

# The use of slideware in academic education: What's behind the projection?





# **The use of slideware in academic education: What's behind the projection?**

MSc Thesis  
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August 2012

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## **Abstract**

This study qualitatively explores the diverse ways slideware (PowerPoint etc.) is used in academic education. I investigated actual presentation datafiles used at lectures at Wageningen University (The Netherlands), as well as teachers' and students' opinions. The research focus was on the actual use of slideware, as well as the perception about, and underlying reasons for that use. The research sample was selected on diversity in used technology (PowerPoint or Prezi), scientific discipline (beta, gamma) and educational level (BSc, MSc). The sample included 11 presentations, 5 teachers and 5 students.

This research showed that many facets of slideware application and -perception can comfortably be placed in an 'educational spectrum'. This spectrum ranges from 'information transfer' to 'self-guided conceptual change'. In general, slideware tends to move education towards the information transfer side. I also found that many slideware creators struggle with 'showing overview' over the presentation as a whole. Finally, I could identify a broad diversity of teachers' motives for creating presentations. A visualization of this mix of motives, as proposed in this research, might in the future support teachers' awareness about possible choices for creating and using slideware.

## **Keywords**

slideware, presentation, academic education, PowerPoint, Prezi

## Preface

Halfway the nineties of the previous century I accomplished my first thesis at the "Landbouwniversiteit Wageningen", what is now Wageningen University. Doing a thesis changed a lot in 15 years: in the past, an important step was to trace and acquire useful information. Nowadays, much more information about almost every thinkable topic, scientific and non-scientific, is very easily available: a very important part of the job is to filter out and focus within all possibilities. Let me call this a 'learning opportunity'.

Also in another dimension, this thesis was different for me. Being a '*agrotechnent*'<sup>1</sup> by nature and by earlier education, I am used to identify technical problems and then go straight towards inventing technical solutions. To widen my experience and my way of thinking, I chose by purpose a thesis containing human- technology interaction and human-human interaction rather than something about plain technology or agronomy itself. I know from (self)observation that  $\beta$ -minded persons like me tend to forget the importance of the less tangible human- and society side in the total equation. Although acquiring more knowledge, more skills and broadening a persons' mindset is never finished, doing this theses did indeed offered me many new insights and will probably make my 'future solutions', in whatever direction, much more meaningful.

For practical reasons, the topic of this thesis was in geographical terms close by: the use of slideware (simply stated: "PowerPoint") at Wageningen University. This proved to be a very interesting subject: everybody has experience with it, and many people have an opinion about it. Unlike many other thesis subjects, it is easy to explain what it is about, although I sometimes had to illustrate why there is something to research at all.

Slideware in a university context means also: education supported (or not) by slideware. Therefore, academic education itself is an important part of this thesis. This thinking about education (and about the role of a student within education) was also an interesting mirror for myself.

Regarding this thesis, I thank my supervisor, Rico Lie, for helping me to find my way through - for me - largely unknown territories for a year and a half. I also owe my gratitude to the anonymous teachers, students and experts for their willingness to be interviewed and share their presentations. I am also very happy with my housemates, other friends and family because of their ideas, remarks and general and/or specific support. And, last but not least, I want to name Brigitte Hertz and Ayelet Cohen for sharing their (yet largely unpublished) thoughts and findings with me. I trust they will find the time and inspiration to publish their outcomes; in my opinion, the world needs more results and more ideas about using presentations.

Luc Steinbuch, August 2012

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1 Literally: "agricultural technician"; in Wageningen University informal language also a student Agrotechnology

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## Summary

Slideware, in many cases 'PowerPoint', took over our lecture rooms in the past decades. Originally designed for business purposes, this technology is supposed to support academic education. How slideware is actually used at Wageningen University, the underlying motivation of this use and the perceptions of this use is subject of this qualitative, exploratory research.

Slideware in education is a topic where many people have experience with and have an opinion about, however a conceptual framework fitting the research questions lacks. The current research is roughly streamlined over three tracks:

- 'What are students' preferences?', often with the assumption that what students like, is positive for education.
- 'How to offer information?', in fact a technical approach fitting into the traditional information-transfer model. This is often empirical research.
- Theoretical considerations about the impact of slideware on the quality of education.

For university education in general, several constructivism-based conceptual frameworks have been developed. This thesis uses the 'prototype learning styles' model of Vermunt (1996) and its extension into the 'learning oriented teaching model' by ten Cate et al. (2004), as well as the 'teaching conceptions' of Kember (1997). Basically, the models of ten Cate and Kember describe a continuum or 'Spectrum of Education' (SoE), parallel to a desired development of students, starting with teacher-guided information transfer and hopefully ending with student self-guided conceptual change.

The research focus was on the actual use of slideware, as well as the perception about, and underlying reasons for that use. The sample selection was aimed at diversity in used technology (PowerPoint or Prezi), scientific discipline (beta, gamma) and educational level (BSc, MSc). The sample included 11 presentations, 5 teachers and 5 students. Additionally, 2 experts have been consulted and several smaller data sources have been used.

The impact of specific use of slideware can often comfortably be placed at spots in the Spectrum of Education, or be interpreted as in movements in that spectrum. In general, slideware tends to move the education to the 'information transfer' side. Or, formulated differently: it is more self-evident for a lecture that is intended for 'information transfer' to be supported with slideware. We might assume that text packed presentations, especially 'projected summaries' have this moving tendency even stronger than visually oriented presentations.

It appeared that many creators struggle with the issue of 'showing the logical structure of the content'.

The analyzed data reveals a remarkable diversity in presentations itself, and also diversity in the motives of the creators – both aware and unaware motives. According to the interviewed experts, the main concern with slideware is that often there is an automatism in using slideware instead of conscious, meaningful application. Therefore, and for future research and concept development, a visualization of the mix of creation motives is proposed. With this visualization, teachers might become aware of their own motives and the connection to the actual slideware; this visualization might also support future research and developments.



## Terms and abbreviations

	Explanation	More information
LOT	Learning oriented teaching	Table 2.5
“presentation”	The slideshow, the projection, the datafile itself.	
“slideware”	Software for showing in advance created presentations	Footnote 2 on page 1
SoE	Spectrum of Education	Section 2.2
TU Delft	Delft Technical University; Dutch university	
“view”	A 'slide' in a PowerPoint presentation or a 'path step' in Prezi	
WU	Wageningen University; Dutch university	

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## Part I: Setting the scope

### 1 Introduction

In this research, I investigate the use of so-called 'slideware'<sup>2</sup> in academic education. The first question might be: 'what is wrong with slideware?'

#### 1.1 What is wrong with slideware?

One of the factors causing the deadly catastrophe with US space shuttle Columbia in January 2003 was the wrong use of slideware for communication between technicians and management (Columbia Accident Investigation Board, 2003; page 191). More details in *Textbox 1.1: Columbia accident and PowerPoint use*.

The Columbia disaster is just one of Tufte's (2003) examples proving that the omnipresent usage of slideware “*induced stupidity, turned everyone into bores, wasted time, and degraded the quality and credibility of communication.*” He stresses layout cannot replace the importance of content, and that 'respecting the audience' should be the basic rule. In its design itself, slideware is basically a tool to 'sell' statements and basic ideas, and is mainly presenter oriented, instead of a tool to discuss concepts and knowledge, what would make it audience or content oriented; this holds even more for the predefined templates and the 'AutoContent Wizzard' of PowerPoint.

##### **In detail: The Columbia accident and PowerPoint use**

80 seconds after launching space shuttle Columbia in January 2003, a small piece of debris from the accompanying rockets hit the space shuttle itself, damaging the heat shielding. This was noticed, but the amount of damage was not clear. During the following days, while the space shuttle was orbiting earth, engineers of Boeing corporation tried to estimate the risk on problems during descent. NASA's management could have decided to investigate the actual damage (by using military photography equipment) and take adequate action if necessary. They didn't. The final result was the total destruction of the spacecraft, including its crew, during reentering the atmosphere on February 1<sup>st</sup>.

The management choose not to investigate the possible damage because the doubts and uncertainties pointed out by the engineers, embedded in the provided overall information, were lost while the information was moving, through the organization, towards the decision takers. The message got too much compressed and summarized, finally suggesting there was nothing to worry about. Perhaps the message was also obscured because people wanted to 'play safe' for their own benefits. The reason this all happened was probably the NASA internal culture, including the habit to use PowerPoint slides as one of the basic communication methods, also for quite technical issues. The Columbia Accident Investigation Board even complained that, while investigating the accident, it often received PowerPoint presentations instead of solid technical reports. Also by analyzing the way PowerPoint slides were filled with content, the suggestion comes up that slideware was just not the right means for passing information in this context: the texts themselves are unclear, the used bullet hierarchy is confusing instead of clarifying etc.

(Columbia Accident Investigation Board, 2003; Tufte, 2003; Tufte, 2005)

*Textbox 1.1: Columbia accident and PowerPoint use*

<sup>2</sup> Definition of 'slideware' in the context of this research: Software for showing in advance created presentations, in general projected in front of an audience, like Microsoft PowerPoint, Apple's Keynote, Corel Presentations, OpenOffice/LibreOffice Impress and Prezi.

Tufte claims that showing and thus thinking in short sentences, bullet lists (hierarchical or not), and simplified graphs does create a too limited view on reality and can actually impede the sharing of sufficient knowledge. According to him, a good summary, printed on paper, can contain much more information which can conveniently be put together, offering a better overview.

Even if we don't agree with the indiscriminate attitude of statistician and graphic designer Tufte in his personal pamphlet - and there is opposition against his statements (Engelhardt, 2007) - we cannot deny that he hits a subject of recognizable importance. We may conclude that *the way slideware is used and perceived must be subject to analysis in the context of the actual application*. In this research, the scope of 'actual application' is defined as “academic education”<sup>3</sup>.

## 1.2 .. and with slideware in education?

Adams theorizes about the role of slideware in education in more modest and balanced terms compared to Tufte. She describes a tool that offers an amazing amount of possibilities, but has also a risk to reshape both classroom behavior and the student mindset into limiting conditions. Therefore, she suggests to use this tool in a conscious way (Adams, 2006). Can we help to make this suggestion concrete?

To add knowledge about 'the way slideware is used and perceived', and to, on the longer term, help to make the use of the tool 'slideware' conscious a decision, we might need to aim yet for qualitative understanding.

Thus, the problem statement as foundation of this thesis is formulated as:

*The use of slideware is widespread in education. However, slideware is a tool we still must learn to master, especially in respect to the quality of education. Research to this topic, especially aiming at qualitative understanding, is unfinished yet.*

## 1.3 Organization of this thesis

The body of this thesis consist of three parts. Part I includes the present chapter 1, setting the outlines of this research. Chapter 2 explores several ideas models around academic education and about the application of slideware to set up a theoretical framework. Chapter 3 gives an overview of earlier research on slideware; chapter 4 gives the research questions and describes how the actual sample selection, data collection and data processing was done.

Part II is devoted to the research outcomes. In chapter 5, the focus is on the actual use of slideware and on the ideas directly related to that use. Chapter 6 explores how students, teachers and experts consider detailed aspects of presentations. Chapter 7 gives a context of slideware use: an indication of the institutional mindset, stakeholders' ideas about education itself and an indication of the current technological landscape.

Part III finishes the thesis. Chapter 8 draws conclusions and directly related considerations: conclusions partly related to existing frameworks, a plain important topic and a way to describe teachers intentions. Chapter 9 evaluates the research and discusses the used methodology, points at shortcomings and suggests succeeding research.

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3 “Academic education” in the context of this research means: as it happens at universities, like for example at Wageningen University, concerning education directed at Bachelor and Master students. Education to PhD students, (other) staff members and participants in separate courses etc. is not included.

## 2 Theoretical framework for education

### 2.1 Education: the basics

Existing knowledge about learning processes in educational context is summarized by Westhoff (2009), starting from basic psychology. Using a metaphor, he emphasizes that knowledge is not like an infectious disease: it cannot be transferred. The role of a teacher should be rather to enable the growth and development of the student, by providing the right means and conditions for learning. The influence of the teacher however remains indirect: the student is an autonomous being, and the students' mind is even more unpredictable.

Westhoff describes the cognitive process itself as a “knowledge factory” in action: An abundance of information from the senses, or in other words: raw materials, enters the mind. First, there is a doorkeeper that filters out most of the information. The information that is allowed to pass goes to the working memory.

This working memory is the place where pieces are put together: the information from outside is combined with the existing information in the long term memory to construct understanding. If new knowledge products are constructed, they can be added to the long term memory.

The power of this crucial working memory however is limited, both in storage capacity and in time (about 6 seconds). Also during construction, information has to be thrown away. In other words: only a part of the incoming information will be used to create a somewhat unpredictable knowledge construct in the long term memory. And due to the limited capacity of the working memory, it is profitable to minimize distractions or meaningless information with an high emotional value: those distractions will actually fill the short term memory without adding useful pieces of information to the knowledge construction process.

Our knowledge is internally not stored as a bunch of separate objects, but rather as combinations of properties. If we need a certain concept, the relevant network of associations (=links to properties) is activated. Some associations are stronger than others. The more often a certain association is used, the stronger it becomes. According to Westhoff this would mean that, when teaching a concept, focus should be to create a rich diversity of associations. By repeatedly emphasizing certain associations, those will become stronger.

Four types of knowledge are summarized by Ros and Wassink (2008): conceptual knowledge, facts, skills and attitudes. In a general educational setting (in fact the authors focus on primary and secondary education), those different types ask for another approach, as is shown in table 2.1 (next page). Given the current time frame, Ros and Wassink argue that more emphasis should be laid on acquiring conceptual knowledge, especially because the quantity of information is not the problem: the real task for today's members of society is to shift and interpret all the available information and place it in a context, rather than just accepting it. This way of looking to the world is related to conceptual knowledge. This does not mean that in education, all knowledge should necessarily be learned in a conceptual way, as is sometimes supposed: the right choice still depends on the type of knowledge. However, Ros and Wassink do not answer the interesting question who or what distinguishes conceptual knowledge from factual knowledge.

*Table 2.1: Approaches to different types of knowledge in an educational setting (Ros and Wassink, 2008). Original table is translated and slightly changed.*

Types of knowledge	Educational psychological theory	Activity	Time/trajectory	Role of teachers
<b>Conceptual</b>	Social-constructivism, “conceptual change”	Discovering, experiencing, playing, reflecting, analyzing	Until mental model has been constructed, one concept by the time	Companion, coach, pilot
<b>Facts</b>	Cognitivism	'Studying' in narrow sense, re-asking, arguing, practicing to remember (but in a meaningful context)	Not relevant: every time, every moment	Supervisor, explainer
<b>Skills</b>	Behaviorism	Applying, imitating, train	Intensive, focused in time	Trainer, 'school teacher', feedback provider
<b>Attitudes</b>	Behaviorism	Polishing, part of daily routine	Continuously, whenever there is an opportunity	Role model, example

Light and Cox (2001) explore a narrower and deeper theoretical framework of learning and teaching in an academic setting. According to them, the main current paradigm is “constructivism”, the idea that we, as human beings, “construct” our knowledge and the way we deal with this knowledge. Within this paradigm, many different approaches and different emphasis are possible: for example, do we 'create' the reality or 'discover' it? Are we 'actors' or 'observers'? Is it a social / cultural / public process or an inner and private one? The earlier mentioned “social-constructivism” by Ros and Wassink (2008) is the social extension: in this view, the construction of knowledge happens basically in interaction with the social environment.

In other words but probably the same intention, Light and Cox stress the importance of language, 'utterance'. Education is not just sending a collection of bare facts from teacher to learner, it is a dialogue about facts and relationships, embedded in a cultural context and in partially already shared knowledge. In other words: *"knowing and communicating are 'virtually inseparable'"*.

## 2.2 Teaching styles & learning styles

The diversity of teaching conceptions by academics following out of a multitude of interviews is reviewed by Kember (1997). An overview is given in table 2.2 (next page). Those conceptions range from 'teacher and content oriented, imparting information' to 'student and learning oriented, provoking conceptual change'. The first focuses on reproducing, and a quantitative increase of knowledge; the latter has stronger links to the abstraction of meaning, the interpretative process itself, and personal development. This seems to parallel the earlier mentioned spectrum of *facts* ↔ *concepts* concerning types of knowledge from Ros and Wassink (2008), as well as the student-centered conceptions are linked to the constructivism as described by Light and Cox (2001).

*Table 2.2: Conceptions of teaching in higher education (Kember, 1997). Original table slightly adjusted, and the two bottom rows added using the original paper of Kember.*

	Teacher-centered content-oriented knowledge transmission		Transitional	Student-centered learning-oriented learning facilitation	
Dimensions	Imparting information	Transmitting structured knowledge	Teacher student interaction / apprenticeship	Facilitating understanding	Conceptual change / Intellectual development
Teacher	Presenter	Presenter	Presenter and tutor	Facilitator	Change agent/ developer
Teaching	Transfer of information	Transfer of well structured information	Interactive process	Process of helping students to learn	Development of person and conceptions
Student	Passive recipient	Passive recipient	Participant	Teacher responsible for students' learning	Teacher responsible for student development
Content	Defined by curriculum	Teacher needs to order and structure	Defined by teacher	Constructed by students within teachers' framework	Constructed by students but conceptions can be changed
Knowledge	Possessed by teacher	Possessed by teacher	Discovered by students but withing teacher's framework	Constructed by students	Socially constructed
Teaching method / technology use	Handouts prepared in such a way that students don't have to take notes at all	Quality of the presentation is very important; it should simplify the content, making it 'easily digestible'	Leave spots for students to fill in	Students are individuals; interpretation not under control	Arguing about things, creating frictions between ideas and observations etc.
Impact on students' learning style	Depress the use of 'deep understanding learning'			Less likely to promote a 'surface approach learning'	

According to Kember, the student-centered conception is usually seen as superior, but not necessarily the best in all circumstances. This does not mean that there is an hierarchical structure in the conceptions themselves: they are qualitatively different, rather than one conception equaling another plus something extra. Kember stresses that both individual teachers and educational institutions should be aware of their underlying assumptions, in order to have the possibility to change and evolve. Kember suggests that the teaching conception should influence the learning outcomes via the actual teaching approach: the choices made about the methods, the learning task set, assessments and workload. This does however not mean that there is an one-to-one relationship between the desired conception and actual approach. During his/hers curriculum, a student will preferably move from 'meanly teacher oriented' to 'mainly student oriented' education. In addition to the teaching conceptions of the teachers, students have quite different approaches to learning as well (as is touched in the bottom row of the table); Kember recognizes *deep understanding* as intrinsic reason to learn; *surface* minded, doing just enough to meet the requirements; and *strategic*, how to gain the highest possible grades.



It is striking that slideware use is much easier to connect to the teacher centered conceptions as it is to connect slideware to the student centered conceptions. As reminder: Tufte (2003) considers PowerPoint as a presenter-oriented tool as well.

While Kember in the study of teaching conceptions, in respect to the students focuses on the plain motivation only, Vermunt (1996) looks broader and finds four prototype learning styles, described over several dimensions. These are summarized in table 2.3. An important addition is the metacognitive or self regulation approach: how do students regulate their own learning processes?

*Table 2.3: Prototype learning styles of academic students according to Vermunt (1996).  
Original table extended.*

Areas	Learning styles			
	Undirected	Reproduction directed	Meaning directed	Application directed
<b>Cognitive processing</b> of learning contents	Hardly any processing: everything is of equal importance, no relationships, no relation to daily life. Studying by rereading.	Selecting important parts, then repeating page by page separately.	Deep processing, looking for concepts, trying to interrelate, forming own schemes, interpretations, opinions and conclusions	Concrete processing, for realizing personal (practical) goals. Concretize subject matter; try to apply.
<b>Regulation of learning:</b> by student or external?	Lack of selfregulation Expectation for external regulation, like on secondary school	Sensitive to external regulation; restricting to provided sources	Mostly self-regulation	Both external and self-regulation: the more abstract the content, the more relaying on external regulation.
<b>Affective processes</b> that occur during studying	Low self-esteem, failure expectations	Fear of forgetting. Learning for examination, not for personal interest	Intrinsic interest: studying generally gives pleasure	Practical interest: what is fascinating in daily life/at work, is fascinating to learn more about.
<b>Students' mental model of learning</b>	Cooperation and being stimulated; instruction cannot be clear enough	Absorbing knowledge to reproduce. Discussions, relativism, perspective and context are all useless.	Construction of knowledge by dialogue, by forming an opinion. Teachers should go outside the books/ examination requirements and be open to questions. Meaning more important than grades.	Practical use of knowledge is ultimate goal of learning.
<b>Students' learning orientation</b>	Ambivalent, insecure: proceed with study or not?	Examination and self-test oriented; want to score as high as possible	Person oriented: personal interest, personal development etc.	Vocation oriented: study contents should be used in work or daily life



The actual learning style of an individual student can be a combination of the four prototype styles, however all students do have a dominant prototype style. In Vermunt's first sample, the division was as shown in Table 2.7:

*Table 2.4: Dominant prototype learning style in sample of Vermunt (1996). Students study at long-distance university or normal university, in several disciplines.*

	Undirected learning	Reproduction directed	Meaning directed	Application directed
# students (n=35;100%)	6 (17%)	12 (34 %)	10 (29%)	7 (20%)

According to Vermunt, both the meaning directed and the application directed styles are preferred in higher education. Teachers should be aware of the different learning styles of their students and in a well developed curriculum, students should be coached to gradually become in charge of their own learning processes, and be able to reflect on it. Those ideas are elaborated by ten Cate et al. (2004; Vermunt being one of the authors) and forged into the 'Learning oriented teaching' (LOT) model. This model distinguishes in the 'learning process component' dimension three levels, and a gradual shift in the 'guidance' dimension, as table 2.5 shows:

*Table 2.5: the 'Learning oriented teaching' (LOT) model. Source: ten Cate et al., 2004. Original table extended and slightly changed, based on the original paper.*

Learning process component	Source of guidance of the learning process			
	Full external guidance from teacher	Shared guidance from teacher+student	Full internal guidance from student	
<b>Cognitive level</b> student: what to learn? teacher: what to present?	Lecture, determine objectives, write study texts, write exam questions	Help students in determining the importance of issues by themselves	Suggest, validate, serve as information source	Determine objectives, choose relevant topics & information sources, apply self-assessment
<b>Affective level</b> student: why learn? teacher: how to motivate student?	Organize tests, give assignments, set tasks	Stimulate students to figure out their own motives	Support perceived values and relevance of contents	Be motivated by intrinsic interest or practical application
<b>Metacognitive level</b> student: how to learn? teacher: how to instruct student?	Tell how and when to study, show techniques	Give no more or less help than is really needed; help students to learn to self-reflect on learning process	Ask students to find own way to solve new problems	Know how to adequately acquire further knowledge
	Examples of teachers' activities			Examples of students' activities & capabilities

The teaching model / conceptions of resp. ten Cate and Kember obviously share the same basic idea. Later in this thesis, I will refer to this basic idea as the 'spectrum of education' (SoE). This spectrum covers the range, the continuum from 'Teacher centered / full external guidance / knowledge transfer' to 'Student centered / full internal guidance / constructivist learning'. As explained above, the prototype learning styles of Vermunt are not one-to-one connected to this SoE but closely related.

Coffield (2004) found in an inventory over 70 learning style models. Beside constructivist based approaches, like the above shown learning style model of Vermunt, many other types of learning models have been developed as well. Coffield emphasizes that some learning style models seem to

have a commercial rather than a scientific background, and that anyway the scientific value of most models must be questioned. Quoting Coffield (2004; page 144) about the relevance of those models for performing research: “...now that most of the instruments can be administered, completed and scored online, it has become a relatively simple matter to give one’s favorite learning styles inventory (no matter how invalid or unreliable) to a few hundred university students who complete the forms as part of their course; in this way, some trivial hypothesis can be quickly confirmed or refuted. The danger here is of mindless and atheoretical empiricism.”

However, to broaden our view, I will shortly introduce two additional learning style models:

The first is the 'Gregorc Style Delineator', related to personality rather than to motivation and learning perception, as shown in table 2.6. The involved quite simple test was used by Lau and Yuen (2010) to get insight in the learning styles of Hong Kong secondary school students in relation to their gender. Females tend to be stronger with CS or AR, males with CR. Also in previous literature, Lau and Yuen found gender differences in diverse aspects of learning, like motivation, the way of conceptualizing and the preferred way of instruction. This suggests that students are different in many ways, making it difficult to find a 'one size fits all' best approach for learning in general and slideware use in specific.

*Table 2.6: Learning style grouping: Gregorc Style Delineator (Lau and Yuen, 2010)*

Learning style	Typical style characteristics
Concrete sequential (CS)	CS learners tend to perceive reality through their physical senses and think in an orderly, logical, and sequentially manner.
Abstract sequential (AS)	AS learners are logical and analytical individuals who have a preference for mentally stimulating task and environment.
Concrete random (CR)	CR learners like to experiment with ideas and concepts and think intuitively, instinctively, impulsively, and independently.
Abstract random (AR)	AR learners have a strong sense on the world of feeling and emotion and tend to think in a non-linear and emotional manner.

The last discussed learning style model is VARK, meant to make students aware of their own preferences in receiving information (Fleming and Mills, 1992). Basically, the model distinguishes four preferred 'modes', see table 2.7:

*Table 2.7: The four receiving modes in the VARK learning model.*

Based on, and literal quotes from: Fleming and Mills, 1992

Abbreviation	Mode	Learners have a preference for..
V	Visual	“... graphical and symbolic ways of representing information”
A	Aural	“... 'heard' information. Students who prefer aural forms of information dissemination report that they learn best from lectures, tutorials, and discussion with other students and faculty.”
R	Read/Write	“... for information printed as words.”
K	Kinesthetic	“... the use of experience and practice (simulated or real) (...) integrative and real nature of the information.”

If this model and the research method is valid and reliable, the outcomes might be interesting in relation to academic use of slideware. The supposed preferences for a receiving mode may strongly come back in personal or assumed preferences for text or pictures on slides, or in a preference regarding the balance between the projection and the verbal part of a lecture.

## 2.3 Education & technology

The use of ICT in learning context is researched, observed and philosophized about a lot. This includes a very broad range of topics, from the idea of putting a computer in front of young children in the Indian rural areas and just see what happens (as did Mitra et al., 2005) to very abstract considerations concerning the design of web-based learning systems (like the work of Yalcinalp and Gulbahar, 2010). Personal experiences are narrated in textbox 2.1 and 2.2 as real life example of the discussion.

Lei (2010) investigated the relationship between ICT use and US-students learning results, stressing the importance of the quality of the used technology, rather than the quantity (=the time spend behind a computer screen). Lei defined 'quality' in this context as the technology use, divided into:

- general technology (such as taking notes, searching the Internet)
- specific subject related (for example a math programme)
- social and communication (emailing, chatting)
- construction (creating websites, editing pictures)
- entertainment and self-exploration (games etc).

Some of those uses had influence on specific student skills, however none of these technology uses could offer a significant increase on the overall learning outcome.

Derry (2008) looks from a quite philosophical viewpoint to education and relates it to technology developments. She distinguishes “instructionism”, knowledge is an collection of facts, from “constructionism”. Just placing computers in a classroom and connect them to the Internet will not automatically improve the quality of education, because 'learners' are not by themselves always 'constructors of knowledge'. A certain mindset is needed to shape a meaning to the world, and a so-called 'domain of knowledge' is embodied in practice and language. This kind of mechanisms should be taken into account when applying technology in education. Derry proposes a shift from a

### **My own experience: Prezi or buckets?**

Example of technology use in academic learning

A teacher/researcher of Wageningen University provided an guest lecture with the help of the quite advanced slideware program “Prezi”, in September/October 2010, at the moment of writing about half a year ago. I remember he did use the full potential of this slideware, including a lot of visual zooming and rotating, using both pictures and texts etc. In my personal opinion, this presentation was somewhat over the top, just because all that rotating and zooming, and therefore I experienced it as a bit irritating and annoying. However, I must admit that my classmates were quite impressed by it. But, perhaps most important: I do not remember the actual content of that lecture at all.

In November/December 2009, so more then one year ago, the same teacher provided a guest lecture in another course. We experienced a lean version of a workshop he normally gives to Andean farmers, showing these farmers the difference in water holding capacity of soils with different soil organic matter contents, using easy means. So we – academic students – were literally working with our hands in the dirt, using some old socks, buckets with water and diverse soils, a watch and a scale. I will probably keep spontaneous memories to this lecture and to the concepts this teacher wanted to share for the rest of my life.

Of course, this “n = 1 experience” cannot be generalized. However, it raises some thoughts, like:

- Using more advanced tools (= tools possessing more visual capabilities) in education doesn't necessarily mean more or better conceptual change by the learners.
- A presentation tool that distracts the attention from the content itself can be counterproductive.
- When the presentation tool actually is part of the content itself, it can be a brilliant move.

By the way, the reason why the teacher choose different ways of teaching was perhaps the group size: in 2010 the group of students was far too large to offer an hands-on workshop.

*Textbox 2.1: Own experience: Prezi or buckets?*

technology view to a learners view: it is needed to have a close look to 'pedagogy' related issues when implementing technological changes.

Another philosopher, Laurillard (2008), agrees with Derry that pedagogy, not technology, should be the driver for educational innovations. She points out that technology can be a 'catalyst for change' in education, offering opportunities for big changes, comparable with the shift from oral knowledge transfer to written knowledge transfer. Especially, learners are able to express and share their own thinking (with exceptional scalability possibilities) and experiment with ideas, for example by building models. Content can be re-used and diversified. And nice current uses can be improved, like facilitating small group discussions, provide feedback in simulations and track learner performance to adjust the next task.

The way ICT is used and appreciated in education, and the probably related added value of ICT use, is also person and culture specific. Therefore, the expanded use of technology (for example replacing classroom teaching by web-based instruction) can have both negative and positive impact on the study outcome, in relation to motivation (Yen et al., 2010) and to learning style. Clayton (2010) for example tried to find a relationship between learning strategies and the preference for traditional, online or 'hybrid' teaching methods. This research, done under 130 (mostly female) psychology US-students, showed a preference for traditional methods, because it supports more engagement and spontaneous discussions. Reasons to opt for online or hybrid learning environments are practical considerations ('lifestyle') as well as the expectation for enhanced learning. Also the previously mentioned research of Lau and Yuen (2010) suggested that especially the so-called 'AR learning style' type students (most of them being female) would perform better if computer related assignments are made better fitting to their needs, for example if extended with social engagement like group work.

### **My own experience: hide the teacher?**

A part of the discussion about 'how to use slideware' deals with the question if a projection does not redirect the students' attention away from the teacher him/herself towards the screen, with the risk of decreasing the personal contact and the possibility for interaction. In one of my own courses, I spotted another approach: the teacher set up a PowerPoint slide, then walked between the students and looked together with the us to the (mainly textual) content of the slide. With his voice coming from the dark explaining and adding to the content, the total setup was actually quite comforting. For me, it was clear where to focus visually.

*Textbox 2.2: Own experience: hide the teacher?*

### 3 Research to slideware application

#### 3.1 *Slideware as information sender: dual coding theory*

A central idea in the “dual coding and cognitive load theory of multimedia learning” states that learners can receive and process information simultaneously over both a verbal and a visual channel, both directed to the previously mentioned working memory to be processed. By creating the right mix of information, the cognitive learning process as well as the overall motivation will be supported in the best way (Mayer, 2008; Mayer and Moreno, 2003; Tangen et al., 2011) .

“Multimedia learning” in this context concerns auditive and visual information (the latter one in a broad sense: written text, pictures, movies, animations, 3D projections etc.); so it includes a lecture with use of slideware. Other senses, like touch, taste and smell, are important as well for observing the outside world and have probably their own channels to the working memory. However, probably for practical reasons, they are not included in any reviewed experiment and only a single time in theory.

More in depth, Wiebe (2007) describes several ideas regarding the above mentioned two-channel approach. The auditory channel is supposed to be more transient, and is processed serial. The visual channel is dominant. The visual / pictorial channel is processed parallel. Using the visual and verbal channel together (for example reading written sentences on a slide) is perhaps a waste of mental energy, as the content has to be transferred from one channel to the other.

As the human working memory is quite small, cognitive overload should be avoided, by avoiding redundancy as well as interesting but irrelevant details. Comparing slideware presentations with 1) text only slides, 2) images that are related to the topic and 3) images that are nice but in-congruent with the topic, revealed that images in general raise more attention, and meaningful images do indeed improve the learning result (Tangen et al., 2011).

Similar kinds of test were performed in laboratory conditions, proving the influence of several “cognitive overload scenario's” in multimedia instructions and their solutions; a summary is shown in table 3.1 (next page). Those solutions should be taken into account when designing multimedia instruction means, according to a much-cited article of Mayer and Moreno (2003). This article can also be seen as scientific prove for sometimes quite obvious rules of thumb related to design and use of slideware.

The experiment of Wiebe (2007), directed at application slideware for online learning, tried in vain to find a difference between the learning results after seeing a presentation with or without narration. His conclusion suggests that the affective part of education (the motivation, the social context) is perhaps more important than economically optimizing the use of the working memory by pushing it to its maximum. One example associated with motivation in case of multimedia use is given by Mayer (2008): 'personification' (in other words: relate the topic to the learner) instead of a formal teaching style can have a significant effect on learning results. Motivation can also depend on the body language of the teacher: Lecturing with eye contact (from teacher to student) increased both student appreciation and student test results compared to lecturing without eye contact (Blokzijl and Andeweg, 2005).

*Table 3.1: Cognitive overload scenarios and solutions (Mayer and Moreno, 2003). Original table slightly changed; 'essential processing' means: “making sense of the presented material”*

Type of overload	Load-reducing method	Description of research effect
<b>Essential processing in visual channel &gt; cognitive capacity of visual channel</b>		
Visual channel is overloaded by essential processing demands.	<b>Off-loading:</b> Move some essential processing from visual channel to auditory channel.	<b>Modality effect:</b> Better transfer when words are presented as narration rather than as on-screen text.
<b>Essential processing (in both channels) &gt; cognitive capacity</b>		
Both channels are overloaded by essential processing demands.	<b>Segmenting:</b> Allow time between successive bite-size segments. <b>Pretraining:</b> Provide pretraining in names and characteristics of components.	<b>Segmentation effect:</b> Better transfer when lesson is presented in learner-controlled segments rather than as continuous unit. <b>Pretraining effect:</b> Better transfer when students know names and behaviors of system components.
<b>Essential processing + processing caused by extraneous material &gt; cognitive capacity</b>		
One or both channels overloaded by essential and nonessential processing (attributable to extraneous material).	<b>Weeding:</b> Eliminate interesting but extraneous material to reduce processing of extraneous material. <b>Signaling:</b> Provide cues for how to process the material to reduce processing of extraneous material.	<b>Coherence effect:</b> Better transfer when extraneous material is excluded. <b>Signaling effect:</b> Better transfer when signals are included.
<b>Essential processing + processing caused by confusing presentation &gt; cognitive capacity</b>		
One or both channels overloaded by essential and nonessential processing (attributable to confusing presentation of essential material).	<b>Aligning:</b> Place printed words near corresponding parts of graphics to reduce need for visual scanning. <b>Eliminating redundancy:</b> Avoid presenting identical streams of printed and spoken words.	<b>Spatial contiguity effect:</b> Better transfer when printed words are placed near corresponding parts of graphics. <b>Redundancy effect:</b> Better transfer when words are presented as narration rather than narration and on-screen text.
<b>Essential processing + short-term memorizing &gt; cognitive capacity</b>		
One or both channels overloaded by essential processing and short-term memorizing.	<b>Synchronizing:</b> Present narration and corresponding animation simultaneously to minimize need to hold representations in memory. <b>Individualizing:</b> Make sure learners possess skill at holding mental representations.	<b>Temporal contiguity effect:</b> Better transfer when corresponding animation and narration are presented simultaneously rather than successively. <b>Spatial ability effect:</b> High spatial learners benefit more from well-designed instruction than do low spatial learners.

### 3.2 Students' perceptions and delivery styles

Related to questions about the most effective application of slideware is the comparison of the educational impact of lectures without slideware and with (different kinds of) slideware.

Alternatively, or combined, are surveys to student perceptions about slideware. This (much performed) type of research shows different outcomes to comparable questions, perhaps of a different context: often it is a research done at the own university, with a specific group of students, and in a certain setting. Without intending to be rude, I would like to coin this kind of research: “survey your backyard”.

As example, we take the question “do you prefer slideware or chalk and talk?": A survey under pharmaceutical students in India revealed a preference for “chalk and talk” lectures (Vamshi Krishna et al., 2012). Contrasting, another research, this time in the USA with 'technical writing students', showed that those students prefer PowerPoint. By the way, those USA students actually performed better in tests after undergoing a traditional “chalk and talk” lecture compared to the



PowerPoint lecture version (Amare, 2006).

Savoy et al. (2009) experimented with a more complicated setup. This experiment had three 'delivery styles': a lecture with slideware, a 'traditional' lecture with using a chalkboard while talking and no lecture at all (all students could prepare themselves with a textbook). Interesting as research method, several dependent variables were measured, related to different aspects of the presentation. These variables are shown in table 3.2.

*Table 3.2: Comparison between three delivery styles: slideware (+talk), traditional (=chalkboard+talk) and textbook-only (based on Savoy et al., 2009).*

Measured dependent variable	Result
Recognition of <i>graphic information</i> : do students recognize graphic figures and tables as shown on the blackboard or by the slideware?	Better scores for traditional and slideware versus textbook-only
Recognition of <i>alphanumeric information</i> : do students recognize text and numbers as shown on the blackboard or by the slideware?	Better scores for textbook-only versus traditional and slideware
Recognition of <i>auditory information</i> : concerning the information that was told without any visualization.	Better scores for traditional lecture versus slideware and textbook-only
Recognition of <i>audio/visual information</i> : concerning the information that was told with some visual display support (graphics and alphanumeric).	Better scores for traditional and slideware versus textbook-only
<i>Overall</i> recognition of information: concerning all provided information	Better scores for traditional and slideware versus textbook-only
<i>Delivery style</i> preference: do the participants prefer slideware or traditional?	No difference when looking in general; significant preference for slideware when questions are split up in overall presence, graphics and alphanumeric; no significant preference concerning discussion possibilities.
<i>Perceived importance</i> : does the delivery style influence the perceived importance of the content?	Slight influence suspected by students in favor of slideware

Concluding the work of Savoy et al, slideware seems to be attractive to students but takes away attention from the teacher, making the narration itself less influential. Overall however, there is no significant difference between learning results of a 'traditional' and a slideware driven lecture. Comparable results are found by other authors like Apperson et al. (2006).

The same Apperson et al. (2008) looked more detailed to student preferences for the actual composition of PowerPoint slides, the handouts and the logistics around the files. Those preferences, based on a survey, are mentioned in table 3.3 (next page). According to her, fulfilling the expectations of students equals a good use of PowerPoint, as it improves motivation and attitude.

Blokzijl and Naeff performed a research comparable to Apperson et al. (2008) - see again table 3.3. Additionally they found a potential shortcoming in the methodology of this kind of research: The “what you see is what you like” effect. In other words: students had, for certain topics, the tendency to rate positive in the survey what they had just seen in the lecture. As example: The set-up was with three groups, each with about 20-25 students of TU Delft<sup>4</sup>. In one group, over 60% liked the use of a laser-pointer with the PowerPoint when asked in the questionnaire. In the other groups, those scores were below 10%. Only in the high scoring group a laser-pointer had been used recently (Blokzijl and Naeff, 2001; Blokzijl and Naeff, 2004).

<sup>4</sup> TU Delft is a university providing technical education in The Netherlands.

In another comparative test at TU Delft, the added value of the general accepted 6x6 rule<sup>5</sup> could not be proven empirically: using slides full of text instead of very summarized slides could in some cases improve both student results and student appreciation. Both variants resulted in better student performance than the variant with narration only (Blokzijl and Andeweg, 2005).

*Table 3.3: Students' preferences for PowerPoint.*

Sources: a: Apperson et al., 2008; b: Blokzijl and Naeff, 2004

Student preference	Source
Key phrase outlines	a
Sounds if congruent with other content	a
Background color: not white, not bright	a
Lights dimmed	a
Copies of complete presentation accessible	a
Build slide up, step by step	a,b
Clear layout	b
Logical build-up	b
Keep slides as empty as possible	b
Use fixed layout	b
Make sure to know how to operate PowerPoint	b
Point out on the slides	b
Do not use sounds	b
Do not use effects or animations	b
Do not use many colors or a busy background	b
Do not read text from slides	b
Do not let PowerPoint attract too much attention	b

### 3.3 Expanding the technology

Also functionally different systems are researched. Based on the earlier mentioned ideas of Mayer and Moreno (2003) and Mayer (2008), Lai et al. (2011) experimented with two synchronized projections: one with written text (“annotations”), the other with visual material. In theory, this would lead to a better balanced cognitive load and an improved overview of the students over the successive topics. Further on, it might better serve the diversity of students. According to survey results, the students liked the experiment. In the actual achievement, statistically significant improvement as result of the two projections was found in the formative test but not in the summative test (Lai et al., 2011).

Going broader than slideware application itself, mind mapping and concept mapping can be interesting tools to improve educational results, but are sometimes overestimated (and probably a bit hyped). Rethinking and rehearsal of information and in between testing can be more important for memorizing and understanding (Karpicke and Blunt, 2011). Eppler (2006) compared concept maps, mind maps, conceptual diagrams and visual metaphors, drawing the conclusion that they all have an added value if used complementary, but not as a separate tool replacing normal education.

<sup>5</sup> “6x6 rule”: a textual presentation view may at most contain six bullet points, each containing six words.



## 4 Research design

### 4.1 Research questions

The earlier formulated problem statement was: *The use of slideware is widespread in education. However, slideware is a tool we still must learn to master, especially in respect to the quality of education. Research to this topic, especially aiming at qualitative understanding, is unfinished yet.*

Earlier research shows -roughly speaking- three main lines of investigation:

- 'What are students' preferences?', with the assumption that what students like, is positive for education. Often this is the 'survey your backyard' approach as earlier mentioned. See section 3.2.
- 'How to offer information?' This is mostly empirical research, testing the learning result. Sometimes it is combined with research to students' preferences. See sections 3.1 and 3.2.
- Theoretical considerations about the impact of slideware on the quality of education. An example if this is Adams (2006), as briefly discussed in section 1.2.

Useful for research design, the following missed aspects in research to slideware showed up in a review (Farkas, 2006):

- A uniform way to categorize slide content
- The position of slideware in the organization
- The kind of presentation the research is about
- The goal of the presentation: performance support or stand alone use?
- The context of the performance
- The performance style.

Some of those missed aspects go wider than the presentation itself; I conclude that many related factors (like the role of the background organization and the actual goal of the presentation) are important as well and might be part of research.

This research intends to help resolving the stated problem, and it intends to be additional to the above sketched three main lines. Therefore, this research also intends to include some of the missing research elements as indicated by Farkas: especially placing slideware in its wider context.

The goal of this research is to describe *how* slideware is actually used and *why* it is used in such a way. We want also to know how this slideware use is *perceived* and how this actual use and this perceptions are *related* to the background of education and backgrounds in other dimensions. Given the practical limitations of a MSc thesis and the lack of earlier research, this research takes a exploring, qualitative approach. These intentions formulated as research questions:

Research question 1: Inventory of current situation

*How is slideware applied today at Wageningen University: how is it used, how is it perceived, both during a lecture and before and/or afterwards?*

Research question 2: Context

*What is the wider context of slideware use at Wageningen University, in terms of implicit institutional expectations, ideas about education, and technological possibilities?*

Research question 3: Connection to education

*Is it possible to connect the usage and perceptions of slideware to theoretical frameworks about education?*

Research question 4: Underlying reasons

*What are the underlying reasons to use slideware in the way it is used, especially from the teacher/creator's view?*

## 4.2 General approach

The methodology per research question, and location of the answer in this thesis report:

### Research question 1: Inventory of current situation

Each presentation in itself, and the opinion of the direct stakeholders (teachers and students) are the main data sources. Additionally, the opinion of experts and lecture observations provide additional insight. Research question 1 is answered mainly in the chapters 5 and 6. One aspect is elaborated in section 8.2.

### Research question 2: Context

Datasources are very diverse (to be explained later), but include the opinions of teachers, students and experts again. Research question 2 is answered in chapter 7.

### Research question 3: Connection to education

This research finds looks for connection with the educational models on the basis of the data that was already collected for answering research questions 1 and 2. The research question is answered in section 8.1 and its subordinate paragraphs.

### Research question 4: Underlying reasons

The slideware creators' motives are made explicit and visualized in section 8.3, again on basis of the data collected for research questions 1 and 2.

## 4.3 Data collection

I used two main data collecting methods: interviewing stakeholders (teachers, students and 'experts') and analyzing the related presentations. I found five teachers, five students and two experts willing to be interviewed, and I collected eleven related presentations. Additionally, I observed two of the involved lectures. By intention, the sample included the two most common technologies (PowerPoint and Prezi),  $\beta$  as well as  $\gamma$  courses, and BSc as well as MSc courses. An overview of all cases is given in in Appendix A. A 'case' is a functional related set of a presentation with a teacher and/or a student and/or a lecture observation.

The interviews were semi-structured, focusing not only on the main issues but also on the perception of 'university education' in general to get a broader picture. I based the questions for teachers and students on two standard 'guides' (see Appendix B and Appendix C) but adjusted those questions for every single interview. Those adjustments resulted from a thorough look to the related presentation(s) and other impressions (the observation of the lecture, course and/or person related information etc.). For the two experts, I prepared special questions using the available, context-related information. In all cases, I saw the presentation(s) before the interview. If there was a lecture observation, this was done as first action. When both teacher and student were part of the same case, the teacher was interviewed before the student. With the exception of teacher #5<sup>6</sup>, all interviews have been audio recorded; the interviews with expert #B and student #7 were in the English language, the rest was in Dutch. The interview with expert #B was conducted with an internet audio connection<sup>7</sup>; all other interviews were face-to-face.

All used presentations have been made available by the teachers or students, in electronic format: as Portable Document Format file, as original PowerPoint file, or as world wide web link in case of Prezi. Except for presentation #Aa and #Ab, all presentations are in the English language.

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6 The way cases, lectures, teachers, students, observations and presentations are coded is explained in Appendix A. Basically, lecture-related objects are identified with “# <number>”, and expert-objects with “#A” or “#B”.

7 In common language: “over Skype”.

I observed lectures by sitting in the classroom (as one of the students) and wrote down perceptions, concerning the teachers' behavior (for example how he/she actually deals with the presentation, with questions etc) and the students' behavior (if they are taking notes etc). Those perceptions are both in general and connected to a certain moment in the lecture.

For the 'institutional mindset' indication, I used additional data sources: pieces of text I happen to encounter as student and the teachers' instructional book I engaged during an earlier part of the research.

For the 'technological landscape' indication, I collected facts and webpages I encountered during the whole thesis project. I selected systems or options with an additional value, in technological sense, within the scope of this research. Therefore I didn't take into account differences between for example Microsoft PowerPoint, Apple Keynote, Open office Impress, Spresent (Patel, 2010) and Google Docs Presentations. Those differences are mainly about creater-friendliness, layout options, transition options and cloud-based<sup>8</sup> versus desktop-based; for the audience there is hardly any difference. Prezi (Prezi, 2011) is a basically different presentation system but is already extensively discussed in other chapters.

I also included relevant spontaneous observations and remarks of fellow students in the research data.

#### **4.4 Data processing**

I transcribed the interviews (with the meaning being more important than the literal phrases and word use), partly with the help of speech recognition software<sup>9</sup>, and coded all interviews using qualitative analysis software<sup>10</sup>. The coding topics were developed and fine tuned during the coding process itself ('in vivo coding').

All presentations have been thoroughly looked at; I also systematically analyzed presentations #1a, #1b, #3 and #4. This means that every single 'view' is qualitatively described in the respect of title, content appearance (like 'plain text', 'picture', 'table' etc), content meaning (in abstract terms, like 'introducing new concept', 'question' etc ) and transition (the movements on the screen, both from one view to another as well as changes in the same view). Beside that, I gave views a logical, semi-hierarchical relation to each other. I developed a web-based system for this 'presentation analysis'. In the same system, the view related observations in the class room could be stored. After this analysis, the presentations were summarized. The focus in this whole process was on how information is offered and what kind of information it is, not on the information / course content itself. An example of this Presentation Analysis for two views is given in figure 9.1.

I analyzed presentation #6 on a finer and more systematically level, coming closer to formal 'content analysis'.

For the analysis of the teachers' instruction book (for the 'institutional mindset' ) I measured the vertical, textual length per topic and calculated it to 'page length'; this measurement includes also one figure and a few lists.

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8 'Cloud-based' in the sense of: creation and storage in a web-based environment

9 Dragon Naturally Speaking 11.0: more information on [www.nuance.com](http://www.nuance.com) (accessed January 2012)

10 NVIVO 9.2: more information on [www.qsrinternational.com](http://www.qsrinternational.com) (accessed January 2012)



## Part II: Results

The results of the research are elaborated in the following three chapters. In chapter 5 the focus is on the actual use of slideware and on the ideas directly related to that use, following main lines like for example “Showing structure in presentations” and “Students' multifunctional use”.

Chapter 6 explores how stakeholders consider detailed aspects of presentations, like the creation time, the desirability of using presentations at all, etc. Chapter 5 and 6 answer research question 1: *How is slideware applied today at Wageningen University: how is it used, how is it perceived, both during a lecture and before and/or afterwards?*

In chapter 7, the context is explored: what can we say about the institutional mindset in relation to slideware, what are the perceptions of the different stakeholders about academic education itself and what are extension possibilities in the technological dimension? This chapter is an answer to the second research question: *What is the wider context of slideware use at Wageningen University, in terms of implicit institutional expectations, ideas about education, and technological possibilities?*

General notes about used terminology, used codes and dealing with figures:

- The word '*presentation*' means here the slideshow, the projection, the datafile itself. A teacher telling something, with or without a presentation, is called a '*performance*'.
- A '*presentation*' is build from different '*views*'; each view being in practice a '*slide*' in a PowerPoint presentation or a '*path step*' in Prezi. One view contains one or more '*elements*'.
- Inside quotes, the exact meaning of words can of course be different. If, for clarity, words are added in quotes, this is indicated with square brackets.
- All interviews, presentations and lecture observations are grouped together into '*cases*', as shown in Appendix A. If a presentation and an interviewee (or several interviewees) share the same number (1..8) or – in case of the experts – the same letter (A or B), they are functionally connected. The same holds for the observations, the lectures etc.
- Sometimes a part of a view in the figures is blurred because of privacy reasons; mostly this concerns course names, course codes and/or teachers' names.

## 5 Use and intentions

This chapter explores the collected data from the viewpoint of 'what happens actually?', 'what are the ideas of teachers to do so?' and 'how is the actual use perceived by the students?'.

While collecting and processing the interview data, five main topics showed up, together covering most of the presentation-use related statements from the interviewees. Several of those topics can be related to observations in the presentation analysis. Those five main topics are:

1. The importance of structure and overview in a presentation
2. Teachers multifunction use: use as cheatnote
3. Students multifunctional use: summary for rehearsal afterwards
4. Direction of spectators' focus
5. Interaction & humor during a performance

Each of those five topics will be elaborated in the following sub chapters. Each topic starts with a introduction and summary combined.

## 5.1 Visibility of structure in presentations

Many of the informants spoke spontaneously about the importance of having a understandable structure<sup>11</sup> in the presentation, and the importance of visualizing it. This structure concerns the relationship of the lecture within the course, of the 'view' within the lecture and of different elements within one view. As is elaborated in the following text and figures, different teachers have very different solutions for showing contextual relationships and sequential order, ranging from using page numbers to consciously arranging a Prezi canvas.

### 5.1.1 Structure by layout & movements

Teacher #1, while converting from PowerPoint to Prezi, saw the latter as a way to relate topics with each other: *"It is just more spectacular if I really think about how to place things in relation to each other, try to make chapters, with frames etc, and sometimes try to relate things back to other topics, leading to a spectacular movement on the screen. So first zoom out a bit, then zoom in, all very fast. That kind of things, I can play with."* Presentation #1a and #1b, both created by teacher #1, actually show a fairly different approach (see resp. figures 4.1 and 4.2 on the next page): on the first glimpse, #1a looks very structured, while #1b doesn't.

Figure 4.1 shows presentation #1a, the content of one lecture. View #1, not indicated, is the overview of all lectures on the canvas. The biggest zooming step is from view #39 to view #40, actually showing the same table: a zoom out action of (roughly) magnitude 20. Considering this from a 'overview' point of view, it looks logical and comprehensible to an observer with related topics in line or grouped in a frame. There are few views with just one or some words.

With presentation #1b, the placing of the elements seems to be more random. While following the path (this is not indicated because that would become too complex), there is more need to cross elements, to zoom etc. There is a large difference between the smallest font and the biggest font; in fact sometimes words are placed into letters of another words (as shown in figure 4.2). This presentation has also several views showing one or two words, or just one short sentence.

Concluding: In the text use per view, in the zooming extremes and other zooming behavior and in the selfcrossing of the path there are difference between presentations #1a and #1b.

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11 The word 'structure' is used here in the sense of 'how something is arranged cq. composed, showing overview'; this meaning is quite similar to the Dutch word "structuur", as was often used in the Dutch spoken interviews.



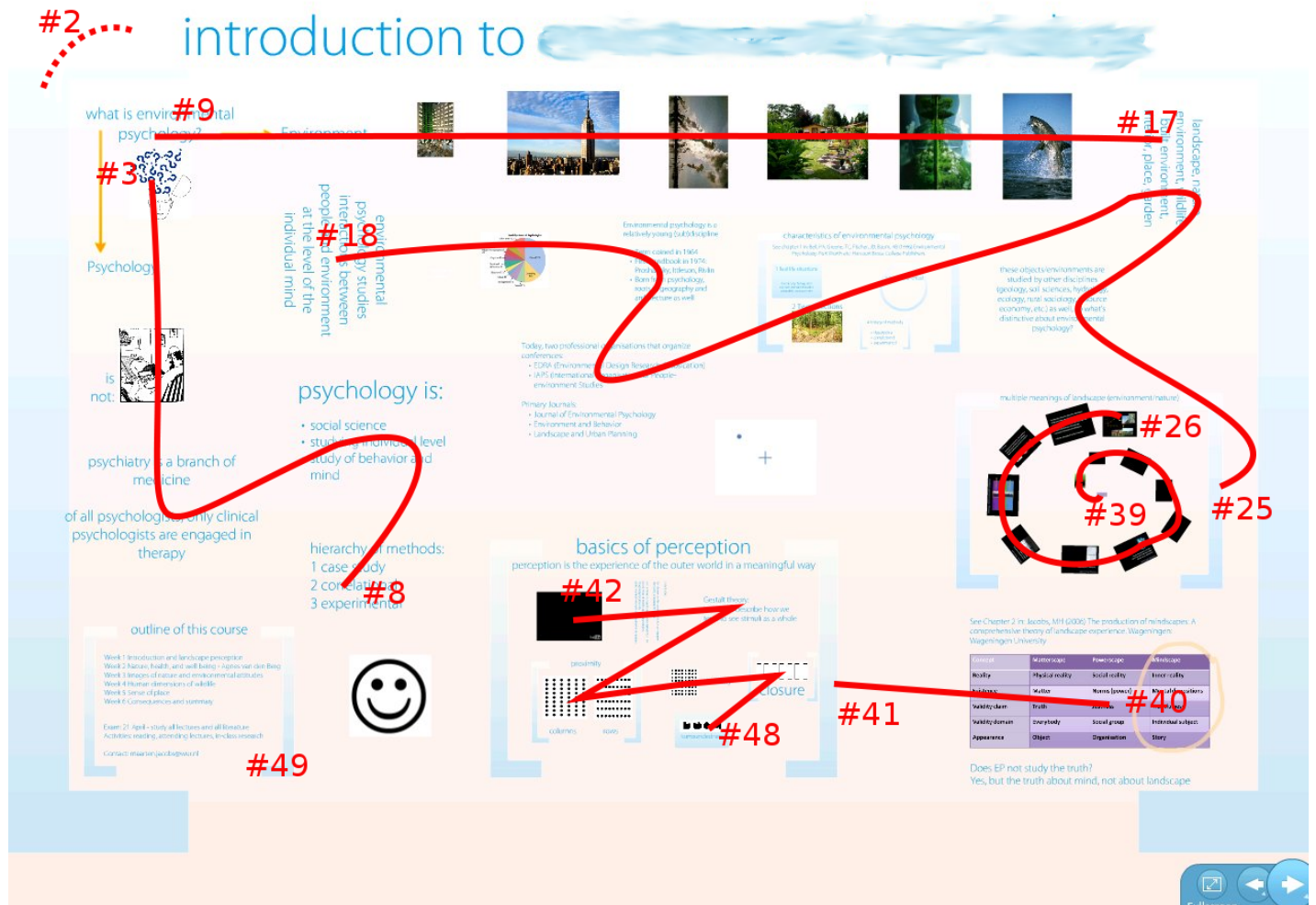


Figure 5.1: Presentation #1a, the Prezi of one lecture. The 'presentation path' is indicated in red, with some sequential view numbers (added by the author of this thesis). For convenience when reading this figure the path is split up in several sections; in reality it is one. View #1 is outside the scope of this figure; the smiley and the cross with dot are not part of the path. Compare the overview this figure supplies with that of figure 4.2.

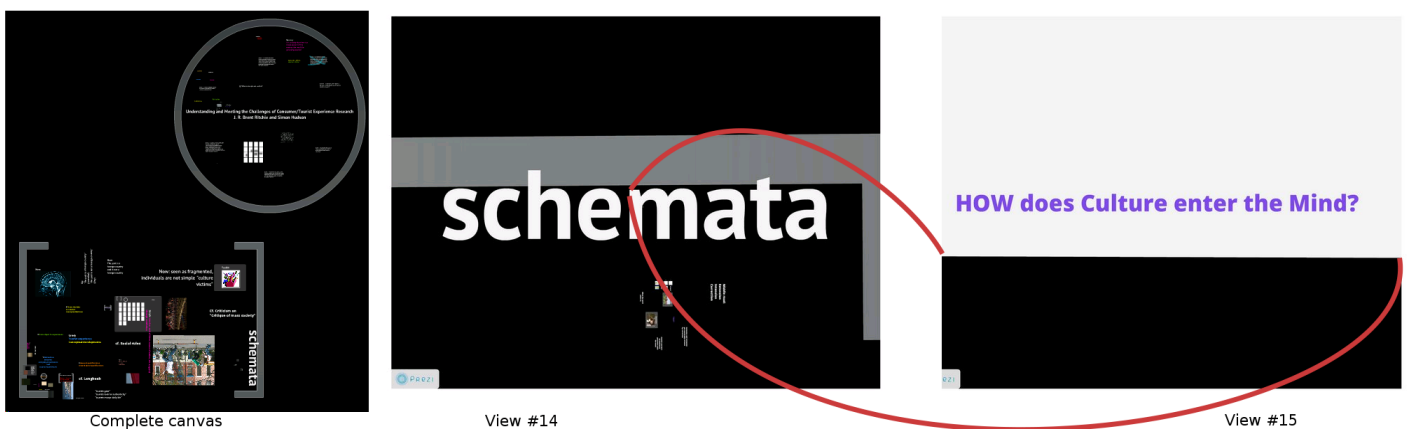


Figure 5.2: The canvas and two consecutive views in presentation 1b, a Prezi. The sentence of view #15 is placed in a small part of the 'm' of the keyword in view #14; the zoomfactor from #14 to #15 is approximately 60 times, beside a rotation of 90°.

Teacher #2 uses normally PowerPoint but tried Prezi for the first time; she saw it as an experiment. What she liked about this technology is that it *"can easily show different layers or levels, to enable placing things in a context. To see the whole. It works a bit like using post-its on a big wall, to orden my thoughts."* According to her, Prezi is especially appropriate when having a storyline with branches. But she saw that also Prezi, even for the creator of the presentation, has the risk of losing the context of a single element or group of elements. In presentation #2 she realizes an 'overview' as shown in figure 4.3:



Figure 5.3: Presentation #2, a Prezi. Left the whole canvas, at right a detail: a kind of 'table of contents'. The main path is indicated with a green solid line; the main steps are indicated in green text (everything in green is added).

After the introduction (in this case, connecting herself to the subject) the four numbers indicate the four main topics, shown by as 'chapters'. The detail shows that the four topics are mentioned inside the four numbers (sometimes using other words than the titles on top of the frames). During the presentation, the path zooms in (without rotating) to the consecutive numbers so the inside text becomes readable.

### 5.1.2 Structure by table of contents and headings

An example of extensive 'table of contents' use in traditional PowerPoint is presentation #3; three views are shown in figure 5.4 (next page).



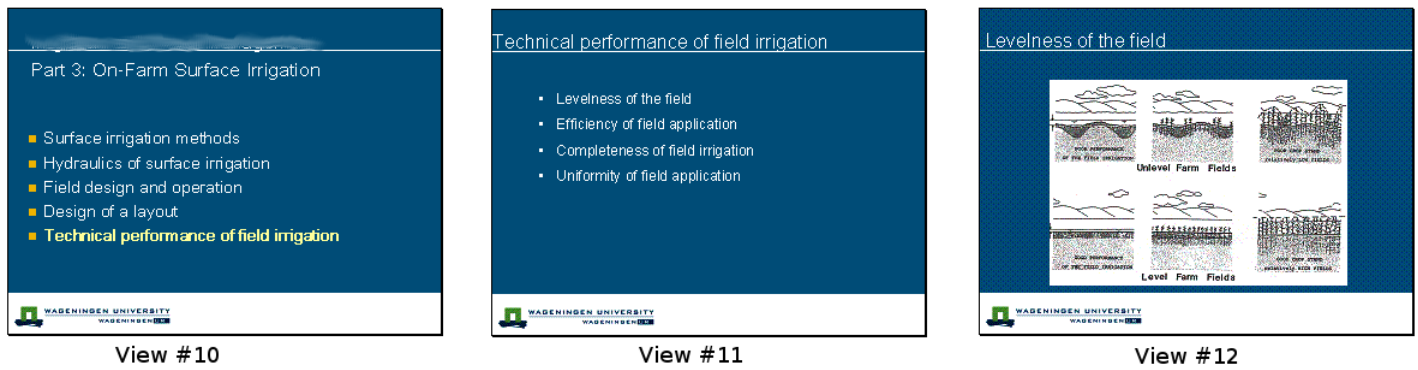


Figure 5.4: Three views of presentation #3, subsequent to each other: two tables of content, one nested in the other, and very clear titles above the sheet content.

Of the analyzed 26 views, six are giving a overview of topics and, indicated by a different text color, the place of the coming few views within that overview. These topics are coming back in the headers (sometimes over two lines) of the subsequent views. This means that in this presentation over 25% of the accumulative shown presentation surface is primary used to give structure and broader context to the remaining content. However, not always a clear distinction can be made between 'showing content' and 'showing context'.

According to teacher #3: "The students have to realize what is important, and what is not, and what is the coherence." He pointed out that the level of the students is very different, as they have different previous education. The presentation part of a lecture is combined with a 'practical training', when students make calculations. Therefore, the presentation is meant to give an overview, and is meant to give an introduction to the associated book and the training.

Student #3 is *not amused* by the performance itself (she points out that the teacher is too much repeating) but likes this aspect of the presentation, also in comparison with other presentations she knows: "Often, presentations show an overview only at the start. Like: 'This is what I am going to tell today', and then the whole stuff. Teacher #3 does it step by step. I prefer this approach. Then you know... If there is an easier subject I can relax my attention, and when there is something more difficult, I can focus again. I cannot stay concentrated from half past eight till quarter past five."

Student #7 likes the way presentation #7 is structured, in the sense of usage of clear headings and "... you can easily distinguish the main aspect and the characteristics. (...). ... this teacher is always very clear in this kind of things." Examples of views he is referring to are shown in figure 5.5:

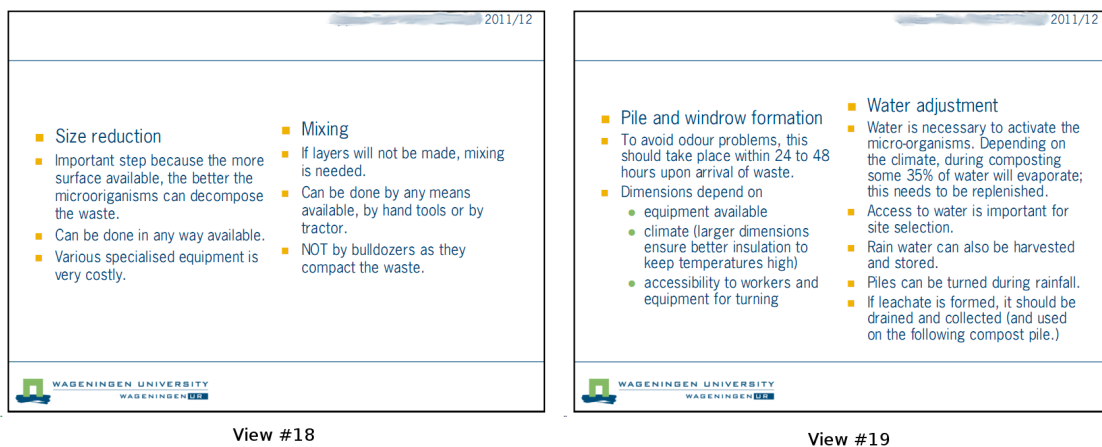
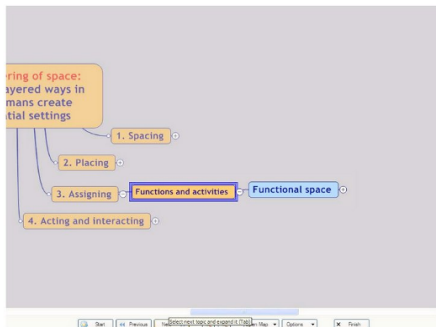


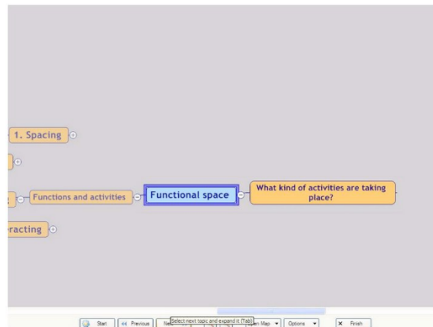
Figure 5.5: Two views from presentation #7. Note the use of font size and bullet points (to be exact: bullet squares) to bring local structure in the content.

### 5.1.3 Structure by mindmap-like figures or overview tables

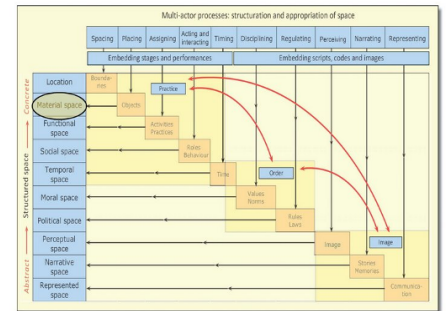
Presentation #4 uses yet other means to show the structure: a mindmap, which unfolds over different views in the presentation, and a table shown several times, with changing accentuation. See figure 5.6:



View #17



View #18



View #34

Figure 5.6: Presentation #4 contained both screenshots from a mindmap-like tool and a table to provide overview.

A few other slides of this presentation are content tables or content headers – most slides are photographs. Teacher #4 explains it like this: "A lecture is naturally part of a whole series, so you can not see it on its own. The course contains a story line, and every time I start with a new session, we have a look where we are with respect to that story line; I also try to show that is such kind of models. (...) The table gives to total overview, and the mindmap gives me the opportunity to zoom in into the part we are talking about. (...) By returning to the image [of the mindmap], you see every time an unfolding branch. The table, on the other hand, is static, where I can point in a static way where I am, and what is the current approach. There is a whole theory behind it, that I can recall in this way." For the future, the teacher thought about making the mindmap a dynamical part of the presentation. He did not consider Prezi a suitable tool for this.

Expert #B suggested using 'word clouds'<sup>12</sup> as visual aid to show relationships starting or during a presentation; the first view of presentation #4 is indeed a word cloud.

12 A "word cloud" or "tag cloud" is a picture with scattered words; the more important a word, the bigger its size

The analysis of presentation #6 shows that it has no explicit 'table of contents' views, but that some overview tables offer content and at the same time are also explicitly acting as an introduction to subsequent subject matters. The views all have a clear title and are numbered. See figure 5.7:

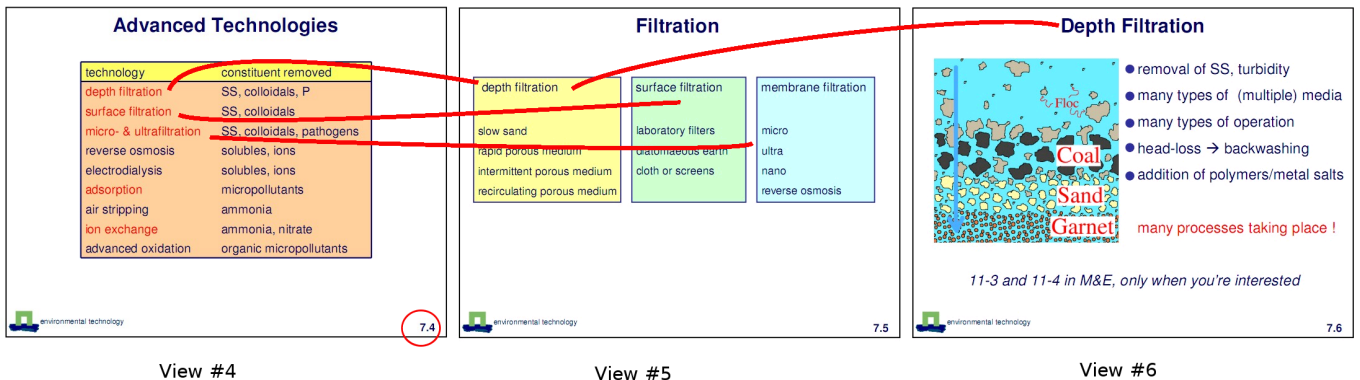


Figure 5.7: Three consecutive views from the starting phase of presentation #6. Related topics are connected by the red lines. This presentation has slide numbering.

The opinion of student #6: "The slide numbers are very useful, especially with this course. (...) If you have a question about a certain slide, the teacher can easily return to that slide, instead of looking for hours. (...) It was really useful, and I don't see that so often. (...) In the beginning, perhaps I didn't get an overview, but I got it when I revised it at home. Then you are starting to follow the story. (...) But there is a need for something like a table of contents, that you just see: 'we are going to deal with this topic now', or maybe some kind of introduction. (...) What I would appreciate - I have seen that on other courses - is a contents overview bar. Such an index bar, so you know how far you are in the PowerPoint, and you can see the subjects in order. I like it if you can see that beside every slide. It does not have to be too extended, because it limits of course the available space." Further on, she likes the view headings because they are so clear: "So you see right away, that you should not confuse things; this sometimes happens at other courses". In general, she thinks that having this lecture without PowerPoint is unthinkable because of the overview; see also section 6.3.

Student #6 pointed out that this lecture is actually following a book, and thus the presentation must be seen as an addition to that book. Perhaps this book-is-leading-approach caused this teacher to refrain from putting explicit content tables or other overviews in the presentation.

### 5.1.4 The need for structure

Student #7 told about lectures of another course he was unsatisfied with: "You can image one slide, and all the information was like bullets, bullets, bullets, bullets. And sometimes the sentence was even separated. And sometimes it was a separate point, and sometimes it was one sentence. And you cannot really distinguish it. And sometimes he is not structuring the information, and sometimes you just get lost, and you cannot understand to what this information actually relates. (...) It seems like that he really cannot structure the presentation." From the rest of the interview, it seems that for student #7, 'structure' means 'clearness' on small scale – within the scope of a view. But how did this frustrating experience influenced the final mark? "I got a really good mark. I was very surprised. (...) I spent quite a lot of time trying to understand... Putting the bullets in the right order, trying to structure and to get the idea in my head. It took me more time.. I mean: not more time, because of course I had too little time to prepare in general, I mean two days is nothing, but it would be much quicker; it would consume less time if it would have been more structured.". It seems 'well structured' equals for him also 'efficient to learn'.

According to expert #A, the use of a presentation can, in general, help to structure a lecture: "... so, what is the purpose of the course? What result do you want? On that, you base the content of your lecture, and on that, you base the red line you want to draw, and then, next step, there is PowerPoint as medium for helping you to structure that. (...) Some orators have a good structure in their story (...) because they summarize from time to time what they just said. If you are able, as orator, to tell our story in such a way, then you don't need a PowerPoint at all. (...) But if orators don't have such skills, PowerPoint keeps the structure of the story visible. Where are you, in this moment? (...) For example, a returning mind-map or scheme can be helpful. PowerPoint offers such possibilities. And you can do that in a corner – you don't need a complete slide surface for that. (...) But this is also possible with bullets. You take the first one, zoom in to it, while the others disappear. Next slide, they are all there again. And then you zoom in to the next."

About the issue if such an approach would not take away a part of the learning process, namely the effort for students to create their own overview, helping to shape their 'internal image' of the content of the course: "Yes, but that brings up the question: what should a student learn? If it is your goal to teach students to get an overview, they should practice that, for sure. But the question is, is offering an unstructured lecture the right exercise for this student? Maybe it is, if you have developed the lecture in a certain way. (...) But, if the purpose of the lecture is not to teach students to get an overview, you will have to offer that structure yourself."

Within the scope of this research, none of the participants complained about too much overview in the presentations itself, what for example could be caused by too often returning content tables. Perhaps the frustration of student #3 about the performance was related to the intention of the teacher to show and explain the overview over and over again. It is not clear if the 'need for visibility of structure' applies differently for the presentation during the performance compared with the phase of using the presentation for rehearsal afterwards (this topic in general will be dealt with in section 5.3).

About the format of the structure to be shown, the different views of presentation #6 were formally described and logically connected. Figure 5.8 shows that a much used ordering way, an hierarchical format, is in itself not sufficient to show all logical relationships:

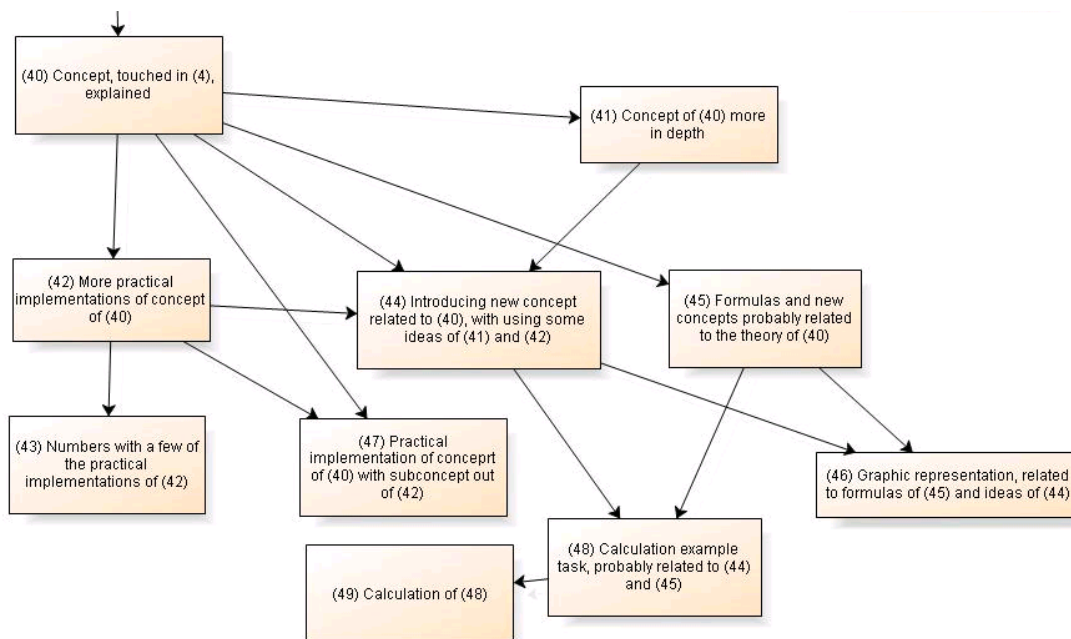


Figure 5.8: A part of presentation #6 in abstract terms. The numbers are the views; the arrows show the logical relationship, based on content. An hierarchical structure would not uncover all relations.



## 5.2 Teachers' multifunctional use: fe. cheat note, showing personality

In this sub chapter, the function of 'supporting a teacher during the lecture' as one of the secondary functions of presentations is explored. It appears that this function is broadly recognized and in general not seen as a problem; however it is nicer for a student if a teacher does not rely too much on it. Some teachers indicate that they use a presentation because of fear to loose the story. The experts see risks involved, like an over-stacked presentation and a lower quality of the performance itself.

Little was said directly about another teacher-serving function: showing personality.

Teacher #1 explained that presentation #1a (shown in figure 4.1) was also meant for himself, as – by external circumstances – he had very little time to prepare it:

*"So I had one month to prepare it, during which I had to give full-time education as well (...). Then I concluded: the only thing I can do, is just quickly putting some basic articles and my knowledge on Prezi in such a way: quite extended. If you are involved with a subject for years, or put a lot of effort in preparing it, one image can be sufficient – triggering a whole story ready in your mind. With this course, that was not possible. So, I created this presentation by purpose in such a way - also for myself - that I can trust on it. So, I will be standing in front of the students: 'This is the story for today'. And then it really is the whole story – as well as my reminder. Maybe that approach is visible here."*

In other contexts, he does not need a presentation for such a purpose: *"I only need to define some anchor points: this is where I start, then this and this and this. And that is the story, with a beginning and an end."*

When asked if it would be possible to perform a lecture without a presentation, teacher #2 replied: *"No, for myself as well as for the students I don't think that's a good idea. Because, for myself, it can be handy to have some guidance, otherwise I have to learn the whole presentation by heart. Now it is click, 'o yes, this is what I am going to tell'. And I will not forget anything; it is easier for me to keep the structure (...)." Student #3 recognized that some teachers act like this teacher #2 (she was not talking about a specific lecture within this research): "Often, teachers use PowerPoint as: 'O yes, this I also have to narrate. And: 'O yes, now I have to go there', that kind of things. (...) In my opinion, that is understandable, because one cannot learn the whole presentation by heart, but it is often used as stepping stone. (...) It does not disturb me." Student #8 is a bit more critical in this: *"yes, it is nice, if the teacher is not lagging behind the PowerPoint, but leads the way. In other words: that he knows the structure beforehand and knows what he is going to tell. And can link his story with his previous content. (...) And often this is about the somewhat unsure teachers."**

Teacher #3 put the story on the first place: *"For me, PowerPoint is an aid to a story, and the story on its term is an aid to the reader"*. Teacher #4, when asked about the relationship between the presentation and the spoken word, puts this relationship a bit differently: *"It is an interaction between those two. I mean: I am not reading from a slice of paper, but for me it is some kind of support, for myself, to look at: now we are here, and now we are here, and indeed: this I also have to discuss. What the students see, also supports the teacher to keep some grip on the storyline – at least in my case. It that sense, the PowerPoint has two purposes. (...) Without those PowerPoints, I would not be able to tell that story"*

For teacher 5, the emphasis of the presentations' goal is more single: *"The way I am using PowerPoint at the moment has in fact relative few added value for the public; it serves largely to support myself."* On the longer term, she intends to shift to more public orientated presentations, if the (part of the ) lecture itself is focused on information transfer rather than interaction.

Expert #A explains that she uses her presentation by purpose as support of her story and the

interaction: she herself can easily use as little as six views per hour, thus she doesn't need them for remembering. More in general, expert #A thinks that a presentation as teachers' aid can help developing bad habits: *"...that's a pitfall, that you want to tell everything, that you want to be complete, and PowerPoint facilitates that wish because you can put everything on it, so you don't forget anything. In that sense, my advise starts with selection of the contents, and try to make the main thread visible, and use that as starting point."*

Expert #B has a clear opinion about the question if a teacher may prepare a presentation because they feel unsure: *"Some people just said that it's a memory-jogger. So it helps them to remember what to say next and keeps them in focus. (...) You need to make sure that it doesn't override what you are trying to gain. So that it is not interrupting the process of teaching, but supporting it."*

*(...) I think there is a level of professionalism that you need to have. As a teacher, you need to prepare yourself to teaching. And a part of teaching is that skill of being able to remember what the story you are telling is. (...) It is supposed to be a lower priority. The presentation shouldn't be just for them [the teachers]. It should be for the students. And they need to make sure that they are remembering enough that they don't need to read the whole slide before they can say anything about it. There should be some sort of a balance there."*

The presentation function of 'showing personality' did not pop up from the interviews as explicit item. However, in many facets there were differences between the presentations, or details of the presentations, that perhaps can be best explained by differences in creators' personality and taste, and the personal touch. The personal choice of teacher #3 however is to stick to the institutional corporate design, contrasting almost all others. Teacher #3: *"Everybody has his own... I don't have problems with it, for me it is okay, one design, easy. I give already lectures for 30 years. When it started with those PowerPoints, everybody started its own design, that became a mess. One person is using a bold font, the other italics, so everybody has... I think using a corporate design is very good."* On the other hand, when asked why there were certain transitions in her Prezi are just small rotations, expert #A replied: *"Just some playfulness, I don't like just strict linearity"*.

### 5.3 Using afterwards as summary: students' multifunctional use

**In practice, a (printout of a) presentation is often used afterwards the performance: for rehearsal and exam preparation and for aid with assignments. As the following quotes show, for most students this procedure is obvious. For some, it is even obvious to pass the exam by using presentations only. However, one student and both the experts see a risk in teachers that are actually going to create and read out a summary, instead of creating a presentation and giving an inspiring performance.**

Student #1 does indeed use presentations for rehearsal: *"Normally I take one week, for example, on one day I am going to do 'week one', and then I print out all presentations of one week – except if it was a Prezi. Then, I go through it, one by one, with my notes beside. After that, I include the literature that belongs to it, the connection between lecture and literature."* She confirms that for her, the presentation is the leading factor while learning for the examination: *"Yes, I follow it, lecture by lecture."*

Teacher #1 places all his presentations, PowerPoint as well as Prezi, at disposal for his students – if possible even before the actual lecture. He does however not know how the students actually use it: *"The students use it normally, as a PowerPoint, I assume. I don't know. To be honest, I don't have any expectations about this. I suppose, it is used as a reminder. Perhaps, some of them write notes on it, others don't. That's all I know."* He stated that he tries to create something that can be used as a memory-trigger of the lecture - not usable without the story itself, and without being sure if that is

the right way. When looking at one of his own presentations, he realizes that he has the tendency to make the presentation quite 'trackable'. He is not afraid that students will skip lectures because they can freely access the presentations afterward.

Also teacher #3 and teacher #4 place every presentation at disposal of students, without expressing a specific opinion about it. Teacher #3 explained that the lecture is showing the finer details and makes clear what is most important, but that, by using the book, the students should be able to pass the exams without following the lectures. Teacher #4 saw the rehearsal as an important part of the learning process: *"I observe this: most people take notes, which is of course just a snap-shot of a lecture; later, they have notes and the possibility to see the whole PowerPoint again. So, as a matter of saying: [with the performance] it isn't finished, it's a first impression, the first acquaintance. And additionally, they will read some literature. For the students, it's more than just that moment. So the result, how it works, if it is didactically justified; that is not finished after the end of the lecture."* Presentation #4 contained conceptual content but a large part of the views are photographs with little or no written explanation; the course is intended to learn students 'how to look' within a certain context – so a part of the learning process afterward is to see the examples again and further develop the skill of looking.

For student #6, the book used with the associated lecture is leading: *"For the examinations I suppose I will follow the slides, and read which chapters are connected to it. (...) And then I will make the recommended exercises."* She uses the slides to recall content, and replied to the question what is the basis of her rehearsal: *"I think the book, because that covers everything, so if I want to search for something during the exam, I suppose I can easily find it there – then it is handy if you know where to it is written. (...) So I think, the book is more or less the basis, and then the PowerPoint to see what we should actually know from the book?"*

At another educational institute, the teachers of student #7 used presentations during lecture but did not made them accessible to the students before or afterward (*"... because they are maybe afraid for author rights?"*). At Wageningen University, he did get all the presentations of his lectures and he prefers the current situation over the previous one: *"And sometimes it was annoying because they were putting too much information into the slide and you could, just physically, not manage to write over all information and just missed it. But here it works much more. (...) They always provide us with presentations. So if you register for a course, you can access EDUweb, and you always have all the facts."* In this context, he relies heavily on the provided presentations for exam preparation : *"...usually teachers they tell us what for we should pay attention. Like what is actually the study material for the exam. In most cases, (...) the most important stuff are the presentations. Just: 'first of all, read the presentations, and it would be nice to read this stuff, and read this stuff'. But usually, presentations and some essential reading. But I even noticed that there where several subjects, when the teacher told us 'you have to read presentations and some articles', but I did not have a lot of time, and I just red the presentations and didn't even open the files with essential reading. (...) And I easily passed the exam. There were no questions about this additional reading. So mostly it is based on the presentation. Almost all subjects that I did - it has been four subjects - all of the subjects were based on presentations."*

For student #8, presentation #8 was even not appropriate as performace-supporting tool: *"It is not really suited for giving a lecture, in my opinion. It is useful for reading it by yourself."* In general, she learns for exams as follows: *"I first read them [the PowerPoints], and then I write a summary of it. While reading, I write down the content of which I had the thought: 'this is something I did not understand directly, so I have to do it now'. And then get it well, and just write down the definitions, [the definitions] I don't know at that moment."* She did not like the idea of teachers using a presentation without giving it to the students: *"Because I consider those presentations as very important. (...) for me it is very convenient to see all those presentations again, so I know what is said during that lecture. (...) "* She recognized the risk that students do not go to the lectures

anymore because the presentation explains everything, and in her opinion, a lecture should offer 'interactivity' which makes it worth a visit instead of withholding the presentation: *"I like owning the presentations, as they add something, and the lectures also add something. (...) It's a bit 'proud' of a teacher not to give it away"* She needs the presentations because *"then I am better able to visualize it. What happened, what was discussed at that moment. For the learning: so I can internally repeat that lecture"*.

Expert #A has clear opinions about the whole issue of teachers telling the students to learn the presentation for the exams: *"Them you created a summary. That's OK, PowerPoint can be a fine tool to create summaries. But that's something else as using it for a lecture. (...) You can use it [the summary kind of PowerPoint] to give to them beforehand, and let the students formulate questions about it. And then: inventorize those questions and perhaps show one or two slides if they have questions about it."* When she gives lectures herself (not to students but to teachers), she sometimes gives a printed extended version but shows a lean version of the presentation.

Expert #B sees it similar as Expert #A, and puts it even stronger; if the presentation equals the handout: *"...that's a risk for how the presentation is going to be in class. Obviously, they are going to put a lot more text inside, because it's gonna be an handout as well, so it is to be informative. But is that a good thing when you are standing in class and that's what accompanies you as you are talking? I am not sure it is..."* She also wonders why sometimes teachers are afraid that making the presentation available would stop students from coming to the lectures – are the lectures that boring? From her survey based research data (unpublished yet), it appears that 19% of the teachers make no difference between the handout and the projection. For her, this is an almost shocking amount: *"I think that is quite high. Because, in my eyes, it demonstrates that one fifth of the teachers are not putting that extra time into making sure that either their presentation... That students can learn differently from class and differently from notes later. It's just the one thing that they give them."* She points out that not only the quantity of text but also the white space in-between elements on a view is one of the factors that separates a handout from a good presentation: *"And when you are demonstrating the issue of space, it really connects to people in a different level, they can feel constrained when there is not enough space between elements when they see the slides, and they can feel the release when there is. Though there can be the same amount of text; only laid down differently and allowing enough space between the elements do already make a huge difference."*



## 5.4 Spectators' focus: where does the students' attention go?

Basically a student can perform three main learning-related activities during a lecture of the type 'transfer information with the help of a presentation':

1. looking to the projection
2. listening to / interacting with the teacher (this also includes body language)
3. taking notes.

As the following examples show, some students do indeed experience problems with this multitasking, but others don't – this is also very lecture and teacher dependent. Teachers are more aware of the amount of attention in general, and seem to be not aware of this specific task division. The experts think that (in certain situations) it is advisable to give the handouts before the lecture, to help students to focus their attention to the performance instead of towards note taking.

Student #1 recognized the multitasking issue, but did not experience that as a problem in general: *"I suppose there is quite a difference between students. Between those who take notes and those who don't. Because, for those who do take notes, perhaps it goes sometimes too fast, because sometimes, you look to your sheet and suddenly everything is changing, while if you are contentiously looking, it looks more like a nice kind of performance that is happening."* She does not know how other students manage without taking notes: *"I also wonder about that.. Because, if I look through my notes, I always think like: 'o yes, that's true, he told that like that', and I would not have known that if I would not have scratched something. I cannot always imagine that they still know everything. Because some things are told but not on a PowerPoint. But I suppose that this is a way of learning. (...) It is not the point that all those extra told things are only exam content. (...) Sometimes it is just that extra piece of context, that I like to have included."* About dividing her own attention: *"That's difficult, it is something you do unconsciously. (...) I just don't know. (...) Until now, I didn't have problems with that."*

Student #3 has similar experiences, however it is also very dependent on the actual teacher. About her attention division in the courses she takes (apart from lecture #3): *".. PowerPoint alone is not sufficient. So you give a lot of attention to the teacher, which forces you to take more notes – because the teacher says something that is not clearly explained in the reader and not in the PowerPoints. (...) In such cases, my attention goes primarily to the note taking. Let's state it like this: first to the teacher, then to the notes. I skip the PowerPoints at such moments because you can also read through them afterwards."* Sometimes she is missing information because of note taking, but she does not experience that as a big problem. Because, in her perception, lecture #3 goes quite slowly, she never makes notes: *"In my opinion, it's not necessary to take notes during his presentation. The only interesting part of the whole course are the presentations he creates."* This observation was confirmed by teacher #3, who said that presentation #3 hardly adds anything to the book, and: *"..I also notice that students are hardly taking notes. That's not only with this course, that's also with other courses"*.

Teacher #1 does actually not know how his students manage, however he clearly sees differences between the amount of notes people take and connected that to the motivation: *".. so these people are coming genuinely to Wageningen, especially for this 2 years' master. So they are very, very motivated. And mostly, they take a lot of notes. With some Bachelor courses you can observe, starting from halfway the lecture room to the backside: not so much is happening there anymore. You can as well talk to trees. That's the way it is."*

Similar to teacher #1, teacher #4 did not know if students experience problems because they have to divide attention: *"That's something you will have to ask the students. I'm already doing this for*

*years in this way, I never received a complaint about it”.*

Student #6 often prints out the presentation before the actual lecture and writes down notes on them: *“Things that make it more clear, or things that the teacher says, I write down immediately. Or, if he explains something about formulas, or (...) a process drawn on the blackboard, I add that [to the printed sheets]. If I don't have those slides, I use a college block. (...) Often I just try to write down as much as possible, at least what's not on the slides, so I can read it again later. For me, that's an easy way of working, so I know what has been said.”* Sometimes she does indeed experience the problem of missing information because of note taking: *“Well, then I don't listen for a moment, and sometimes the teacher goes indeed too fast and I ask: 'can you repeat that please?' That's not because I don't understand it, but because I didn't hear it.”*

Student #7 does not have such a problem: *“If I have to make an hierarchy of most important things, first is the lecturer, the things he or she says; second is the content of the presentation, and only then notes. Because it rarely happens; seldom I use notes, I noticed. Only when I do remember that I wrote something very specific, and especially when I meet with a question while studying, I can take my notes and find this thing. But it happens very seldom.”*

For student #8, the order is different: *“If there is a PowerPoint, I will indeed not look to the teacher. And writing and looking goes partially at the same moment: I can write while looking at the PowerPoint. That's quite handy. But when the teacher starts to explain, it becomes cumbersome: at that moment, I don't want to look at the PowerPoint but write down.”* Except when the teacher is telling irrelevant or obvious things: *“... then I start to read the PowerPoint. And in fact, it does not happen too often that what a PowerPoint shows, and what a teacher says, is synchronously”.*

Expert #A, talking about her own teacher-ship (educating teachers), explained that she gives an hand-out with all the relevant information to prevent her audience being too busy with note taking. It seems she does not consider the note-taking itself as a part of the learning process; rather as an inconvenience that should be avoided when possible. Expert #B has similar ideas: *“Some teachers here said that they don't like to give notes out because students are not writing anything down, and therefore not participating in class. (...) students can actually be engaging in your class, learning, even though they have the notes, because actually they have more availability to listen to you. If they had to write down their own notes all the time, they wouldn't have anything to base these notes on, or to know that certain points will be rewritten for them; they won't be able to listen to you.”*

## 5.5 Interaction, humor etc

**As the following quotes show, many interviewees consider 'interaction' (in this context mainly the exchange of questions and answers between students and teachers) during a lecture as something that is preferable, especially in smaller groups. However, in the perception it is not always functioning. Interaction does come back sparsely on the presentations self (the few explicit examples on the following pages cover almost everything found). Perhaps interaction is rather seen as a property of the performances, and very person-dependent. The same can be said about humor.**

Expert #B formulated clearly why, in general, interaction as part of education is seen as important: *“In an ideal world, all teaching should be conversational. All teaching should not be focused on content. I don't think these are the type of things we need in this age, I think content can be acquired in many ways, and if you actually have a teacher next to you it needs to be more substantial form of learning, it should be the exchange of ideas and interactions instead of just giving students content.”* She mentioned the 'Teaching Naked' approach as example: *“It's basically teaching without technology : A group basically started taking out PowerPoint (...) from the classrooms. So a lot of what they do is basically give some kind of podcast to their students, prior to the class, and use the 50 minutes they have with their students for more conversational, or*

activating, interaction type of learning. That's an very interesting way of doing things.”

If relating to the fact that there are students who don't like this approach at all: *“We have the same [here], and I think that is a culture that we created as university. That students don't need to be involved. (...) Personally, I think we created the culture anyway, and at the moment the culture here especially is that teachers take a very active role, and that students need to just be there, basically. And they are not taking charge of their own study. And I think that that is a very bad position to be in. And I hope to see that changing.”*

Teacher #1 does use his presentation while answering questions: *“And that is the nice thing of Prezi: you can zoom in. I'm really using that indeed.”* He prefers Prezi in this respect because in case of PowerPoint, he has to go forward and backward. If he asks questions, these are mostly just asked, not projected.

Sometimes humor is integrated in the presentation. Most humor applied by teacher #1 is spontaneous, and is in his view useful to get rid of a certain, too serious, mood. According to him, humor works well if the timing is right and spontaneous enough. Figure 5.9 shows as example a view with humor.

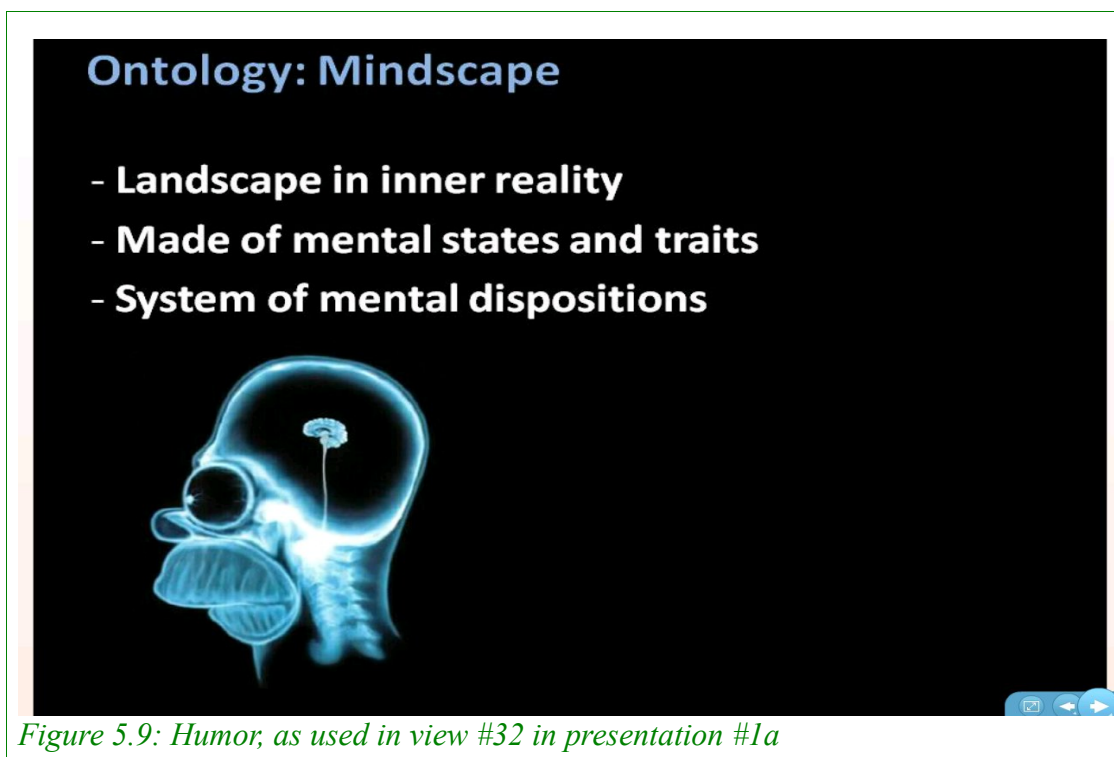


Figure 5.9: Humor, as used in view #32 in presentation #1a

Teacher #3 thinks that 'interaction' is possible when the physical context allows it (in his case this was limiting; see paragraph 6.1.4) and by *“using the presentation rather as additional tool.”* During the observed lecture, he asked a question one time while it appeared on the slide (figure 5.10, next page) and one time without visual support.

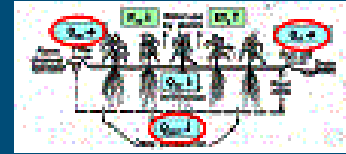
In the first lecture of the investigated course (another one as the observed and analyzed lecture #3), he shows definitions with a big picture, because that would enhance interaction: *“.... if you have something like this, it is easier to ask questions about it. It makes it easy, because.. It's about 'Surface irrigation', and here is the definition, and then you can easily ask a question about the picture. That improves interaction”.* See figure 5.11.

A presentation can also be used to support a largely interactive class, as for example presentation #5: this contains a few views with practical issues, and then some slides with just a keyword or key sentences to start up or broadly explain an activity. The total length of the presentation is 7 views.

## Technical performance of field irrigation

- Levelness of the field  $e_n = \frac{\sum |h_{n-1} - h_{n+1}|}{n}$

- Efficiency of field application



- Completeness of field irrigation

$$e_s = \frac{V_{\text{irrigated field}}}{V_{\text{irrigation available}}} \cdot 100\%$$

- Uniformity of field application

$$e_u = \left( 1 - \frac{\sum |d - d_i|}{d \cdot n} \right) \cdot 100\%$$

In which equation(s) is the crop yield considered?



**Make Exercise 6.1**

Figure 5.10: View #29 of presentation #3. The question (in yellow) pops up finally: point of interaction

## Surface irrigation

Irrigation whereby the water flows over the soil surface, thereby partially wetting the soil through infiltration, as in basin, border, and furrow irrigation



Figure 5.11: View of the starting presentation from the same course as presentation #3, showing a definition. According to teacher #3, the photograph at the right facilitates interaction

## 6 Perceived problems, considerations and expected future developments

### 6.1 Perceived problems

Interviewees indicated several problems related to slideware; these are discussed in the next paragraphs. For example: teachers have not always sufficient time to prepare courses, lectures and thus presentations to the extend they would like to. Also knowledge about the software is lacking, but perhaps this has also to do with setting priorities and an educational goal. The software itself has limitations as well, as can have the lecture room itself. Another problem, mainly for students, is the lack of 'printability' of some presentations, related to color use and putting few information in one view, thus causing overuse of ink and paper. A point of attention that everybody recognizes are rigid, disorienting transitions in some Prezi's (however not in a presentation within this research). Courses, students and teachers all show an variation.

#### 6.1.1 Creation & maintenance: time, priorities and limitations

When looking for improvements, it is important to take into account that teachers don't have unlimited resources. Expert #A, for example, indicates that teachers often do not have - or take - enough time to prepare courses well: like have learning goals explicitly defined etc. That should be even more important than preparing slides.

Also, teacher #1 indicated that he is using Prezi primary because it saves time when developing a presentation: *"I think it's handy, because you can quite found, just get out your thoughts, and slap them down on the canvas, And then start ordering. So you can save time with it, when comparing to PowerPoint, while the presentation itself still looks tolerable. Of course, PowerPoint can also be done fast, but that's how it looks like: quite boring (..) Prezi looks a bit better in such a situation."* He indicates that creating a new lecture takes him about four hours. He sees it as important to have a well prepared lecture, but also feels the need to minimize the amount of time spent on it.

Teacher #4 sees it as an important task to update his lecture. This takes about three hours preparation time for a lecture of two hours. However, for him this is a natural part of his job: If a teacher doesn't take time to prepare his or her lecture properly, something is wrong with the policy of the group.

According to the research of expert #B, most teachers experience what they describe as 'technical problems' while creating their presentations rather than time limitations – and even that signals an underlying lack of awareness about presentations and teaching. In her words: *"And it's about what you want to archive in your teaching. If you are committed to what you are trying to archive, it's not a real problem for them to learn this things. The block is not a technical block; the block is a mental one."*

When using Prezi, several interviewees pointed to its limited possibilities for making a nice aligned composition per view. It happens that people make a slide in PowerPoint, and then paste it into Prezi. For example expert #A: *"What I did here [in a Prezi] is importing parts on PowerPoint. So the easy to use layout of PowerPoint, you don't have it here. This combination, that I could create my basic slides in PowerPoint and then import it here, was ideal to me!"*

About PowerPoint itself, expert #B indicated that the reason that mathematics and physics teachers use a blackboard, instead of projected presentations, is because it is difficult to make equations within PowerPoint.



## 6.1.2 Printability & color use

Some of the interviewed students insist on printing out the presentation for learning, others don't. Printing out of a Prezi however seems to have practical consequences: It are more sheets (sometimes with only one word on it), and often there is the ink-consuming background color (student #1): *"because, if you just want functional printouts for the examination, you spend a lot of money on ink and sheets because there are just much more sheets if you are using this program."* She received Prezis mostly both as link (to the Prezi on the Prezi website<sup>13</sup>) and as PDF.

Some students print out presentations mainly because they prefer reading from paper to reading from screen: more tangible, less exhausting and annoying (student #8 confessed: *"I hate computers"*); because it offers more mobility and it is easier for putting down notes (students #1, #6, #8). But student #7 says: *"I never print stuff. Because too much things to print. Most of the slides are just useless when you print them. And it is not sustainable, you know. I never print"*. Student #4 is indifferent about this topic: she does both.

In the extension of 'printability', it is noteworthy that, as was already discussed in section 5.4, student #6 prints out slides to take them to the lecture, if possible. Student #1 does not do this, although *".. I sometimes regret that, because then I think: it would be nice to add my notes to it."*

When student #1 was asked about irritation points in general, her answer was straightforward: *"Color. If people use red and green, it is just really unreadable from the backside. (...) I don't understand that they are using colors, for letters (...) I prefer black and white."*

## 6.1.3 Movements, transitions and navigating

When it becomes a topic of discussion, all respondents indicate that an over the top moving Prezi is annoying, and this possibility is a pitfall for the system.

As example, teacher #1 describes the process of finding a balance in the rotation and zooming in a Prezi: *"I like it because you can just get nice effects. You cannot get this with PowerPoint, or just very difficult. Zooming in and zooming out, very strong, very sudden. (...) With Prezi however you may be also go too much for the effects: Zooming in and zooming out, etc. (...) It is only because it becomes a bit more playable in the visual sense – I hope. It is in fact just stimulation, so they [the students] don't get bored by it."*

*And I have no idea if it is good or not. It is just what I try, you just look, you can have it wrong, but I think, that at certain moments, if you often try things, or just don't do them, and you see a difference, then you know: this will work for this kind of group."*

Student #1 recognized this but: *"You move a bit more 'chic' around - if you keep it modest with zooming in and zooming out, and how we are moving over the fields, I think it's nicer."*

About another presentation (outside the scope of this research) student #1 was far more critical: *"... That drove me very crazy. It's most like... It was continuously turning. But not by a quarter turn: sometimes it turned a total round before it zoomed in to a certain point. It went from in, to out. He [the teacher] indicated he was trying it out, but you see that you need to be skilled for making such a presentation. You can make it as crazy as you want, but then it really drives you mad. Then, it's just moving too much."*

Teacher #4 considered the moving possibilities even as a good reason not to use Prezi. In his PowerPoints, he is also not using any transitions because that distracts – see also later, section 6.2.

About moving elements in traditional PowerPoint presentations, for example gradually building up a slide statement by statement, student #8 declared she likes it: *"Because at such a moment you*

13 Remember that Prezi is basically an online accessible presentation tool.

*learn to think by yourself, as a matter of speaking. Finally, the whole slide is there as well. (...) so, you don't have a PowerPoint that everything is already there, but you have: PowerPoint. Than: first thing you're going to tell: keywords flies in, people see that's, it stops moving. Then you start to tell. And then people have more attention for what you actually telling them. (...). It's perhaps less distraction. I'm not sure about but I think teachers don't do that often, that's it flies in."*

She suggests an important property: a projection that is too full, might distract rather than improve the learning process.

About transitions in traditional slideware, going from one slide to another, most interviewees seemed not to have a special opinion. Perhaps, this is because in a professional environment like Wageningen University, everybody knows that complicated transition can be annoying - as long as related to traditional PowerPoint.

Navigating in itself, for example returning to a previous view because of a question, can be improved. Teacher #3: *"Yes, and that is also very confusing. In the past, you had this overheadsheets, than it was easy. That is for me the big disadvantage of those PowerPoints; if you want to return to something, than you have to backwards flip through the slides, or start up a new presentation. That's one of the reasons for me to use a blackboard."*

#### 6.1.4 Physical environment

The properties of the lecture room can have an impact of how a lecture is performed and perceived.

Teacher #3 experienced limitations in the lecture room (see figure 6.1) where presentation #3 was used: It was not possible to show the blackboard and the projection simultaneously; he had no freedom to walk around (because it could block the view on the projection and he did not want to rely on remote control) - so he had to sit in the corner and, even worse, in that corner he needed to be in the relative dark. According to him, this influenced the relationship between the presentation, the students, and the teacher in a negative way: *"you should not be invisible yourself. The PowerPoint should be visible and people should follow the story and think from time to time: 'okay, there he is at this moment'. But in this room, that PowerPoint becomes more guiding than it was intended to. (...) What is the consequence? It's that they [the students] both fail to listen as well as to look. (...) When you [teacher] are in a dark, it is more difficult to have interaction."*



*Figure 6.1: The actual lecture room of teacher #3; not suitable for interactive, PowerPoint supported lectures.*



Teacher #4 has the room of performance in mind, when designing the presentation; more specific the contrast: *“Sometimes I don't know where I will have to work, So it is actually more accidental how it looks like. But the original idea is, that I work with white on black, if I want more contrast, for a room that is difficult to darken. (...) Black on white, in an insufficient darkened room, with sunlight, with backlight, does not work so well.”*

### 6.1.5 Diversity

Expert #B pointed out that 'diversity' is one of the hard parts in improving teaching practices: *“Again, we are all different. It all comes down to that, that's the difficult thing about teaching. You are different from all other teachers that are going to teach that student. And every student in your class is different. It's such a diversity. And catering all of that is quite difficult.”*

Most interviewed teachers easily told about the differences between different stages of study, between different disciplines, or could easily compare university education with other education types. However, this difference could not easily be connected to the actual use and creation of presentations.

Teacher #1 was an exception: *“If I give education to bachelors landscape architecture, (...) they are in general not so much interested. Then, I better take care that it looks really nice, so at least I can carry them with me a bit. (...) If I provide a Masterclass, with highly motivated students, I rather won't use Prezi to because it might be too much distracting; I want focus on the content. I can play a bit with that, of course. Depending on the public.”*

This comes back in the two different presentations created by teacher #1: Presentation # 1a (see figure 5.3) is part of a free choice bachelor course, and is meant as easy to follow introduction. Presentation #1b (figure 5.4), obligatory for master students of a certain education, has a more advanced content; for example different ways of looking to the same concept. This can explain the different approaches of the teacher. Beside, it seems that the teacher is developing his Prezi style and experience. Perhaps he will in the future develop towards more unity in his presentations.

Expert #B observed at her university that presentations are mainly used for undergrad<sup>14</sup> students: *“... it has mainly to do with the number of students – in undergrads you may have classes of 500 students. And in postgrad you can have smaller classes. But also because of the perception that is very common here. In undergrad it's more content oriented, so students need to learn this amount of content, and therefore using PowerPoint seems like the fastest way to let them get that content. In postgrad it is more conversational.”*

Also students can be very different in the way they experience teaching and therefore presentations. According to teacher #5: *“.. the problem is also that students have different learning styles: some want to hear a story, others want to do something themselves, and others like to discuss”*. Of the interviewed students, student #7 and #8 are perhaps the most extreme examples: the first one prefers clear content, as stripped and pragmatic as possible; the second one likes interaction and discussion. Student #7 formulated his preference for education (and presentations) like this: *“..it's here, (...) you can just take it, read it, not consuming too much time to read a lot of things, that [are] maybe not really necessary.”* When student #8 described properties of a good teacher, she started with: *“Somebody who seduces to asking questions and have discussions”*.

Perceptions about education in general are elaborated in section 7.2.

14 Some universities use the term 'Undergrads' instead of 'Bachelor', and 'Postgrad' instead of 'Master'

## 6.2 Prezi versus traditional slideware

**Prezi is used by several interviewees, instead or beside PowerPoint. The reason why they use it, and how they use it, helps us to understand their general perception of presentations. This section shows that visual aspect and 'overview' (as already discussed in section 5.1) are the most important aspects – however sometimes students lose overview *because* Prezi is used. During creation, using Prezi can be time saving and a way to order content.**

Teacher #1 is using Prezi because: *“That’s why I like it: you can have very nice effects that are impossible with PowerPoint or at least very difficult. That zooming in and zooming out, very strong, very sudden. (...) You have to seduce students a little; not everything you say it’s always that interesting. (...) so, if such a mean can help to attract the attentions of the students, it is only helpful. However there is also a danger: you shouldn’t make it too funny. It’s about the content, not about the format. (...) Personally, I don’t think that there is so much added didactic value. I didn’t discover it”.*

As already indicated in section 6.1.1, another very important reason for teacher #1 to use Prezi is because it saves him time to create the presentation, and also because of the intuitive way this creation can be done.

Student #1 however was not convinced of the additional power of Prezi: *“I notice that PowerPoint is already a bit old-fashioned. When talking about functionality, I think PowerPoint is a bit easier to create, and Prezi - we must get grip on it, how do we make it really functional, instead of only nice to look at? (...) It is nicer but it should stay functional in how you transfer that information; and I think PowerPoint is at this moment more easy for this.”* She has seen both presentation #1a and #1b but does not seem to a clear distinction in her memories about the differences. Anyway, she thought that *“..the Prezi’s of [.. teacher #1] are fine, in the sense of: they are clear. What I personally don’t like, is the quarter turn rotation, and the fact that you often still see a part of not related words. With PowerPoint, this problem does not exist: you have just a new sheet. (...) What I also often notice, is that teachers using Prezi show just one word, causing them to continue rapidly. From one word, to the next one. While, when using PowerPoint, the projection stays for a while, offering just more time to write down. Nobody will put one word on one PowerPoint slide (...) With Prezi, there is a tendency to move from word one, to word two, to word three. And then they are gone. I think that is handy if you are a student who does not make notes, because then it all passes quickly (...), but if you want to make notes, it goes and moves too fast. (...) Prezi is sometimes used too much to throw everything together, instead of creating a clear picture, in my opinion. I think this is a pitfall for the way it is used.”.*

The last remark is interesting, because the teacher does indeed actually uses the Prezi canvas put everything on, before ordering it; see also the related quotes in paragraph 6.1.1. To understand the responses of student #1 better: she has dyslexia. She needs more time to read text than most other students. Perhaps this makes it more difficult for her to filter out not-relevant words in a view.

Teacher #2 likes Prezi because of the overview (which is more difficult with traditional slideware) and because of the visual impression; for herself *“.. I think I would use Prezi again. It depends also: if this is a very linear presentation then PowerPoint is fine because I have experience with it and it is 10 times as fast as if I will be working with Prezi (...) But if it is something around a central theme, that is returning all the time, perhaps it is more convenient to use Prezi.”*

Teacher #3 and teacher #4 both know about the program but have reasons not to use it. Teacher #3 is afraid that students will lose the overview, and at a certain point, don't know anymore where they actually are. Teacher #4: *“I think that it will distract too much. I master several transitions, manipulations, animations, but I use them seldom. Because, in my opinion, they distract too much, eventually it is about a formal transfer of a certain amount of visuals.. from images, from some text.*

*I don't think it helps to let it flashing around, and to do magic with animations. My impression is that, when using Prezi, the teacher is basically showing how smart he is in mastering this techniques, and that students are just looking: 'o, now he is doing this, now he is doing that'. In other words: that the styling is distracting the attention..”*

The experience of student #8: *“Yes, you can do very nice things with it, and it may add something, but it can also be distracting. Because indeed, starting from a slide, you can zoom in, and zoom in somewhere again, and zoom out.. Once I was in a group, two others created a Prezi, so they used it but in an illogical way. (...) So, at that moment it wasn't practical, but I can imagine that you can use it in handy ways.”*

Expert #A describes why she sometimes chooses for Prezi: *“The visual aspect and the fact that I don't have sequential relations in this case, but this overview, let me choose for Prezi. And, depending on the content of the course, the story has storylines: a main line and for example three times a trip away, a branch. So if you have such a mind-map like image, it's ideal to put in Prezi. So students know where you are following a branch, and what is the main line. Often that is the hardest part of teaching: to take the student with you on your journey, to let the student follow the steps that are very logical, very obvious to you..”*

Expert #B has almost the same ideas: *“What I like about it, is that they temped to keep things in the context, and to answer the difficulty of loosing the context, loosing the hierarchy, using the relationships. But I think they just need to solve the whole issue of the transitioning.”*

### 6.3 Presentation versus no presentation

**Using no presentation at all does happen but is an exception – by default, a lecture contains projected content. The following quotes reveal thoughts behind this decision. Sometimes, teachers encounter pressure from their students to use a presentation or feel that they are not capable of giving a good lecture without. The most used arguments to use a presentation are 'providing structure', as is extensive discussed in paragraph 5.1 and 'use as cheatnote' as discussed in 5.2; also the possibility of showing visuals was mentioned. The experiences with presentation-less lectures are both positive and negative; within this research it is impossible to state if this is due to differences by lecturers' capabilities or the perceptions of students.**

According to teacher #1, students don't like lectures without a presentation, but he doesn't exactly know why not: *“In this course there is a guest lecturer, who is not using PowerPoint. Students find it difficult. I think just because they're used to it, because everybody has PowerPoint and then you know before... And, in my case, they know my presentations will be on Blackboard, so they know already: 'I don't have to write down all of that, I can make additional notes'. (...) Perhaps it disturbs their routine of following lectures, if you are without visual presentation.”*

Student #1 describes that this guest lecturer handed out paper instead of using a projection. And she didn't like it, because the lecture was quite chaotic and without a focus.

However, teacher #1 for himself would like to use no visual aids at all, just tell his story, but is not sure if that is the best way: *“I can imagine that it [visual support] works, that the content lingers better because people receive more or less the same information over two channels. In my opinion, sometimes you can support a story with pictures or with images. But at the same moment I think it can also distract. (...) Finally, students learn most optimal by just reading it. Not by following lectures. (...) At least, that is how I understood it. (...) I would like to just narrate, without anything additional. But in that case, the demands on what you tell and how you tell it, will become heavier, in my opinion.”*

Teacher #2 wants to use a presentation for herself, so she is sure to tell everything she wants, and because otherwise students may lose concentration. Teacher #5 also indicates to feel unsure without a presentation.

Teacher #3 frequently uses the blackboard beside the presentation but did not like the idea of giving an lecture without any projection: *“Only the blackboard without slides makes this course pretty more difficult, or at least more difficult to consume for the students. By means of figures you can show a lot of things. Only a blackboard? Without the possibility to show images, slides: that requires also a total different structure of the class.”* He was referring to a tutorial rather than to a lecture.

Student #3 liked another course (not related to lecture #3), that was performed without presentation. *“That includes more mathematics-like stuff. That was really good. Then you had to write something down, because afterwards there's nothing to look it up. I thought that was very instructive.”* According to her, more lectures without a presentation can be given, because you are forced to be more aware and take better notes. But only if the teachers know well what to tell.

Student #6 cannot imagine lecture #6 without presentation, because *“... it is really the guide, the story thread. Like: 'this is the first step, and then we go to the next slide', and then we go to the next slide. It is really the story thread. If the teacher would not do this, we would really lose the overview”*.

Student #8 told about positive experiences with another lecture (not lecture #8), where the blackboard was used to draw figures: *“That works extremely well. (...) Concepts are very clearly, very illustrative explained. (...) Different situations are being sketched, and you can re-draw them. It is a quite difficult concept, but still you understand it. (...) Those pictures, you really learn a lot from them.”*

Expert #A can easily imagine to give lectures without any electronic helping tool even to bigger groups, again within the frame of the goal of the lecture and the capabilities of the teacher: *“Then again the point is, what is the goal? Partly it's also the question: What are your qualities as presenter? There are presenters who can bring a good structure in their story, By summarizing again and again what it is just told (...) If you are, as presenter, capable to tell your story in such a way, then you don't need to PowerPoint. (...)”* For presenters that are not enough capable of doing this, PowerPoint adds the quality of *“.. keeping the structure visible. Where are you now, on this moment, in your story?”*

Expert #B said it like his: *“Basically, just in general, I think that PowerPoint is not good or bad. It's a tool. And we kind of put it on a pedestal; we just made it bigger than it actually is. And I think we need to go back to looking to that as a tool.”* She thinks that many teachers use a presentation because they feel they have to: *“If you think about 20-30 years ago, there was just a blackboard there, and that was what you used. Now, there is PowerPoint there, and that is what you use. [...] It is not something that is taught to think about; some of them did, but some of them, and that came up especially strongly from the focus groups, just thought by themselves: 'this is what students want, OK, so I will give it to them, whether I want it or not. I need to give it to them'. So they didn't give that extra thinking about what else they would do.”*

She indicated, similar to expert #A, that the goal of the lecture and the context should be decisive. For smaller groups, she prefers an interactive format without any presentation: *“it is better to sit down and have a discussion and to have perhaps printed out a few visual things that are important for the discussion, but standing away from the small group, and looking at the screen creates a worse dynamic.”* An example she mentioned, about a deliberate presentationless approach, was already discussed in relation to 'interaction' in paragraph 5.5.



## 6.4 Expected or desired future developments

When explicitly asked about wishes and expectations for future, the interviewees had few spontaneous ideas, apart from many content-, layout- and transition-related complaints that have been discussed in previous sections. As the quotes below show, some ideas arose about creating presentations that contain 'everything'; the use of 'smartboards' is seen as upcoming, however the opinions about it differ: some answers suggest more opportunities for interaction. The two experts emphasized the importance of changing the teachers' mindset.

In the dimension of content, teacher #1 was thinking about one big Prezi with all his knowledge: *"And then per course, per lecture, per speech perhaps add some things if needed, but basically: just create a new path. Putting everything I will ever present on one single canvas. That would have a very useful property: you can draw your path over and over again (...) It seems very appealing to me in itself, like: 'I am (...), I have one presentation, this one' and for every opportunity I create a new 'thing' out of it."*

Student #7 indicated a strong desire for a 'presentation plus', an extended version of a presentation, that includes all needed information to pass the exam.

Talking about expected changes in hardware, it is experienced that the use of so-called "smart boards" is upcoming. Teacher #3: *"It is clear that you need such a blackboard. So, this combination, which is a bit trivialized, will come back now. This has also to do with interaction; if you only have the PowerPoint, this interaction is marked harder. If you have a question from the public, then you put it on your blackboard, and then they come back to that. (...) In the new building they are going to build<sup>15</sup> (...) they are going to implement this interactive systems: smart boards."*

Expert #A also liked the idea of using smartboards as a blackboard, especially in larger groups; for smaller groups she prefers devices like a flip-over. Expert #B was however not so impressed by smartboards: *"They are not taking off very much. I don't think they are a good product as well, personally. They are very clunky, at the moment. They are very difficult to use. I think that the best combination would be something along the lines of projecting, images etc, and also using markers on the screen, on the computer or something like that, that show automatically on the main screen. Something that would be a little bit more simple than the electronic whiteboards at the moment. (...) That you write something intuitively on your computer screen, and then it is projected in front of the whole audience. (...) Some of our teachers are experimenting with a mouse pen, (...) I think that's the way we are going."*

For expert #B, the biggest gain for the future is to change the behavior: *"Our answer to that at this moment is raising awareness at the university to the research around PowerPoint - and incorporating a lot of visual communication guidelines that are recommended when designing presentations."* For both expert #A and expert #B, future improvement is also about the mindset, the awareness of teachers about the goal of the lecture, as was discussed in paragraph 6.1.1.

In the technical dimension, most teachers seem to accept the software as it is, not seeing any points for improvement. Some indicated a lack of time for acquiring skills to work better with the software. Earlier mentioned were problems with creating equations in general and align possibilities in Prezi (again in paragraph 6.1.1).

<sup>15</sup> Teacher #3 is referring to the so-called 'Orion' building, at the moment of research under construction at the Campus of Wageningen University.

## 7 Context of presentations

This chapter draws a picture of the context in which slideware is used at Wageningen University. We will start with an indication of the institutional mindset regarding presentations, in addition to the teacher- en student perceptions of the previous chapters (chapters 5 and 6). Second topic are perceptions about education itself. Finally, we slightly explore extension possibilities in the technical dimension.

### 7.1 Institutional mindset

Participants' beliefs are extensively discussed in the previous chapters; general institutional beliefs are not. For a completer picture, the two following paragraphs give an indication of institutional beliefs in Wageningen University about using presentations, as seen from the perspective of students resp. teachers. The analysed (written) sources suggest that especially students are confronted with the expectation that there is simply no other choice than using presentations. Teachers may likely come across several considerations the question *if to use slideware*, and if yes: *how?* to use it. However, the emphasis and transferred experiences focus mainly on text-based PowerPoints.

#### 7.1.1 Students' instructions

An indication of the implicit expectations of Wageningen University towards its students, about the use of slideware, is given in figure 7.1:

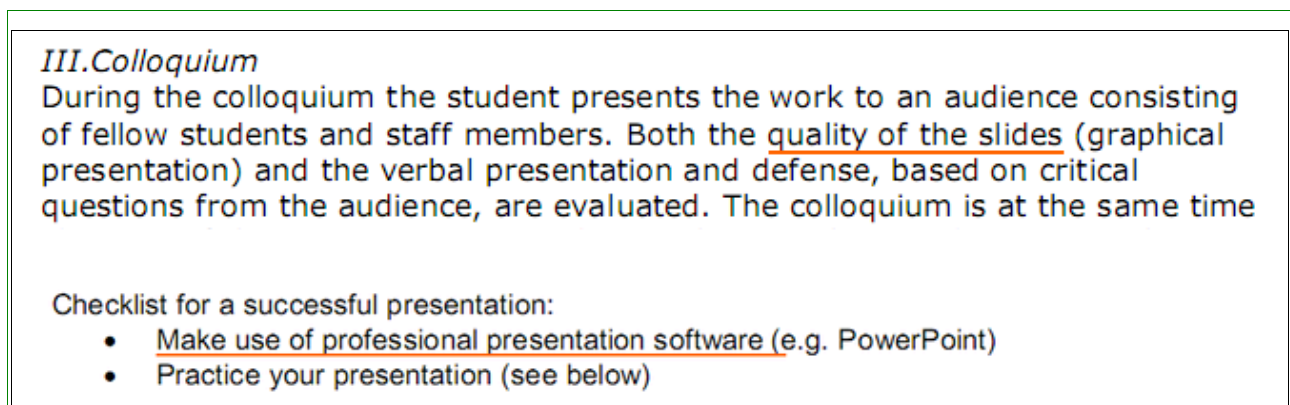


Figure 7.1: Text fragments of two student-directed instructional papers of Wageningen University, indicating institutional beliefs about the significance of using presentation software.

Source upper part: assessment procedure for a MSc thesis colloquium (Department of Social Sciences, 2011); source lower part: tips for presentations during a large and often obligatory project course (internally called: "ACT") (Drenth, 2012). Underlining (in orange) was added.

In advice to students, using presentations (here called *graphical presentation, software*) during a performance (*verbal presentation* etc.) seems to be completely self-evident (upper part) or at least an undisputed condition for success (lower part).

Also note that in both showed cases, the presentation is mentioned before the performance: using presentation software seems to be considered as the first and most basic step. The upper part looks at the 'quality of the slides' as if it are individual pieces, not mentioning the added value nor the quality of the coherence; the second text suggests that using professional software by itself provides a good presentation part of the performance.

These examples follow the convictions and best practices within their own context and do not apply to teachers preparing a lecture, but likely this indicated implicit belief in the necessity of presentation software influences students' perceptions, and might influence future behavior if those students once will become teachers themselves. And this implicit belief may influence the expectations of students towards their lecturers right now.

### 7.1.2 Teachers' instruction book

Expert #A, working at EDUsupport<sup>16</sup>, already gave an impression about the ideas provided to teachers in the previous presented results. In this paragraph, I investigate additionally the accompanying instructional book about teaching: “Giving a lecture – from presenting to teaching” (Exley and Dennick, 2009). This book itself represents the ideas of authors (whom are not related to Wageningen University) but can be seen as one of the factors 'shaping' the lecturers' mindset, beside the shaping by EDUsupport itself.

The textual body of this book contains about 210 pages; 27 of those pages are dedicated to the chapter “Presenting material and using PowerPoint well”. In the introducing text of this chapter, emphasis is laid on the choice of visual aid in relation to course purpose and content, and also other options are mentioned, as the following quote shows: “... *you may be giving a lecture to twenty students whom you wish to engage in dialogue and discussion during the lecture and to incorporate student views in the material you present. In this case a whiteboard or a flipchart may better suit your purpose.*” Several pages are spend in the beginning of the chapter to non-PowerPoint topics: using a blackboard / whiteboard (1.5 pages), flipchart (1.7), interactive whiteboard (0.5) and overhead projector (1.7).

The last 16 pages of the total 27 are explicitly dedicated to PowerPoint. The discussions if PowerPoint is 'good' or 'bad', and the use as handout/rehearsal material etc is discussed, without giving a final answer. The tendency to put too much information in the views is discussed as well. Also theories and stories showing that using relevant graphics is superior over using text are discussed – including the risk of using not-relevant images: “*The results from this research suggests that the incorporation of graphics and image in visual aids will greatly assist learning, but only if they are clearly relevant.*”

This shows that the authors are aware that theory encourages the use of relevant visuals instead or beside projected text. However, the authors largely fail to make this use of visuals concrete. As example the division of the part about 'Designing PowerPoint slides' (table 7.1, next page).

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16 EDUsupport: organisational section within Wageningen University supporting lecturers



*Tabel 7.1: Indication of institutional mindset concerning PowerPoint: the division into topics of the 'Designing PowerPoint slides' section, in the teachers' book "Giving a lecture" (Exley and Dennick, 2009)*

<b>Topic (= heading)</b> In the books' order	<b>Content</b>	<b>Textual length</b> approximately, in page(s)
"Starting with text"	Font size, font type, color use	1.0
"Selecting templates"	Using a standard layout or not	0.4
"Thinking about a layout"	Developing a layout	1.2
"Including graphics and images in PowerPoint lectures"	Pro's and con's of graphics and images; recommendations about titles and legends	0.2
"Advice on designing charts and graphs"	Creating titles, graph choice; also about tables	0.5
"Incorporating digital images, animations and video"	Embedding animations and video clips; mainly technical details	0.6
"The complex issue of copyright and intellectual property rights"	Legal issues	1.5

From this table, as well as from the rest of the chapter, it seems that the authors' focus is still on text; to a lesser extend also charts are described. The few examples are mainly about textual PowerPoints. This focus on text also comes back in the following quote, related to 'printing notes', after a paragraph explaining how to extract text from a presentation: *"If you really want copies of the slides themselves rather than the text contents (e.g. when there is a graphic you want to include in the notes) use the .."*

Also worth noticing: In this chapter, many tips and ideas relating to PowerPoint in general, coming from scientific and non-scientific sources, are connected to using PowerPoint for university education without further reflection if education might have special needs. And, within the topic of education directed presentations, the authors make straight extrapolations. For example, rules-of-thumb about the maximal number of views for a ten minute educational presentation are multiplied by 4.5 to do recommendations for a 45 minute lecture; no thoughts are given about the question if a short presentation could perhaps be basically different from a complete lecture, and therefore might need other considerations.

Maybe, the authors of this book used their impression of current practice of the use of PowerPoint, being mainly text and chart based, as main basis to describe and elaborate. Or perhaps, there are simply no practical facts about, or hints for the use of pictures. But as final result, future teachers reading this chapter will know about other options than traditional text-based PowerPoint, but are hardly seduced to move away from this traditional approach. Because theory in this book recommend using visuals, the authors could for example have given examples to inspire teachers.

In relation to the topic of 'showing structure' in a presentation (see section 5.1), this book does not raise the awareness of the reader: there is a chapter about 'Structuring and sequencing lectures' but the connection to presentations is hardly made, not in that chapter, not in the chapter about PowerPoint.

## 7.2 Perceptions about university education itself

In this section, I show some general perceptions of interviewees about their lectures and about university education. This provides us with the educational context of the ideas and perceptions about presentations and slideware itself.

We can conclude that diversity in students (background, motivation etc.) is an issue. Secondly that teachers and students often have clear ideas about education, like the changing role of education during the study, or the objective of delivering 'critical' graduates. Finally, students are motivated about studying in general (not about every single course) and like involved teaching, and often also like to be involved in the teaching and processing afterwards.

### 7.2.1 Diversity in students and students' background

As already indicated in section 6.1.5, many teachers encountered differences between students but, with one exception, this perceptions are hard to relate to the presentation themselves. More examples of this diversity:

Teacher #2 experiences a challenge in providing an introductory lecture to students from several different educations, because they have a different way of working: *“Just try to satisfy Rural Development students, as well as Animal Science students, as well as Agricultural Engineering students, as well as Food Science students<sup>17</sup>. Both content wise and in methodology, alpha, beta and gamma students have a complete different way of approaching things. (...) For example, Animal Science and Food Science students are used to work very qualitatively, so when writing a report, they use a tight format: 'this and this and this', and then fill in the numbers. Social Science students are much more focused on arguments, better in building a coherent story, and less focused on numbers.”*

Teacher #3 indicates that, in his view, BSc students are provided with building blocks; during the total education, the complexity of the applications increases. He uses the order: *“absorb knowledge, understand knowledge, apply knowledge in an easy way, finally apply knowledge in a complex way.”*

Compared with her finished former education, a university for applied sciences<sup>18</sup>, student #6 indicate that the courses are a bit more difficult and students are expected to be more critical. However, for lecture #6, everything you need is in the book and the slides; at her former education she had far more challenging courses. Another big difference is the attention for personal development and self reflection in her previous education. In her current (BSc) university education, this lacks totally.

### 7.2.2 Ideas about good education & good graduates

Teacher #1 already indicated in section 5.5 his opinion about participation of students during the lecture: depending on motivation. In 6.3 he shares some ideas about good education itself: *“Finally: the best way for students to learn is just by reading, not by visiting lectures. That has been researched – at least, that is what I understood.”* The problem with Dutch universities is that *“... after graduation you are supposed to do research, (...) but 90% is not going to be a researcher and has probably also no interest to become a researcher at all”*. He would like to organize specialized project groups with motivated students.

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17 In informal, Dutch Wageningen jargon resp.: ontwikkelingsstudenten; veetelers; agrotechnenuten; voedingsmiepen

18 In Dutch: “HBO”

As important values for university graduates, teacher #2 stresses 'being critical to ones own data', 'having ideas about reproducibility' and 'working in a systematic way'. Only reproducing is not enough. Teacher #3 adds to this the possibility to think 'out off the box', and the application of (by definition simplified) theory in practical applications. Additional to the earlier remark that the bachelor is for a big part about learning building blocks, he also indicates that students nowadays are more passive. : *“But it is of course not so nice to learn a building block. But the study itself, the self-discipline, the understanding why they do something: that's a bit less.”*

### 7.2.3 What makes a good teacher?

How students assess teachers might indicate how students think about education itself. For example, student #1 praises the flexibility and open attitude of teacher #1: *“I like him very much, in the sense that he is very active, wants to involve the group – what not always succeeds, but I like it: not only talking to a group, also interaction. (...) Asking questions, but also a feedback: 'is it all clear?'. If there are questions, he does not stick to his PowerPoint<sup>19</sup>, but is willing to take a side-path, and than returns.”* It seems student #1 likes an open minded education where she can participate herself.

Student #7 recognizes and appreciates a teacher with interest in the subject. As already told in section 6.1.5, student #8 sees as a good teacher *“Somebody who seduces to ask questions and have discussions”*. Additionally, she also expects the teacher to give guidance: *“.. and who gives a clear overview over the course, because there is also a test involved. Somebody who motivates but perhaps also uses obligatory assignments.”* We might assume that student #7 likes education to be inspiring, and student #8 likes to be involved but also need external guidance. Concluding, all these students like education to be at least a bit more than just a neutral information source.

A different perspective: Talking about her university, expert #B indicates that teachers may feel forced to use means they don't want because of the students' power to rate every course; those students are assumed to have preferences for a predictable, easy digestible PowerPoint that contains all content.

### 7.2.4 Student study preferences & reasons to study

If the course allows it, student #1 likes discussion: *“Yes, because one time I followed a course (..) , it was a perfect group, (...) everybody had interaction, and really interesting discussions.”* Student #1 told that, in the past, she had very nice experiences with a a fixed group of study friends that meet to discuss content – it eased learning a lot. However, she had bad experiences with formal project groups, at Wageningen University and at her previous education on a university of applied sciences. At this previous education, she had almost exclusively project work in teams, therefore she says: *“So now I am a bit tired of projects. Currently, my attitude is more like: just give me more content, just let me learn, instead of having me continuously creating it myself.”*

Student #1 is more focused on the big lines and relations than on knowing facts. She thinks that she should read more if she would like to know more facts - but she does not like reading itself. She does follow non-obligatory courses just out of interest: Her reason to study is 'fun' and also the practical application. She indicates that she would like to do more than consuming and repeating content, and that she is not convinced so easily. About sources: *“However, I have to say, it's funny that if I read literature, I much faster assume the presented content to be true; if somebody tells something in a presentation<sup>20</sup> I am more eager to put my question marks. For me, it is more difficult to be critical on texts.”*

Student #3 likes groupwork, including the disadvantages, because *“.. a student asks other questions*

19 She said 'PowerPoint' but it was a Prezi, or perhaps she means both.

20 In her vocabulary, 'presentation' means here probably the projection plus the verbal story.

*as a teacher. That makes me thinking: do I understand it? I like that.*” Like student #1, she also spontaneously discusses course content with fellow students, and occasionally arrives at new ideas.

Student #6 likes making exercises with others, not writing a paper together. She likes most 'guided' self study & exercises (with somebody to help) because of: working at own speed, doing it yourself, finding your own answers, and eventually working with other students. She likes studying because of 'learning new things actively', because it is together with other students, and because the transfer of different practice related experiences of different teachers.

Student #8 likes interaction and group work, and meaningful content. She didn't like lecture #8 at all, which seemed her a bunch of hardly related facts. In general, she studies to get a diploma but also even more out of personal interest for the topic– in case of many, but not all, courses.

Concluding, it seems that the students in the sample are motivated about education in general and often like group discussions about the content.

Zooming in to a detail of 'study preference': There were no clear answers on the question if students in general like pictures over text or vice versa. Student #6 indicated that she likes working with pictures over text, and it annoys her if pictures are not correct or have ugly colors. However, in certain situations she prefers text over pictures: *“I have to say, if I am reading a book, and there are additional pictures, I often skip those pictures. That happens more often to me, because I am in the story at that moment, I wonder, when do I have time to look to the picture?”* Other answers were even more indecisive.

### 7.3 Technological landscape

**For a complete picture, we should also be aware of the technological dimension of slideware. Because the basic functionality of slideware, or at least of PowerPoint, is most likely known to all readers, I provide in this section an impression of new or less known possibilities in the technological landscape of slideware and education, to indicate possible extensions in use and creation. It seems, there are easy and -in theory- useful functions of PowerPoint, however these are hardly used in practice. For teaching itself, we see a development towards web based long distance learning. In the future, the place of slideware in education might change.**

The topics, or functionalities, that previously showed up in the results and are relevant in this technological context are:

- (1) Showing structure
- (2) Teacher multifunctional use / use as cheatnote
- (3) Students multifunctional use / use for rehearsal
- (4) Focus on projection vs lecturer
- (5) Interaction
- (6) Printability

Because Microsoft's PowerPoint is the *de facto* standard, table 7.2 (next page) shows less obvious options of this software program, connected to the list above. Table 7.3 (next-next page) briefly shows other systems or ideas with the same connection to these topics.

Table 7.2 shows technologically oriented options for PowerPoint offering additional freedom for a teacher in designing and performing his/her lecture. A nice example is 'blackening or whitening the screen in one touch', that provides possibilities for focus change, for short term interaction and might enable more dynamic lectures anyway. This feature is already part of the PowerPoint program for many years<sup>21</sup>. Interestingly, none of the interviewees in this research data ever mentioned this functionality: this suggests that nobody uses it<sup>22</sup>.

Some of the suggestions in table 7.3 might be interesting for software developers, to set out future evolvment lines. Slideware development might use elements of social media (like AnnotatEd) to make the learning a shared happening, and/or it might use techniques to present information in new ways, like the Data mountain or Topic Browser variations.

Other technological extensions in table 7.3 are also interesting for current day users, like posting presentations on Slideshare and discuss the content.

Focusing on changes in the technological landscape of Wageningen University itself, imbedded in changes in education and organization: Expert #A indicated a growing interest of Wageningen University in long distance learning. For the technological landscape, this means the development and use of specialized webbased systems for sharing content and discussing it. Also advancing are the possibility to record lectures: the performance and the presentation are simultaneously recorded, and can simultaneously be played back. Furthermore, within Wageningen University both "computer-supported collaborative learning" (Noroozi et al., 2011) and "adaptive e-learning" (van Seters, 2011) were recently researched. This changing landscape, in technological and broader sense, might influence the future use and development of slideware.

In the same line of this technological context: In section 6.1.4 I already gave an example of the influence of the physical context, the actual lecture room, on the use of slideware. In section 6.4, the use of 'smartboards' is briefly discussed.

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21 At least since PowerPoint 2000

22 As personal note: also in my own experience as student of Wageningen University, that lasted several years, I never noticed somebody using this functionality.

*Tabel 7.2: PowerPoint features or technology-based ideas that might have an additional value for university education*

<b>Feature or add-on</b> Explanation, <i>effect</i>	<b>Source</b>
<b>Add slide number &amp; total amount of slides automatically</b> <i>Showing structure: at least over the presentation itself</i>	Microsoft Corporation, 2012_a
<b>Blacking or whitening the screen in one touch</b> In the English version resp. 'b' or 'w' key <i>Focus on projection vs lecturer, interaction: makes a projection a choice for every single moment in the lecture</i>	Exley and Dennick, 2009
<b>Extensively use notes additional to the slides; provide them in the hand-out</b> <i>Avoid a projected summary; create useful handout for students' multifunctional use</i>	Russell, 2012
<b>Extract text from presentation for hand-out/summary</b> <i>Increases printability, however only for text-based presentations</i>	Exley and Dennick, 2009
<b>Hide slides during projection</b> <i>Multifunctional use student: for every slide, the creator can choose if it is for the handout only or also for the projection</i>	Microsoft Corporation, 2012_b
<b>Jump straight to slide</b> Type <number of slide> + <Enter> <i>Supports interaction and showing structure: makes it much easier for a teacher to move within a presentation.</i>	Exley and Dennick, 2009
<b>PowerShow</b> Add-in for PowerPoint for Windows View parallel presentations on different monitors; shows can be synchronized <i>Teacher multifunctional use: lecturer can project his/her personal reminders (also figures, large font etc) on a private screen instead of in front of the audience; Showing structure: view 'content' and 'context' on different screens</i>	Microsoft Corporation, 2012_c
<b>pptPlex</b> Add-in for PowerPoint for Windows A bit similar to Prezi, it offers a canvas with the different slide, and parts of slides, accessible via scrolling and zooming. It does not allow rotating. Despite it's relative popularity Microsoft halted it's development; for certain versions of PowerPoint it can still be downloaded. <i>Showing structure by placing slides logically and zoom out to the total canvas; Improving interaction support by freely moving around instead of following linear start-to-finish</i>	Microsoft Corporation, 2010
<b>Presentation and notes on different screens</b> <i>Multifunctional use lecturer: lecturer can project his/her personal reminders (text only) on private screen instead of in front of the audience</i>	Microsoft Corporation, 2012_d



Table 7.3: Existing or developing systems & concepts in the technological landscape, related to slideware in education

System/topic/concept	Source
<b>AnnotatEd</b>	Farzan and Brusilovsky, 2008
<p>This is a (yet rather experimental) hyperlink educational environment with 'social media' properties like making visible how many others have followed a certain path in between the information elements, and the possibility to put personal and shared notes.</p> <p><i>Interaction: with a presentation functionality added, it would make a great tool for online interaction after a lecture and to support long distance learning.</i></p>	
<b>Data mountain</b>	Robertson et al., 1998
<p>Using spatial memory to organize and recognize information and relationships in a virtual 3d space</p> <p><i>Offering overview/structure: this can be a way to order items within a presentation; perhaps this offers more overview than a 2-d space with larger amounts of items.</i></p>	
<b>Microsoft Journal</b>	Microsoft Corporation, 2012_e
<p>In fact a tool to use on a tablet; it can also be used to show presentations in a smartboard like way, both pre-created (but still very flexible) and on the fly.</p> <p><i>Enables lectures to be more interactive</i></p>	
<b>Presentation software for specific purposes</b>	
<p>Originally designed for supporting a worship service, a package like Mediashout (MediaComplete, 2012) offers the possibility to project text in front of the presenter and something else in front of the audience.</p> <p><i>Multifunctional use: reminders invisible to public</i></p>	
<b>Sliderocket</b>	Sliderocket, 2012
<p>Webbased presentation creation and sharing tool. It offers the possibility for viewers to commend on every individual slide; this commend is only visible for the editor/creator.</p> <p><i>Webbased interaction between teacher and student</i></p>	
<b>Slideshare</b>	Slideshare, 2012
<p>Basically a website for sharing presentations, and showing them embedded in a web page. Has extensive connections to 'social media' (Facebook, Twitter, Google +, LinkedIn) and allows online discussions about a presentation.</p> <p><i>Interaction afterwards between participants, and between participants and creator(s) about the presentation as a whole.</i></p>	
<b>'Topic Browser', mind map, topic map etc.</b>	For example: Dicheva and Dicheva, 2007. Already mentioned in section 3.3.
<p>Several related techniques to show topics and their relationships on a two dimensional canvas, partly with self-editing possibilities</p> <p><i>Offering overview/structure: this can be a way to order items within a presentation, to show relationships.</i></p>	



## PART III: Synthesizing and concluding

### 8 Conclusions & considerations

Based on the collected research data as is presented in the previous chapters, I place the results on a higher abstraction level, and draw conclusions and related considerations. First, I relate the research outcomes to the theories about teaching and learning, to find answers to the research question 3. Secondly, I explore deeper the topic of 'offering overview' as this seems to be an important aspect where many creators struggle with. This is a part of the answer to research question 1. Finally, in search for the answer on the question *what are the underlying reasons to use slideware in the way it is used* (research question 4), I propose a visualization of the teachers' intentions.

#### 8.1 Results in the context of education theories

In section 2.2 I introduced teaching and learning models with constructivist background: 'teaching concepts' according to Kember (1997; table 2.2), 'learning approaches' according to Kember (explained in the text), 'learning style prototypes' as recognized by Vermunt (1996; table 2.3) and the related 'Learning oriented teaching model' (LOT) according to ten Cate et al. (2004; table 2.5).

In this section I connect the research outcomes of the previous chapters to those educational models, working towards conclusions and related considerations.

For textual simplicity, I sometimes use 'Spectrum of Education' (SoE) as general term for the continuum of the teaching models. I might call the left hand side of the SoE the 'teacher side'. This is the transmission-oriented, 'Full external guidance' in the terminology of ten Cate et al., and 'Teacher centered / imparting information' in Kember's conceptions. Equally, I sometimes call the right hand, constructivist-oriented side of the SoE the 'student side'.

Beside the above mentioned models, I introduced two non-constructivist models (table 2.6: Gregorc Style Delineator and 2.7: VARK model). In 8.1.5 I try to connect the VARK model with the results.

##### 8.1.1 Academic values & authority

Not surprisingly, teachers generally expect graduates (especially MSc) to possess academic values like 'to think out of the box' and 'being able to self-reflection', as for example teacher #2 and teacher #3 tell in section 7.2.2. Those academic values belong to the 'student side'. Teacher #3 also talks about the practical application in the same section, which is one of the desired prototype learning styles in Vermunt's model.

Almost all students indicated intrinsic interest in the general study content (including expanding knowledge over the limits of the examination requirements) and/or interest in the practical application: the 'deep understanding' according to Kember's student approaches, or both the 'meaning directed' and 'application directed' prototype learning styles in the model of Vermunt. However, this 'intrinsic interest' also depends on the course. For example, student #8 indicates a broad interest but not in the content of lecture #8.

Student #1 observes something interesting about herself: she does question the content of texts to a far lesser extent than she does question something that is told (section 7.2.4). She is mainly talking about literature, but we may extend her perception and wonder if a presentation with a lot of text has a higher 'level of authority' than has a presentation with mainly pictures, a presentation with

fewer views (=less written content) or even no presentation at all. As a critical attitude belongs to the 'student side'<sup>23</sup>, a choice to offer information with more or less authority might shift the lecture resp. to the 'teacher side' or to the 'student side' of the teaching models. To make this consideration more complex, students are supposed to learn to be critical on written sources as well. Perhaps, on the shorter term, more text in a presentation will increase the authority of the content, wanted or unwanted. On the longer term however, within the right educational environment, students might learn to question also written text: in that case, presentations with a lot of text might even provide practicing opportunity to be critical on written content.

To make this consideration even more complex, a survey under 190 psychology students suggested that, when slideware is heavily used, it loses authority to the presenter. If slideware is occasionally used, its relative authority might rise (Roehling and Trent-Brown, 2011).

### 8.1.2 Interaction versus knowledge transfer

According to Kember, teaching in the 'Transitional' situation is an interactive process. Vermunt indicates that 'construction of knowledge by dialogue' fits to the meaning directed prototype learning style. In other words and generally speaking, using teacher initiated, teacher-student interaction tends to move education from the 'teacher side' towards at least halfway the 'student side'. Interaction as (part of a) teaching approach, discussed in section 5.5, is strongly recommended by expert #B (as quoted earlier): *"In an ideal world, all teaching should be conversational"*. If students don't like this approach, this is -according to her- because they are not used to it. She connects this interaction with a self-guiding and self-motivating student attitude, fitting with the shift of 'teacher guidance' to 'student guidance' in the model of ten Cate. In section 6.3 she indicates a perceived risk: using presentations may, especially in smaller groups, worsen interaction possibilities. Expert #A is primarily focused on the goal of a lecture but also indicates that for smaller groups, interactive lectures without dominant presentation may be preferable.

Beside the experts, also teachers are aware of the value of interaction and some implicitly believe that it is preferable, but not possible in all situations. An example of this awareness is packed in the plead of teacher #3 for smart boards in section 6.4. Interestingly, while teacher #2 and teacher #5 are in clear favor of interactive lecture methods, both they are almost afraid of providing a presentation-less lecture: for their own hold or because it will otherwise be too boring for the students; not because a presentation would add to the interactivity.

Teacher #1 believes that students learn best by reading (section 6.3), but he would also like to do project group work with motivated students (section 7.2.2). Teacher #3 describes in his own words the transition of students from information receiver to concept creators (section 7.2.1). It seems most teachers oversee, implicit or explicit, the whole spectrum of the learning/teaching models.

Teachers face limitations in respect to interaction: for example teacher #3 complains, in section 6.1.4, about the physical limitations of the lecture room to combine a presentation with teacher-student interaction. While this grade of missed interaction is, on the scale of the SeO, just a small step moving towards the 'student side', it still annoys him: *"...that PowerPoint becomes more guiding as it was intended to"*.

Several of the interviewed students indicated that they, if the situation allows it, like to discuss course content in a (preferably self formed) group – and even extend on the content. In other words: some students spontaneously use elements that can be placed at the 'student side' teaching. Such student initiated student-student interaction may fit in the student activity of the 'full internal guidance' of the LOT model, especially at the 'cognitive level component'. Wider than only the

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<sup>23</sup> There are also education models formulated on basis of shifting authority, for example *Perry's model of cognitive development*, mentioned in Roehling and Trent-Brown (2011)

content itself, students in such groups might even become each others' role model and metacognitive mirror, fitting into the 'affective level' and 'metacognitive level' components. However, if group work becomes formalized and obligatory, it may also become annoying and limiting, as student #1 indicates in section 7.2.4: Purposeful she wants “*more content (..) instead of having me continuously creating it myself.*” In the educational models, this is a shift to the 'teacher side'. Such a choice of student #1 confirms Kember's remark that the 'student side' is not by default superior to the 'teacher side' – in this case as seen from the students' view. As indicated, the perception of expert #B is different: to her, interaction is superior over information transfer.

### 8.1.3 Presentation, hand-out & rehearsal

In section 5.4, expert #A and #B explain both that better prepared handouts handed out before a lecture means more participation in class: because the audience has to take less notes, it is able to listen and participate better. This might mean that students become more teacher depended in one aspect (=getting prefabricated notes) to be perhaps less dependent in another (=more participating in class); while keeping in mind that we are talking about just small steps in the continuum between 'teacher side' and 'student side'.

As example of student related behavior & perception: Student #3, when talking about a lecture without presentation in section 6.3, liked that she needed to be active during this lecture, because there is no backup. This suggests that she likes to be active in her own learning process (a bit towards 'shared guidance' in the LOT model), and that she is aware of this ('meta-cognitive level'). Controversially, student #6 tries to write down everything the teacher says and what is not on the supplied presentation (see section 5.4): it seems that in the stress of the moment, she becomes 'undirected' in the sense of Vermunt. She also indicates a preference for guided learning by a presentation (for example in section 6.3), in other words: she appreciates 'external regulation'. It seems that in different lectures and with different students, very different learning styles show up.

Redirecting the focus to what happens after the lecture: Student #7's priority is to receive the course content (as presentation and as handout) as easy digestible as possible (see section 5.3), fitting best in the 'teacher side' of the models. The way he talked about preparation for the exam suggests a 'surface minded' or 'strategic' attitude rather than 'deep understanding'. Again in section 5.3, student #8 explains the importance of owning the presentations herself: “*so I internally repeat that lecture*”. Also in the rest of her description of using a presentation for rehearsal, she shows a 'teacher side' approach. However, when talking about her preferred learning style, she indicates how much she likes to discuss things with others: a mere 'student side' approach. It seems her actual behavior depends on the situation rather than on her preferences. Or, in other words: she is forced by the educational system (including the manner slideware is applied) to learn in a more 'teacher side' way as that she would actually like.

The tendency of some teachers to create a packed summary instead of a presentation (as discussed in section 5.3) probably shifts the teaching conception to the content-oriented, the 'teacher' side. We might conclude this just by looking at what happens: information is provided in the easiest possible way. In the most extreme case, it is about providing a finished complete set of facts en eventually relations, without leaving any 'white spots'. We might also conclude this by looking how to serve best the students #6 and #7 as they are presented in the above paragraphs: a 'presentation that is (almost) a summary' fits the demands of the 'Undirected' and 'Reproduction directed' prototype students. If the presented knowledge is of practical use, also 'Application directed' can be included.

The question if offering a complete, structured overview of the content in the presentation, with all its relations, might take away a part of the learning process from the students, can also be seen in the educational framework. Is a certain lecture goal the plain transfer of facts, or helping students to build their own internal image? Kember's teaching conceptions remind us that academic teaching

ranges in the continuum from 'Imparting information' to 'Conceptual change'; the latter needs to be developed and experienced by the student rather than be shown in a pre-defined way. Looking more closely to this model of Kember, in the 'teaching' dimension the 'transfer of well structured information' is considered a bit less 'teacher side' than the 'transfer of information'. Perhaps, the level of showed predefined structure is maximum in the 'Transmitting structured knowledge' teaching conception: more to the 'teacher side', students are supposed to focus on the bare facts; more to the 'student side', students are encouraged to find relationships themselves.

By the way, 'showing structure' is also discussed in section 8.2; the results concerning 'offering structure' are explained in 5.1 and its underlying sections.

Of course, when looking for the trade-off of using prefab notes or not, and prefab structure overview or not, also considerations like available study time (inside and outside a lecture) and keeping up students' motivation are important.

### 8.1.4 Concluding: education & slideware in the SoE perspective

Taking the above story together, teachers and experts generally have some kind of idea about a desired student development from 'dependent information absorbing' to 'independent self creating', or in other words: they have an internal image resembling the constructivist learning/teaching models. One of the experts and several teachers experience 'interactive education' as universal preferable above teacher-side 'sit and listen' lectures, others don't. Who is right is a discussion outside the scope of this research.

When it comes to actual slideware use, the general tendency implies a shifts to the 'teacher side', both by the nature of this technology as well as the way students react on it. Students often are capable and willing to work like 'student side' conceptions, but by the context, including slideware, they work more in a 'teacher side' way. Especially the combination of projecting a lot of info with the possibility to acquire this info as hand-out or summary tends to strengthen this movement.

I must add the consideration that, except for one, all investigated teacher-student lectures are intended to be relatively 'teacher side': the focus is on information transfer. The medium (=actual use of presentation) is adjusted to the message (=a relatively information transfer lecture). Perhaps, it is also possible to support 'student side' - or a least 'halfway student side' - lectures with slideware. For example with making a presentation together, creative use of smartboards etc etc.

In general, the SoE framework offers the possibility to place many responses and observations in a meaningful context. It also shows why some literature about 'improving the effectiveness of PowerPoint' has limited value for real life situations: it is only focusing on the information-transfer side.

### 8.1.5 Results & considerations in the context of the VARK model

Apart from the models describing the information-transfer to constructivist continuum in educational context, I also introduced the VARK model by Fleming and Mills (1992), describing different 'receiving modes' (see table 2.7, page 8). This model suggests that students may prefer written text ('read/write' mode) over 'graphical and symbolic ways of representing information' ('visual' mode) or vica versa. In the setting of presentations, such a preference would imply that an accent on textual views or 'visual' views would facilitate some students better than others.

Within the research data, there is a clear difference between students who easily read and those who don't (most distinct example of the last: student #1, having dyslexia). In section 7.2.4, an example shows that for one student, easy with reading, the actual preference for pictures or text depends on the situation. No one showed up who did not like pictures, or had structural trouble understanding



pictures, graphs etc.

Another receiving mode, the auditory mode ('preference for heard information'), can also be important when designing a lecture and finding the balance between what is told and what is projected. The VARK model however does not distinguish between *how* information is told. Blokzijl and Andeweg (2005) showed in their experiment that the way a teacher narrates, including body language, influences learning outcomes of a lecture as well as students' opinion about that lecture, even if almost the same text is spoken by the same teacher<sup>24</sup>. Within this research, there are even many more variables who will influence the students' opinion about a preference for hearing or viewing, like the degree of interaction, the quality of the presentation, the quality of the speech, the actual content etc. etc. Therefore, it is not possible to say anything meaningful about the existence of an 'auditory mode' and its balance with other modes.

Probably, when I had used the original test of Fleming and Mills, results would be better fitting into, and be more decisive in respect to, the VARK model. However, this research data shows only a difference in the ability of, and willingness to, reading text. Apart from that, nothing can be said about the degree of appreciation for visuals, nor can anything be said about the preference for 'hearing' or 'viewing'.

## 8.2 Showing structure in presentations

In literature about slideware, both scientific and non-scientific, the focus is often on the composition of a single slide: the quantity of text, the choice between text and graphic components, which kind of heading etc. It seems, at least in this investigated context of university education, that also the composition of the presentation as a whole, and the connection of the individual view with the structure of the presentation, is important; see the results in section 5.1 and underlying sections.

This research suggests that many teachers struggle with the concept of showing structure, showing context and keeping overview in presentations. Even more, one can wonder if the teacher / composer of the presentation does always have the correct estimation about the degree of overview the students possess. In the teachers' book (discussed in section 7.1.2) this topic isn't even mentioned in relation to slideware. Concluding: this topic could get more attention from presentation creators (=teachers), from teacher supporting institutions as well as from software developers on the longer term.

The question if (and how much) 'showing structure' supports a set learning goal (or not) is already discussed in section 8.1.3.

Also, there are examples of 'badly' conceived presentations. One of the ways to analyze them, to make more explicit what is exactly bad about them, could be to look in terms of 'providing overview' and 'giving structure and context'.

Apart from the investigated cases, an accidentally interviewed student<sup>25</sup> had a very clear experience of the same presentation performed by two teachers. With the first teacher, it was impossible to follow the 2-hour story, mostly because he added so too much anecdotes and did often not pronounce clear, separated sentences. To help the students, another teacher explained the content to full satisfaction in about 45 minutes, using the same presentation. This example makes clear that the role of the teacher him/herself can be very determining on the final impression and educational result. Also the 'bad' example of student #7 shows this connection: his criticism was on the presentation as well as on the rest of the performance. It can be hard to separate the presentation

<sup>24</sup> Blokzijl and Andeweg actually compared 'read aloud' with 'eye contact' teacher behavior

<sup>25</sup> Personal conversation, January 25, 2012

from the presenter, as was already pointed out by expert #B<sup>26</sup>.

Both in Prezi and PowerPoint like software, there are different ways to show structure and context. Some examples are given in the different cases, and probably there are more possibilities. Several interviewees suggest that Prezi offers a nice overview by its design; however, perhaps Prezi makes it more natural to create a logical arranged presentation, once the creator learns to limit the use of rotation and zooming actions.

An interesting question is what structure should be represented. The most obvious way is the hierarchical, tree-like ordering. This fits also the best in the way we read books (structured into chapters, sometimes also in sub chapters etc) and a lot of other media. And a tree like structure can be easily applied in the linearity of time, needed for a performance. However, both in reality as well as in the lecture content, much more relationships can exist than just hierarchical ones; this is also shown in figure 5.8. One can question if focusing too much on an hierarchical structures would also shape the worldview of the students in a too limiting way, similar as seeing everything explained in bullets would shape the worldview of the audience into something too simplified and summarized (as was suggested by Tufte (2003)).

### 8.3 Visualization of teachers intentions

Analysis of the research data within the frameworks of educational constructivist models as done in section 8.1 enables to describe to some extent *what happens* and *what are the consequences*. This section tries to describe *why* teacher-creators shape a certain presentation format, by proposing a visualization capturing their diversity of implicit and explicit reasons.

This visualization shows the teacher's intentions about the purpose of a presentation as given as in the four-chart-diagram. Those diagrams are 'radar chart' types. A radar chart shows the values of several variables in one plane; those values appear as being independent. In this case, those values are qualitative, formulated as 'not important' in the center of each radar chart to 'very important' at the border.

In the central, primary part of the figure, the general notion about multifunctionality is represented over three main axes: support teacher during and before the lecture (for example use presentation as cheat-note), support students afterwards (use presentation for rehearsal etc.), and support students during the lecture. See "Chart 1" in figure 8.1. An example how this primary radar chart can be used is given in figure 8.2.

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<sup>26</sup> Personal email, August 1st, 2011

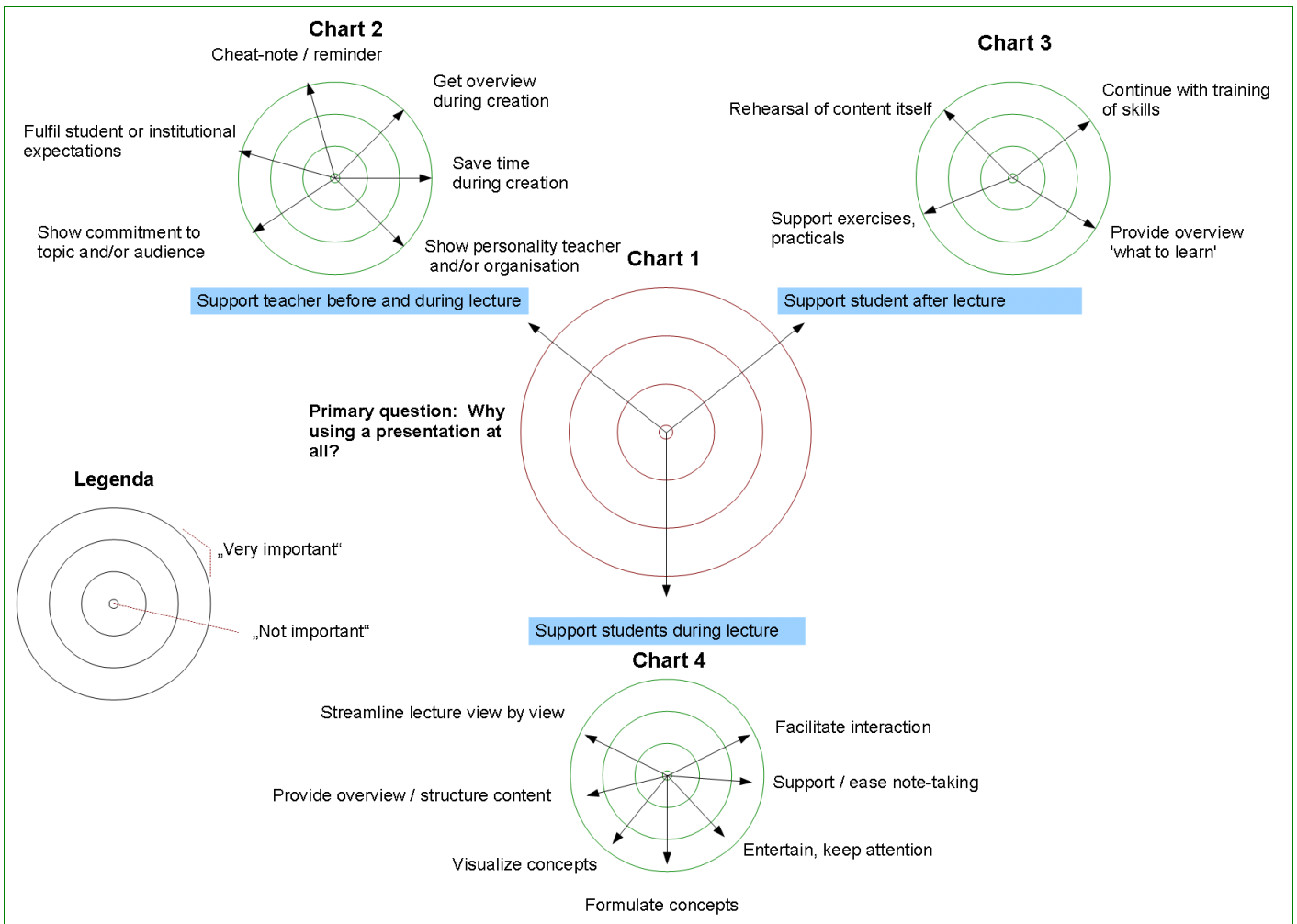


Figure 8.1: Proposal to visualize teacher's intentions & reasons about the goal of a presentation for a specific lecture, in a four-chart-diagram.

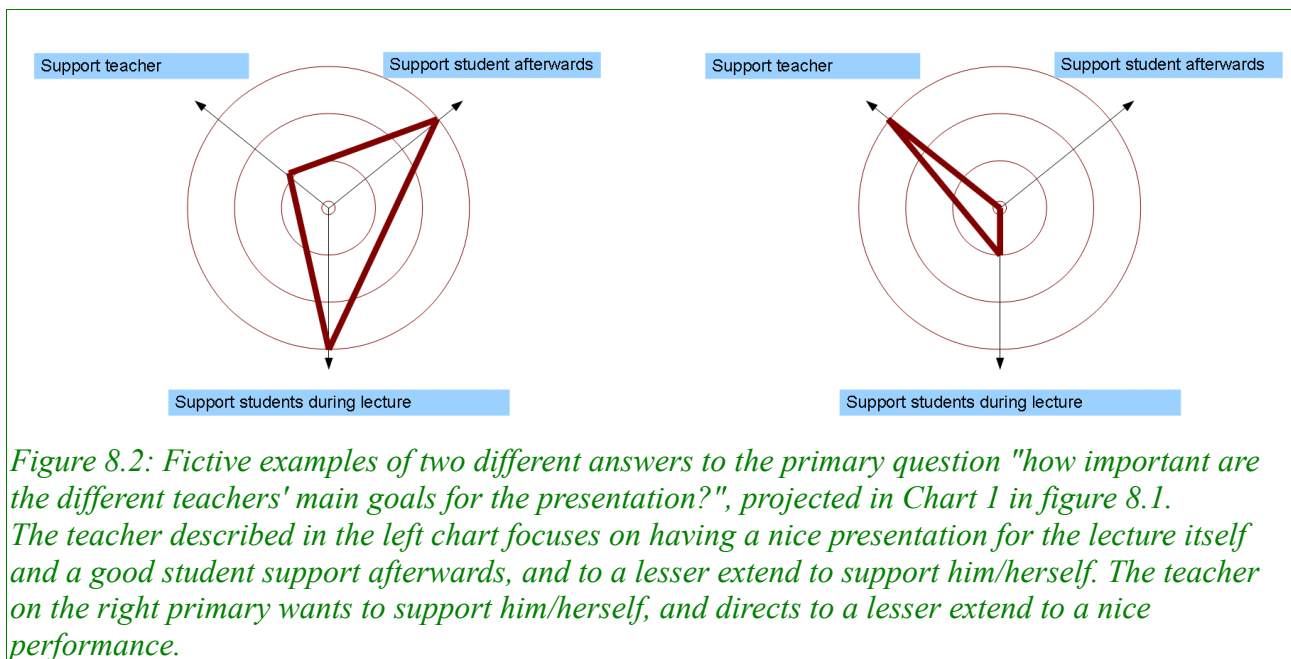


Figure 8.2: Fictive examples of two different answers to the primary question "how important are the different teachers' main goals for the presentation?", projected in Chart 1 in figure 8.1. The teacher described in the left chart focuses on having a nice presentation for the lecture itself and a good student support afterwards, and to a lesser extend to support him/herself. The teacher on the right primary wants to support him/herself, and directs to a lesser extend to a nice performance.

The three secondary charts refine the main goals. Chart 2 shows the teacher-directed reasons, both during the creation phase as well as during the actual lecture. The use of a presentation as cheat-note proved to be widely accepted as is discussed in sub-chapter 5.2 and thus is one topic. As appears in sub-chapter 6.1.1, the process of creating a presentation might influence choices about presentations as well: the topics 'getting overview during creation' and 'save time during creation'. The 'showing personality' topic does not literally show up in the research data but I assume it could be another important factor, for example explaining the over-the-top moving Prezi presentations one student was complaining about. When directed towards 'show personality of organization', we can think about using an institution-wide standard layout etc. A related teacher intention is: 'show commitment to topic and/or to audience'. This intention does also support students (more precise: student motivation) during and after the lecture, as is touched in section 7.2.3 of the results and by earlier research (Blokzijl and Andeweg, 2005; Wiebe et al., 2007). I put it in Chart 2 instead of Chart 3 or 4 because it comes close to 'showing personality'. 'Fulfill student or institutional expectations' can be an (probably implicit) intention, as expert #B suggests in section 7.2.3. An indication for the institutional expectations at Wageningen university is given in section 7.1 and its underlying sections. This intention supports the teacher in the sense that it might increase his/her self confidence.

Chart 3 focuses on the teachers' intention to support students after the lecture. Although it did not show up in this research, it is thinkable that a presentation is used for preparation before the lecture as well – this option is left out. Different reasons inside chart 3 were mentioned by the interviewees, mainly in section 5.3: 'Continue with training of skills', for example 'learn how to look'; 'provide overview what to learn', for example in a reader or book; to 'support exercises or practicals' at home or in another part of the course by giving the actual assignment, start-up information etc.; and for 'rehearsal of the content itself', basically as preparation for the examination.

Chart 4 shows several reasons why a presentation could be useful for students during a lecture. Those reasons can be focused on the lecture itself, like: 'Facilitate interaction' by using appropriate views; 'support / ease note-taking' (in combination with 'rehearsal of content itself' in Chart 3; the student may have to write/draw/type a smaller amount of information him/herself); by showing nice and/or funny pictures, or introduce changes of any kind, the lecture as a whole might become more attractive and keep students awake: 'Entertain, keep attention'. The reasons why a presentation could be useful for students may also be directed towards the lecture content itself: 'formulate concepts' (written down definitions, textual examples etc); 'visualize concepts' (showing quotes, images that explain, photographs, video's etc etc); 'provide overview' (tables, lists, mindmaps etc) and 'streamline the lecture' by showing a summary or keywords of what is actually being told (this can be lists again).

Apart from offering an overview about teachers' intentions, the above described visualization tool may offer practical applications:

First of all, it might help in the process of designing a course and raising awareness of teachers by setting clear goals, and making the use of presentations (*if?* and *if yes, how?*) a choice again. For example, both interviewed experts indicated that sometimes teachers have the automatism of creating a handout/summary and use that as presentation. Apart from the discussion if that is a good or bad educational practice, both experts emphasized that the final performance and possible presentation should be a choice rather than an automatism. This visualization might help teachers to understand their intentions.

Secondly, I think it will in the future be possible to do recommendations: given the mapped set of goals and their relative importance, and given the context (available hard- & software, target group, target

group size, subject, availability of images, available preparation time etc. etc.), an approach in creating a presentation that fits to the goal may follow. For example, when the goal both for 'support students afterwards' and 'support student during lecture' are set to maximum and the 'support teacher' to a minimum, the advice could be to create a lean spectator-directed presentation for the performance and a second extended version as summary or hand-out, easy printable for the students who would like to work with paper.

Thirdly, for future descriptive research, I think about using this system as basis to accomplish 'reverse engineering': is it possible to calculate reproduce-able scores for teacher's intentions, based on answers from teachers, and/or lecture observations, and/or analysis of actual presentations? This will be a topic in the discussion chapter of this report.

Fourthly, for future decision taking, we wonder if it is possible to give a general advice related to the graph: which mix of intention values, and related practical implementation, will finally delivers 'the best' educational result? Also this application will be explored in the discussion chapter.

Finally, going outside the scope of this research, one might think if these education directed visualization can be generalized into a common perspective covering every presentation and every presenter. This idea will be touched in the discussion chapter as well.

By the way, I want to stress that the orientation 'Teacher oriented' according to Kember has no logical relationship with the 'Support teacher' intention of figure 8.1, despite their textual similarity. Connecting figure 8.1 to the broader educational theories as elaborated in section 2.2, we see that *knowledge transmission* as one of Kember's conceptions comes back in a lot of presentation functions (almost all goals in chart 3 and 4 in figure 8.1). However, explicit *learning facilitation* in the sense of Kember comes back in none.





## 9 Discussion

This chapter discusses from a distant perspective both the results presented in chapters 5...7 and the conclusions & considerations in chapter 8. What are the limitations of this study, what can we learn from the research process itself and what can I advise for future research?

### 9.1 *Methodological reflexion*

#### 9.1.1 Sample selection and organization

As appendix A shows, it proved difficult to collect complete packages (one teacher + one student + presentation + observation, all part of one lecture). Actually the ideal situation could be organized one time only (case #3). This limits the possibility to connect the teachers expectations to the actual student perceptions, as was the original plan of this research. It also limits the value and comparability of the 'lecture observations', as this happened only twice.

This shortcoming is due to practical limitations. Unlike my expectations, organizing research like this by using formal means (sending emails to course coordinators etc.) does hardly work, at least for someone with the authority of a MSc. student. Using my social network and/or just asking the teacher or student him/herself in person proved much more effective. This might however give a bias in the results, as easier approachable persons are favored. Especially concerning the students. For example, one of the topics in the student interviews was the desirability to work in groups. As the sample selection process favored 'socially active' students, the 'liking group work' aspect may be over emphasized in the results. The same may be true for the overall motivation.

Another concern: The male-female ratio among the students in the sample is unbalanced (1 male, 4 female). As there is a general concern that boys perform worse in the current educational system including the university (ANP, 2011), there might be gender differences in students. Therefore, there might be a gender bias in the results: the presented students' perceptions are predominantly female.

And, again a concern: none of the students is a first-years BSc straight from high school<sup>27</sup>. This group might be interesting because they might have non-university educational habits. In future research, this group should be included.

Apart from the limitations of finding the right person to interview, the sample selection for this qualitative research was not aimed to find 'the mean' of slideware use at Wageningen University, but rather to explore the diversity of slideware use, reasons and perceptions. By purpose I searched for different types of presentations (PowerPoint, Prezi) and different types of courses ( $\beta$ ,  $\gamma$ , BSc., MSc. etc.). This means that the diversity I found cannot be extrapolated to the whole university<sup>28</sup>. For example: Of the nine explored lecture presentations in this research, three are Prezi's, which seems a big share for this alternative system. However, I especially approached teacher #1 because he is using Prezi. As result, the fraction of Prezi's (as related the total number of presentations) can be larger in the sample compared to the fraction over the whole university. Based in the collected data I can only say there are at least a few more than two teachers using Prezi at Wageningen University, and that everybody in the sample heard about Prezi.

Except for expert #B, all interviewees are connected to Wageningen University. This means that instead of the 'survey your backyard' approach I discussed in section 3.2, I actually used an 'interview your backyard' approach. The same holds for the presentations, and partly for the

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27 In Dutch: "VWO"

28 However, as personal remark: It amazed me how easy it was to collect a wide diversity

investigated institutional and technological context. Therefore, all results and conclusions must be seen within this scope.

### 9.1.2 Presentation Analysis

Starting point was an extended but as strict as possible Content Analysis (CA) of the individual elements of every slide, based on the visual orientated branch of 'Content Analysis' as described for example by Bell (2001) but with extensions to capture the meaning of the every element as well.

In the process of research, this intended system appeared both too time consuming and not mature enough to work in practice. Perhaps also because there are no fine-tuned systems already developed for slideware (Farkas, 2006): known research focuses often on what kind of elements (for example: Rowley-Jolivet, 2004) or counting words and / or bullet points per slide. In this case, the diversity in presentations to be analyzed was larger than I expected, actually causing more work to adjust the system over and over again than doing the actual analysis. Finally, I created a flexible system that is able to store separate views<sup>29</sup>. With every view, it is possible to show the place of the view in the context of the whole presentation and a free textual description in six (or less) areas:

- *Title*: is there a title on the slide, how does it look, and what is its meaning?
- *View Appearance*: how does the view look, in technical terms?
- *View Meaning*: what does the view tell, in abstract terms?
- *Transition*: description of the transition (PowerPoint) or movement & zooming (Prezi) from the previous view to the current view and/or separate elements popping up later, as is sometimes the case with PowerPoint.
- *Observation*: what teachers and students actually did in the lecture at the period the slide was projected
- *Remarks*: for everything else.

Figure 9.1 shows two such analyzed views as example (next page).

This "Presentation Analysis" system proved satisfactory in scope of the performed research: it offers adequate flexibility, it offers fast access to the data and it forced me, as researcher, to look detailed to every view - making me aware of both details and larger contentwise relationships that have the risk to stay hidden otherwise.

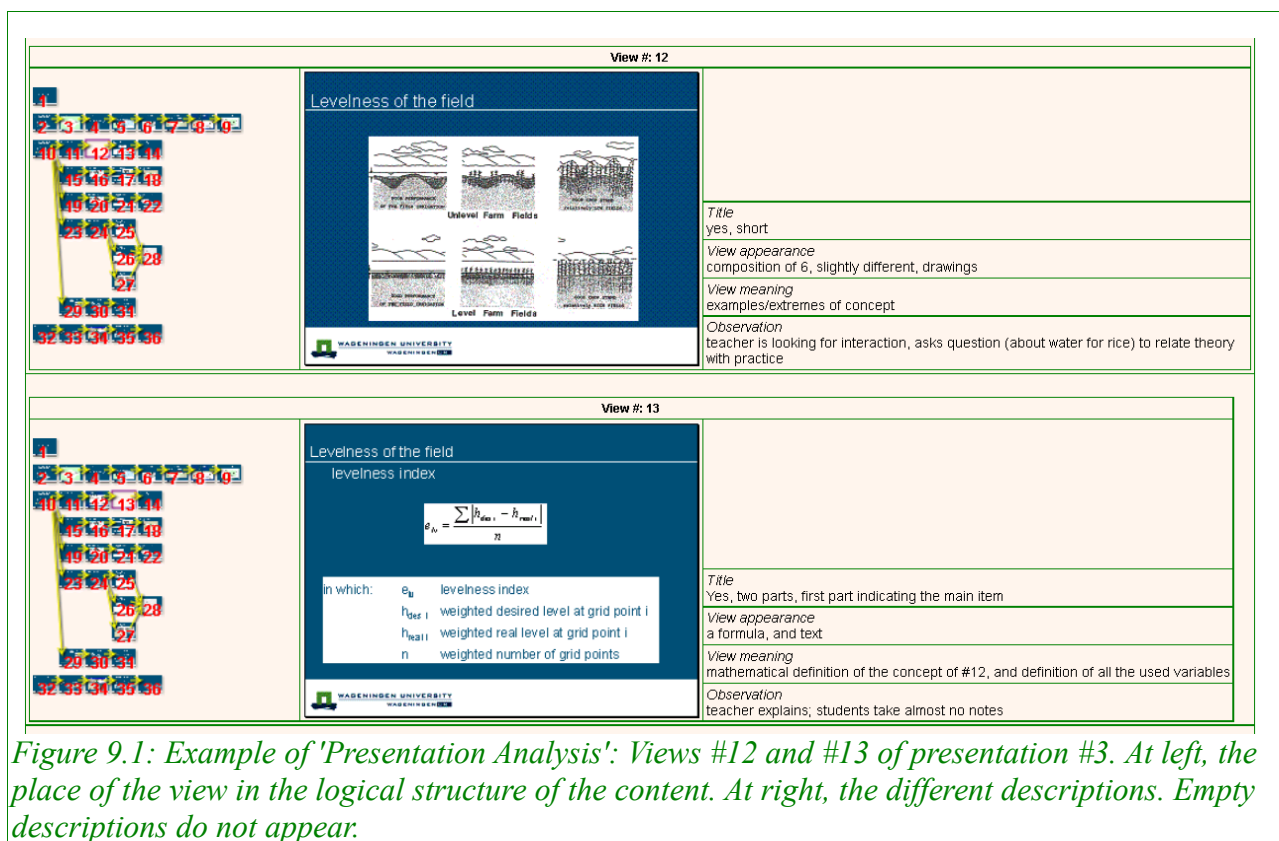
This system offers transparency: every step can be explained and easily be followed. However, its reproducibility can be improved: even very similar slides, all viewed by the me, did produce different formulated descriptions. Perhaps because they are in another context, or even because my state of mind. A goal for future research should be to gradually formalize and categorize the different descriptions into a standard "Presentation Analysis" vocabulary, adjusted to a research question. Clear definitions are needed: for example, suppose a view with one picture and a few words describing that picture. Is the text the 'view title', is the text a 'caption' of the picture, or perhaps both?

Open methodological questions are:

- How to deal with the different kinds of graphic representations (text, graphs, arrows etc. etc.) and their combinations? There are indefinite possibilities, a limitation according to the research question is necessary.
- Can 'Content Meaning' be included in strict, formal CA at all, as this is already an element of interpretation, going away from the principles of CA? Perhaps procedures should be taken from

<sup>29</sup> 'Views': 'Slides' in case of PowerPoint, 'Path stops' in case of Prezi

other methods, like semiotics, iconography, and linguistics/language meaning, dealing explicitly with giving meaning to images, symbols, texts and their combinations.



### 9.1.3 Interviews and coding; lecture observations

I coded the interview transcriptions<sup>30</sup> 'en vivo', and ordered and sometimes merged the appearing topics. Together with topics appearing from the Presentation Analysis, this way of working finally delivered the logical composition of the different facets, visible in the content of chapters 5, 6 and partly 7. However, many topics were coded but not used, and the whole process of defining topics, ordering those topics and the coding process itself was not systematically checked by somebody else. Because of the very exploratory nature of this research, I do not consider these shortcomings a problem. However, with the knowledge of now, future research in the same direction may use the found relevant topics as starting point for the coding. With a better streamlined coding process, it is possible to compare a part of the work of the main coder with a second coder's work, to get an indication of the reliability (in scientific sense) of the main coder and thus of the research itself.

I draw the conclusions in respect to the educational framework (summarized in section 8.1.4) by finding relevant remarks and mechanisms in the presented results. In other words: I made the connection with the Spectrum of Education in a secondary stage of analysis. Perhaps, I missed information because of this two phase approach. When designing future research, I advise to incorporate topics concerning the SoE already in the coding process and in the interviews: this might deliver a complete picture.

To understand how a presentation is actually used, lecture observation can be an important data

30 And the written summary of the interview with teacher #5

source. Knoblauch for example urges to put the performance, the 'speaking and showing', in front of the research on slideware; just analyzing the projected content tells only a part of the story (Knoblauch, 2008). Actual sitting in the lecture room and looking around is an option, giving for example the possibility to get an idea if (and when) students make notes, or how a teacher actually is presenting. Using video is another one, allowing to rewind to a certain situation - but not to focus the attention of a researcher. However, in this research I did not gather enough experience with this kind of data collection to give any concrete advice for future research.

### 9.1.4 Terminology

During this research, it appeared that at least two concepts need refining and perhaps precise defining. I often used the word 'interaction', which can actually be refined over several dimensions:

- Teacher-initiated or student-initiated
- Teacher-student or student-student
- Textual online or face-to-face; in case of textual online, interaction can be instant ('chat') or time delayed ('forum')
- Etc. etc.

The other concept is the much discussed concept of 'showing structure'. In the context of presentations, 'showing structure' can be accessed over several gradation lines:

- In scope: overview over page, lecture itself, lecture content, course itself, course content
- In functionality: textual, static visual, moving visual
- In presented relationships: one-dimensional (fe. timeline), hierarchical, webs
- Etc. etc.

In the current research, the refining of those two terms was not always explicitly made, especially in the interviews. As example: a lecturer occasionally asking a question (with one correct answer) or a group of students spontaneously discussing (and trying to expand on) course content is both called 'interaction' in some interviews – but the (perceived) effects are probably different. Not noticing this diversity in an early stage may have caused the research outcomes to be less precise and less specific. For future research, I suggest to consider this refinements in an early stage, enabling to find more precise relationships and research outcomes.

## 9.2 Reflexion on content

### 9.2.1 Framing the results in the Spectrum of Education

The used main theoretical framework (as packed in the models of Kember, Vermunt and ten Cate, introduced in section 2.2, and called SoE, 'Spectrum of Education') proved a powerful environment to relate research data to a position in the spectrum of education between 'teacher side' and 'student side', as is summarized in section 8.1.4.

I used this framework to investigate education. But there is also a connection the other way round: current day university education<sup>31</sup> is by purpose shaped according to ideas from this framework. Therefore, it is easy to find a logical fit between the research data and the models. In other words: the framework describes how reality functions, but we must not forget that the reality might actually be adjusted to fit the framework. This reciprocal relationship might limit the credibility of the framework as pure explanation model: using the framework as explanation has the risk of just reinforcing the existing paradigm. Did I, in this research, explore the reality of education with the help of this framework, or did I explore how decision takers in education use the ideas of this framework to shape reality?

Another effect of this reciprocal relationship between framework and reality is that teachers and experts sometimes are almost talking on the abstraction level of the framework. For the future, this has the advantage that suggestions for improvement, following out of this framework, can easily be explained to the decision takers.

In this research, the step of translating/mapping research data to a spot or movement in (my personal interpretation of) the frameworks' spectrum was performed by myself only, in an exploring way. To increase the reliability of similar future research, I suggest to formalize a relevant interpretation of the framework as well as those connections, to make the translation/mapping process transferable. If possible, use cross examination (for example presentation views and interviews as data sources) to check the validity of the analysis design.

For example, as idea: an indication of the place of a presentation on the continuum between 'teacher side/knowledge transmission' and 'student side/learning facilitation' can perhaps be given by parameters like "fact density" or "relative fact density". Those -yet imaginative- parameters could for example be defined as resp. "number of delivered facts in the presentation per lecture" and "number of delivered facts in presentation / number of delivered facts in presentation+performance". Another, easier test to perform: count the number of projected words. Perhaps: The more words, the more the presentation can be mapped to to the 'knowledge transmission' side?

An issue that has to be solved, or at least clarified when using this framework as basis for research to presentations in education, is the question if normative values can be given to spots in the spectrum. Is 'student side' education by definition preferable over 'teacher side' education or is the total spectrum an essential part of student development?

Despite its wide acceptance, the constructivist side of the framework itself is also not undisputed. Mayer stated for example that the far 'learning facilitation' side, presented as 'discovery learning', is actually less effective than other learning methods; he stated in general that the constructivist framework and its applications tends to be ideologically colored rather than evidence-based (Mayer, 2004).

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31 At least at Wageningen University and many other universities

Another point of concern might be that the SoE focuses mainly on conceptual and factual knowledge. On a university, also skills and attitudes are an implicit or explicit part of the learning goals – in fact, lectures #5 and #8 focus mainly on skills. Maybe the SoE should be adjusted to fit also skill and attitude directed courses.

Perhaps, the most remarkable outcome of this exploratory analysis is not that slideware tends to move the education to the 'teacher side'. This is a somewhat obvious result, seen the formulation of the models forming the SoE. Based on reasoning, Adams (2007) arrives at the same conclusion. The most remarkable outcome is the easiness for mapping ideas, concepts and research data concerning presentations into the spectrum. In spite of its limitations, this framework offers a large potential to literally frame future research on slideware use. For example, the almost intuitive aversion to text-saturated presentation views can be explained because those 'would hamper interaction', 'focus attention the wrong way' etc. This is still a bit vague. By locating text-saturated views in the spectrum of education, and interaction as well, those perceptions get a clear context.

Of course, we should not view everything through the glasses of the SoE. For example, in section 8.1.1, the question is asked if using pictures instead of projected text lowers the level of teaching authority and thus easier allows students to form their own opinion about the content. Or if a verbal-only lecture leaves more mental space to students than a presentation-driven lecture. We can expand on this way of thinking to extremes: as Blokzijl and Andeweg (2005) indicate, a lecturer with eye contact is judged more credible than one without. Thus, to move education to the 'student side', do we want, at a certain moment in the educational track, boring lecturers who look straight the other way? Obviously not. Therefore, it is important to involve factors like 'student motivation', 'personal affection' etc. also directly in research, bypassing the abstract logic of the SoE. Students might be invited, seduced and inspired to become 'student side' learners, not teased into it.

## 9.2.2 Teachers' intentions

As described in section 4.4 I developed a system to visualize the teachers' intention mix (including relative importance) in respect to the creation and use of presentations. I propose several possibilities to use and expand it in the future:

- 1) Raising self-awareness: ask (future) teachers to fill in their intention mix and reflect on it
- 2) When intention mix is known, connect them to practical implementations
- 3) Reverse engineering: find the intention mix with a given dataset (interview/survey, presentation analysis etc.)
- 4) Present the best intention mix for certain goal
- 5) Expand visualization system to presenters and presentations outside education
- 6) Expand visualization system to the preparation of the lecture

Briefly discussing each of these possibilities:

1) is a straightforward application, however the results can also used for further research. The current scheme may however be checked and refined (preferably with a second data set), and be tested with a pilot panel of teachers-in-education, before it can be used.

2) is merely a matter of using common sense, based on examples from research data. It might help teachers to avoid common pitfalls like unintended presenting a summary.

3) is interesting as future research tool, as it offers a way to systematically analyze relevant data and compare the outcomes of different presenter-presentation sets with each other and with data from other sources. It will however be a challenge to make this a transparent and reliable analysis. The



same observation can be explained from different intentions. An example: PowerPoint slides with bullets points and keywords can indicate the intention 'Streamline lecture view by view' (Chart 4), 'Support / ease note taking' (Chart 4), 'Provide overview what to learn' (Chart 3) and/or 'Cheat-note / reminder' (Chart 2). Thus, additional to the analysis of the presentation, this research will need the right questions in an interview or survey to find the background intention(s) and to rate its importance. On the other hand, relaying on interview or survey only may disguise non-conscious intentions. And: using two data sources offers also a possibility to cross examine the research design – within restrictions as shown in the example.

4) is even more ambitious. In combination with 2), it might be possible to give advise about slideware use based on an educational goal. By explicitly using 'desired intentions' as in-between step, the advise may become better funded. 4) is yet a matter of using common sense; research to deliver ideas for the translation step from 'education goal' to 'best intention mix'

5) and 6) require probably larger adjustments to the visualization system. 5) may be interesting for allied research, for example on presentations in scientific conferences. 6), combined with 2), may provide a well-balanced total package.

Further research to the concept of 'making the choices of presentation creators explicit and visible' might need the help of other scientific disciplines like psychology.

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## Appendix A: Cases & experts

Case #	Teacher # (gender)	Student # (gender)	Presentation #	Lecture observation #	Context	Remarks
1	1 (m)	1 (f)	1a, 1b		Both Prezi; 1a is part of course that is choice for a Bachelor, 1b is part of course obligatory for a Master. Both $\gamma$ science	
2	2 (f)		2		Prezi; $\gamma$ ; guest lecture in course, directed to 2 <sup>nd</sup> or 3 <sup>rd</sup> year Bachelor.	
3	3 (m)	3 (f)	3	3	PP; $\beta$ ; mandatory for 2 <sup>nd</sup> year Bachelor	
4	4 (m)		4	4	PP; $\gamma$ ; mandatory for Master	
5	5 (f)		5		PP; mandatory linking & general supporting course for Master	Interview not recorded
6		6 (f)	6		PP; $\beta$ ; mandatory for 2 <sup>nd</sup> or 3 <sup>rd</sup> year Bachelor, free choice for Master	
7		7 (m)	7		PP; $\beta$ ; choice for Bachelor, choice for Master; non-Dutch student	Interview in English
8		8 (f)	8		PP; learning a computer programm language, mandatory for Bachelor, choice for Master	
<b>Expert # (gender)</b>						
<b>A (f)</b>			Aa, Ab		Resp. Prezi, PP. A “teachers' teacher” inside Wageningen University.	Presentations are not meant for lectures
<b>B (f)</b>					Educational media designer & researcher at foreign university; non-Dutch person	Interview in English & long distance
Gender: <i>f</i> = female, <i>m</i> = male					PP = PowerPoint. "Mandatory for" means: obligatory for a certain educational track. If not indicated otherwise: Dutch interviewees	If not indicated otherwise, interviews recorded, in Dutch and face- to-face

Additionally: a *presentation* belongs to a *lecture* with the same number, which belongs to a *course* with the same number.



## Appendix B: Interview guide for interviewing lecturers

Example questions are in italics.

- Introduction (not recorded)
  - Reason for interview
  - About interviewer
  - For MSc thesis
  - Topic: use of slideware at Wageningen University.
  - Higher purpose: improving education by improving (use of) slideware
  - Reason to choose interviewee
  - Expected time
  - Permission to record; procedure about anonymity
- **Facts like age, primary profession, scientific field.**  
*Also: how important is the lecture giving part for you, in relation to the rest of your work? For how many years do you teach?*
- **Teaching intentions**  
*What does the teacher perceives as target in the case of education in general, of the course and of a specific lecture – apart of what is already in the study guide? What would you like your students to learn at this university, this course, this lecture? Also apart from the content? Is it more important to you that they know the content by heart, understand the outlines, can apply the methods, have learned something else (and what)..? How would you describe a perfect student (BSc, MSc), and a perfect graduated?*
- **Reason to choose for a certain delivery style**  
*Why did you choose to work this way? It is a conscious choice? Did you consider other options? What are you trying to achieve with this approach? Do you always (in every lecture) do it like this? In the time you were working as teacher, did you change your delivery style and/or your teaching style in general? If yes, how and why? Can students pass the exam if they just learn the slides?*
- **Reason(s) to choose a certain slide composition**  
*If there is a concrete example: See this slide, why did you choose this kind of appearance to tell the story? Does it has a special function?*
- **Suggestions for improvement**  
*What, in your opinion, could be improved on the software features of slideware, the hardware features (beamer, mouse, keyboard etc), the attitude of the university in this respect, the attitude of the students in this respect? Anything else?*
- **Closure**  
*Any more things you would like to say but I forgot to ask..?*

## Appendix C: Interview guide for interviewing students

Example questions are in italics.

- Introduction (not recorded)
  - Reason for interview
  - About interviewer
  - For MSc thesis
  - Topic: use of slideware at Wageningen University.
  - Higher purpose: improving education by improving (use of) slideware
  - Reason to choose interviewee
  - Expected time
  - Permission to record; procedure about anonymity
- **General information**  
Like age, cultural background and studying history.
- **Perception about certain lecture; experiences, spontaneous comparisons between lectures**  
Also if there is a preference for a certain delivery style.  
*Concerning <that> lecture, what do you think about the use of PowerPoint by the teacher? Were all the slides clear? Do you have examples of other lecturers that you found better / worse in this respect? What made the difference? Do you like it if you have the actual sheets already with you at the lecture? Do you study them beforehand? Can you imagine a lecture without PowerPoint?*
- **Activities during lecture**  
*Do you make notes during lecture? And how exactly? Did you also try to do it otherwise?*
- **Usage afterwards (reflection, rehearsal)**  
*How do you use the information you got during this lecture? How do you study? Do you use slideware (on the computer, on paper) to learn for the exam? If yes, how do you use it?*
- **ICT use in general**  
*Do you often visit Blackboard or EDUweb<sup>32</sup> when studying? Do you use other aids or websites? What do you prefer: learning from screen or from paper? Is that related to concentration?*
- **Study intentions, motivation**  
Some of his topics are already covered by previously mentioned topics in this section. Additional questions can refer to motivational aspects: *Why do you study in the first place? Did you change the way you study while at the university? Is studying different at the university compared to secondary school, higher vocational education<sup>33</sup>, a BSc in your home country? What is your goal for the study as a whole, for this course? Do you like studying anyway? How important are grades for you?*
- **Points for improvement**  
*What, in your opinion, could be improved in the use of slideware for this lecture, and in general?*

### Closure

*Any more things you would like to say but I forgot to ask..?*

32 Blackboard Academic Suite™ is a commercial webbased system to exchange information between students and lecturers within courses, used at Wageningen University. EDUweb is a somewhat similar system developed by Wageningen University itself.

33 Translated to Dutch: secondary school = VWO; higher vocational education/university of applied sciences = HBO