. This means the training was given a moderate to good review.

Table 4: Grade for the online training

	Mean	SD	Minimum[a]	Maximum
Grade for the online training (n=12)	7.40	1.13	4.00	9.00

[a] minimum =1 (lowest), maximum = 10 (highest)

The second question is whether the motivation to (learn to) create effective, visual presentations has increased overall after training. Median scores pre training (*Md*=5.16) and post training (*Md*=5.57) indicate that participants are moderately to well motivated to create effective, visual presentations and that this a slightly increased after training. A Wilcoxon signed-rank test indicated mean Overall scores post training are not statistically significantly different from mean Overall scores pre training (*Z*=-1.804, *p*=0.071). This means that, although a change was observed, the motivation increase cannot be attributed to the intervention of training or chance.

The third question is whether the factors assumed influence motivation, have improve after training. The only construct scale that was both reliable pre and post training, was Emotion. Median scores pre training (*Md*= 5.33) and post training (*Md*=5.58) indicate that participants feel (moderately) positive when they think about creating presentations and that this has slightly increased after training. A Wilcoxon signed-rank test indicated that this change (*Z*=-1.381, *p*=0.167) is not statistically significant. This means it cannot be concluded that participants feel more positive when they think about creating presentations than they did before training due to the intervention of training. Table 5 shows the results of both Wilcoxon signed-ranks test statistical analyses.

Table 5: Results of statistical analysis for the effect of training on motivation

Scales (*n*=12)	Pre-Training Median[a]	Post-Training Median[a]	*Z*	Asymp. Sig. (2-tailed)
Overall Score	5.16	5.57	-1.804[b]	0.071
Emotion	5.33	5.58	-1.381[b]	0.167

[a] minimum =1 (strongly disagree), maximum = 7 (strongly agree)

[b] based on negative ranks (post-training < pre-training)

The sub scale Effectiveness Value was only reliable post training, which means no statistical comparison could be performed, but descriptive statistics show findings for the attitude towards this factor. The mean score was 5.62 (*SD*=0.50) and compared to a 7.00 maximum available score, this indicates that (learning to) create effective, visual presentations is valued as (moderately) effective. Table 6 shows the results of the Effectiveness Value sub scale.

Table 6: Results for Effectiveness Value sub scale

	Mean[a]	SD	Minimum	Maximum
Effectiveness value (*n*=12)	5.62	0.50	4.14	6.00

[a] minimum =1 (strongly disagree), maximum = 7 (strongly agree)

4.2.2 Illustrations from interviews of the effect of training on motivation

Eleven out of twelve participants were interviewed as one participant opted out of the study (*n*=11).

Personal agency

Insights concerning personal agency relate to participants' belief in their ability and opportunity to create effective, visual presentations. Overall, participants are reasonably satisfied with the presentation they created in training. Several reasons are named as to why participants were satisfied with their presentations; creating a clear storyline, using more visuals, using visuals to make a point and not just for decoration, using less text on slides, more consistency between and within slides and needing less slides or information to convey the message. For instance, participant K stated on the latter: *"I can convey where I want to go in a fraction of the slides"*. And participant B mentions: *"(...) I think it [the presentation] has a very clear structure, which is quite important. I think it more clearly shows what I want to say."*

The participants who were doubtful or less satisfied with their presentations name being perfectionist as one of the reasons. Participant F says to be *reasonably satisfied but to always think it can be better, so the presentation is actually never finished."* Another reason given was that participants do not know how their organisation or audience will respond to their presentation. At the time of the interview, none of the participants had used the slides they created in an actual live presentation yet and seem to perceive how the presentation will be received as a 'test' for whether the presentation they created is good or not. Additionally, participants are not always free to design slides the way they want, for instance when their organization employs a company PowerPoint template. A few participants started from scratch where they would normally use the company template and now wondered whether this would be acceptable to their organizations. A final reason provided for doubts about the quality of the created presentations was when there were some questions about having applied what was taught appropriately. For example, participant L had questions concerning the visualisation of slides: *"(...) at a certain point I wanted to paste multiple visuals [onto a slide] but I did not know whether that was advisable or not."*

Participants also perceive (some) improvement in their ability to create presentations. The most mentioned reason is because training teaches defining a goal and structuring information before creating the visually effective presentation. The step-by-step method for presentation creation taught in training is stated to 'force' participants to consider what to include in presentations more critically. Participant B states that *she now thinks about all that she wants and how to order the information, instead of just creating presentations 'of the cuff'*. Participant J said to *think more about what a visual says, so as to not just use a visual to decorate the slide, but to convey a message.*

A reason that half of the participants see just some improvement in their ability to create presentations seems to stem from previous experience. Because they feel already experienced creating presentations, there was an overlap between their existing knowledge and content taught in training. Participant G says: *"I have the idea that I have created extra tools but it isn't the case that before I couldn't [create effective, visual presentations] and now I can."*

Participants did not find learning tasks in training difficult, although there were some considered a bit challenging: creating a mind map and visualizing slides. Specifically, to create a mind map using 'newspaper headlines' and to relate elements within the mind map to each other.

Finding visuals was stated to cost a lot of time and choosing the appropriate way to visualize information was found to be a challenge.

A big threat to personal agency was time. Due to the time constraints of this study, learners had a week to complete training (and their presentation) and this was not considered enough by several people. The workload for training was estimated at six to eight hours and with two exceptions, all participants used this time or (some of them much) more. Often this was in their free time, alongside working hours, which added to perceived time pressure.

Emotion

Insights concerning Emotion relate to the feeling participants have when thinking of creating effective, visual presentations. Most participants state that they already liked creating presentation and, to that respect, not much has changed due to training. However, participant L, who scored negatively on the questionnaire items concerning emotion before training, does feel more positive and says: *"Before training, I did not know how to approach creating visual presentations and now I do have an idea. I have to dread making presentations less."* Two others provided similar reasons.

Effectiveness value

Insights concerning Effectiveness Value relate to how useful, interesting and important participants find the method to create effective, visual presentations and the instructional features in the training.

First of all, all participants would recommend the training to others, especially to beginners. Half of the participants indicated training is most useful when learners do not have much experience creating presentations. Participant C mentioned that *if learners are more experienced creating presentations, the training needs a higher difficulty level and more body.* Others disagree and state that even with experience, the training is recommended. Participant F says that *looking back, he thinks other presentations could have been better.* Participant I relates her recommendation to the regularity in which potential learners create presentations and says "*If you do that [create presentations] sporadically, it will cost you a large time investment but if you create presentations regularly, I thinks it helps a lot."*

However, three participants mentioned that their expectations of training did not match with reality. They expected more information to be new to them and for the visual aspect to be emphasized more, which made training less useful. Participant G states: *"I found that training focused much more on how to structure your thoughts and slides based on these [thoughts], than on how visual aspects in your presentation resonate with your audience."* This discrepancy caused him to grade training with 4.0 (out of 10) on the questionnaire, but he states training would be appropriate for beginners.

All of the participants said they would apply (elements of) the five-step method again when creating presentations in the future. Six of them said they would go through all five steps again. Participant B provides the following reason: *"Because it is important to think about what you want to convey, to whom and in which order. In a step-by-step method. If you just start without thinking, you will make a mess."* A reason to pick and choose elements from the method instead of following all of the steps for future presentations is when you re-use an existing presentation, according to three participants this means you can skip over some of the steps or go through them more quickly. Another reason is that not all learning tasks in training are considered equally useful.

<u>Effectiveness value of learning tasks</u>

Creating a mind map to precede slide design was most often mentioned as a useful step. With one exception, the participants were interested in creating mind maps. The added value of the mind map is stated to be gaining overview of what you want to say. Participant L states: "*because of it [the mind map] I could limit the amount of slides, for I saw what clustered together and could be told in one slide whereas I previously might have used three slides".* A few people were so interested that they created the mind map online, even though this added to the challenge for them. Some additional information would however have been appreciated in this step: on how to set up a mind map, on how to use mind mapping software and on how to phrase a good 'newspaper headline'.

Half of the participants state they learned most from visualizing the slides. There was also critique and questions about this step. The graphic design rules that were supplied were not found to be as useful and said to be mostly information participants already knew. Some people therefor found

this step lacked depth and new information for them, especially on how visuals could affect the audience, how to really design a slide and what the possibilities of PowerPoint are. For instance, participant B said she *missed information on how and when to add dynamic movements of visual elements in presentations was.*

Stating a goal and context for the presentation and structuring the storyline were both valued as steps but not often discussed in detail in interview. Goal setting was found very useful for most participants, but for a few more an affirmative than constructive step. Structuring followed most logically from the mind map and was often grouped with creating the mind map when discussing the method. Participants valued this step, but often stated not to apply storyline structures taught in training, although all of them thoughtfully considered their story structure.

Fine tuning was a step many participants did not pay a lot of attention to. None of them practiced their presentations live, while almost all (with the exception of the two teachers) state that it is important. What they did do and found useful was to 'read' the slides out loud to yourself to check for mistakes or use a checklist provided to review their presentations.

Effectiveness value of training design

Segmentation (R1) was said to provide clear and manageable learning tasks. Participant B valued segmentation: *"It [training] was very well build, in small and easy steps, which made me think before I acted."* Participant L said segments (what & why, procedure, assignment, reflection) were recognizable within the levels and said helped to *"(..)know what is next and what is expected of you"*.

The animation videos (M1) were considered more fun to watch than the more serious, but also more useful screencast: *"The animation video is more fun to watch, and the screencast is just very informative and practical"*. The animation video with its instructional narrative (A1) and organizer & summaries (A1) were found to be supportive and the screencast, with its worked example (R3), more useful. If videos were re-watched, these were the procedural screencasts for their practical application potential. Participant F said that *the combination of the two videos, the animation to make clear what to do and the screencast on how to do it in practice, worked very well.* However, two participants noticed that *in one of the screencast video the visualisation was not exactly the same as what they saw on their screen*. This bothered them, so to anchor the tool in the task domain (M4) better, this should be remedied.

The organizers and summaries (A2) in the animation videos helped structure learning. The hurdles in the animation videos were very helpful to many, as was the introduction. Others saw the added value of the hurdles, but found them repetitive and annoying because there was little time for them between executing learning tasks so they did not need the constant reminders.

The on-screen coach was said by more than half of the participants to not have an effect on them. Others really noticed him, to the point of distraction. But when asked whether these people would rather not see the on-screen coach at all, this was denied. The visibility of the on-screen coach was said by five participants to add personality to the training. Participant C said that *because the trainer is speaking directly to you and visible, it[training] becomes something between him and you, even though he is not there"*.

All participants chose to use their own topic for the assignments of practice (P1). Participant H said that that way *learning effect is used on something she had to do anyway, and that although it cost more time, she also gained more.* Most participants followed the guided learning route for their learning process, and often used (printed or digitally) the process worksheets (P2) from the library. Worksheets were in PDF format and therefor a little more difficult to use digitally, participants would prefer Word formats. The worksheets with the example topic's worked-out example were by half of the participants considered valuable and used primarily as a source when problems arose or to clarify steps to be taken, as a review of a good example. Participant J stated: *"Such an example can sometimes help guide you along"*. One participant suggested adding a good and a bad example of the same presentation as passive material in training, for a more in-depth comparison.

The usefulness of self-reflection (M3) was found to be looking back upon the steps taken as a quality and learning progress check. One participant stated *"the reflection questions were a good check to see whether you had executed an assignment well."* However, there was also a lot of critique on the self-reflection questions by the people who found them effective. It was too easy to skip or provide short answers to some of them, especially with closed questions requiring only 'yes' or 'no

answers, making these less effective as they could have been. Participant D stated that *sometimes the question did not reflect the content of the training appropriately*.

Participants said to have enough learner control (R2) in training. With the exception of one person, all participants completed training in multiple sittings and valued that freedom. Participant C stated that she thought the training facilitated different learning routes well: *"You are able to determine your own pace, step-by-step and with the appropriate amount of information. That is super nice!"*. However, a lack of overview was reported to hinder leaner freedom. People had trouble finding what they were looking for, be it a specific video to view a second time or passive material in the library. Three people did not realize there was a seventh level in training. Many people also mention navigation to be troublesome: each level had to be started manually, clicking 'next' would keep learners in a loop in the same level, which was found to be irritating and disruptive.

Recommendations for the improvement of training were also provided. One of the ideas was to incorporate feedback into training, for instance in chat sessions with an expert. Another idea was to add an online community for discussion among participants, for feedback and to help each other. A final suggestion was to incorporate music in the training for engagement.

4.2.3 Effect on task performance

Out of the twelve participants, nine submitted a completed presentation they had created during training (n=9). Two of the three other participants did submit presentations to the researcher, but commented that these were not completed. Another one opted out of the study after training and did not submit a post-training presentation. Table 7 shows the findings for the effect of training on task performance.

Table 7: Results for the effect of training on task performance

Principles (n=9)	Pre-Training Median [b]	Post-Training Median[b]	Z[a]	Asymp. Sig. (2-tailed)	Effect size (r value)
Overall task performance*	0.75	0.88	-2.692	0.007	.63
Appropriate Knowledge*	0.40	0.80	-2.124	0.034	.53
Compatibility	1.00	1.00	-1.134	0.257	-
Discriminability	0.83	0.83	-0.378	0.705	-
Informative Change	0.71	0.86	-1.933	0.053	-
Limited Capacity*	0.50	0.67	-2.232	0.026	.53
Perceptual Organization	0.92	1.00	-1.414	0.157	-
Relevance*	0.64	0.91	-2.536	0.011	.60
Salience*	0.71	0.86	-2.209	0.027	.52
Overdetermined	0.87	1.00	-1.211	0.226	-

a based on negative ranks (post training < pre training)
b minimum=0, maximum=1. The higher the results, the better adherence to cognitive communication rules.
* significant difference found between pre- and post training scores

The first question to ask is whether participants have overall performed better for the task to create effective, visual presentations after training than before training. This is the case if participants' mean score of all items on the Presentation Checklist is significantly higher for post-training presentations than for pre training presentations. The findings show that the median for mean overall scores increased from pre-training (Md=0.75) to post training (Md=0.88). A Wilcoxon signed-rank test indicated that this change in mean overall scores on post-training presentations is significantly different to mean overall scores on pre-training presentations (Z=-2.692, p=0.007, r=.63). This means training is indicated to have a large positive effect on the overall task performance of participants to create effective, visual presentations.

The second question to ask is whether participants' adherence to specific cognitive principles has increased. It should be determined whether and for which cognitive principles mean scores for

items related to that principle, are significantly higher after training than before training. In Table 7 all of the results for the effect of training on task performance are shown.

A Wilxocon signed-rank test indicates that for four out of the nine principles, mean scores post training are significantly different from mean scores pre training: Appropriate Knowledge (Z=-2.124, p=0.034, r=.53), Limited Capacity (Z=-2.232, p=0.026, r=.53), Relevance (Z=-2.536, p=0.011, r=.60) and Salience (Z=-2.209, p=0.027, r=.52). The medians of the mean scores for these principles increase from pre to post-training: Appropriate Knowledge (Md=0.40 to Md=0.80), Limited Capacity (Md=0.50 to Md=0.67), Relevance (Md=0.64 to Md=0.91), and Salience (Md=0.71 to Md=0.86), Based on the results, training is indicated to have a large positive effect on participants' task performance to adhere to the cognitive communication principles Appropriate Knowledge, Limited Capacity, Relevance and Salience.

For the other five principles, Compatibility, Discriminability, Informative Change, Perceptual Organization and 'Overdetermined', no significant difference was indicated with the Wilcoxon signed-rank test, although for Informative Change a close to significant difference (p=0.053) was indicated. Based on this analysis, no effect of training can be concluded for these principles.

5. Discussion and conclusion

In this chapter findings for the three research questions are discussed, limitations of the study and recommendations for future research are provided and conclusions are drawn.

5.1 Discussion of the findings

5.1.1 Findings for question 1: "How to design online training, using instructional video, in which professionals learn to create slideshows for oral presentations, based on the existing offline training 'Presenting with visuals' by GriDD?"

A Demonstration-Based Training Model was provided with instructional features to four interlinked learning processes, based on a literature review. To facilitate attention processes, instructional narrative (to show the reason and utility of the learning task), organizers and summaries (to convey what instruction entails) and humour (for engagement and direction) were employed. To facilitate retention processes, segmentation (to facilitate understanding and manageable tasks), learner control (to fit diverging needs of learners) and worked examples (for focus on essential processing an schema construction) were incorporated. To facilitate production processes, practice (to encourage transfer of learning) and process worksheets (for guidance) were applied. And to facilitate motivation processes, an on-screen coach (for engagement through social partnership), conversational style (for improvement of learning through social partnership), self-reflection (to focus learning and gain confidence), animation video (to improve self-efficacy and interest) and to anchor the tool in the task domain (to demonstrate meaningful tasks) were constructed.

Training was constructed based on these features and guidelines following from the analyses of practice. This resulted in an online training consisting of seven levels (one for introduction, five for the body of training and one as a conclusion) in which learners are guided through sixteen short videos (nine 'what and why' animation videos and seven 'procedure' screencasts) enhanced by practice with assignments, self-reflection and passive material such as process worksheets and worked examples. Insights from interviews relating to the effectiveness value of training design imply that it was overall well received by participants, especially when it comes to segmentation, animation video and worked examples. Improvements can be made concerning the format of process worksheets, type and direction of self-reflection questions, navigation and overview in the learning environment for learner control, the obligatory viewing of organizers & summaries in the form of a hurdle race at every step and (distracting) appearance of the on-screen coach.

Additional instructional features were also suggested by participants. One of them was to provide opportunities for feedback. Support for this addition can be found in the literature on effective training in organizations by Alvarez, Salas, and Garofano (2004) who emphasize the effect of feedback for learning aimed at professionals. An elaboration on this and other suggestion was to create a learning community online for feedback and help from peers. Cercone (2008) provides, in her guidelines for adult learning in online environments, a guideline specifically focused on the need for dialogue, social interaction and collaboration with other students. In the opinion of the researcher, these suggestions should be taken to heart since they could quite easily be implemented and tried out with little added costs (for instance by using existing social media platforms) or changes to the online training as it was designed in this study. It is therefore a recommendation for GriDD to explore their options to include feedback and a learning community.

A final suggestion was to add music to the training. A study into videos on YouTube, found evidence that supports this suggestion; inclusion of background music was one of the differentiating factors of popular instructional videos (Ten Hove & Van der Meij, 2015). However, Moreno and Mayer (2000) found that background music hindered learning. It is recommended to explore and research this suggestion further to see if and how incorporating music in the online training will be beneficial to learning.

5.1.2 Findings for question 2: "What are the effects of the online training 'Presenting with visuals' on the motivation of professionals to create effective, visual slideshows for oral presentations?"

Motivation was defined as the commitment and necessary effort applied to (learning to) create effective, visual presentation. Following Clark's (1998) CANE model for this subject, personal agency, emotion and effectiveness value were assumed to be influential. A questionnaire was adapted from existing instruments for these factors.

This CANE questionnaire was used to analyse the potential difference when comparing pre and post training results of overall motivation and of personal agency, positive emotion and effectiveness value. Since pre and post training scale reliability turned out only to be acceptable for overall motivation and the emotion subscales, this study could only draw conclusion from the analysis of these constructs. No significant difference was found between the two times, but findings do indicate moderate to good scores for motivation and positive emotion. The latter seems to be confirmed with insights from the interviews. Participants do not report much change in their emotions as a result of training, when thinking about creating effective, visual presentations for most already liked it.

The Effectiveness Value scale was reliable for the post training questionnaire, so comparison to pre training was out and only the post training scores could be analysed. Its findings show that participants' effectiveness value was scored moderate to good too. These findings are in line with the overall opinion of training, indicated with an average grade awarded by participants of 7.4 (on a scale of 1, lowest to 10, highest).

Illustrations from interviews for effectiveness value suggest that all of the participants value training enough to recommend it to others and intend to apply (parts) of what was learnt when they create future presentations. Participants state to especially recommend training for beginners. Insights from the interviews suggest that participants' who seem to consider themselves to be experienced at creating presentations, found that training did not meet (enough of) their expectations and often found training elements and (certain) learning tasks less useful.

The learning tasks that were mentioned to be most useful were creating a mind map and visualizing slides. These are also the aspects in training in which participants experienced challenges and desired more learning material. For instance, when creating a mind map, the use of 'newspaper headlines' was found difficult but also valuable. Determining goal and context and structuring the story were found to be both doable and useful. The task of fine-tuning was not applied much although participant state to find the step valuable.

For Personal Agency the scales on the CANE Questionnaire were not reliable enough to gain insights. Illustrations from interviews show that overall participants seem to be (moderately) satisfied with the presentations they created in training. Perfectionism, organizational policy concerning presentations, too little time to execute the learning task and questions about whether their application of the guidelines taught in training was appropriate, seem to negatively influence participants' satisfaction with the presentation they created. Higher levels of previous experience creating effective visual presentations, seem to negatively influence participants' perception of improvement but overall participants state to perceive that their ability to create effective, visual presentations has improved (some) due to training.

5.1.3 Findings for question 3: "What are the effects of the online training 'Presenting with visuals' on the task performance of professionals to create effective, visual slideshows for oral presentations?"

Task performance was defined as the ability to create effective, visual presentation for which the measure was the level of adherence to cognitive communication principles by Kosslyn et al. (2012). Presentations created before training and during training were compared using the same presentation checklist, scoring the amount of rule violations related to these principles. Based on the results it can be assumed that overall, participants' ability to create effective, visual presentations has increased. There was a large positive effect of training on task performance since they scored significantly better on the checklist post training compared to pre training.

When taking a closer looking at each cognitive communication principle, training seems to have a large effect on four of them. Participants have increased their ability to design slides in adherence to the Relevance Principle (communication is most effective when neither too much nor too little information is presented), Appropriate Knowledge Principle (communication requires prior knowledge of relevant concepts, jargon and symbols), Limited Capacity Principle (people have a

limited capacity to retain and to process information and will not understand a message of too much information must be retained or processed) and Salience Principle(attention is drawn to large perceptible differences). There was a large positive effect of training for these principles, since significant decrease of violations was found for scores on the presentation checklist post training compared to pre training.

Insights from the interviews seem to endorse some of these findings. The main reported reason for improvement was that participants consider what to include in presentation more thoughtfully which is said to be related to segmentation of the learning task and self-reflection opportunities. Also, reasons provided for satisfaction with the presentation created related to the learning task were stated to be a clear storyline, using less text on slides and using more (relevant) visuals and needing less slides or information to convey the message. This could lead to their presentation better adhering to the principle of Relevance, Limited Capacity and to some extent Appropriate Knowledge, for this helps to convey the message of the presentation more appropriately. Another reason reported for why participants were satisfied with their created presentation, was consistency between and within slides. This could relate to Limited Capacity because more consistency means less 'noise' for the audience to look past when looking for the essential information in slides. This could also potentially influence the principle of Salience, because when slides are consistent and the information in slides is more relevant, intended emphasis could become more apparent.

For the other cognitive communication principles (Compatibility, Discriminability, Informative Change, Perceptual Organization and 'Overdetermined') no significant differences were found. Looking at the insights from interviews, this might be illustrated by reports of the participants of needing more in-depth information on how to visualize slides. These principles all contain rules mainly related to (specific aspects) of the actual design of slides. Informative Change is the only principle for which that argumentation would be less applicable, and looking at the findings from statistical analysis, this principle is close to being significant ($p=0.053$).

5.2 Limitations of the study

As this was a case study, the generalization of results is difficult which is a limitation of the study. Also, for the possibility of result generalization, the sample would have to have been larger. The study started out with an already small sample of twelve participants and lost three due to the time constraints of this master thesis and the workload demands that put on the participants. It is feasible that due to these demands participants were not able to perform optimally, which could impact the reliability of the results. Also, the interviews used in this study were coded and analysed only by the researcher where, for validity and reliability with regard to possible bias, it would have been better if coding was done by more than one person.

Additionally, the CANE questionnaire instrument adapted from a collection of existing instruments proved not to be reliable for half of the scales which made drawing conclusions on the effects of training on motivation, as it was defined in this study, challenging. Application of the instrument to a larger sample might reveal insights on better scale reliability and could render it more useful.

Another limitation is that the DBT model was meant to be used for (a set of) demonstrations such as instructional videos. In this study, the online training with all its instructional features organically grew to an instruction type more closely related to a complete e-learning course. For e-learning there are more specific instructional design approaches available in the literature body (e.g Garrison, 2011; Clark & Mayer, 2016) and, even though for the design of instructional features research on online learning was used (e.g. Cercone, 2008; Clark & Mayer, 2008), the choice for the DBT model may have impacted training design and results.

5.3 Recommendations for future research

5.3.1 Use and development of the DBT approach

With regard to the Demonstration-Based Training approach, this study built on the limited amount of available research (e.g. Rosen et al., 2010; Grossman et al., 2013; Van der Meij and Van der Meij, 2016). From the experience of this study, the DBT approach is a flexible and practical approach to design instruction. The first recommendation for future research is therefor to employ more empirical

studies and/or literature review in order to study which instructional features are effective for which circumstances (including e-learning), so more instructional designers can more easily apply the DBT approach.

For instance, in this study not one but two approaches were used to convey information: DBT for training design and adherence to cognitive communication principles by Kosslyn et al. (2012) for presentation design. One could argue one of the approaches could be used for both. There are some similarities between the two approaches. For instance, both assume cognitive processes need to be facilitated in order for the target audience to reap benefits from the information presented to them. Kosslyn et al (2012) relate the principles of Discriminability, Perceptual Organisation and Salience to encoding processes stating the audience has to see and make sense of what they see in order to process information. This is closely related to the attention processes facilitated by the DBT approach which relates to learners actively processing what they see (Rosen et al., 2010). The retention processes described in the DBT and the working memory principles (Limited capacity and Informative Changes) described by Kosslyn et al. (2012) both aim for perceived information to be stored and intergrated. Even for facilitating motivation processes stated in DBT and accessing long term memory principles (Appropriate knowledge, Compatibility and Relevance) the goal is similar, affecting the ease to extract (positive) meaning from the perceived information.

However, DBT is very focused on learning and includes facilitating production processes, whereas the cognitive communication principles do not include active learning activities in their approach. Also, DBT is not content specific and whereas the principles offer very detailed guidelines and cognitive principles do not specifically aim to motivate the audience. The approaches could be integrated to benefit each other. For the design of training, the DBT approach is a good way to make sure learning processes are supported in a more general way. The specific principles by Kosslyn et al. (2012) could be used as guidelines for the instructional features in the DBT approach, in the case of this study, they could have been used to design the learning elements such as the 'what & why' or 'procedure' videos but also the process worksheets. For presentation design, it might be a good idea to include the DBT model in the early stages of presentation creation, such as when setting the goal for the presentation to make sure to facilitate all four cognitive processes. Also, presentations are often used for educational purposes so possibilities to facilitate production processes would be a nice addition to presentation design guidelines. The development of the DBT model would benefit from more research on its application to different contexts.

5.3.2 Define more visual design guidelines for presentations

During the adaption process of the original presentation checklist by Kosslyn at al. (2012) for this study, insights were gained into potential gaps in the instructional content of the online training. It became clear that not much detail is provided in training on specific data visualization design (for graphs, diagrams and charts, keys and labels) or the effects of using certain colours, that almost no attention given to dynamic animation and transitions and that sound as a presentation element was not mentioned at al. It seems that –to some extent- these potential gaps have been recognized by participants as well. In the results of interviews, several participants commented on wanting to know more about the possibilities of PowerPoint (for instance on dynamic movement) and more in-depth guidelines on visualisations. However, apparently gaps in this area are a common occurrence when guidelines for presentation design are provided. Berk (2011) states that most studies concerning evidence based presentation design guidelines focus on the basic features of PowerPoint, while the use of rich media (such as movement, music, visuals and videos) receives little attention despite their potential increase of comprehension, understanding, memory and deep learning. It is therefor a recommendation for GriDD to consider these potential gaps in instructional content for training improvement and for future research to research and develop more (specific, evidence based) guidelines for 'rich media' use in presentations.

5.3.2 Further development of the presentation checklist

Another suggestion for future research is to make the Presentation Checklist more widely accessible, reliable and applicable. The list by Kosslyn et al. (2012) was a great instrument and in this study an effort was made to provide more clarity to the instrument by explaining the rule items of the list in more depth. Still both raters in this study needed to discuss disparities of interpretation and find

consensus on what the items meant for the instrument to become reliable and useful. Reliability research among a large sample of raters could specify the instrument further and make it an even better addition to the knowledge base on guidelines for presentation design.

Additionally, it would be good if future research addressed an issue that arose in this study concerning the items on the checklist: when scoring the items, it became clear that not all of the items are applicable to every presentation. For instance, if a presentation does not display a table, all of the items concerning table design are void. In this study, whenever a presentation did not display a table, items concerning tables were coded as 'no violation'. However, this kind of 'no violation' is of a different order than if a table had been displayed in the presentation and no violation of design rules occurred. A solution could be to code the first instance as 'not applicable' so as to not muddle the data. These could then be excluded as missing values or, for instance, multiple imputation could be used to replace the missing values. In this study with such a small population, exclusion or imputation would impact the data and thus the reliability of analysis too much, so to remain within the scope of a master thesis, it was chosen to reserve this observation as a recommendation for future research.

5.4 Conclusion

The purpose of this study was to design online training in which the creation of slideshows for oral presentations is taught using instructional video, based on the content of GriDD's existing offline training and aimed at its (potential) clients, and evaluate training for its for its effects on motivation and task performance. The Demonstration-Based Training approach seems an appropriate way to design instructional features to facilitate learning processes and construct training participants, to warrant a moderate to good grade from participants. Even though no effect of training on motivation could be found using statistical comparison analysis, drawing from insights gained from participants' statements in interviews, the grade awarded to training and the median/mean scores for overall motivation, emotion and effectiveness value, it might be suggested that the attitude towards the commitment and necessary effort needed to (learning to) create effective, visual presentations was not negative. Training was found to have a significant large effect on participants' overall task performance and on their increased adherence to the principles of Relevance, Appropriate Knowledge, Limited Capacity and Salience.

An implication of this study is that it adds to the knowledge base of the effects of Demonstration-Based Training which, to the knowledge of the researcher, is still limited since the model is relatively new. Also, this study builds on the accessibility of the presentation checklist by Kosslyn et al. (2012) for use as an instrument to gain insight into one's ability to create effective, visual presentations. And, of course, the study is of practical value to the client, GriDD Consultancy B.V., who have gained an online training to add to their list of services, which has been empirically found to be effective for professionals (to learn) to create effective, visual presentations.

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Appendices

Appendix A: Stakeholder Needs Analysis Question Guide (in Dutch)

In this appendix the questions for the needs analysis with GriDD, the client in this study, and Splintt, their partner, are displayed (in Dutch). Four consultants at GriDD were interviewed and the managing partner at Splintt answered questions.

Table A1: Interview Guide, questions for the consultants at GriDD (in Dutch)

Vragen voor GriDD consultants
Duidelijk krijgen aan welke eisen de training moet voldoen en aan welke onderwerpen aandacht moet worden geschonken om het een echt GriDD training te maken.
- Wat moet het doel zijn van de training? - Wat is de doelgroep van de tutorial training? - Welke onderwerpen moeten aan bod komen? - Aan welke randvoorwaarden moet de training voldoen? - Wat voor sfeer moet de training uitstralen?

Table A2: Questions for Splintt, partner of GriDD (in Dutch)

Vragenlijst Splintt
Duidelijk krijgen aan welke eisen de training moet voldoen en aan welke onderwerpen aandacht moet worden geschonken om het een Splintt training te maken.
- Waarom de co-productie met GriDD? - Wat is Splintt's doel voor de training? - Wat is de doelgroep van de training? - Wat voor sfeer moet de online training uitstralen wil het een Splintt training zijn? - Waaraan moet een goede online training voldoen? - Aan welke randvoorwaarden moet de training voldoen?

Appendix B: Target Audience Needs Analysis Interview Guide (in Dutch)

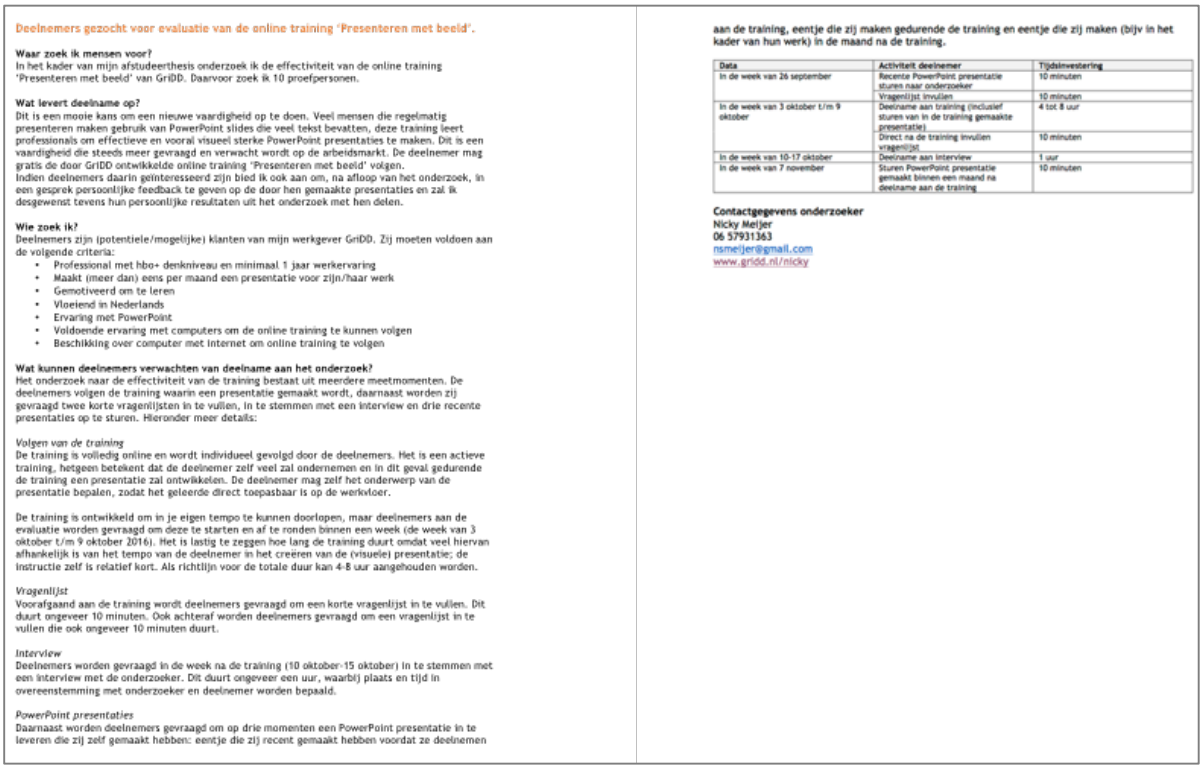
Inleiding

- Uitleg geven over het doel van het gesprek en het nut van de uitkomsten. Tevens een korte introductie over mijzelf, mijn afstuderen en het onderwerp.
- Tijdsduur: 30 minuten
- Doelen:
  - inzicht verkrijgen in de huidige situatie van de doelgroep
  - inzicht verkrijgen in problemen rondom creatie van presentaties
  - randvoorwaarden video in kaart brengen

Onderwerpen
Huidige situatie
- Wie geven er presentaties? - Hoe zien deze er meestal uit?
Onderwerpen rondom creatie van presentaties
- Bent je tevreden met de manier waarop jijzelf en mensen binnen de organisatie presenteren? - Wat vind je aspecten van een goede/slechte presentatie?
Leren van video
- Kijk je weleens informatieve video's? (Zo ja, welke onderwerpen en wanneer kijkt u deze? Zo niet, waarom niet?) - Wat zijn eisen aan instructieve video? - Wat heeft de voorkeur: lange (< 10 min) video met stap-voor-stap uitleg van methoden of korte (<10 min) video met globale procedures en handigheidjes

Appendix C: Communication With (Potential) Participants

A document was composed to search for participants in which inclusion criteria for participants were stated, along with information on the need for participants, what they would gain from being included in the study and what the procedure was for taking part in the study. Participants were not offered any kind of monetary compensation, but it was made clear that by volunteering for training they would have the chance to develop new knowledge and skills for free. Additionally, an offer was made to receive individual feedback on the presentations created as a result of participating in the study, after the research is concluded. This document was distributed through the network of GriDD employees and partners as well as friends and family of the researcher. More information could be obtained by e-mailing or calling the researcher. This method of sampling yielded 12 participants for the study.



Deelnemers gezocht voor evaluatie van de online training 'Presenteren met beeld'.

Waar zoek ik mensen voor?
In het kader van mijn afstudeerthesis onderzoek ik de effectiviteit van de online training 'Presenteren met beeld' van GriDD. Daarvoor zoek ik 10 proefpersonen.

Wat levert deelname op?
Dit is een mooie kans om een nieuwe vaardigheid op te doen. Veel mensen die regelmatig presenteren maken gebruik van PowerPoint slides die veel tekst bevatten, deze training leert professionals om effectieve en vooral visueel sterke PowerPoint presentaties te maken. Dit is een vaardigheid die steeds meer gevraagd en verwacht wordt op de arbeidsmarkt. De deelnemer mag gratis de door GriDD ontwikkelde online training 'Presenteren met beeld' volgen.
Indien deelnemers daarin geïnteresseerd zijn bied ik ook aan om, na afloop van het onderzoek, in een gesprek persoonlijke feedback te geven op de door hen gemaakte presentaties en zal ik desgewenst tevens hun persoonlijke resultaten uit het onderzoek met hen delen.

Wie zoek ik?
Deelnemers zijn (potentiele/mogelijke) klanten van mijn werkgever GriDD. Zij moeten voldoen aan de volgende criteria:

- Professional met hbo+ denkniveau en minimaal 1 jaar werkervaring
- Maakt (meer dan) eens per maand een presentatie voor zijn/haar werk
- Gemotiveerd om te leren
- Vloeiend in Nederlands
- Ervaring met PowerPoint
- Voldoende ervaring met computers om de online training te kunnen volgen
- Beschikking over computer met internet om online training te volgen

Wat kunnen deelnemers verwachten van deelname aan het onderzoek?
Het onderzoek naar de effectiviteit van de training bestaat uit meerdere meetmomenten. De deelnemers volgen de training waarin een presentatie gemaakt wordt, daarnaast worden zij gevraagd twee korte vragenlijsten in te vullen, in te stemmen met een interview en drie recente presentaties op te sturen. Hieronder meer details:

Volgen van de training
De training is volledig online en wordt individueel gevolgd door de deelnemers. Het is een actieve training, hetgeen betekent dat de deelnemer zelf veel zal ondernemen en in dit geval gedurende de training een presentatie zal ontwikkelen. De deelnemer mag zelf het onderwerp van de presentatie bepalen, zodat het geleerde direct toepasbaar is op de werkvloer.

De training is ontwikkeld om in je eigen tempo te kunnen doorlopen, maar deelnemers aan de evaluatie worden gevraagd om deze te starten en af te ronden binnen een week (de week van 3 oktober t/m 9 oktober 2016). Het is lastig te zeggen hoe lang de training duurt omdat veel hiervan afhankelijk is van het tempo van de deelnemer in het creëren van de (visuele) presentatie; de instructie zelf is relatief kort. Als richtlijn voor de totale duur kan 4-8 uur aangehouden worden.

Vragenlijst
Voorafgaand aan de training wordt deelnemers gevraagd om een korte vragenlijst in te vullen. Dit duurt ongeveer 10 minuten. Ook achteraf worden deelnemers gevraagd om een vragenlijst in te vullen die ook ongeveer 10 minuten duurt.

Interview
Deelnemers worden gevraagd in de week na de training (10 oktober-15 oktober) in te stemmen met een interview met de onderzoeker. Dit duurt ongeveer een uur, waarbij plaats en tijd in overeenstemming met onderzoeker en deelnemer worden bepaald.

PowerPoint presentaties
Daarnaast worden deelnemers gevraagd om op drie momenten een PowerPoint presentatie in te leveren die zij zelf gemaakt hebben: eentje die zij recent gemaakt hebben voordat ze deelnemen aan de training, eentje die zij maken gedurende de training en eentje die zij maken (bijv in het kader van hun werk) in de maand na de training.

Data	Activiteit deelnemer	Tijdsinvestering
In de week van 26 september	Recente PowerPoint presentatie sturen naar onderzoeker	10 minuten
	Vragenlijst invullen	10 minuten
In de week van 3 oktober t/m 9 oktober	Deelname aan training (inclusief sturen van in de training gemaakte presentatie)	4 tot 8 uur
	Direct na de training invullen vragenlijst	10 minuten
In de week van 10-17 oktober	Deelname aan interview	1 uur
In de week van 7 november	Sturen PowerPoint presentatie gemaakt binnen een maand na deelname aan de training	10 minuten

Contactgegevens onderzoeker
Nicky Meijer
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Figure A1: Contacting document participants (Dutch)

Findings from this study are reported anonymously and communicated to participants after completion of the research. Participants will be provided with their personal results if they wish to receive these. Communication, with the exception of the interview, has primarily taken place via e-mail and sometimes through telephone calls. An informed consent form was signed by every participant to indicate they know their rights in this study.

Toestemmingsverklaringformulier deelname onderzoek.

Titel onderzoek: Design and training effectiveness case study
Verantwoordelijke onderzoeker: Nicky Meijer

In te vullen door de deelnemer:

Ik verklaar op een voor mij duidelijke wijze te zijn ingelicht over de aard, methode, doel en de risico's en belasting van het onderzoek. Ik weet dat de gegevens en resultaten van het onderzoek alleen anoniem en vertrouwelijk aan derden bekend gemaakt zullen worden. Mijn vragen zijn naar tevredenheid beantwoord.

Ik begrijp dat film-, foto, en videomateriaal of bewerking daarvan uitsluitend voor analyse en/of wetenschappelijke presentaties zal worden gebruikt.

Ik stem geheel vrijwillig in met deelname aan dit onderzoek. Ik behoud me daarbij het recht voor om op elk moment zonder opgaaf van redenen mijn deelname aan dit onderzoek te beëindigen.

Naam deelnemer: .....

Datum: .....

Handtekening deelnemer: .....

In te vullen door de uitvoerende onderzoeker

Ik heb een mondelinge en schriftelijke toelichting gegeven op het onderzoek. Ik zal resterende vragen over het onderzoek naar vermogen beantwoorden. De deelnemer zal van een eventuele voortijdige beëindiging van deelname aan dit onderzoek geen nadelige gevolgen ondervinden.

Naam onderzoeker: NICKY MEIJER

Datum: 28/09/2016

Handtekening onderzoeker: .....

Figure A2: Informed Consent form (Dutch)

Appendix D: Demographic Questionnaire (in Dutch)

The Demographic Questionnaire was administered combined with the pre training CANE Questionnaire, and precedes it.

Table D1: Questions on the Demographic Questionnaire (in Dutch)

Item	Vraag	Mogelijke antwoorden
0	Wat is je naam?	open
0a	Wat is je geslacht?	man, female
0b	Wat is je leeftijd?	getal
0c	Wat is je functiebeschrijving?	open
0d	Wat is je werkervaring (in jaren)?	getal
0e	Hoeveel presentaties maak je average per maand?	0-1 1-3 3-5 meer dan 5
0f	Welk expertiseniveau op het gebied van Microsoft Powerpoint zou je jezelf geven?	1 Erg laag 2 Laag 3 Ondergemiddeld 4 Gemiddeld 5 Bovengemiddeld 6 Hoog 7 Erg hoog

Appendix E: CANE Questionnaire (In Dutch)

The items on the CANE Questionnaire are displayed in the table below. Original items from existing scales in English, adapted items as used in this study in Dutch. The questionnaire was presented online pre and post training in a matrix format in which participants could select one of the items on the answering scale.

Table E1: Items on CANE Questionnaire and their relation to existing scales

Answering scale used for all items, level of agreement 1 (strongly disagree) to 7 (strongly agree).	
Geef voor elk van deze stellingen aan in welke mate u het ermee eens bent op een schaal van 1t/m 7. (1 Zeer niet mee eens, 2 Niet mee eens, 3 Enigszins niet mee eens, 4 Neutraal, 5 Enigszins mee eens, 6 Mee eens, 7 Zeer mee eens)	
Items on Personal Agency. First six adapted from MSLQ (Pintrich et al., 1991, p13) and the other two created by the researcher (which are the same pre and post).	
Item	Statement
1. Original	I believe I will receive an excellent grade in this class.
1. Pre	Ik verwacht dat ik na deze training goed zal zijn maken van effectieve, visuele presentaties.
1. Post	Ik ben goed in het maken van een effectieve, visuele presentatie.
2. Original	I'm certain I can understand the most difficult material presented in readings for this course.
2. Pre	Ik ben er zeker van dat ik het moeilijkste materiaal in deze training kan begrijpen.
2. Post	Ik heb het moeilijkste materiaal in deze training begrepen.
3. Original	I am confident I can understand the basic concepts taught in this course
3. Pre	Ik heb er vertrouwen dat ik de basis concepten in deze training kan begrijpen
3. Post	Ik heb de basisconcepten in deze training begrepen.
4. Original	I am confident I can do an excellent job on assignments and tests in this course
4. Pre	Ik heb er vertrouwen in dat ik de opdrachten in de training uitstekend uit zal kunnen voeren.
4. Post	Ik heb de opdrachten in deze training uitstekend uit kunnen voeren.
5. Original	I expect to do well in this class.
5. Pre	Ik verwacht dat ik het goed doe in deze training.
5. Post	Ik heb het goed gedaan in deze training.
6. Original	I'm certain I can master the skills being taught in this class.
6. Pre	Ik ben ervan overtuigd dat ik de vaardigheden die mij geleerd worden in deze training kan beheersen.
6. Post	Ik beheers de vaardigheden die aan bod kwamen in deze training.
7. Pre and post	Ik verwacht dat de organisatie waarin ik werk, het belangrijk vindt dat ik effectieve, visuele presentaties kan maken.
8. Pre and post	Ik verwacht dat ik van de organisatie waarin ik werk de ruimte krijg om effectieve, visuele presentaties te maken.
Items on Emotion (same items pre and post training)	
9. Pre and post	Ik voel me angstig als ik denk aan het maken van effectieve, van visuele presentaties. (negatief)
10. Pre and post	Ik voel me zenuwachtig als ik denk aan het maken van effectieve, visuele presentaties. *(negatief)*
11. Pre and post	Ik voel me teneergeslagen als ik denk aan het maken van effectieve, visuele presentaties. *(negatief)*
12. Pre and post	Ik voel me enthousiast als ik denk aan het maken van effectieve, visuele presentaties. *(positief)*
13. Pre and post	Ik voel me sterk als ik denk aan het maken van effectieve, visuele presentaties. *(positief)*
14. Pre and post	Ik voel me vol inspiratie als ik denk aan het maken van effectieve, visuele

	presentaties. *(positief)*
Items on Effectiveness Value, adapted from Perceived Task Value items by Eccles and Wigfield (1995, p.224)	
15. Original	How useful is learning advanced high school math for what you want to do after you graduate and go to work?
15. Pre	Deelnemen aan de training 'Presenteren met beeld' is nuttig voor mijn professionele leven.
15. Post	Mijn deelname aan de training 'Presenteren met beeld' was nuttig voor mijn professionele leven.
16. Original	How useful is what you can learn in advanced high school math for your daily life outside school?
16. Pre and Post	In staat zijn om effectieve, visuele presentaties te maken is nuttig voor mijn professionele leven.
17. Original	In general I find working on math assignments (very boring - very interesting).
17. Pre	Ik vind het erg interessant om deel te nemen aan de training 'Presenteren met beeld'.
17. Post	Ik vond het erg interessant om deel te nemen aan de training 'Presenteren met beeld'.
18. Original	How much do you like doing math?
18. Pre and post	Ik vind het leuk om presentaties te maken.
19. Original	Is the amount of effort it will take to do well in high school math courses worthwhile to you?
19. Pre	Ik verwacht dat de moeite die het kost om de training te volgen, het waard is om effectieve, visuele presentaties te kunnen maken.
19. Post	De moeite die het kostte om de training te volgen, is het waard om effectieve, visuele presentaties te kunnen maken.
20. Original	I feel that, to me, being good at solving problems which involve math or reasoning mathmetically is (not at all important - very important)
20. Pre and post	Voor mij persoonlijk is het belangrijk dat ik goed ben in het maken van effectieve, visuele presentaties.
21. Original	How important is it to you to get good grades in math?
21. Pre	Het is voor mij heel belangrijk dat ik goede resultaten behaal in deze training.
21. Post	Het is voor mij heel belangrijk dat ik goede resultaten heb behaald in deze training.
Additional question only asked post training, answered on a scale of 1 (lowest) to 10 (highest).	
22	Als ik de training 'Presenteren met beeld' een cijfer moet geven, dan beoordeel ik deze met een...

Appendix F: Interview Topic Guide (in Dutch)

Introductie		
-	Even voorstellen	
-	Toestemming geluidsopname	
-	Doel interview - inzicht krijgen in het effect van de training volgens deelnemer, specifiek over het vermogen om de taak uit te voeren, de gemoedstoestand rondom de taak en de waarde van effectiviteit - inzicht in de rol van training ontwerp hierop - mogelijke verbeterpunten in kaart brengen	
-	Benadrukken nut van openheid en duur interview	
-	Vragen vooraf?	
Onderwerpen		Aan bod gekomen?
Context		
-	Algemene indruk	
	- positief / negatief	
	- kort: waarom	
-	Aanpak: hoe de training doorlopen?	
	- In een zitting of meerdere zittingen; positief / negatief	
	- Alles bekeken	
	- Duur training	
	- Oorzaak duur training	
	- Eigen onderwerp of voorbeeld	
	- Ondersteuning vanuit de organisatie; waarde/ruimte (tijd)	
Methode om effectieve, visuele presentaties te leren maken		
-	Vermogen om effectieve, visuele presentaties te maken na training?	
	- Waarom positief / negatief	
	- Tevredenheid gemaakte presentatie (verschil met voor de training)	
	- Gevoelens over het maken van effectieve, visuele presentaties	
-	Effect van de training: beheersen van vaardigheden, nut voor het maken van effectieve, visuele presentaties. *(bespreken onderdelen training)*	
	- Introductie	
	o Ervaring	
	o Waardevol	
	o Introductie trainer; welke bijdrage levert dat	
	- Stap 1: Doel en context	
	o Beheersen kennis & vaardigheid	
	o Waarde voor maken effectieve visuele presentaties	
	o Nut van instructiemateriaal (animatie, screencast, opdracht, reflectievragen, documenten in bibliotheek)	
	- Stap 2: Mindmap	
	o Beheersen kennis & vaardigheid	
	o Waarde voor het maken van effectieve visuele presentaties	
	o Nut van het instructiemateriaal (animatie, screencast, opdracht, reflectievragen, documenten in bibliotheek)	
	- Stap 3: Structureren	
	o Beheersen & vaardigheid	

	o Waarde voor het maken van effectieve visuele presentaties	
	o Nut van het instructiemateriaal (animatie, screencast, opdracht, reflectievragen, documenten in bibliotheek)	
	- Stap 4: Verbeelden	
	o Beheersen kennis & vaardigheid	
	o Waarde voor het maken van effectieve visuele presentaties	
	o Nut van het instructiemateriaal (animatie, screencast, opdracht, reflectievragen, documenten in bibliotheek)	
	- Stap 5: Finetunen	
	o Beheersen kennis & vaardigheid	
	o Waarde voor het maken van effectieve visuele presentaties	
	o Nut van het instructiemateriaal (animatie, screencast, opdracht, reflectievragen, documenten in bibliotheek)	
	- Afsluiting	
	o Ervaring	
	o Waardevol	
	o Nut van instructiemateriaal (animatie, screencast, documenten in bibliotheek)	
	- Algemeen: mening over opbouw training	
Toekomst		
-	Volgende keer weer effectieve, visuele presentaties volgens deze methode?	
	- Waar is wel/niet toepassen van afhankelijk?	
	- Is het belangrijk voor hen?	
-	Training aanraden aan anderen?	
	- Waarom wel/niet	
	- Specifieke verbeterpunten	
Afsluiting		
-	Uitleg verdere procedure: - manier van verwerken: transcriberen, quotes mogelijk in rapport (vertaald en anoniem) - toestemming vragen eventuele uitwerking interview door derden - feedback mogelijkheid na onderzoek	
-	Zijn er nog vragen of opmerkingen?	
-	Benoemen hoe te bereiken indien nodig	
-	Bedanken	

Appendix G: Adaptation Process Presentation Checklist

Adaptation process:

1. Create a list of GriDD guidelines following from what is taught in training. See Table G1 for an excerpt of GriDD guidelines.
2. Provide explanations for each item on the original checklist by Kosslyn et al. (2012).
3. Determine in- or exclusion of items by matching whether items on the checklist are taught the same (inclusion), different (potential inclusion) or not at all in training (exclusion). See Table G2 for an excerpt of the determination table.

Table G1: Excerpt of GriDD Guidelines Table

GriDD Guidelines	
Guidelines for choosing appropriate visuals	
G01	Choose visuals to match the presentations' goal, story and assertions
G10	Label the axes on your graphs, charts and tables
Design guidelines	
Calligraphy	
G30	Choose readable, sans serif fonts

Table G1: Excerpt of the in- and exclusion determination of items for the Presentation Checklist.

No.	Item	Explanation of rule	GriDD Training		Item included in instrument?
			Same	Different	
Appropriate Knowledge					
1	Unusual bullet symbols are used	Unusual bullet symbols (e.g. smiley faces) require time from your audience to understand (Kosslyn, 2007)	-	-	excluded
Discriminability					
44	Visually complex fonts are used	A complex font means your audience has to work harder to understand what is written (Kosslyn, 2007). An example of a complex or ornate font can be a handlettering font such as ***this one***.	-	G30, item is possible operation alization of linked guideline	included
Relevance					
92	X and Y axes are not clearly identifiable and appropriately labeled	Viewers should be oriented towards what is varied, assessed or measured (Kosslyn, 2007). Therefore, labels should be used.	G10	-	included

Appendix I: Presentation Checklist

Guidelines for the use of the Presentation Checklist			
Use as follows: • Score the presentation on rule violations stated in the column 'Category/Rule violation'. An explanation is provided for interpretation of the rule which could help with scoring. • Note the score in the column labelled 'Score'. Use '1' when the rule is violated and use '0' when it is not.			
No.	Item by Kosslyn et al. (2012)	Explanation provided using insights from Kosslyn et al. (2012) and Kosslyn (2007).	Score
Appropriate Knowledge			
1	Non-standard or unfamiliar display formats are used	The way information is displayed in the presentation is not familiar to people which requires processing effort (Kosslyn, 2007). This can be in regard to placement (use of a visual pattern, alignment) or elements such as visuals (photo, illustration, graph, diagram etc). Important here is not whether these are incompatible with the story, but whether they are displayed in an unfamiliar manner.	
2	The title is not at the top of the slide	Audiences expect titles at the tops of documents and if it is not, viewer may group it with other elements. However, the title anywhere but the center of the top (e.g. bottom), this convention should follow throughout the presentation for a familiar, recognizable consistent design (Kosslyn, 2007). This rule is violated if the title is not on top OR if the title changes location (e.g. first slide top, second slide bottom)	
3	Symbols are potentially ambiguous for the audience	Violated if symbols used in the presentation could have different meaning for one or for the other. Medium should match the message (Kosslyn, 2007).	
4	Standard conventions for fonts are not used	This item is not definitively explained in either Kosslyn (2007) or Kosslyn et al. (2012). However, Kosslyn (2007) does state the need to use standard, readable fonts. And since the principle of appropriate knowledge states the need for familiarity, it is not a reach to include one of GriDD guidelines here (G16), which calls for consistent use of fonts (e.g. consistently use same font size for body, titel etc in all slides).	
5	Terms do not convey the appropriate denotations and connotations	It is important to ensure that both the direct meanings (denotations) and indirect meanings (connotations) are appropriate for the audience and the message (Kosslyn, 2007).	
Compatibility			
6	Font is incompatible with its connotations (sans serif implies modern, technological; serif implies traditional)	For example: "Old-fashioned looking typeface would send a conflicting message if used in a written description of a high-tech device." (Kosslyn et al., 2012, p5).	
7	The background pattern is inappropriate to the main point of the display	The background will interfere with the message if it is inappropriate. Example provided by Kosslyn et al. (2012, p.5) "a floral background is not compatible with a presentation about carbon reservoirs in the ocean."	

8	The style of photos or clipart is not compatible with the message	Make sure the image is easy to interpret, which is easiest for viewers when it depicts a typical example (Kosslyn et al., 2012). An example provided by Kosslyn et al. (2012, p.5): “a picture of a duck effectively illustrates 'water fowl' but not 'pet bird”.	
9	Sounds, text, and graphics are not coordinated	A valuable opportunity is missed when sounds are presented without dual means of learning. (Kosslyn, 2007) If sound, text and graphics are used to convey a message, they should be coordinated for effect.	
10	Animations/videos are not compatible with the represented object or event	"Animation interferes with comprehension if it does not fit the natural movements of the object (e.g., a picture of a car should not drop down from the top)" (Kosslyn et al., 2012, p.4). Additionally, can illustrate events unfolding over time well (Kosslyn, 2007) which means it could be used to represent an event.	
Discriminability			
11	Entries in a table are too small to be read easily	One of the indicators of a too complex table is that font has to be made small for the table to fit the sheet. Even if the entries are highlighted, determine whether it is readable or whether too much information is being tried to convey or zoom in should be used (Kosslyn, 2007).	
12	Photos and clipart become too grainy when inserted into the slide	Resolution of the visual should be of high enough quality to display on a large screen without the visual becoming 'grainy'. (Kosslyn, 2007). Grainy can for instance refer to the visual becoming pixelated or blurry.	
13	Information-conveying visual properties are not discriminable	"Two properties (such as two colors, degrees of gray, or sizes) cannot convey different information unless they differ by a large enough proportion to be easily distinguished." (Kosslyn et al., 2012, p.2). If there is a change in pattern or consistency to convey information this should be very noticable: salient visual effects (e.g. bold lettering, color highlighting) should be used.	
14	Text cannot be easily discriminated from the background	"If the color of text or graphics is not clearly distinct from the color of the background on which they appear, they cannot be readily distinguished." (Kosslyn et al., 2012, p.2). Colors should be noticeably distinct from each other, for instance separate by at least one color in the color wheel (Kosslyn, 2007). Other variables besides color could also be used to discriminate, such as font size or type.	
15	The foreground and background are not easily discriminable	The most discriminable colors are black and white, depending on room lighting where your presentation is held: if well lit use black on white, if dark maybe use white on black. (Kosslyn, 2007)	
16	Visually complex fonts are used	A complex font means your audience has to work harder to understand what is written (Kosslyn, 2007). An example of a complex font can be a handlettering font such as ***this one***.	
Informative Changes			

17	Visual or auditory characteristics change even when they do not signal a change in information	Viewers assume that changes in appearance, such as background, bullet points, color, font, terminology etc, convey new information. If this is not the case, it can be confusing or lead the audience astray (Kosslyn et al., 2012)	
18	There is no crisp ending to signal that the presentation, or a given part, is over	"Clearly marking the beginnings and ends of sections of a presentation (for instance by presenting a title or concluding slide with a distinct format, typeface, or background) helps audience members follow the presentation." (Kosslyn et al., 2012, p.4)	
19	Serif and sans serif are mixed arbitrarily	Serif fonts have little lines on the tops and bottoms of letters, for instance with this font 'Times New Roman', whereas sans serif font does not, in this font 'Arial' Mixing means using them together in one slide or between slides.	
20	A consistent and distinctively formatted slide does not signal the beginning of each new part/group of the presentation	"Clearly marking the beginnings and ends of sections of a presentation (for instance by presenting a title or concluding slide with a distinct format, typeface, or background) helps audience members follow the presentation." (Kosslyn et al., 2012, p.4)	
21	Different bullet symbols are used for entries in a list of similar items	Changes in appearance are assumed to convey new information (Kosslyn et al., 2012), which is also the case in using bullet point symbols. So if there is a change for instance from a dot to a stripe, this should be meaningful.	
22	Different transitions are used randomly for different slides	The same transitions should be used throughout the presentation, unless you want to emphasize something (Kosslyn, 2007). A transition is the visual way one slides follows the next.	
23	The same terminology is not used in labels and surrounding text	Audience might wonder if you mean different things when using different terms (Kosslyn, 2007). For example, if you lable a cube 'cube' and then name it a 'box' later, this might be confusing.	
Limited Capacity			
24	More than two lines are used per bulleted sentence	According to Kosslyn (2007) two lines can convey four concepts. Perceptual grouping laws state we can hold four units in our working memory (Kosslyn et al., 2012)	
25	More than four bulleted items appear in a single list	Perceptual grouping laws state we can hold four units in our working memory (Kosslyn et al., 2012)	
26	Slides contain more than what can be read aloud in about one minute	Each slide should contain only as much as you can read aloud or describe in about one minute. If you present too much text or too many graphics, the audience will be looking at one thing while you are saying another. In this study, we will only look at text on slide.	
27	Complex displays are not built up a part at a time	Building a display might make it easier to understand (Kosslyn, 2007). For instance, when a flow chart is used and you see each step appear one by one instead of all together.	

28	Viewers are expected to read a complex table	In a presentation, viewers should be led to conclusions quickly so only information needed to make a point should be presented. One of the indicators of a complex table: they have so many entries that the font has to bee very small to fit on the slide (Kosslyn, 2007).	
29	Content elements are not labeled directly whenever space permits	Labeling refers to placing lables near corresponding elements (Kosslyn, 2007)	
Perceptual organization			
30	In tables with more than two rows and two columns, grid lines are not included	Grid lines are the lines within a tables, signaling components in the table and help viewers read the table and its specifc entries (Kosslyn, 2007)	
31	The title is too close to other words or patterns and groups with them	Determine whether elements are placed too close to the title and are too similar, since these elements could be seen as a group. (Kosslyn, 2007)	
32	Parts of background patterns group with parts of the foreground	Confusion could arise when background and foreground elements gtoup. Look for instance at contrasting hue, saturation, and brightness to determine whether grouping occurs (Kosslyn, 2007)	
33	In a key, labels and patches fail to group together	Grouping is helped by proximity, e.g. when label and the patch are closer to each other than to any other part of the key. (Kosslyn, 2007)	
34	The space between bar clusters is less than the width of two bars	A bar graph is easier to read when space is left between clusters (Kosslyn, 2007).	
35	Labels are not grouped with the appropriate elements of the display	Labels should only be placed near graphics to which they apply (Kosslyn, 2007)	
36	A banner at the top is not clearly distinct from the other material	A banner can be used to indicate the audience where you are in the in your story. This should be less salient (noticable) than the elements conveying the message of the slide, but clearly distinct (e.g. different font size or color) so it does not group with these elements. (Kosslyn, 2007)	
37	Corresponding bars are not arranged in the same way	Bars are arranged in a certain way, so they can be grouped more easily and this should be consistent (Kosslyn, 2007).	
38	Words in the same label are not close together and typographically similar	If letters are not close to each other or similar in for instance font, size or color, they will not group together.	
39	Portions of the same text, line, or graphic move separately	When using animations, portions of the same piece of information (text or graphic) should be moved in the same way, so that they group together (Kosslyn, 2007)	
40	There is no space between bar clusters	Item 78 handles the appropriate width between bar clusters. For this item, violation occurs only if there is no space at all.	
41	Corresponding bars are not marked in the same way	If bars relate to each other, make sure they are easily distinguished, for instance by giving them the same color (Kosslyn, 2007).	

Relevance			
42	Bullets do not introduce topic sentences/phrases or specific cases	Bullets should only provide key concepts or examples, match with the message and not every word in the presentation should be in a bulleted list. (Kosslyn, 2007)	
43	Either more or less detail than required for the point is presented	"To decide what is too much or too little, one must know about the nature of the message: depending on what the intended point is, specific information can be necessary or extraneous." (Kosslyn et al., 2012, p.5)	
44	X and Y axes are not clearly identifiable and appropriately labeled	Viewers should be oriented towards what is varied, assessed or measured (Kosslyn, 2007). Therefore, labels should be used.	
45	Problem, question, or topic of the presentation is not defined	The problem, question or topic should be made clear in the slides, for instance with a concrete example or an outline (Kosslyn, 2007)	
46	Tables show more than the information needed to make the point	Unnecessary distinctions and unnecessary data can confuse viewers (Kosslyn, 2007). See what goal a slide tries to make and match this with the conclusion one can draw from the table; no more and no less.	
47	Gratuitous animation, which obscures rather than illuminates the point, is presented	A visual change should convey information (Kosslyn, 2007; Kosslyn et al., 2012). Any form of dynamic animation in a presentation should have a clear goal, if not, this rule is violated.	
48	Gratuitous graphics, videos, or sounds are presented	"Presenting too much information is a problem in part because this forces viewers to search for the relevant information, which requires effort" (Kosslyn et al., 2012, p.5). Graphics, videos or sounds that do not contribute to the message are gratuitous.	
49	Photos or clipart are named with a word or phrase that does not bear directly on the point	Visuals should be representative of the point and not be ambiguous or lead away from it. (Kosslyn, 2007)	
50	Photos and clipart do not: define the context, introduce an abstract idea, or evoke a specific emotion	Kosslyn (2007) provides an example of using an historical figure to set the state for a contemporary topic or a familiar face to introduce an idea (such as Einstein for genius) and for evoking emotion show a fitting image for that emotion.	
51	Complex concepts are not illustrated clearly with graphics (displays, videos, sounds, or animations)	"Graphics (photos, drawings, graphs, diagrams), audio, and video can provide detail to illustrate the relevant concepts clearly." (Kosslyn et al., 2012, p.5). Illustrating clearly, for instance, refers to its match with the message, it not being ambiguous, important elements being salient etc. Complex concepts can be identified, for instance, when a lot of text is used to convey them.	
52	A table is not presented when needed (i.e., when specific values are important)	This is more useful than a graph, if specific values are used in text or graph: determine whether a table should have been used. (Kosslyn, 2007)	
Salience			

53	Different colors are not being used for emphasis or to specify	Use color consistently to signal change, so it groups together. Use of too many colors to emphasize or specify (more than three) can be overwhelming to viewers and should be avoided (Kosslyn, 2007).	
54	The most important content element is not the most salient	"If salience is aligned with importance, the more important aspects of the slide (e.g., the title or topic sentence) or of an illustration (graph, diagram, demo) draw the audience members' attention – which will also enhance later memory for those aspects" (Kosslyn et al., 2012, p.3)	
55	Color makes less important elements salient	The larger the color difference, the more it stands out; so it should be the most important on the slide. (Kosslyn, 2007)	
56	The salience of lines or bars does not reflect relative importance	The most salient line (e.g. thicker or different color) is seen first and interpreted as most important (Kosslyn, 2007)	
57	The background pattern is very salient	Do not let the background steal the show. Background should be less noticeable than the rest of the display, for instance lighter and with less saturated colors. (Kosslyn, 2007)	
58	The title is not typographically distinct	The title should catch the eye immediately and be the most salient element in the slide (Kosslyn, 2007).	
59	More salient labels are not used to label more important components of the display	More salient means having them be relatively large, bold, in a striking color or dynamically appearing (Kosslyn, 2007).	
"Over-determined"			
60	The title of a slide does not focus attention on the most important point	Title should only include the most relevant information and what is most important first (Kosslyn, 2007). It should fit the message.	
61	Different types of data are graphed in a single display even when they are unrelated	Using the same display for unrelated data can be taxing on the viewer for they have to search for the information. Only when variables are related and the relation is essential to the message, the same display can be used (Kosslyn, 2007).	
62	Pictures and icons used as labels do not evoke the appropriate concepts	Use graphics or icons that are easily recognizable for what they are (Kosslyn, 2007).	
63	The same size and font is not used for labels of corresponding components	If entities are of equal importance, these should be labelled similarly, for instance with the same size and font, because if they are not, unintended meaning could be assigned to it by viewers (Kosslyn, 2007).	
64	A chart is not used to convey overall organizational structure	"Charts effectively illustrate organizational structure, a sequence of steps, or processes over time (e.g."flow charts")." (Kosslyn et al., 2012, p.5)	
65	A graph is not used to illustrate relative amounts	A graph can be illuminating if data concern a specific issue (Kosslyn, 2007). So rule is violated if data is displayed not in a graph, when it would be more appropriate to use a graph.	

66	A horizontal bar graph is not used when labels are too long to fit under a vertical display	If the label requires too many abbreviations, it may take viewers too much time to decipher and extract meaning (Kosslyn, 2007) Which means it is more difficult to draw a conclusion from it.	
67	All parts of static 3D diagrams are not shown from the same viewpoint	Formatting should be used to emphasize important aspect. Difference in viewpoint (e.g. in one part a 3D bar viewed from the front with visible right side is seen, in another a 3D bar viewed from the front with visible left side). This requires mental effort not beneficial to understanding (Kosslyn, 2007)	